SECTORAL APPROACH IN GSEP

GSEP: Global Superior Energy Performance Partnership

POWER, STEEL AND CEMENT SECTOR

MINISTRY OF ECONOMY, TRADE AND INDUSTRY, JAPAN
THE FEDERATION OF ELECTRIC POWER COMPANIES OF JAPAN
THE JAPAN IRON AND STEEL FEDERATION
JAPAN CEMENT ASSOCIATION

Contents

Objective and Overview of Global Superior Energy Performance Partnership **1**

Sectoral Approach in the Electric Power Industry **4**

Sectoral Approach in the Steel Industry **12**

Sectoral Approach in the Cement Industry **22**

Objective and Overview of
Global Superior Energy Performance Partnership

Ministry of Economy, Trade and Industry, Japan

Objective and Overview of Global Superior Energy Performance Partnership

August 3, 2012

Takashi Kono
Deputy Director for Climate Change
Global Environment Affairs Office
Ministry of Economy, Trade and Industry, Japan

Executive Summary The Global Superior Energy Performance Partnership, or GSEP (comprising sector-by-sector working groups), was inaugurated as an international initiative for promoting the industrial sector's energy conservation and environmental responses under the leadership of the Japanese and U.S. governments in 2010, taking over achievements of the Asia-Pacific Partnership on Clean Development and Climate, or APP. At two GSEP meetings that took place in FY2011, although participants pointed to such challenges as a further expansion of participating countries in the GSEP and the materialization of specific GSEP measures, the meetings attracted many participants who shared expectations about progress in GSEP operations. As an organization to realize a bottom-up approach led by Japan, the GSEP is expected to develop its operations, including effective inputs into climate change negotiations, by taking advantage of government-private cooperation unique to the partnership.

1. Introduction

The Global Environment Affairs Office takes charge of external negotiations on and international cooperation in global environment conservation. In this respect, the office leads and manages operations of the Global Superior Energy Performance Partnership (GSEP), an international partnership for improving energy efficiency. The GSEP is an international framework to promote energy security and global warming measures, two sides of the same coin, through the development, diffusion and transfer of energy conservation and environmental technologies and through relevant technical cooperation under the public-private partnership. This paper outlines the Global Environment Affairs Office's present views about the background for the GSEP inauguration, future challenges and expectations, and the GSEP's relations in U.N. negotiations.

2. Body

2.1. GSEP taking over APP

In July 2005, the Asia-Pacific Partnership on Clean Development and Climate (APP) was created to respond to growing energy demand in the Asia-Pacific region and address environmental pollution, energy security and the global warming problem. The seven countries of Japan, Australia, Canada, China, India, the Republic of Korea and the United States participated in the APP to promote regional cooperation for the development, diffusion and transfer of cleaner and more efficient technologies under the public-private partnership. Establishing eight task forces on (1) aluminum, (2) cement, (3) coal mining, (4) renewable energy and distributed generation, (5) buildings and electric appliances, (6) cleaner fossil energy, (7) power generation and transmission, and (8) iron/steel, the APP proceeded with specific cooperation projects.

The APP Policy Implementation Committee at its ninth meeting in April 2011 agreed to terminate APP operations for some reasons, including budgetary constraints at the U.S. Department of State. At the same time, it was explained that three task forces on iron/steel, cement, and power generation and transmission would be taken over by the GSEP (a framework that was proposed by Japan and the United States and approved as an initiative under the Clean Energy Ministerial (CEM) at the meeting in July 2010). At its meeting in Paris in September 2010, the Executive Committee of the International Partnership for Energy Efficiency Cooperation (IPEEC) agreed to position the GSEP under the IPEEC.

In addition, three more working groups were created: the Energy Management Working Group (led by the United States), the Combined Heat and Power (CHP) and Efficient District Heating and Cooling (DHC) Working Group (led by Finland) and the Cool Roofs and Pavements Working Group (led by the United States). The GSEP then started its operations officially with the six working groups under the CEM and IPEEC.

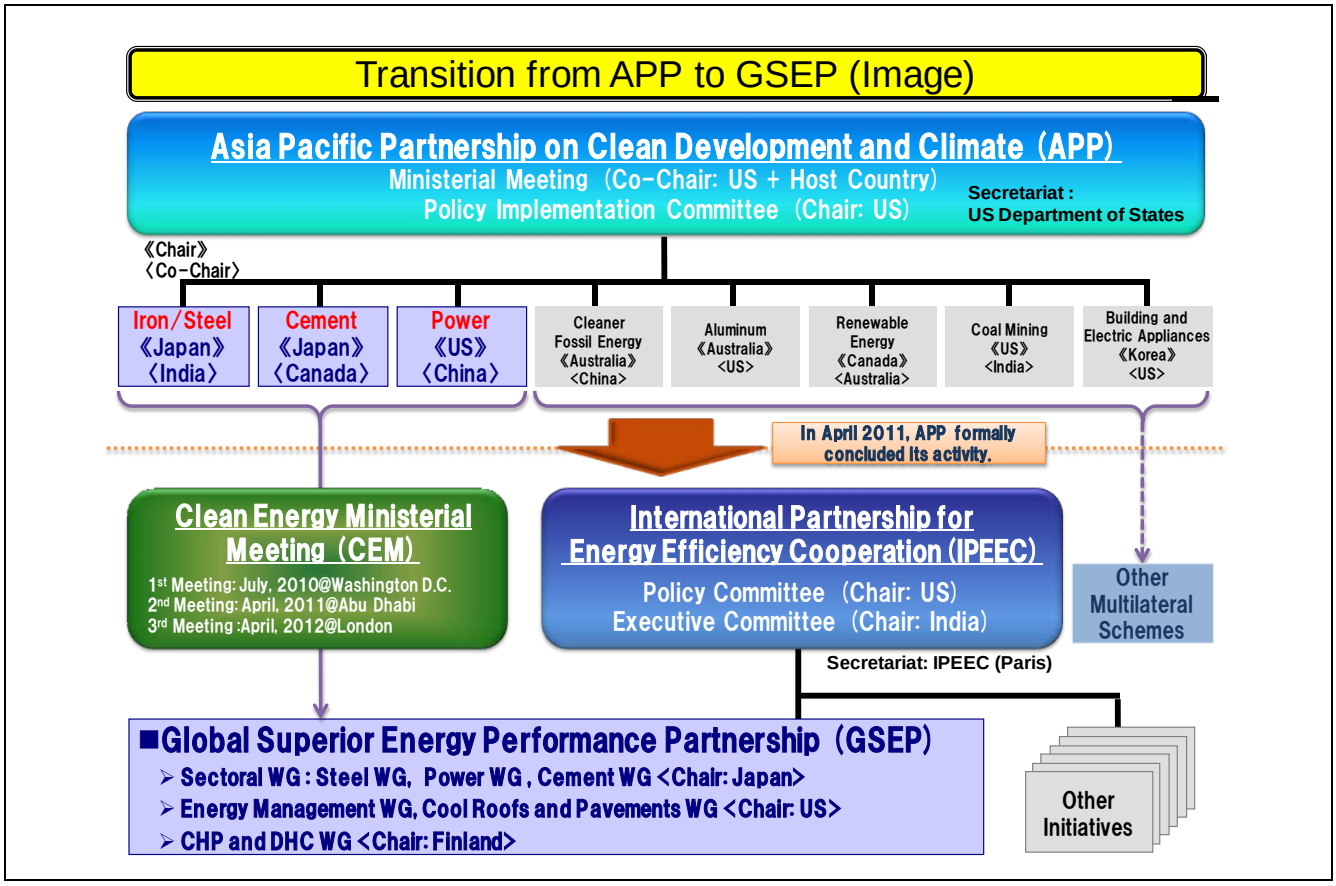


Fig. Transition from APP to GSEP (Image)

2.2. Specific APP achievements

The Steel Task Force prepared "State-of-the-Art Clean Technologies: SOACT," allowing the partners to share 64 relevant technologies. The task force also conducted an energy conservation diagnosis for steel plants, estimating that the seven APP countries have a potential to reduce carbon dioxide emissions by 130 million tons per year. It also implemented an energy conservation and environmental diagnosis for three Chinese and as many Indian steel plants, finding that they could afford to reduce energy consumption by 30,000 terajoules per year.

The Cement Task Force created the "Cement Technologies Booklet," a collection of best practices for energy conservation technologies. It also conducted an energy conservation and environmental diagnosis for four Chinese and as many Indian cement plants and made specific proposals on energy efficiency targets and the potential installation of waste heat power generation systems.

The Power Generation and Transmission Task Force held five peer reviews two years from 2007, with 50 to 100 people participating in each. The task force estimated that the APP countries could reduce CO_2 emissions by 120 million tons per year by diffusing operational improvements. It also compiled a handbook of good operation and maintenance practices, which was actually used for a performance diagnosis for power plants in China.

While the APP made these achievements, there were some indications that for example the APP lacked discussions on how to finance commercial projects.

2.3. GSEP operations in FY2011 and future challenges

In September 2011, the GSEP held the first workshop in the United States. In the workshop, participants expressed their expectations on future operations including APP task force operations being taken over by the GSEP. In response, the first sectoral working group meeting (cement, power and steel working groups) took place in Tokyo in March 2012. Participants, including new ones from the European Union, shared APP achievements and deepened discussions on future operation plans and specific themes to address. Participants numbered about 140 for the first workshop and about 70 for the working group meetings, conducting constructive discussions. These meetings indicated the high expectations placed on future GSEP operations.

