



**CTI INDUSTRY JOINT SEMINAR ON
TECHNOLOGY DIFFUSION OF ENERGY
EFFICIENCY IN ASIAN COUNTRIES:
24-25 FEBRUARY 2005**

The Climate Technology Initiative (CTI) Industry Joint Seminar on Technology Diffusion of Energy Efficiency in Asian Countries took place from 24-25 February 2005 at the Jianguo Garden Hotel, Beijing, China. Organized by CTI in cooperation with the Government of China and Tsinghua University, the seminar was attended by approximately 150 participants.

The seminar provided an opportunity for experts, policymakers, technology transfer specialists, private sector companies and financial institutions to address technical and policy options for energy efficiency in the transport, residential and industrial sectors. The objective of the seminar was to increase the awareness of participants from Asian countries, promote discussion on possible climate-friendly technology transfer activities, including through the Kyoto Protocol's Clean Development Mechanism (CDM), and foster networking among participants. The seminar also aimed to provide insight into:

- best practices for the deployment of energy efficiency technology and practices today and in the future;
- policies that promote the accelerated introduction of the best energy efficiency technologies and practices;
- major barriers to the diffusion of energy efficient technologies in Asian countries, and suggestions on how to overcome these barriers;
- ways to mobilize the CDM for energy efficiency; and
- regional information, technology and training needs.

During the two-day meeting, participants heard 27 presentations and participated in five open-floor discussions addressing a range of energy efficiency issues. On Thursday, 24 February, three sessions were held to set the context of the seminar, provide government perspectives on policies and energy efficient technologies, and address energy efficiency in the residential and transportation sectors. On Friday, 25 February, participants convened in two sessions to discuss energy efficiency in the industrial sector and financing for, and barriers to, energy efficiency projects.

This summary report provides a brief history of the climate change process, technology transfer and the CTI Industry Joint

Seminar series, followed by a summary of the two-day CTI Industry Joint Seminar on Technology Diffusion of Energy Efficiency in Asian Countries. It concludes with a list of relevant upcoming meetings.

**A BRIEF HISTORY OF CLIMATE CHANGE
POLICY AND TECHNOLOGY TRANSFER**

THE UNFCCC AND KYOTO PROTOCOL: Climate change is considered one of the most serious threats to sustainable development, with adverse impacts expected on human health, food security, economic activity, water and other natural resources, as well as physical infrastructure. The international political response to climate change took shape in 1992 with the adoption of the UN Framework Convention on Climate Change (UNFCCC). The UNFCCC sets out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases in order to avoid "dangerous anthropogenic interference" with the climate system. Controlled

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gases include methane, nitrous oxide and, in particular, carbon dioxide. The UNFCCC entered into force in March 1994, and now has 189 Parties.

In December 1997, delegates met in Kyoto, Japan, and adopted a Protocol to the UNFCCC that commits developed countries and countries making the transition to a market economy to achieve quantified emissions reduction targets. These countries agreed to reduce their overall emissions of six greenhouse gases by an average of 5.2% below 1990 levels between 2008 and 2012 (the first commitment period), with specific targets varying from country to country. The Kyoto Protocol also establishes three flexible mechanisms to assist the Parties in meeting their national targets cost-effectively: an emissions trading system; joint implementation (JI); and the CDM, which encourages projects in developing countries. The Protocol entered into force on 16 February 2005 and has been ratified by 141 Parties.

TECHNOLOGY TRANSFER UNDER THE UNFCCC AND KYOTO PROTOCOL: Technology transfer is considered a key element in combating climate change under the UNFCCC. Article 4.5 of the Convention addresses technology transfer, stating that “developed countries... shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.” Article 10c of the Kyoto Protocol contains a similar commitment.

In 2001, Parties to the UNFCCC adopted a framework for actions to enhance the implementation of Article 4.5. The framework contains five key activities relating to technology needs assessments, technology information, enabling environments, capacity building and mechanisms for technology transfer. Funding to implement the framework is provided through the Global Environment Facility climate change focal area and the special climate change fund. The CDM is also expected to contribute to the transfer of cleaner and more efficient technologies to developing countries.

Parties to the UNFCCC took further action in 2001 by establishing an Expert Group on Technology Transfer (EGTT) to help to advance the Convention’s technology-related goals. Since that time, workshops have been held on technology information (Beijing, China, April 2002), needs assessments (Seoul, Republic of Korea, April 2002), enabling environments (Ghent, Belgium, April 2003), and innovative financing (Montreal, Canada, September 2004).

At the tenth Conference of the Parties to the UNFCCC, held in Buenos Aires in December 2005, delegates continued to consider technology transfer issues, focusing in particular on the work of the EGTT, as well as the UNFCCC Technology Transfer Clearing House (TT:CLEAR), an internet database. The main aim of TT:CLEAR is to improve the flow of, access to, and quality of information relating to the development and transfer of environmentally sound technologies under Article 4.5 of the UNFCCC.

CTI INDUSTRY JOINT SEMINARS ON

TECHNOLOGY DIFFUSION: CTI is a multilateral initiative that was established in 1995 at the first Conference of the Parties to the UNFCCC, and operates as an Implementing Agreement under the International Energy Agency (IEA). Its mission is to bring countries together and foster international cooperation in order to accelerate the development and diffusion of climate-friendly and environmentally-sound technologies and practices. CTI works with the UNFCCC Secretariat and the EGTT, as well as relevant IEA Implementing Agreements and other international organizations and initiatives. Its activities are designed to be consistent with UNFCCC objectives, in particular the framework for technology transfer that was adopted at the seventh Conference of the Parties in 2001. CTI has an ongoing programme of seminars and workshops designed to support the UNFCCC process and facilitate the diffusion of appropriate technologies and practices. CTI also organizes a series of joint industry seminars. The first industry seminar for the Asia and Pacific Region was held in Beijing in May 1998.

Second CTI Industry Joint Seminar on Technology Diffusion in Asia: This seminar was held from 14-15 January 2000 in Cebu City, Philippines. The seminar’s sessions covered: the UNFCCC and technology diffusion and transfer; lessons learned from existing projects in the Asia region; financing for climate change projects; information and capacity-building needs; the institutional environment; and practical steps to promote, facilitate and finance transfer of, and access to, environmentally sound technologies and know-how.

CTI Industry Joint Seminar on Technology Diffusion in Eastern Europe and Central Asia: This seminar was organized by CTI and the UN Industrial Development Organization (UNIDO), in cooperation with the UNFCCC and the Austrian Government. It was held in Vienna, Austria from 28-29 October 2003. The event sought to increase participants’ awareness of climate change and technology transfer issues, review experiences in the region, and promote environmentally sound projects by encouraging collaboration between policymakers, technology transfer specialists, financial institutions, and the private sector. The meeting involved presentations and discussions on the status of technology transfer under the UNFCCC and Kyoto Protocol and considered the role of developed countries and multilateral and financial organizations in diffusing technology, as well as financial barriers.

CTI Industry Joint Seminar on Technology Diffusion in ASEAN and Small Island States in the Pacific Region: This seminar was held from 4-5 February 2004 in Jakarta, Indonesia. Organized by CTI and the New Energy and Industrial Technology Development Organization (NEDO) in cooperation with the Indonesian Government and the UNFCCC, the seminar focused on clean energy and energy efficiency as well as challenges experienced by governments, industry, academia and the financial sector in promoting technology transfer. The seminar’s sessions covered: government perspectives on strategies for the introduction of clean energy technologies; possibilities for private sector cooperation between developing

and developed countries; financial barriers and the role of multilateral and financial institutions; and practical steps to promote and facilitate access to, and transfer of, clean energy technologies.

Second CTI Industry Joint Seminar on Technology Diffusion in Central and Eastern Europe and the Commonwealth of Independent States: This seminar was organized by CTI and UNIDO and held in Vienna, Austria from 28-29 October 2004. Focusing on linkages between climate change and energy efficiency, the seminar reviewed best practices for the deployment of energy efficient technology and considered how policies such as energy security, market reform and social and rural development can create incentives for improving energy efficiency. It also sought to identify major barriers to the diffusion of energy efficient technologies in Central and Eastern Europe and the Commonwealth of Independent States.

REPORT OF THE SEMINAR

The CTI Industry Joint Seminar on Technology Diffusion of Energy Efficiency in Asian Countries began on Thursday morning, 24 February 2005, with opening speeches from one of the seminar's organizers and a representative of the host country.

Toshi Sakamoto, CTI Chair and Director of the Global Environmental Affairs Office at the Ministry of Economy, Trade and Industry, Japan, welcomed participants, explaining that this event was one of a series of seminars that CTI is hosting in the Asian region. He underscored that energy efficiency provides "win-win" opportunities by lowering energy costs, enhancing energy security, improving industrial competitiveness, reducing air pollution and mitigating climate change. Toshi Sakamoto called for the full utilization of the CDM, and expressed hope that seminar participants would learn from each other and return to their countries with new ideas for promoting energy efficiency.

Noting the negative impact of climate change in the Asia region, Guangsheng Gao, Director of the Office of Climate Change, National Development and Reform Commission, China, welcomed the Kyoto Protocol's entry into force and highlighted China's willingness to participate in the promotion of technology diffusion to mitigate climate change. He stressed the importance of reducing greenhouse gas emissions through the adoption of energy efficient and clean technologies. Guangsheng Gao drew attention to Japan's leadership role in energy efficiency and expressed hope that, through cooperation and technology diffusion, China may accelerate its uptake of energy efficient technologies.

SESSION I: CONTEXT OF THE SEMINAR

Morihiro Kurushima, CTI Programme Manager, outlined the objectives and agenda of the workshop. He explained that the seminar would focus on the diffusion of energy efficient technologies in Asia based on partnerships between governments, industry, academia and financial institutions to enable "win-win" situations for energy and the environment in light of the Kyoto Protocol's obligation to reduce carbon dioxide emissions.

Lv Yingyun, Deputy Director of 3E Research Institute, Tsinghua University, China, drew attention to the rise in energy consumption in Asian countries. He said the promotion of energy efficient technologies was crucial to stop the severe environmental problems associated with fossil fuel use. He underscored that the rapid increase of China's energy consumption resulted from the development of energy intensive industries, rapid urbanization, and the increase in electricity demand and the number of dwellings and cars. Noting that coal provides China with energy security, Lv Yingyun stressed the need to diffuse energy efficient technologies and promote renewable energy and alternatives to coal.

Wanna Tanunчайwatana, Manager of the UNFCCC Technology Sustainable Development Programme, underscored that technological innovation and the widespread transfer and implementation of technologies are critical to achieving the UNFCCC's ultimate objective. She outlined key UNFCCC activities in the area of technology transfer relating to: technology needs assessments; technology information; enabling environments; capacity building; and mechanisms for technology transfer. Wanna Tanunчайwatana drew attention to TT: CLEAR and the ongoing activities of the EGTT. She highlighted that the UNFCCC is producing a technical paper on innovative options for financing technology development and transfer, and noted the need to consider further the role of the private sector.

SESSION II: GOVERNMENT PERSPECTIVES ON POLICIES AND IMPLEMENTATION OF ENERGY EFFICIENT TECHNOLOGIES – NATIONAL PRIORITIES AND EXAMPLES OF TECHNOLOGY TRANSFER

This session was chaired by Chow Kok Kee, Director General of the Malaysian Meteorological Service.

Lv Wenbin, Deputy Director of the Energy Conservation Division, Department of Environment and Resources Conservation, National Development and Reform Commission, China, spoke on China's medium and long-term energy conservation plan. Drawing attention to China's energy shortages and energy-related environmental pollution, he explained that energy constraints have limited social and economic development. He said energy conservation has been hindered by inadequate rules, standards and incentive policies and a lack of awareness. Lv Wenbin discussed China's energy conservation targets, and outlined implementation measures, including: developing and implementing incentive policies to strengthen energy conservation; accelerating the development and dissemination of energy conservation technologies; promoting new market-based energy conservation mechanisms; enhancing energy conservation management of large energy consumers; and improving energy conservation awareness, education and training.