Future challenges include the official, stable participation by both the public and private sectors of such major countries as China and India, the identification prioritized areas for the GSEP, and the materialization of how to mobilize finances.

2.4. Future expectations (including relations in U.N. negotiations)

As for U.N. climate change negotiations, the 17th Conference of Parties to the U.N. Framework Convention on Climate Change, or COP17, agreed to establish the Ad Hoc Working Group on the Durban Platform for Enhanced Action, agreeing on a path to a future framework. For the immediate future, the group is expected to hold brainstorming or workshops including experts inside and outside the United Nations. The GSEP, though being an initiative independent from U.N. negotiations, has the potential to input best practices for the development, diffusion and transfer of energy conservation and environmental technologies into such brainstorming or workshops as an organization to realize the bottom-up approach.

Industrial energy conservation and environmental response needs in the world have been persistently increasing. According to the International Energy Agency, the industrial sector accounted for 36% of global energy consumption in 2009, the largest share among sectors[1]. In addition, as long-term CO_2 emission reduction measures "energy conservation" is expected to account for 72% in 2020 and for 44% in 2035[2]. According to an assessment reported by the Asian Development Bank, the ADB limited investment to $10 million per year in the industrial sector's energy conservation while investing nearly $550 million per year in renewable energy under clean energy projects between 2006 and 2010[3]. Given this situation, the GSEP is required to creatively discuss the industrial sector's global energy conservation and CO_2 emission reduction measures including finance.

The GSEP is expected to develop its operations while accumulating specific successful practices as an initiative to lead the materialization of the public-private partnership. The Global Environment Affairs Office is determined to strive to promote the GSEP toward the development, diffusion and transfer of energy conservation and environmental technologies.

---

[1] IEA Energy Balances of Non-OECD Countries, 2011
[2] IEA World Energy Outlook, 2011
[3] Review of Energy Efficiency Interventions, Independent Evaluation Department, Asian Development Bank, October 2011

Sectoral Approach
in the Electric Power Industry

The Federation of Electric Power Companies of Japan

Sectoral Approach in the Electric Power Industry

Outline of Power Working Group of the Global Superior Energy Performance Partnership

October 2012

The Federation of Electric Power Companies of Japan

Executive Summary The electricity sector has promoted peer review activities relating to the operation and maintenance of fossil power plants as one of the main action plans under the Asian Pacific Partnership on Clean Development and Climate (hereinafter referred to as APP). The US government proposed winding up the APP because it claimed that the mission of the APP had been completed, but the Japanese government and the country's private sector recognized the importance of promoting the activities of the APP and tried to carry on the achievements and experiences of the APP in the newly founded Global Superior Energy Performance (hereinafter referred to as GSEP). In collaboration with the USA, Japan set up a Power Working Group and took the chair under GSEP. The Power WG decided to expand outreach and engage the International Electricity Partnership (hereinafter referred to as IEP), a global private initiative to leverage the private resources of the electricity sector to promote public and private partnerships.

Achievements of APP Activities

Introduction

It is imperative to deploy developed countries' energy saving technologies in developing countries, in order to mitigate the negative effects of global climate change. The technology of electricity, amongst others, will be more and more important. APP activity has been best practice of a public sector partnership, which provides policy assistance, and the private sector, which owns energy saving technologies. APP has been transformed into the GSEP on the basis of the experience that was acquired in APP activities. The activities that were closed to APP member countries are now expected to develop and be exploited in the wider field.

In the electricity sector, technology is not only deployed by siting and constructing power plants; the transfer of know-how focused on operations and maintenance is also important. The APP stakeholders made the O&M peer review the main activity, in addition to sharing information on energy saving technologies. The mind-set will not be changed and will develop even after transformation into the GSEP.

During this transformation, there has been close coordination between the public and private sectors to make this happen. At the private sector level, cooperation with the IEP, which includes European colleagues, was assured as a step towards international alignment. And in Japan, the iron and steel, cement and electricity sectors shared the value of APP activities, worked together, cooperated with the government to plan to set up the GSEP. While APP started as a top-down approach, GSEP started as a bottom-up approach.

This article introduces some examples of what APP achieved and examines how the GSEP has evolved, with the focus on a public private partnership.

The APP begins

The APP was launched by the USA in July 2005 to contribute towards energy and climate change in the Asia and Pacific region. The Bush administration tried to demonstrate how the USA was pushing forward with technology deployment for the sake of energy and climate change and worked hard to coordinate among member countries and to attract attention. The official announcement was made at the ASEAN ministerial meeting in Vientiane Laos, with participating countries consisting of Australia, China, India, South Korea, Japan and the USA (Canada joined later). It was implemented by a ministerial meeting and its' Policy Implementation Committee (PIC). It started with eight task forces; that is, Power Generation and Transmission, Cleaner Fossil Energy, Renewable Energy and Distributed Generation, Buildings and Appliances, Steel, Cement, Aluminum, Coal Mining. The vision statement designated the following;

First, by building on the foundation of existing bilateral and multilateral initiatives, we will enhance cooperation to meet both our increased energy needs and associated challenges, including those related to air pollution, energy security, and greenhouse gas intensities,

Secondly, areas for collaboration may include, but not be limited to: energy efficiency, clean coal, integrated gasification combined cycle, liquefied natural gas, carbon capture and storage, combined heat and power, methane capture and use, civilian nuclear power, geothermal, rural/village energy systems, advanced transportation, building and home construction and operation, bioenergy, agriculture and forestry, hydropower, wind power, solar power, and other renewables.

Thirdly, a non-binding compact in which the elements

of this shared vision were developed, as well as the ways and means to implement it, will be further defined and lastly, the partnership will be consistent with and contribute to our efforts under the UNFCCC and will complement, but not replace, the Kyoto Protocol.

The Japanese participants regarded the APP as one of the key components of the "Sectoral Approach", which was strongly promoted by Japanese governments, and a peer review of the operation and maintenance of fossil power plants was given the status of a main action plan by the Generation and Transmission task force. The Sectoral Approach was developed by Japanese governments to quantify CO2 emissions, with an assumption of setting a reduction target. This plans to provide incentives to invite the main emerging economies to participate in international targets by acquiring accurate information such as the current and future potential of reduction, and of internationally comparable data, through which the challenges could be shared and the technology road map would be developed and implemented. Each sector showed various specific measures. Because the Sectoral Approach was designated to be introduced in the international context, the first thing it required was common indicators.

In the case of the electricity sector, the portion of non-fossil fuel generation in the energy mix, operation

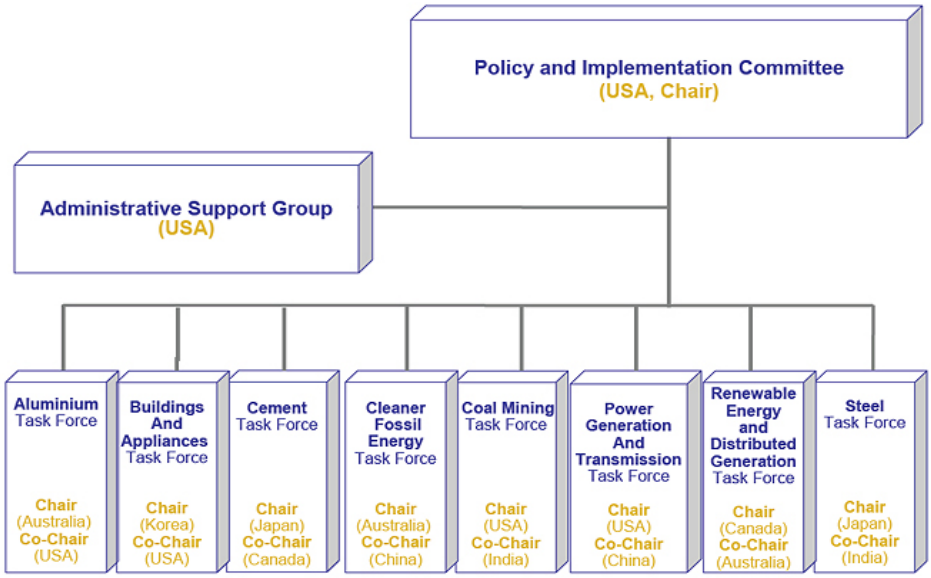


Fig. 1 Asia Pacific Partnership- Organization

	Measures to be considered	Conceptual indicator	Possible MRVable indicators
Non-fossil fuels	Optimization energy mix -- Nuclear -- Renewables (associated with national energy policy)	Proportion of non-fossil fuel generation	
Fossil fuels	1. O&M improvement (e.g APP peer review) 2. Renovation& Replacement (supported by financial initiatives such as tax credit etc.) 3. BAT installation	Thermal Efficiency	Deviation from designed efficiency Minimum efficiency standard for incoming plant
Others	Capacity building…etc.	Important but it is Not likely to be MRVable…	

Fig. 2 Low carbon fuel mix common

and maintenance improvement, renovation and replacement potential and the best available technologies in fossil fuels generation can be common indicators. Among the above, operation and maintenance improvement can be implemented through the APP peer review[4] activities and it was therefore selected as a flagship project, "Power Generation Best Practices".