Chong Cheong Yin, Director of the Department of Electricity Supply, Energy Commission, Malaysia, presented Malaysia's experiences with energy efficiency. He noted that the country's energy policy focuses on the sustainable development of energy resources, increasing use of natural gas and renewable energy, improving energy efficiency, and minimizing environmental

impacts. He said that awareness of energy efficiency was being promoted actively in the public and commercial sectors. Chong Cheong Yin described several energy efficiency activities, including the Small Renewable Energy Programme, the Capacity Building on Energy Efficiency and Demand-Side Management Project, the Low Energy Office Demonstration Project, the Industrial Energy Efficiency Improvement Project, and the initiative for the Promotion of Awareness and Education in Resource Efficiency and Energy Efficiency among School Children.

Francis Benito, Assistant Secretary of the Department of Energy of the Philippines, presented the Philippines' efforts to make energy efficiency a way of life. He noted the push for mandatory implementation of nationwide energy efficiency and conservation measures to cushion the impact of rising energy prices and reduce expenditures on fuel and electricity without sacrificing productivity. He set out ways in which the consumer could be empowered to choose energy efficient products through labeling information. Francis Benito also outlined voluntary agreements and partnerships between government and the private sector to improve energy efficiency. He noted his government's strategies for energy labeling and efficiency standards, energy standards for buildings, energy efficiency in government procurement, energy management programmes and audits, alternative fuels and technologies, and the institutional framework for implementing energy efficiency policies.

In the ensuing discussion, participants addressed the need to increase the percentage of biofuels in the fuel blend and possible resistance to this, and discussed whether there was a need to monitor fuel blends to ensure that companies do not make false claims. Participants also talked about the long-term financial viability of small renewable energy projects and the challenge of finding project financing. In response to a question on possible barriers to energy efficiency programmes, Chong Cheong Yin stressed the importance of legal frameworks, and Francisco Benito highlighted the need to inform the public as to how they could benefit financially from energy conservation. Chow Kok Kee noted the need for top-down promotion of energy efficiency in many developing countries, particularly when energy prices are low, and called on governments to take the lead in this regard.

Yogo Pratomo, Director-General for Electricity and Energy Utilization, Department of Energy and Mineral Resources, Indonesia, noted that Indonesia's oil, gas and coal reserves are estimated to run out in 50 years and highlighted the potential for hydro and other renewable energy sources. He indicated that *per capita* emissions in Indonesia are low but emphasized the need for energy conservation due to the country's high energy intensity and inefficient consumption. Outlining Indonesia's national energy conservation strategy, Yogo Pratomo listed incentives, regulation, price and information dissemination as instruments of the government's green energy policy. He explained that activities implemented included training and education, demand-side management, national and international partnership programmes and an energy efficiency labeling

programme designed to help consumers choose the most energy efficient equipment.

Nguyen Khac Hieu, Deputy Director General of the Department of International Cooperation, Ministry of Natural Resources and Environment, Viet Nam, highlighted the importance of the CDM for his country. He said the International Cooperation Department has been appointed the Designated National Authority and noted that guidelines had been developed for CDM activities in Viet Nam. He outlined the approval procedures and criteria for CDM projects, explaining that these included exclusive and priority criteria. Nguyen Khac Hieu reviewed Viet Nam's CDM portfolio and potential for CDM projects, listing a number of technology needs related to the reduction of greenhouse gas emissions in the energy, industrial, transportation and forestry sectors. He said the integration of technology needs with CDM policy presented a challenge.

Toshi Sakamoto, Director of the Global Environmental Affairs Office at the Ministry of Economy, Trade and Industry, Japan, discussed Japan's energy efficiency policy. He outlined some of the policy's key goals, including energy security (alternatives to oil), environmental harmony (lowering carbon dioxide emissions), and economic efficiency (utilizing market mechanisms). He drew attention to the efficiency increases achieved in the industrial sector, and noted that Japan was using voluntary measures and financial incentives to promote energy efficient technologies. He also noted that, with the recent entry into force of the Kyoto Protocol, Japan was considering additional policies and measures for energy efficiency in various sectors. He indicated that Japan was emphasizing energy-related research and development to reduce emissions through energy conservation, renewable energy, nuclear power, carbon sequestration and clean coal technologies.

Participants then discussed Japan's experience applying cost-benefit analyses in developing its energy policies. They also considered the relationship between Viet Nam's CDM Executive and Consultative Board and the CDM National Authority in approving CDM projects in Viet Nam. In response to a question about whether Japan intended to impose a carbon tax, Toshi Sakamoto said a carbon tax had been debated extensively, although currently there was no plan to introduce one. He noted that Japan already imposed an energy tax on coal, oil and natural gas, penalizing the use of coal in order to reduce its use. Participants also noted that a carbon tax was a sensitive issue that had been discussed extensively in China.

SESSION III: ENERGY EFFICIENCY IN RESIDENTIAL AND TRANSPORTATION SECTORS

Wei Zhihong, Deputy Director of the Global Climate Change Institution, Tsinghua University, chaired this session.

Noting that China's energy consumption in the building sector is high and increasing, Fang Zhanhe, Consultant at the Energy Saving Building Office, Beijing Construction, stressed the need for increased efficiency. Highlighting Beijing's 65% energy efficiency target and its "Design Standard for Energy Efficiency," he identified ways to improve building energy efficiency, including reforming the heating supply system and regulating

design standards for both residential and non-residential buildings. In addition to energy efficiency, Fang Zhanhe stressed the importance of renewable energy in residential areas, including solar energy and heat pump technology, noting that the higher initial investment for renewable energy will be more than offset by the longer-term cost savings it brings. He concluded by calling for a change in thinking on this issue and for the removal of institutional barriers to energy efficiency and new technologies.

Nguyen Minh Bao, Principal Researcher at the Department of Science and Technology Institute of Energy, Ministry of Industry, Viet Nam, said energy conservation and efficiency are critical for his country's continued economic growth and environmental protection. He outlined some ongoing energy efficiency activities in Viet Nam, including the Energy Conservation and Efficiency Programme, and the Demand-Side Management and Energy Efficiency Project, which focuses on the residential sector. Nguyen Minh Bao drew attention to the provisions of the Electricity Law that relate to demand-side management and energy efficiency, including a recognition of the need to introduce cost-based tariffs and the creation of a National Policy for Electricity Development that includes demand-side management. He outlined barriers to implementing energy efficiency programmes in Viet Nam, including: high initial costs; inadequate information and skepticism from end-users, equipment manufacturers and service providers; limited product availability due to limited domestic manufacturing capability and low domestic demand; and low energy tariffs. Finally, Nguyen Minh Bao identified measures to overcome barriers and encourage residential energy efficiency activities. These measures include marketing and information dissemination to end-users about the benefits of energy efficiency, investment grants to encourage highly energy efficient products, and electricity tariff reform.

Mili Majumdar, Fellow and Area Convenor at the Centre for Research on Sustainable Building Sciences, The Energy Research Institute, India, explained that the residential sector accounts for 25% of electricity consumption in India. She noted the need for technically and financially viable models for energy conservation and increased awareness among stakeholders. She discussed a macro-level housing initiative by the local municipal body in the city of Pune where population growth had increased energy demand. She said the project aims to create an enabling environment for energy efficient and eco-friendly housing and to develop urban community models. She outlined plans to implement a model project, build the capacity of architects and developers, form long-term partnerships, and produce a mainstreaming plan with financial institutional support. She then discussed a micro-level project in Kolkata that aims to construct a solar housing complex with 20 dwellings. She noted that the project takes an "integrated" environmental approach throughout the building process, both at the site level and in individual buildings. She explained that the measures focus on sustainable site planning, selection of materials, use of renewable energy sources and efficient waste management. Finally, she

highlighted eco-housing as an economically viable option with real environmental benefits.

Suani Coelho, Deputy Secretary of the São Paulo State Secretariat for the Environment, Brazil, highlighted biofuels as an affordable energy option for developing countries, stressing that they can be competitive without subsidies. She said biofuels reduce dependence on imported fuels, thus improving energy security. She discussed the social and environmental benefits of biofuels, explaining that problems resulting from firewood collection in developing countries could be mitigated by biofuel production, and that the transport costs of isolated communities dependent on diesel fuels could also be reduced. Noting that sugarcane production had led to job creation in Brazil, she emphasized that the production cycle for ethanol can be sustainable and creates potential CDM projects. She listed the environmental benefits of biofuels, including reduced emissions of carbon monoxide and sulphur oxides and almost zero net greenhouse gas emissions. She explained that over three million cars in Brazil run on ethanol and that all cars can use gasoline blended with ethanol. While noting that Brazil exports ethanol, she drew attention to the problem of trade barriers imposed by developed countries in spite of their obligations under the Kyoto Protocol. She emphasized biofuels as a unique "win-win" opportunity for developing countries to promote rural development, alleviate poverty, diversify energy sources, contribute to the objectives of the Kyoto Protocol and promote new investment through the CDM.

Guo Jifu, Deputy Director of the Beijing Transport Development Research Center, China, outlined policy measures for municipal transportation in Beijing, stressing the challenges facing Beijing due to rapid urbanization and a steep increase in the number of vehicles. Noting Beijing's underdeveloped public transport system, he drew attention to inefficient and ineffective transportation management. Guo Jifu noted that the aim was to develop a viable, comprehensive, economical and environmentally friendly transport system, including light rail. He said that Beijing would have to develop its transportation infrastructure, prioritize public transportation, and manage car usage. He also explained that, taking into account Beijing's needs for the 2008 Olympics, roads were being built in coordination with an expansion of public transportation. He noted that a key objective was to improve the environmental quality of the city, especially for pedestrians and cyclists, through stricter emissions standards for vehicles.

Participants discussed the potential of energy efficiency in the residential sector compared to other sectors. One participant raised the need to find energy efficient solutions for various income groups, including the poor. In response to a question about India's long-term energy strategy, Mili Majumdar highlighted India's Energy Conservation Act 2001, but noted that it focuses primarily on the commercial sector. She explained that targeting the residential sector would be the next step, and highlighted that current efforts focus on rural electrification with the aim of providing electricity for all by 2012. One participant noted the potential to use liquid effluent from waste to produce

biogas and energy. Fang Zhanhe noted that a Chinese national standard for commercial energy efficiency was being developed. It was noted that energy service companies were relatively new in China, and had been introduced in several World Bank pilot projects to upgrade technology; however, it remained to be seen how such companies would be developed in China's construction sector.

Regarding the transportation sector, one participant suggested that many petroleum companies resist the development of biofuels because oil is more profitable. However, Suani Coelho said companies recognize the marketing advantages of pursuing environmentally friendly strategies involving renewable energy and biofuels. She indicated that technological efficiency had increased in Brazil, ethanol production costs had decreased, and opportunities to export ethanol had been created. With respect to the use of sugarcane biogas to produce surplus electricity, she noted that more efficient technologies had been introduced in sugarcane mills. Suani Coelho also explained that, although pure ethanol causes engine corrosion, this is not a problem when using an ethanol blend, meaning that ordinary engines can be utilized.

One participant noted that transportation policies often focus on the need for improved efficiency on the road, yet do not regulate fuel efficiency or emissions. He explained that this approach only increases the number of vehicles on the road, and recommended focusing instead on policies and measures to encourage less people to drive, including incentives for public transportation. Another participant noted that energy efficiency in the transportation sector in the majority of developing countries is much lower than in developed countries, and called for new policies to address this. In response to a question on the development of energy efficiency and conservation policies in Viet Nam, Nguyen Minh Bao said the Department of Science and Technology coordinated and exchanged information with the Ministry of Natural Resources and Environment during the policy-making process in order to take decisions related to transportation and climate change, and in particular to coordinate projects and undertake feasibility studies for CDM projects.