Apart from the above, the following were included in the Power Generation and Transmission Task Force;

- Best Practices for Demand Side Management Activity Plan
- Energy Regulatory & Market Development Forum
- Trade Exhibitions/Conferences and Trade Missions
- Hydroelectric Generation Best Practices
- Combustion Optimization in Coal Based Power Plants
- Implementation of Artificial Intelligent Soot Blowing System for Improving the Steam Generator Efficiency by Increasing the Effectiveness of Soot Blowers
- SOx Reduction Technologies in Flue Gas
- Risk Evaluation and Prioritization (REAP) for Maintenance and Renovation & Modernization (R&M) of Power Plants
- Life Extension & Remaining Life Assessment of Power Plants
- Site Visit of Energy Conservation and Environment Protection Technology—Application of Plasma Ignition Technology in Power Generation
- Generator Transformer Programs (Inspection Procedures, Diagnostic Tools and Maintenance)

Coal Fired Power Generation Peer Review Activity

With regard to the deterioration of generation efficiency through the ageing of existing coal fired power plants, this is expected to recover by improving operations and maintenance.

There is a possibility that this case is similar to refurbishment in developing countries. Peer review here means that peers mutually evaluate the power plants, identify common challenges, share best practice through discussion and propose specific improvement plans.

When implementing the Peer Review the Green Hand Book, which was compiled by Japanese electricity companies and which encompasses a wide variety of best practices, was distributed for free. The Green Hand Book was prepared for the first Peer Review activity and later acknowledged to be the office text by the task force. It can be downloaded from the following URL[5].

The following peer review activities occurred after test one in the USA in October 2006.

- April 16 – 19 2007, at J Power's Takasago Thermal Power Station in Hyogo Japan, two 250 MW, with the participation of two Australian,

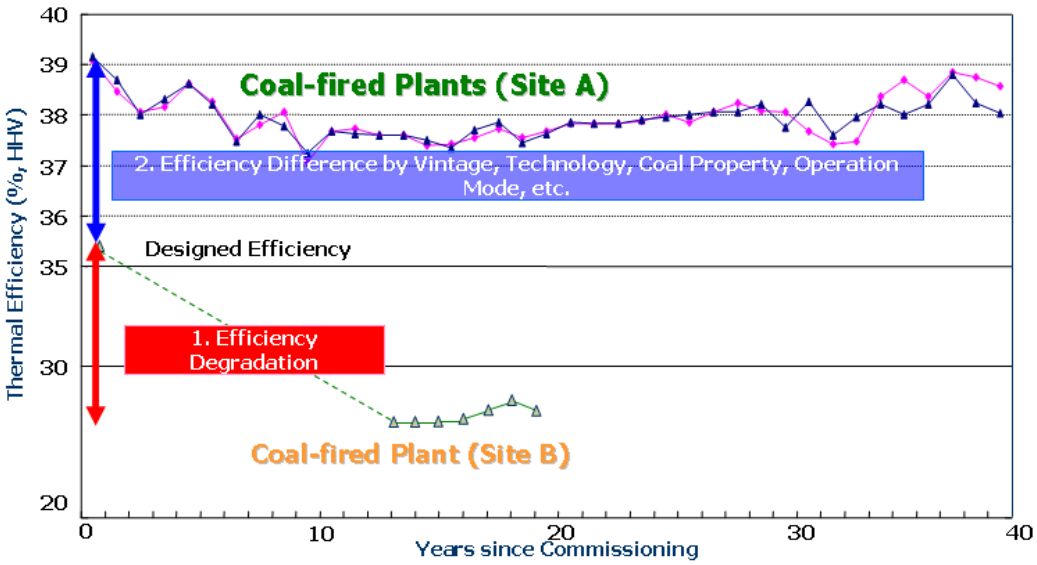


Fig. 3 Comparison on deviation from designed efficiency

[4]In January 2006, the Federation of Electric Power Companies of Japan(FEPC) and the Edison Electric Institute (EEI) joined the APP ministerial meeting, where Mr. Masumoto of FEPC and Mr. Morris of AEP agreed to adopt peer review because they were knew how important this is.Mr. Morris of AEP agreed to adopt peer review because they were knew how important this is.

[5] See http: www.fepc.or.jp/env/app/

eight Canadian, eight Indian, 10 Japanese, 13 Korean and six American engineers

- February 6 – 12 2008, at the Kota Power Station Rajasthan, two 110 MW, three 10MW and 1.195MW and the NTPC

Fig.4 Green Handbook

(National Thermal Power Corporation) Dadri Power Station in India, with the participation of four 210 MW, with the participation of two Australian, five Canadian, 37 Indian, 14 Japanese, 10 Korean and seven American engineers

- April 28-March 2 2008 at Alliant Energy's Edgewater Coal-based Station, 60 MW, 330 MW and 380 MW in Sheboygan, Wisconsin, and the Columbia coal-basedPower Station, two 533MWs in Pardeeville, Wisconsin USA, with the participation of one Canadian, two Chinese, six Indian, 22 Japanese, eight Korean and 42 American engineers
- June 23 – 27 2008, the Loy Yang Power Station, two 515 MW and two 560 MW, the Yallourn Power Station, two 350 MW and two 375 MW and the Hazelwood Power Station, eight 200 MW in Australia, with the participation of 20 Australian, one Chinese, six Indian, 16 Japanese, three Korean and two American engineers
- July 6 – 10 2009 at the South-East Power Company's Yonghung coal-fired Power Plant, two 800 MW and two 870 MW in Korea, with the participation of 20 Japanese, one American, two Chinese and 80 Korean engineers

The following are examples of the result of the peer review activity. Experience in the USA shows that;

- Participants were divided into teams for boilers, auxiliary machines and turbines.
- Opinions were exchanged and experiences were shared with regard to the optimization of boiler combustion, increased efficiency of air-preheaters, improvement of steam turbine efficiency, water quality improvement of cooling water for condensers, etc.
- A tentative calculation of the improvement effects of steam turbines was made. It was confirmed that heat efficiency could be increased by 1% to 1.5% at each power plant, which is equivalent to a potential of approximately 90,000 ton CO2 per power plant.

Apart from the above, the National Energy Technology Laboratory of the Department of Energy under USAID's Greenhouse Gas Pollution Prevention Project established the Centre for Power Efficiency & Environment Protection (CenPEEP) and two regional CnePEEPs, and provided basic power plant diagnosis. To date, NTPC avoided a total of 30 million tons of CO2 of additional reductions. Under APP, they extended the successes of the NTPC and CenPEEP to three plants operated by the State Electricity Boards of West Bengal and Punjab.

Quantification of CO2 Potential through the improved operation and maintenance of power plants

The APP Power Generation and Task Force quantified the CO2 Potential through the improved operation and maintenance of power plants, resulting from the achievements of peer review activities, based on the mutual trust of the member countries. The study will be reported here.

After quantification, two scenarios for the introduction of new technology, BAU (Business As Usual) and BAT (Best Available Technology), were developed. Under the BAT scenario, strategic technology transfer was expected.

- The BAU scenario did not envisage the introduction of improved O&M. Current coal fired technology (Subcritical combustion) existed until 2010. From 2015 onwards Ultra- Supercritical Coal-Fired Power Plants (USC) with steam conditions up to 600 degrees will be diffused
- The BAT scenario envisages the introduction of improved O&M. Ultra-Supercritical Coal-Fired Power Plants (USC) will be diffused up to 2015. Integrated Gasification Combined Cycle (IGCC) Technology will be diffused from 2016 to 2025. Next Generation IGCC technology will be diffused after 2030.

With regard to BAT, deterioration in efficiency would begin 15 years after its start-up, but the potential for improvement was assumed, based on information gained from questionnaires sent to member countries. That of existing plants was based on the Platts database. Future prospects of power plants were based on the International Energy Agency (IEA)'s World Energy Outlook 2009. As a result of this study, the potential was 1,185 Mt-CO2/year, 2.29 Mt-CO2/year and a total

of 1,503Mt-CO2/year. The breakdown showed that the 153 Mt-CO2 reduction was attributed to the improved O&M of existing plants, the 186 Mt-CO2 reduction was attributed to the improved O&M of existing and incoming plants and the 1,163 Mt-CO2 reduction was attributed to incoming new technologies. The study was conducted under the APP Power Generation and Transmission Task Force and presented to the IEA with the idea that the diffusion of new coal technologies was important and that improved O&M was also necessary.

Distribution/Demand Side Management Best Practice Activities

The Distribution/Demand Side Management Best Practice Activities were led by the Lawrence Berkeley National Laboratory (LBML) in cooperation with the Edison Electric Institute (EEI). This started in 2007 in Maharashtra in India, based on California's experience focusing on structural, regulatory and administrative challenges. In 2009 they held a Distribution/Demand Side Management Event in North Carolina and California with assistance from Progress Energy and PG&E, with 35 participants from Australia, China, India, Japan, South Korea and the USA. The program was focused on technical information exchange and the identification of Best Practices, which included Smart Grid and Demand Response planning, presented by the USA. Improving the reliability of the distribution system was presented by Japan. There was an active discussion on the cost of DSM and reduced losses in the transmission and distribution system in Japan by the Indian regulators and local utilities. It was agreed to further develop the activity as one of the flagship projects.

Renewable Energy Best Practice Activities

The 1st "Hydroelectric Generation Efficiency Improvement Project" was held from August 13-17, 2007 in support of the Asia Pacific Partnership "Power Generation and Transmission Task Force" Action Plans. The program began in Charlotte, North Carolina USA at the Duke Energy headquarters and concluded at FirstEnergy's Yards Creek Pumped Storage Hydroelectric facility in Blairstown, New Jersey, USA. More than 40 participants with hydroelectric engineering, operations, maintenance and management expertise from five APP countries participated in the event. In March 2009, 50 participants form Canada, China, India, Japan, South Korea and the USA met in San Francisco, California to exchange initial information from the different perspectives of the purchaser, operator/developer and integrated system operator. The event was hosted by PG&E and NextEra Energy Resources in cooperation with the Edison Electric Institute.