SESSION IV: ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR

Wanna Tanunчайwatana chaired this session, emphasizing the importance of the industrial sector's active participation in technology transfer.

Noting that the rapid growth of China's gross domestic product has resulted in high energy demand and that China lacks sufficient energy resources and suffers from pollution, Zhaoguang Hu, Vice President and Chief Economist of China's State Power Economic Research Center, highlighted the enormous potential of demand-side management. Emphasizing that demand-side management is the "largest, cheapest, cleanest and fastest energy resource," he added that it also increases energy reliability, competitiveness and energy security, and stimulates economic development. He explained that much had already been done on demand-side management in China, especially with regard to training, pilot projects, international

programmes, laws and regulations, and awareness raising among government leaders and the public. He highlighted that, from 1990-2000, demand-side management in China had achieved energy savings of 130 terawatt-hours, reduced peak load by 365 gigawatts and cut coal use by 58.5 megatons. He also identified barriers to demand-side management, noting that it is not well understood, especially by officials and customers who are unfamiliar with its benefits. He noted that China's current tariff system does not encourage peak load shifting and electricity saving, that utilities lack the incentive to carry out demand-side management programmes, and that there are no financing mechanisms to provide funding for demand-side management programmes. He concluded that demand-side management is a strategic option for sustainable development in China and that the demand-side management laboratory would be a useful tool for testing incentive policies.

Richard Libed, Safety and Environment Executive, Nestlé Philippines, outlined Nestlé's energy policy, stressing that viewing energy as a resource gives the company a competitive advantage. He highlighted a 12% reduction in energy use since 1997, resulting in US\$2 million savings per year, as well as carbon dioxide reductions of 3 million tons in 2004. He outlined capacity-building activities to improve energy efficiency, including training of "energy leaders," quarterly energy meetings, energy awards and an annual energy conference, as well as external energy training and exhibits, networking and benchmarking. He also identified success factors, including: support from top-level management; the development and involvement of "energy leaders"; corporate mandated energy targets; the establishment of energy as a key performance indicator; regular energy management reviews; and networking and benchmarking. He drew attention to future challenges, including the need to become more passionate about energy savings to gain competitive advantage and the need for internal and external innovation. He also highlighted the value of ongoing effort with regard to energy efficiency practices, and the need to communicate and share best practices within the company and with other stakeholders. Identifying future opportunities for action, he underscored the benefits of government subsidies for energy savings, an aggressive government information and education campaign, and policies requiring all establishments to appoint full or part time energy managers.

Paul Suding, Head of the Section of Environmental Protection and Energy Management, German Development Cooperation (GTZ), spoke about industry's energy efficiency policies and technology transfer in China. He explained that GTZ is a non-profit company funded by the German Government that provides, among other things, technical assistance to support industry efficiency in Asia. Noting that China has made great efforts in improving energy efficiency, he said that resource conservation and energy security were the main drivers behind energy efficiency objectives in China. He indicated that in Germany the government helps achieve energy conservation by disseminating information and conducting research, taxing energy, setting minimum standards, providing incentives to

decision makers using fiscal measures, encouraging voluntary agreements with industry, and establishing emission rights allocation and trading. He suggested that the drivers for energy efficiency include reducing costs, developing technologies, increasing competitiveness, responding to public interest, and the CDM. He also explained that energy efficiency technology is spread through foreign and joint venture investment, joint venture energy service companies, license contracts, plant and equipment acquisition by local investors, research and technology cooperation and exchange, technical and financial cooperation, and the CDM.

Takeo Niga, Director General of the Policy Planning and Coordination Department, NEDO, Japan, talked about NEDO's efforts to address climate change through the development and diffusion of environmental and energy-saving technologies. He noted that the Kyoto Protocol and its CDM had made technology diffusion increasingly important in resolving environmental concerns. He observed that Asia has a high potential for energy conservation, as its energy demands will increase with economic growth. He also explained that NEDO's main activities include research and development in industrial technology and the introduction of energy conservation and environmental and energy-saving technologies, often through international cooperation. He said that, with funding from Japan's Ministry of Economy, Trade and Industry, NEDO works with universities and the private sector to promote and disseminate energy efficiency-related activities and to support new markets for energy efficiency. He indicated that NEDO encourages technology transfer and energy efficiency through international projects, including the CDM and JI, feasibility studies and implementation subsidies. He also suggested that, while the Kyoto Protocol is one "giant leap," it is just a step on the path to energy efficiency. Noting that Japanese companies have some of the most energy efficient technologies in the world, he concluded that technologies drive sustainable development and climate change mitigation.

Philip Yu, Environmental and Applications Engineering Director, Trane Asia Pacific, provided a case study of American Standard Companies in China. Noting the importance of protecting the environment and natural resources, he highlighted that the company brings the most technologically advanced products to China, thereby improving energy efficiency and minimizing overall environmental impact. For instance, he explained that the Trane R-123 chiller is 18% more energy efficient than the next most efficient chiller on the market, adding that if every centrifugal chiller consumed 0.45 kilowatts per ton rather than 0.55 kilowatts, annual power plant emissions would be reduced by nearly 21 billion pounds of carbon dioxide. This, he said, would be equivalent to removing over 2.5 million cars from the road, or planting nearly 600 million trees each year. Philip Yu also drew attention to various energy efficient technologies produced by Trane, and encouraged other companies to bring energy efficient technologies to China.

Participants then discussed the importance of host country government support for companies bringing new technologies

to that country. Philip Yu stressed that the transfer of technology is a long process and requires facilitative measures by the host country government. Participants talked about enabling environments and financing, noting that developed country governments cannot require companies to transfer privately owned technologies to developing countries. One participant said more information should be collected by governments on technology needs and opportunities, and that actual projects should be implemented. Paul Suding said China's policy on the transfer of renewable energy technologies requires a high local content, and noted that the current regulations for the protection of intellectual property may deter companies from entering China. Participants discussed technology transfer cooperation and projects between Japan and various Asian countries. Chair Wanna Tanunchaiwatana noted that even if official development assistance (ODA) funding for technology transfer was reduced in the future, the Kyoto Protocol would still open several windows of opportunity for assistance.