In September 2010 APP participants held a wind energy event in Montreal.

Engagement in GSEP

APP completed

In the APP activities, the power generation and transmission task force was chaired by the US from the start, but because of the change in US politics it proposed giving up its status as chair of the PIC (Policy Implementation Committee) and the task force secretariat, and informed Japan in June 2010. The APP revealed new potential, from the viewpoint that this established the regional cooperation framework on energy security and environmental protection in the Asia and Pacific region, and that the collaborative public and private sector partnership progressed this. Politicians and negotiators attended the ministerial

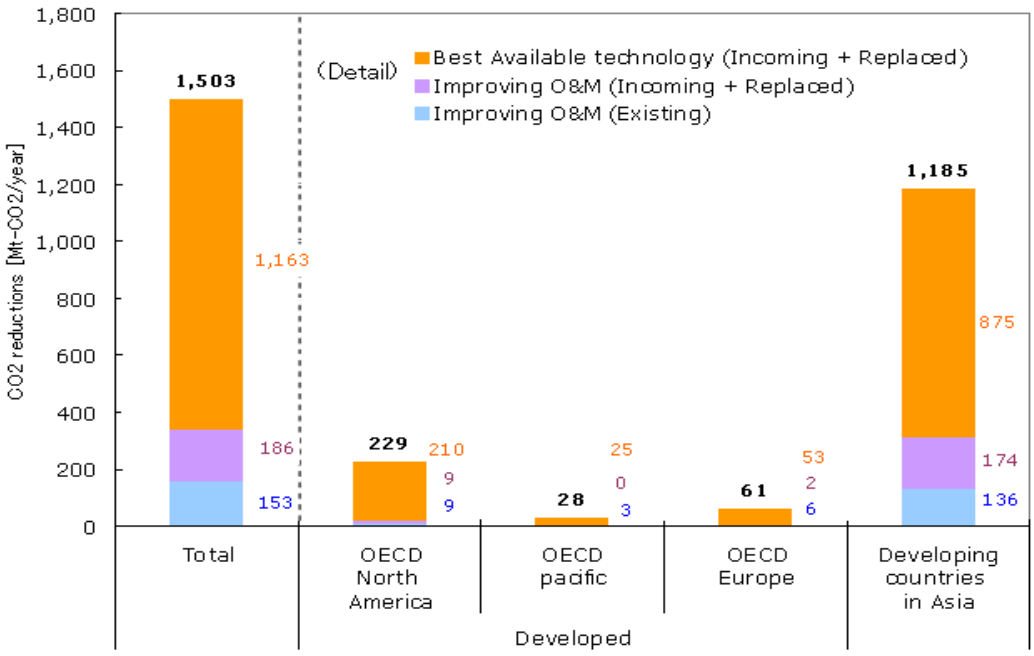


Fig. 5 Comparison of CO2 reduction effect (2030 BAT Scenario)

meetings and PIC meetings, and were likely to reflect negotiations at the UNFCCC, but in the task forces, because there was less influence from the negotiations, and there was a greater private sector presence, there was a constructive discussion. Particularly in the sectors of cement, steel and electricity, a common measurement method for GHG emissions, peer reviews and plant diagnosis was developed. The Japanese private sector made APP activities the centre of international cooperation on climate change and took as many opportunities as possible to be heard, making an active international contribution. In due course there was growing attention from third parties, including the EU.

The APP showed how successfully the public and private partnership worked in terms of technology transfer and the perception was fostered that the private sector has to be given an important role in climate change policy making, while the partnership with the public sector needs to be accelerated. The Japanese public and private sectors shared the idea that it is imperative to replace the APP task forces, but on the other hand they believed that meaningful participation by the USA was not expected if it continues as the APP, and that it was task forces that should be promoted further and not the PIC meeting, because the latter was subject to political influence. They reached a judgment that the decision of the US had to be accepted and that task force activities had to be transferred to some other initiative.

In response to the above development, the power generation and transmission task force had an inner meeting in Tokyo in June 2010 with its task force chair Mr. Jarad Daniels of the US Department of Energy. The two day meeting concluded with several recommendations for future task force activity, assuming that the APP would end, which were intended to promote the expected results and to make up for deficiencies. Here are the main points of the recommendations;

- To maintain key stakeholders, government representatives must show strong support for public-private efforts and move quickly to maintain momentum in the private sector.
- To broaden engagement, additional public and private sector involvement should include service providers and technology providers, and also representatives from funding organizations for the implementation of capital-intensive projects.
- Specific near-term outreach plans for the Task Force should include, but not be limited to, organizations and countries such as the E.U.'s Eurelectric organization and the International Electricity Partnership (see below for further details), with participation from other countries which rely greatly on fossil fuel use
- The Task Force's Best Practice Peer Review project for coal-fired power plants should continue, as this has proved to be very effective and very important for significantly reducing GHG emissions.
- A technology transfer mechanism should be developed for best practices in Transmission and Distribution (T&D)
- The current Demand-Side Management activities should be expanded and
- best practices and regulations for Renewable Energy should be shared

The APP held the closing PIC meeting in Bangkok in April 2011 to conclude this activity. It was decided to transfer the cement, steel and electricity task forces to GSEP. It was expected that the valuable network that has developed through APP activities would continue on the next platform, and that new initiatives would be launched. The APP website[6] will be maintained to share the legacy of the information gathered, as well as best practices and other information that has been developed.

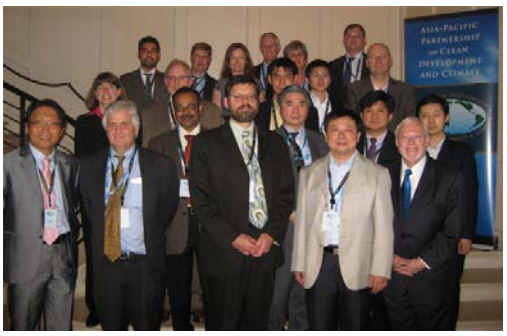


Fig 6 APP Closing Policy Implementation Committee

GSEP launched

Before the APP's closing PIC meeting at the first Clean Energy Ministerial Meeting in Washington, D.C. in June 2010, U.S and Japanese ministers proposed a new public and private partnership initiative, GSEP. This aims to diffuse technologies to accelerate energy efficiency improvements in commercial buildings and industrial facilities, which together account for almost 60 per cent of global energy use, and to reduce greenhouse gas emissions and pollution. Participating governments include Australia, Canada, Denmark, Finland, France, India, Japan, Korea, Mexico, Russia, South Africa, Sweden and the United States, together with the European Commission.

[6] See http://www.asiapacificpartnership.org/english/default.aspx

The GSEP was initially composed of the Certification Working Group (later renamed the Energy Management Working Group) and the Sectoral Working Group.

The central focus of the Energy Management WG is to adopt an energy management system, to achieve designated minimum rates of energy performance improvements and to receive third-party validation for these improvements. (This is led by the US). It was assumed that the Sectoral Working Group would include energy intensive industries who are engaged with energy efficiency improvements, to be driven by public and private partnerships. This plans to develop a database of best available technologies and best practices with regard to successful energy saving and GHG emission reduction, and to standardize the measurement and monitoring methodology of energy consumption and GHG emissions. It is expected to implement facilities diagnosis and peer review. It was also placed under the IPEEC. (This is led by Japan)

Japan proposed that the Working Group should consist of the cement, steel and electricity sectors, which were among the most active under the APP, emphasizing that there had to be a successor to the APP task forces because these were a good demonstration of public and private partnerships. The electricity sector insisted that activities relating to improvements in operation and maintenance that were focused on coal-fired generation plants needed to continue in the new framework, knowing that the circumstances concerning coal-fired power generation differ from country to county.

With regard to the electricity industry, because APP stakeholders met at the Tokyo Inner meeting held before the Clean Energy Ministerial Meeting to discuss the transfer to GSEP, the APP's Power Generation and Transmission Task Force was quickly transferred to the GSEP Power WG. The APP's Steel and Cement Task Forces also decided to transfer to the GSEP WGs by the end of 2010. The US added the Cool Roofs and Pavements WG and Finland launched the Combined Heat and Power WG after the Clean Energy Ministerial Meeting. Now there are six WGs.

The GSEP WGs were also adopted by the IPEEC Executive Committee.

In Japan this was followed by a period of consultation by the Ministry of Economy, Trade and Industry (METI) and relevant organizations, and resulted in a workshop in Washington, D.C in September 2011. At the meeting, the six WGs discussed how they would proceed with their activities. The Power WG was attended by METI and FEPC from Japan, the USDoE and the EEI from the US, Eurelectric from the EU, the Canadian Electricity Association and the World Resources Institute from China, with the objective of learning lessons from the APP and exchanging views on the development of the activity plans.

The main conclusions of the Power WG were as follows;

- It was confirmed that the APP Power Task Force activities and the peer review of coal-fired generation plants were particularly significant
- The WG's activity plan should be developed on the

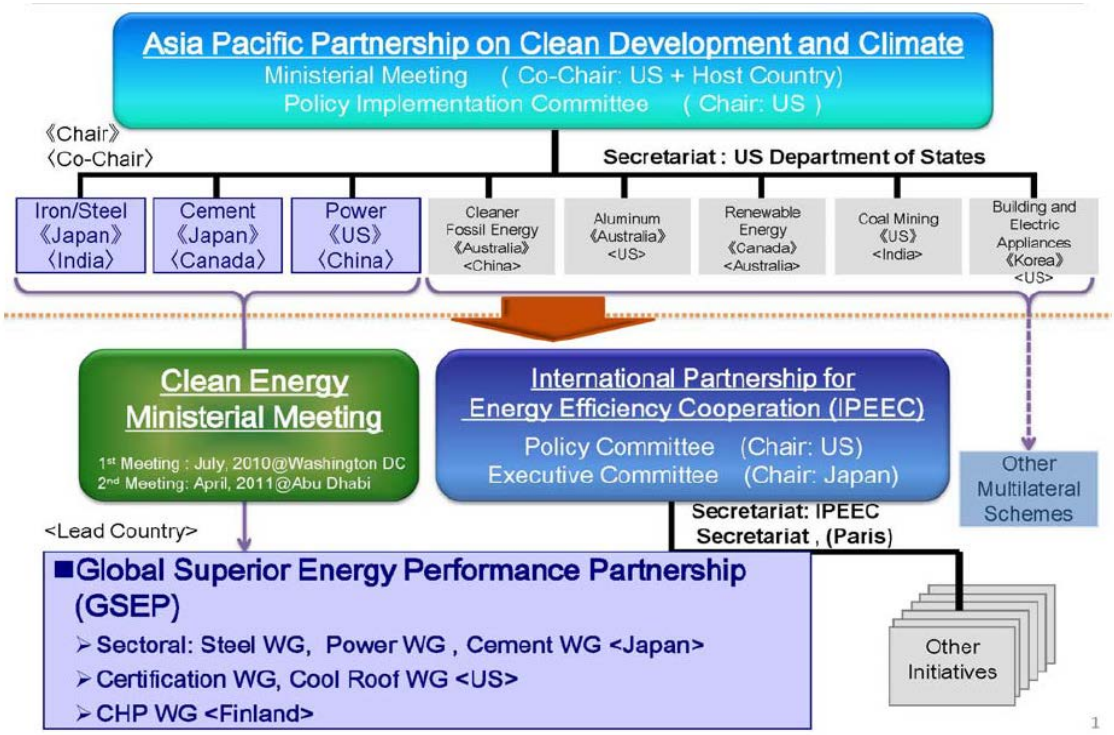


Fig. 7 Transfer of APP to GSEP

basis of recommendations (peer review, T&D, DSM etc) provided by the Tokyo Inner meeting held in June 2010
- Outreach to developing countries is important
- It was agreed that the Power WG Chair would be Mr. Asahi, Director-General of METI and that the Co-Chair would be Dr. Kyte, coordinator of the International Electricity Partnership
- The activity plan would be reported to the third Clean Energy Ministerial Meeting which would be held in London in April 2012

International Electricity Partnership (IEP)

In October 2008 the Canadian Electricity Association, essa (Australia), the Edison Electric Institute (US), Eureletric(EU) and FEPC(Japan) agreed to establish the International Electricity Partnership at the World Electricity Summit Meeting in Atlanta, US. The Comisión de Integración Energética Regional (Latin America) joined later.

The objective of the IEP is (a) to exchange views on the agenda at international climate change negotiations, (b) to confirm common perspectives of the international electricity sector and to deliver its own views and (c) to seek what contribution the electricity sector can make to viewpoints on climate change impact.

The activities it has previously implemented are;

- April 2009, announcement of CCS roadmap at the Ad hoc UNFCCC WG in Bonn
- December 2009, announcement of "Roadmap for a Low-Carbon Power Sector by 2050 at the side event of COP 15 in Copenhagen
- April 2010, panel discussion on the above roadmap in Tokyo
- December 2010, MRV report of the electricity sector and performance of the IEP at the COP 16 side event in Cancun
- December 2011 Outreach to South Africa about common challenges facing the electricity industry, in Durban

GSEP 1st Sectoral Working Group

Following the workshop in Washington, D.C., the GSEP 1st Sectoral Working Group was held in Tokyo in March 2012, consisting of the Power WG and the Steel WG. The Power WG was attended by 30 members from Japan's METI, FEPC, CRIEPI, Tokyo Electric Power Co., Kansai Electric Power Co., the US DoE, Indonesia's Ministry of Mineral Resources and Energy, PLN, China's Renmin University, CLP of China, the IEP and the Asia Development Bank. The WG adopted the WG's work plan and operational guidelines and approved the implementation of activities to facilitate the development, deployment and diffusion of cost-effective, cleaner and more efficient technologies based on work done by the APP Power Generation and Transmission Task Force, among others by highlighting

- Best Practices in Power Plant Efficiency and Operation
- Best Practices in Transmission and Distribution (T&D)
- Best Practices in Demand Side Management (DSM).

Moving ahead

Throughout the course of moving to the GSEP from APP, some challenges were highlighted. The most typical example was pointed out by the Centre for European Policy Studies (CEPS) report [7] entitled Sector-specific Activities as the Driving Force towards a Low-Carbon Economy. From the Asia-Pacific Partnership to a Global Partnership (Noriko Fujiwara 2012). This gives an assessment of the APP by describing "The APP's two features – bottom-up approaches and a public–private partnership – were considered factors behind its success" but at the same time it pointed out "Among the major barriers, the lack of funding puts constraints on progress in the demonstration of new technologies." and suggested "Facilitating access by the private sector to international and regional financial institutions (e.g. the World Bank, the Asian Development Bank and the European Investment Bank (EIB)) would be a possible solution to the funding problem."

This may be correct but the focus should be on how resources can be secured to allow financing to be reimbursed. Under the APP/GSEP, it is assumed that resources are derived from increased efficiency, but electricity rates are normally low in developing countries. Therefore different ideas, including lengthening the reimbursement period and reducing the initial cost, have to be taken into account.

The above essay pointed out another barrier, "a lack of capacity for data collection and management". This is also true of the electricity sector. However all the challenges pointed out already can be solved. These will be addressed as the GSEP moves ahead.

[7] See http://www.ceps.eu/book/sector-specific-activities-driving-force-towards-low-carbon-economy-asia-pacific-partnership-gl

Sectoral Approach in the Steel Industry

The Japan Iron and Steel Federation

7300
169
338
764
J.I.S.F. 日本鉄鋼連盟
The Japan Iron and Steel Federation
http://www.jisf.or.jp
Copyright ©The Japan Iron and steel Federation All Rights Reserved.

J.I.S.F. 日本鉄鋼連盟
The Japan Iron and Steel Federation
http://www.jisf.or.jp
写真：西澤 丞
Copyright ©The Japan Iron and steel Federation All Rights Reserved.

Sectoral Approach in the Steel Industry

Outline of Steel Working Group of the Global Superior Energy Performance Partnership

October 2012

The Japan Iron and Steel Federation

Executive Summary With global crude steel production expected to continue expanding into the medium-to-long term thanks to the growth in China, India and other countries. Since the steel industry consumes a great deal of energy, the transfer of Japan's world-leading technology in energy conservation and environmental protection will be indispensable to the formation of a sustainable society from a global perspective.

The Japanese steel industry continues to press ahead with a cooperative, sectoral approach towards the greater diffusion of energy-saving and environmentally friendly technologies. Especially, GSEP (Global Superior Energy Performance Partnership) Steel WG (working group) conforming to its technology-based, bottom-up approach based on PPP (Public and Private Partnership) is playing a core role in this initiative.

In this document, we would like to provide an introduction covering a step-by-step explanation of the cooperative, sectoral approach that the steel industry is adopting, the significance of the PPP, the story of the transition from the APP (the Asia-Pacific Partnership on Clean Development and Climate) to the GSEP Steel WG, and an outline of the GSEP Steel WG itself.

Introduction

Japan's industrial sector continues to implement and strengthen measures towards energy conservation, by constantly exploiting and introducing cutting-edge technology to the maximum extent possible, to raise what is already the world's highest degree of energy efficiency yet further. And it continues to make a positive contribution to the energy conservation and environmental protection initiatives of society at large by supplying outstandingly high-quality products. Furthermore, the energy conservation and environmental protection measures undertaken worldwide thank to the transfer and diffusion of Japanese technology can be said to be indispensable to the development of a sustainable society by balance between the economy and the environment on a global scale.

Against this background, Japan's steel industry, along with the cement and electric power generation industries have outpaced other industrial sectors in creating structures for international cooperation. Every year since 2005, 'Japan- China Steel Industries Conference on Exchange of Advanced Technologies on Environmental preservation and Energy saving' for specialists in the field has been held. And the APP Steel Task Force started in 2006. The task force comprises seven nations (Japan, Australia, China, India, South Korea, the USA and Canada) and its activities include the sharing of information about energy conservation technologies and diagnostic surveys of steel production mills in China, India and other countries. Furthermore – both leveraging the success of the APP Steel Task Force and broadening its scope to encompass the worldwide steel industry – the decision was taken by the World Steel Association (worldsteel) in October 2007 to adopt 'A Global Steel Sectoral Approach'.

Nowadays too, thanks to the GSEP (the Global Superior Energy Performance Partnership which is the successor organization to the APP Steel Task Force) Steel WG (working group) and Japan-India bilateral initiatives and other cooperative undertakings, the aim remains to foster the transfer of effective energy-saving and environmental conservation technologies.

What sort of structure is preferable for international coordination efforts contributing to the transfer of energy-saving and environmental conservation technologies?