SESSION V: FINANCING FOR, AND BARRIERS TO, ENERGY EFFICIENCY PROJECTS

Andrei Marcu, Executive Director of the International Emissions Trading Association (IETA), reviewed the emerging carbon market. Noting that most of the demand for CDM credits comes from Europe, he explained the functioning of the EU emissions trading scheme and pointed out that Certified Emission Reductions (CERs) from CDM projects are eligible through the EU's linking directive. He explained that, compared to the CDM requirements under the Kyoto Protocol, the linking directive excludes CDM sink projects and sets some restrictions on large-scale dam projects, but added that this should not impose major constraints on China. Andrei Marcu then outlined the provisions of the linking directive relevant to the CDM, such as bankability of credits. He indicated that EU Member States had set generous emissions allowances for the first period from 2005 to 2007, but that these would probably be stricter for the second period from 2008 to 2012. He said IETA was concerned about the fragmentation of the carbon market, with ten brokers and several exchanges planned, and noted that some big banks and financial institutions were becoming more involved in carbon trade. He discussed recent price developments in the carbon market, noting that the prices of CERs and EU allowances were expected to converge. He added that factors affecting the interest of CDM investors include good governance in the host country and the level of certainty that CERs actually comply with the Kyoto Protocol. He also discussed methodological issues affecting energy efficiency projects, including additionality, rising activity levels relative to the baseline scenario, and leakage, stressing that these issues need further guidance from the CDM Executive Board.

Noriyuki Kasuya, Chief Representative in Beijing, Japan Bank for International Cooperation (JBIC), presented on the role of JBIC in supporting overseas projects related to the Kyoto Protocol mechanisms. He noted that JBIC had been established as a Government Financial Institution in 1999 to promote Japan's international trade and other international economic activities.

He reported that JBIC also assists developing countries in their efforts to develop economic and social infrastructure, and stabilize their economies. He noted that JBIC supports projects to improve the environment and mitigate climate change through financing operations for renewable energy, natural gas, energy efficiency and forest conservation. He also highlighted the importance of environmental service companies in disseminating energy efficient management services to energy users. Pointing out that JBIC contributed to the World Bank's Prototype Carbon Fund, he emphasized JBIC's financial support for CDM and JI projects through international financial operations and overseas economic cooperation. He noted that the advantages of using JBIC financing for CDM and JI projects are that JBIC possesses knowledge and know-how in dealing with environmental projects in developing countries and has strong relationships with host countries.

Masato Masuda, President of M4U Limited, noted that Asian economies rely heavily on fossil fuels, a trend that is forecast to continue. He listed some of the problems resulting from this, including uncertainty of economic growth, tension between countries, and domestic and global environmental problems such as climate change and transboundary pollution. He expressed hope that the CDM would improve energy efficiency in Asia, but cautioned that the reality differs greatly from the expectations. He noted that the CDM Executive Board has approved a number of methodologies, but only two for energy efficiency CDM projects, while no such project has yet been registered. He said energy efficiency CDM projects are constrained by methodological difficulties relating to the baseline determination and justification of additionality. He also noted financial constraints, as such projects require large capital expenditure but create proportionally smaller carbon revenues than methane projects due to the lower global warming potential of carbon dioxide. He listed policy incentives that could be offered by CDM host countries to make CDM projects more financially attractive, including exemption from value added tax, reduction of income tax or subsidized on-grid tariffs. He stated that upfront payments for carbon credits are more attractive for investors, as they increase the internal rate of return by approximately 0.5%. Finally, he highlighted that the Japanese Government is providing an upfront payment budget for JI and CDM projects and that Japan Carbon Finance Ltd. and JBIC are cooperating to provide bank loans and carbon finance.

Liu Deshun, Deputy Director of the Global Climate Change Institute, Tsinghua University, said China's CDM potential in 2010 is estimated at 79.2 megatons of carbon dioxide equivalent, meeting 11% of the world's total demand for carbon offsets and 48% of the total CDM potential. He highlighted the benefits of the CDM for China, such as the transfer of clean and efficient energy technologies and mitigation of climate change. He then outlined the opportunities for CDM projects in China in the energy, transportation, commercial and residential sectors, and identified priority technologies for CDM projects in these sectors. Liu Deshun also discussed challenges facing the CDM in China, including the need for accurate

and transparent methodologies, institutional and regulatory arrangements, capacity-building activities such as seminars and information campaigns, intermediate agents to assist in CDM project development, and carbon funding. He presented a barriers analysis for CDM implementation in China, noting the complexity of the CDM project cycle, high transaction costs, low levels of public awareness, and financing and data needs. He explained the potential for the CDM in the electricity sector, asserting that China is eager to increase capacity quickly, but that the sector is cautious about risks and delays related to the CDM. He added that small and medium-sized power companies would need upfront payments to secure financing for energy efficiency CDM projects, and noted that buyers could also help maintain and operate projects. He concluded by highlighting that China's fast economic growth provides opportunities for the CDM, and outlined plans to develop CDM project portfolios that could be registered by the end of 2005.

Dae-Gyun Oh, Director General of the Center for Climate Change Mitigation Projects, Korea Energy Management Corporation (KEMCO), set out the Republic of Korea's experience with energy efficiency. He noted that KEMCO is a government initiative started in 1980 to encourage energy conservation and efficiency. He explained that energy service companies are important for mitigating climate change and implementing the Kyoto Protocol mechanisms, and as windows of opportunity for technology transfer. He also described the development of environmental service companies in the Republic of Korea since 1991 and observed that such companies are potentially key players in the emissions trading market. He indicated that the Korean Government provides low interest loans for these companies and tax credits for energy users. He then identified barriers to projects by Korean environmental service companies, such as high debt ratios, long project duration, risks related to guaranteed energy savings, and the small size of projects. He suggested that the solution was to compile projects, improve people's understanding of the nature of environmental service companies, and develop capacity to manage risks and carbon dioxide credits. He emphasized that KEMCO was promoting the Republic of Korea as a host for CDM projects.