In this document, we shall provide a step-by-step explanation, based on the guidelines etc. adopted at the inaugural round of the GSEP Steel WG, of the cooperative, sectoral approach adopted by the Japanese steel industry as well as an outline of the GSEP Steel WG that forms the nucleus of our current and future activities.

We shall be extremely grateful if you take this opportunity to become more familiar with the ideals and activities of the Japanese steel manufacturing industry as it strives, to meet the challenges of spreading its energy conservation and environmental protection technologies through its technology-based, bottom-up model.

1. Global crude steel production and production processes and the energy conservation and environmental protection technologies required for the formation of a sustainable society

1.1. Global crude steel production

The volume of world crude steel production was around 700-800 million tons in the 90s but rose sharply from 2000 onwards in response to rapid growth in China. The global economic crisis sparked by the Lehman Shock of autumn 2008 brought a temporary decline but, from the second half of 2009 onwards, growth was stimulated by the economies of the emerging nations and had reached nearly 1.5 billion tons by 2011 (Fig. 1).

From a longer-term perspective, the growth in India and other nations is expected to result in this figure exceeding 2 billion tons in 2050 (Fig. 2).

1.2. Japanese energy conservation and environmental technology necessary to the formation of a sustainable society

Japan's steel industry achieved a rapid expansion in production volumes in response to the fast growth in the country's economy in 1960s. The industry also took steps so as to proactively deal with the challenges raised by the problems of various types of pollution, the suitable treatment of waste water drainage and gas emissions, the effective usage of water resources, and the greening of factory sites etc. which surfaced as a result of this rapid industrial development. In response to the two oil shocks of the 1970s, the introduction of energy-conservation technology was promoted as a national policy priority and the industry made great efforts to proactively develop and install various types of energy-saving technologies (including programs implemented to reduce the environmental burden by the treatment of waste gases and augmented measures to control particulate pollution so as to control the impact of a large increase in energy consumption).

Thanks to these measures, the dissemination rate of the main large-scale energy-conservation technologies such as coke dry quenching (CDQ) and blast furnace top gas pressure recovery power generation equipment (TRT) reached close to 100% which, in turn, resulted in the achievement of the world's highest level of energy efficiency being achieved in Japan. (Fig. 3, 4, 5, 6)

Because the energy conservation and environmental technology that enable the Japanese steel industry to achieve such results can be introduced into steel mills worldwide, it is essential for the formation of a sustainable global society that they contribute to the energy conservation and environmental protection strategies adopted worldwide.

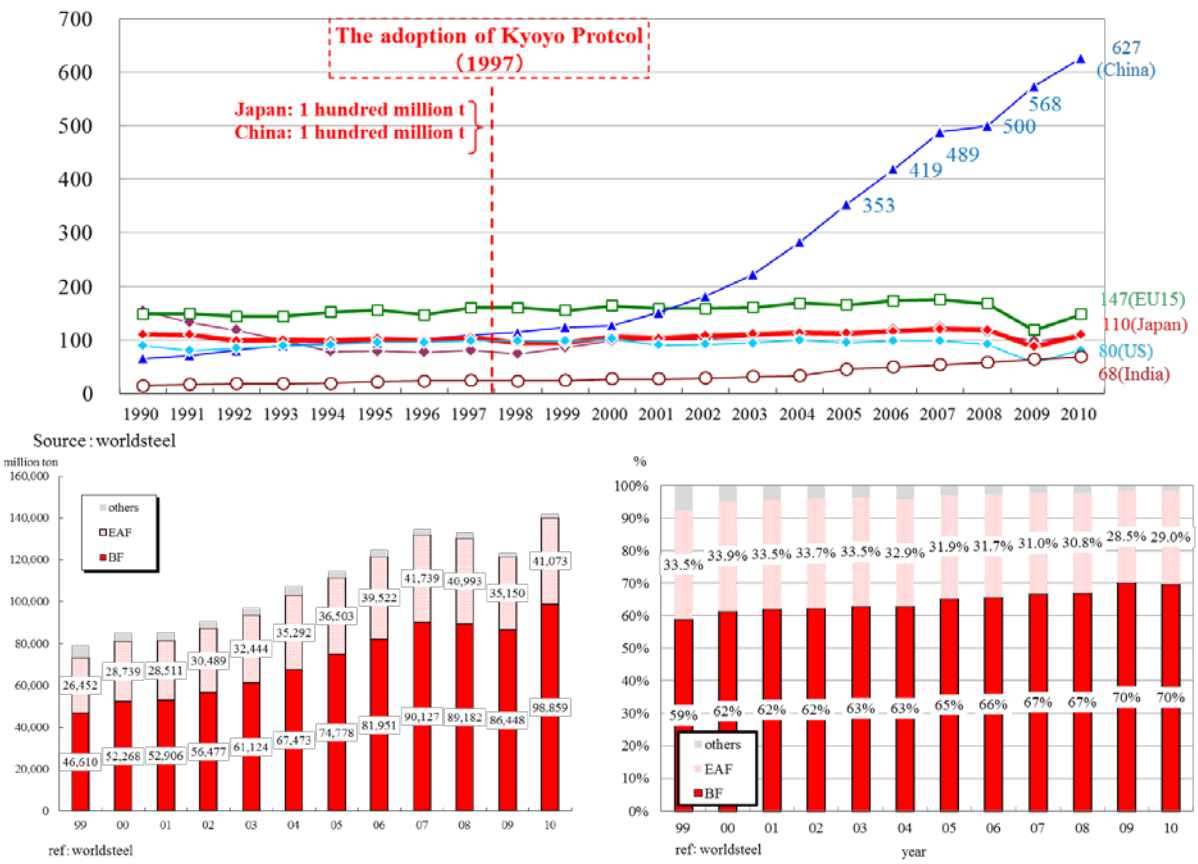


Fig. 1 World crude steel production

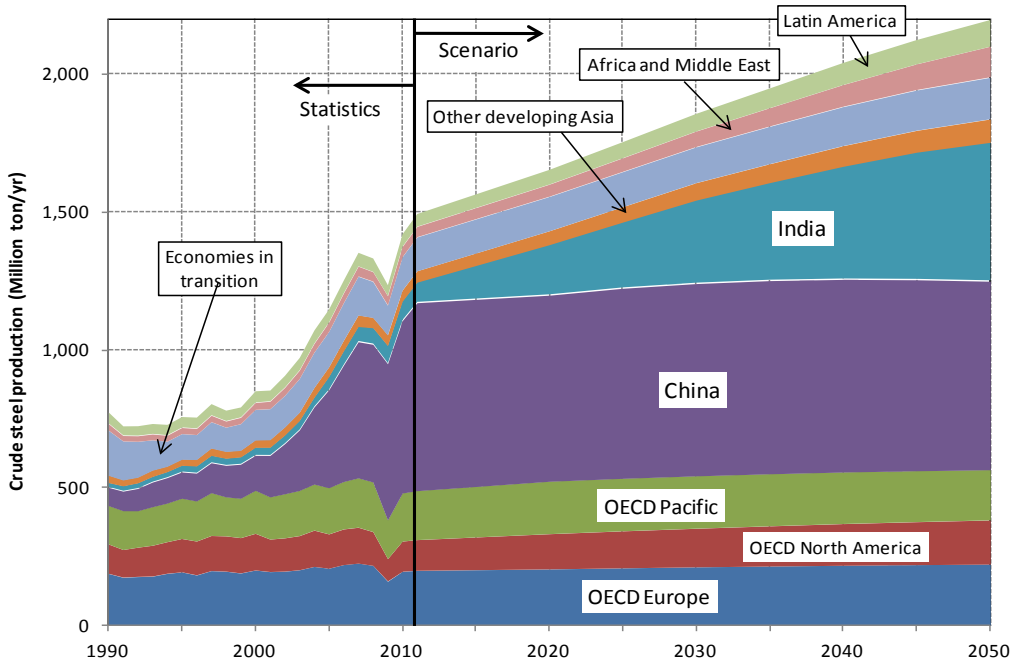
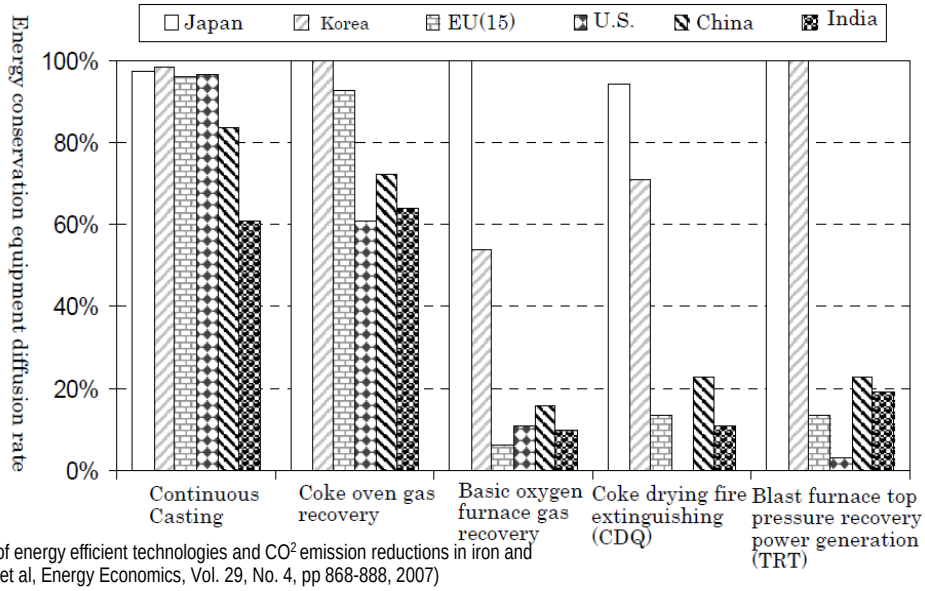
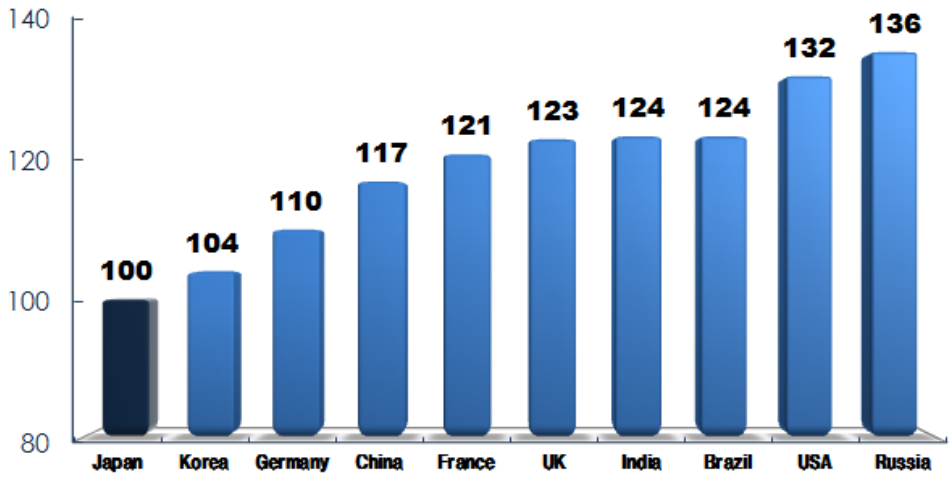


Fig. 2 Long-term outlook of world crude steel



Source: Diffusion of energy efficient technologies and CO^2 emission reductions in iron and steel sector (ODA et al, Energy Economics, Vol. 29, No. 4, pp 868-888, 2007)

Fig. 3 Utilization rate of major energy-conserving technologies



Source: RITE

Fig. 4 Comparison of Unit Energy Consumption of Steel (2010)

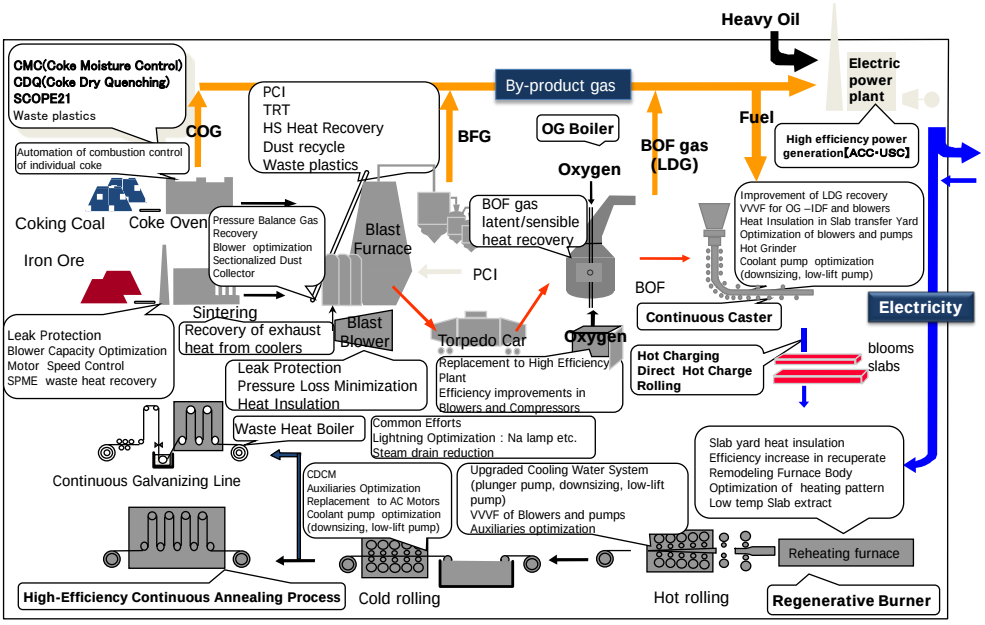


Fig. 5 Environmental Protection & Energy-saving technologies in steel works technologies

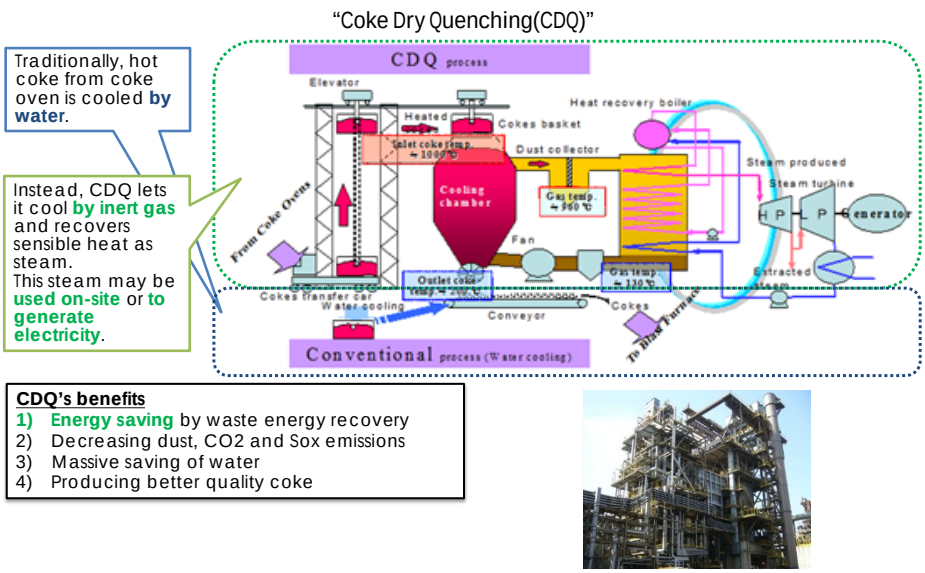


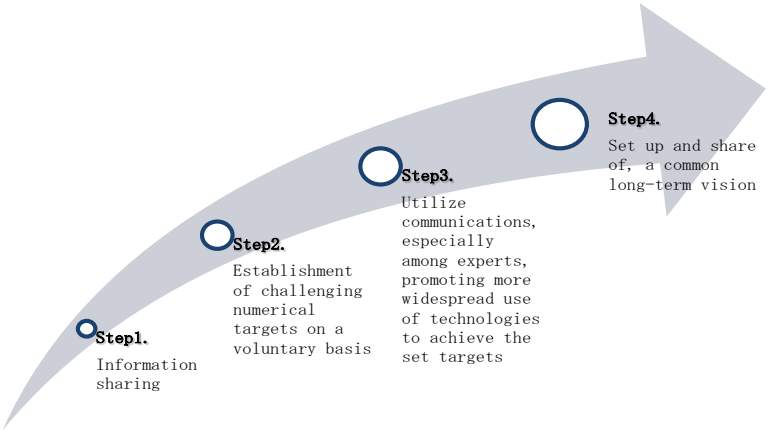
Fig. 6 The example of energy conservation technology in steel works

2. Steps taken towards the cooperative, sectoral approach adopted by the steel industry and the significance of the public-private joint initiative

2.1. The cooperative, sectoral approach

To date, Japan's steel industry, in aiming at the creation of a new international framework to really promote the transfer of energy conservation and environmental protection technologies, has taken a bottom-up based, cooperative, structural approach towards the promotion of concrete, achievable projects resulting from a series of technical discussions with specialists and experts in the field in forums such as the 'Japan-China Steel Industry Advanced Technology Exchange Meetings for Environmental Protection and Energy Conservation', the 'Asia Pacific Partnership for Clean Development and Climate' (APP) and various initiatives undertaken by the World Steel Association (worldsteel).

Specifically, we have followed the 4 Steps outlined below. (Fig. 7)



Source: T Okazaki et. al., Accelerating the Transfer and Diffusion of Energy Saving Technologies. Steel Sector Experience - Lessons learned

Fig. 7 Cooperative sectoral approach of Steel Industry

Step 1. Information Sharing

When transferring energy conservation and environmental protection technologies, the following can be cited as examples of the sort of information that should be shared.

1. Sharing lists of energy conservation and environmental protection technologies

By sharing the technical information/data compiled into lists, it is possible to grasp what sort of energy conservation and environmental protection measures can successfully be deployed in what kind of processes in steel mills.

Moreover, regardless of the efficiency of the steel mills in which they are introduced, because the effectiveness of each individual technology is constant, it becomes possible to comprehend in quantitative terms the operational results and energy efficiencies achieved in the case of each individual installation project.

As part of its flagship project, the APP Steel Task Force has compiled a comprehensive collection of the very best energy conservation and environmental protection technologies utilized in the steel industry under the title of the 'SOACT Handbook' and has made it available to everyone by publishing it on its website.

SOACT Handbook:

(http://asiapacificpartnership.org/english/soact2nd.aspx)

2. Sharing barrier analyses of reduction potential surveys and technological dissemination

By investigating the diffusion rates of technologies, it is possible to grasp their reduction potential. Furthermore, the sharing of barrier analyses of technology diffusion is important in the transfer of energy conservation and environmental protection technologies.