In the concluding discussion, participants engaged in a lively debate about the CDM. Many participants commented on the criteria for additionality of CDM projects and on how to measure and set out methodologies. Andrei Marcu said the private sector and some governments were increasingly frustrated with the requirement of financial additionality, and stated that the subjectivity of the criteria was deterring CDM investment. He highlighted the requirement of environmental additionality in the Marrakesh Accords. One participant noted that the Marrakesh Accords represented a political agreement, which he said would need to be operationalized by Parties to the Kyoto Protocol. He stated that the original idea behind the CDM was to assist developing countries in obtaining technologies they could not otherwise afford, and therefore financial additionality of CDM projects remained important. He acknowledged the

difficulty in developing additionality criteria but expressed his confidence that a solution could be found. One participant noted that Indonesia and China were facing similar barriers in implementing the CDM, while another said it was important to foster the creation of local intermediate consultants to encourage the development of CDM projects.

In response to a question on CDM projects in China, Liu Deshun indicated that China had approved two CDM projects, with others awaiting approval. Replying to a query about the role of private equity in CDM projects, Masato Masuda said private sector funding was important and Japan's private sector was actively involved in CDM financing. Dae-Gyun Oh noted the unique position of the Republic of Korea, where the government was providing the roadmap for CDM project development, with a clear role for the private sector. Andrei Marcu said there was a debate about the extensive role played by the World Bank in the CDM, adding that for the CDM to develop credibility it was necessary to involve private sector banks. One participant said the evolution of equity was such that small banks would focus investment on CDM projects in their area of specialization.

There was also discussion on the role of ODA in the CDM and the role of non-governmental organizations (NGOs) in CDM decision making and project development in China. Liu Deshun said each CDM host country would have to establish a Designated National Authority and CDM approval processes, and that during the project approval stage it could invite, and should encourage, NGO assessment of projects.

CLOSING SESSION

Koshin Kura, Executive Director of the International Center for Environmental Technology Transfer, stressed the importance of increasing energy efficiency and reducing energy consumption. He emphasized the need for investment in renewable energy and noted the important role of schemes such as the CDM, emissions trading and carbon finance. He hoped the seminar had promoted further understanding and cooperation on these issues.

Wei Zhihong noted that the seminar had brought together participants from many countries and regions and had involved various institutions and sectors, including the residential, commercial, transportation and industrial sectors. He welcomed the exchange of experiences by, and expertise of, the participants. He noted that, out of the 14 seminars organized by CTI, three had been held in Beijing, and thanked CTI and Chair Toshi Sakamoto for selecting China as the venue for this meeting.

Toshi Sakamoto noted that the seminar had addressed a number of important issues. Observing that six countries had explained their energy policies during the meeting, he pointed out that all of them had identified energy efficiency as a pressing need. He stressed the importance of sharing information and experiences to overcome barriers and difficulties in implementing energy policy. Reflecting on the sectors discussed during the seminar, he noted that the transportation sector needs to focus not only on fuel efficiency, but that it should take a more holistic approach, and should also consider biofuels. He stressed that developing countries would make huge investments

in energy by 2020, adding that the involvement of the private sector is necessary. Noting that the final session of the seminar focusing on the CDM had touched on this issue, he underscored that the topic is so extensive and complex that an ongoing dialogue is needed. He thanked the chairs, speakers, organizers, and participants, and closed the meeting at 5:30 pm.

UPCOMING MEETINGS

CARBON MARKET INSIGHTS EVENT 2005: This event will be held from 1-3 March 2005, in Amsterdam, Netherlands. The annual event, which is organized by emissions consultancy Point Carbon, will provide a forum to discuss the latest developments in the carbon market, including the state of the Kyoto Protocol's Clean Development Mechanism and Joint Implementation initiatives, the EU's emissions trading scheme, and other regional and national schemes. For more information, contact: Point Carbon Organizing Committee; tel: +47-924-29-400; fax: +47-925-70-818; e-mail: conference@pointcarbon.com; Internet: <http://www.pointcarbon.com/>

CAIRO NINTH INTERNATIONAL CONFERENCE ON ENERGY & ENVIRONMENT (EE9): This conference is organized by the Supreme Council for Research, Egypt and Wayne State University, Detroit, Michigan and will be held from 13-15 March 2005, in Cairo and Sharm El-Sheikh, Egypt. The conference will include technical paper presentations, keynote lectures, training sessions, poster sessions, panel discussions, open forum sessions and social events. For more information, contact: Ralph H. Kummler, Wayne State University; tel: +1-313-577-3775; fax: +1-313-577-5300; e-mail: rkummler@chem1.eng.wayne.edu; Internet: <http://ee9.sat-eng.com/index.htm>

SECOND INTERNATIONAL FORUM ON PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT – ADVANCING IMPLEMENTATION ON WATER AND ENERGY: The event will be held from 21-23 March 2005, in Marrakesh, Morocco. It is being organized by the Moroccan Ministry of Territory Planning, Water and Environment in cooperation with the UN Department of Economic and Social Affairs (UN/DESA). For more information, contact: Moroccan Ministry of Territory Planning, Water and Environment; tel: +212-37-77-26-62; fax: +212-37-77-26-40; e-mail: forum@minenv.gov.ma; Internet: <http://www.minenv.gov.ma/forum-part.2005/>

IPCC-23: The 23rd Session of the Intergovernmental Panel on Climate Change is scheduled for 8 April 2005, in Addis Ababa, Ethiopia. It is expected to continue preparations for the Fourth Assessment Report, scheduled for release in 2007. For more information, contact: IPCC Secretariat; tel: +41-22-730-8208/84; fax: +41-22-730-8025/13; e-mail: IPCC-Sec@wmo.int; Internet: <http://www.ipcc.ch/calendar2005.htm>

THIRD ANNUAL BRUSSELS CLIMATE CHANGE CONFERENCE: The conference will be held from 19-20 April 2005, in Brussels, Belgium. This year's conference, which will be held under the theme "EU climate change policy beyond Kyoto: Building a global climate change agreement,"

will address issues concerning: EU climate change policy after the EU Spring Council; transport and air transport; further development of the EU ETS; and impact mitigation and technology solutions. For more information, contact: James Wilmott; tel: +44-1495-300013; fax: +44-1495-309372; e-mail: james.wilmott@euconferences.com; Internet: http://www.euconferences.com/climatechange05_intro.htm

CARBON EXPO 2005: The event is scheduled for 11-13 May 2005, in Cologne, Germany. The expo will further understanding of key emerging issues in the carbon market area, including the EU emissions trading scheme, similar schemes elsewhere, and the Kyoto Protocol's market-based mechanisms. The event is being organized by the International Emissions Trading Association and the International Bank for Reconstruction and Development, which is a part of the World Bank Group. For more information, contact: Robert Dornau; tel: +41-79-689-2242; fax: +41-22-839-3181; e-mail: dornau@carbonexpo.com; Internet: <http://www.carbonexpo.com/>

FIFTH GLOBAL FORUM ON SUSTAINABLE ENERGY (GFSE) - ENHANCING INTERNATIONAL COOPERATION ON BIOMASS: This forum will meet from 11-13 May 2005, in Vienna, Austria, convening under the theme "Enhancing international cooperation on biomass." For more information, contact: Irene Freudenschuss-Reichl, Austrian Ministry for Foreign Affairs, Development Cooperation; tel: +43-50-1150-4486; e-mail: irene.freudenschuss-reichl@bmaa.gv.at; Internet: http://www.sidsnet.org/webcal_data/data/1107288580.html

22ND SESSIONS OF THE SUBSIDIARY BODIES TO THE UNFCCC: The 22nd Sessions of the Subsidiary Bodies to the UNFCCC will be held from 16-27 May 2005, in Bonn, Germany. The meeting will be preceded by a "Seminar of Government Experts," scheduled for 16-17 May 2005, which will seek to promote an informal exchange of information on actions concerning mitigation and adaptation, and on policies and measures adopted by governments supporting implementation of existing commitments under the UNFCCC and Kyoto Protocol. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; Internet: <http://unfccc.int>

2005 ANNUAL MEETING OF THE INTERNATIONAL ENERGY WORKSHOP: This workshop will meet from 5-7 July 2005, in Kyoto, Japan. Themes to be covered at this year's workshop include managing uncertainty and abrupt climate change, UNFCCC/post-Kyoto regimes and technological responses to climate change. For more information, contact: Leo Schrattenholzer; tel: +43-2236-807-225; fax: +43-2236-807-488; e-mail: leo@iiasa.ac.at; Internet: <http://www.iiasa.ac.at/Research/ECS/IEW2005/index.html>

SOLAR WORLD CONGRESS 2005: The congress will take place from 6-12 August 2005, in Orlando, Florida, USA. The event is expected to bring together researchers, scientists, engineers, architects, designers and other renewable energy professionals to discuss solar energy issues. In particular, the Congress will consider linkages between solar and water issues

under the theme, "Bringing Water to the World." For more information, contact: Becky Campbell-Howe, American Solar Energy Society; tel: +1-303-443-3130 ext.103; fax: +1-303-443-3212; e-mail: bchowe@ases.org; Internet: <http://www.swc2005.org>

INTERNATIONAL ENERGY PROGRAMME EVALUATION CONFERENCE: The conference will be held from 17-19 August 2005, in New York, USA. The International Energy Programme Evaluation Conference (IEPEC) is a biennial professional conference for energy programme specialists. In 2005, the Conference will take as its theme, "Reducing Uncertainty through Evaluation," providing a forum for presenting and discussing new research and objective evaluations of energy programmes. For more information, contact: Cara Lee Mahany Braithwait, Conference Organizer; tel: +1-608-231-2266; fax: +1-608-231-1365; e-mail: samb@LRCA.com; Internet: <http://www.iepec.org/>

FOURTH WORLD WIND ENERGY CONFERENCE AND EXHIBITION: The event will be held from 2-5 November 2005, in Melbourne, Australia. Organized by World Wind Energy Association, this conference will consider the latest issues facing the wind energy sector, including the impact of the Kyoto Protocol's entry into force and plans to implement the Millennium Declaration and Millennium Development Goals. Other issues on the agenda include the linkages between wind power and water management, desalination, human health, off-grid systems, financing and training. The conference will also include an exhibition on wind energy facilities and technologies. For more information, contact: Conference Organizers; tel: +61-3-9417-0888; fax: +61-3-9417-0899; e-mail: wwec2005@meetingplanners.com.au; Internet: <http://www.wwec2005.com/index.shtml>

GREEN POWER MEDITERRANEAN CONFERENCE - THE SUSTAINABLE ENERGY MEETING PLACE: This event is scheduled for 15-16 November 2005, in Rome, Italy. The conference will seek to create a focused platform for networking and knowledge transfer that will further the adoption of renewable energy systems and energy efficiency programmes in the region. For more information, contact: Sarah Ellis, Director, Green Power Conferences; tel: +44-870-758-7808; fax: +44-207-900-1853; e-mail: sarah.ellis@greenpowerconferences.com; Internet: <http://www.greenpowerconferences.com/events/GreenPowerMed.htm>

FIRST MEETING OF PARTIES TO THE KYOTO PROTOCOL AND 11TH CONFERENCE OF PARTIES TO THE UNFCCC: MOP-1 and COP-11 will be held from 28 November - 9 December 2005, in Montreal, Canada. Canada is hosting the historic first Meeting of Parties to the Kyoto Protocol (MOP-1), which is taking place in conjunction with the eleventh session of the Conference of Parties (COP-11) to the UN Framework Convention on Climate Change (UNFCCC). For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; Internet: http://unfccc.int/meetings/unfccc_calendar/items/2655.php