Thanks to the APP Steel Task Force and its calculations of the reduction potential (as a theoretical value) particularly in the case of the diffusion of effective energy conservation technologies, it has become possible for the first time for steel specialists to achieve real, quantifiable results for themselves. (Table 1)

Moreover the barrier analyses conducted by APP members on the basis of the expertise of steel specialists were shared.

3. Sharing the settings and results of calculation analyses for the performance indices of steel mills

By establishing the methodologies for calculating the energy performance indicator of the steel mill (by sharing common calculation formulae, boundaries, emissions sources and factors) it is possible to understand in objective terms the energy performance of the steel mill in question.

The APP Steel Task Force has compiled a database of the energy performance indicators of steel mills.

On the basis of this method for determining the input and expenditure of energy, worldsteel has compiled a User Guide to its 'CO2 Emissions Data Collection', constructed a global database of steel mills and has commissioned a follow-up project which is being conducted by steel specialist from nations all over the world.

At present, this technique is being carried forward through Japanese leadership towards recognition under the ISO 14404 international standard and has already achieved the issuance of a DIS (Draft International Standard). ISO 14404 is a 'Calculation method of carbon dioxide emissions intensity from Iron and Steel production' but by using the standard's scope, emissions sources and boundaries together with its emissions factors of worldsteel values, an annex designation has been granted which is identified as an 'energy performance indicator of the steel mill' (ISO 14404 Annex A). This certainly means that the definition of the calculation formulae, boundaries, emissions sources and various factors etc. for the energy performance indices established by the APP Steel Task Force are now much more minutely and accurately defined. (Fig. 8)

Step 2. Establishment of challenging numerical targets on a voluntary basis (no-legally binding)

The second step requires that challenging, achievable, independent (not legally binding) targets be set on the basis of the technologies. In order that this outcome be properly achieved, it is desirable that these should be evaluated, tested and, if necessary, revise by specialists in the field. The object of this, however, is absolutely not that member nations or business persons be restricted or bound in any way whatsoever.

Step 3. Utilize communications, especially among experts, promoting more widespread use of technologies to achieve the set targets

The third step covers technology dissemination activities undertaken for the sake of meeting these targets.

As part of this process, the APP Steel Task Force has conducted diagnostic investigations concerning energy conservation and environmental protection in China and India and carried out detailed analysis of its findings. (Table 2)

Step 4. Set up and share of, a common long-term vision

The fourth step is concerned with sharing programs for the development of a long-term vision and innovative new technologies. A radical CO2 reduction technology development program called 'CO2 Breakthrough Programme' was started by worldsteel in 2003 and Japan has also participated in the development of an innovative steel production process (COURSE 50).

2.2. The significance of PPP

It is important that energy conservation be promoted not just for the sake of its economic benefits such as lowering energy costs but also from the perspective of establishing and improving (national) energy security in a broad sense. Moreover, projects boosting the production of highly profitable steel products are likely to be prioritized in the investment decisions of private steel manufacturing companies and so, it is essential for governments to take suitable policy measures to promote energy conservation projects such as the gradual phasing in of regulations and closely targeted investment incentives etc. Furthermore, it is necessary that regional environments be taken into consideration in the suitable treatment of waste water drainage and exhaust gases so that the long-term development of the steel industry as one of our key industries, but one which also imposes a heavy burden on the environment, can be fostered. From this perspective it is clear that the participation not just of the private sector but also of government is critically important.

The APP Steel Task Force has, by obtaining the participation of the public sector in addition to that of the private, promoted the dissemination of environmental technology which boasts only limited merit and, by sharing its experience of the introduction of regulatory and legislative systems in developing, can be regarded as having made a major contribution to

Table 1 Theoretical reduction potential from diffusion survey

Source: APP Steel Task Force

【Based on Data of 2005】

	Reducing Potential (Million t/y)	
	New Analysis (APP 7)	Previous (APP 6)
CO2	129	127
SOx	0.67	0.65
NOx	0.29	0.29

Table 2 Improvement potential based on diagnostic investigations concerning energy conservation and environmental protection in China and India

Source: APP Steel Task Force

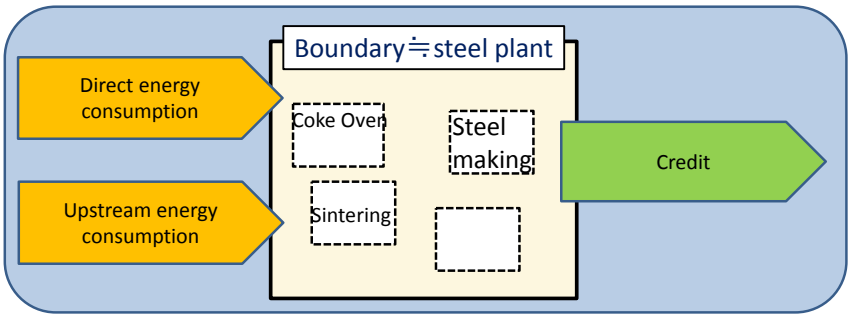
Steel Plant	Energy Reduction Potential (TJ/Year)	CO_2 Reduction Potential (kt-CO2/Year)	Improvement Ratio of Energy Efficiency (GJ/t)
A	23,558	2,290	4.7(17%)
B	1,995	481	0.6(2%)
C	18,544	2,080	2.4(11%)
D	9,209	1,019	4.4 (13%)
E	2,308	279	1.5 (6%)
F	–	–	–
Total	55,614	6,149	

NOTE)

·Quantitative diagnosis could not be done at Plant F, because the data required for diagnosis was not submitted.

building up the capacity of the governmental administration and bureaucracies of countries like China and India. As a result, we believe that public-private initiatives are essential to the future of Japan's steel sector.

The focus from the next chapter onwards is on the GSEP Steel WG.



Energy consumption = Direct energy consumption+ Upstream energy consumption – Credit
Energy intensity = energy consumption / crude steel production

Fig. 8 Calculation method of energy consumption and energy intensity in the steel plant based on ISO 14404 Annex A

3. From the APP Steel Task Force to the GSEP Steel WG

3.1. From APP to GSEP

In the summer of 2010, a communication was sent to the relevant parties concerned with APP in the governments of various nations worldwide to the effect that both the chairman of the APP PIC (Policy Implementation Committee) and the US State Department which was fulfilling the role of secretariat/executive office 'wished to relinquish the APP executive office since (because of political factors) there was some difficulty in guaranteeing the budget related to the APP's executive office expenses'.

Having received this communication and as a result of discussions between the governments of major nations including Japan, the USA, Australia and Canada, there was general agreement that, because the accomplishments of the various APP task forces were extremely highly regarded, their activities should be allowed to continue and so it was determined that whereby at least the Japan-led steel, cement and electric power task forces should be reconfigured as International Partnership for Energy Efficiency Cooperation (IPEEC) task groups and that a framework should be established which it would be possible for non-APP member nations to join. Following on from these developments, it was decided at the first Clean Energy Ministerial (CEM) held in Washington DC in July 2010 that, as part of a Japan-US initiative related to energy conservation, the GSEP should be established under the auspices of the CEM, International Partnership for Energy Efficiency Cooperation (IPEEC).(Fig.9) Between 12 and 13 September 2011, preparatory meetings for the first kick-off sessions of each of the GSEP cement, electric power and steel WG were held with workshops in Washington and the GSEP Steel WG draft guidelines were introduced on this occasion with the work of finalizing the details of the clauses being undertaken principally by Japan and the US. The section below covers the background required to grasp the issues surrounding the confirmation of the points at issue concerning the 'objective' mentioned on the first page of this draft and also the details of the metamorphosis from APP Steel Task Force to GSEP Steel WG. (Fig. 10)

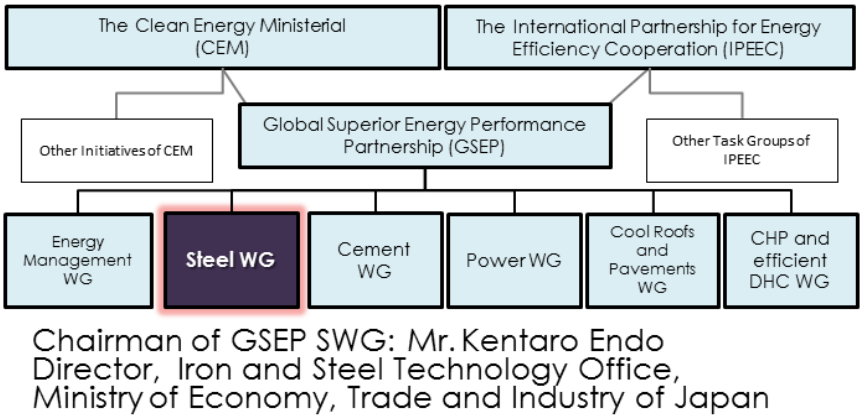
3.2. The 1st GSEP Steel WG held in Tokyo

Japan, the USA, South Korea, China and Australia were amongst the nations that participated in the 1st Steel WG convened in Tokyo between 12 and 13 March 2012. On this occasion, the guidelines were adopted and Mr. Kentaro Endo (director, Iron and Steel Technology Office, Ministry of Economy, Trade and Industry) was appointed as Chairman of the Steel WG.

Comments followed on the expectations for GSEP from the U.S. Department of Energy, the China Iron & Steel Association, POSCO (Korea), the Japan Iron and Steel Federation (JISF), Alezz Dekheila Steel Co. (Egyptian steel manufacturer), and worldsteel (the World Steel Association) and, in conclusion, five concrete project proposals were put forward by the Japan Iron and Steel Federation (JISF).

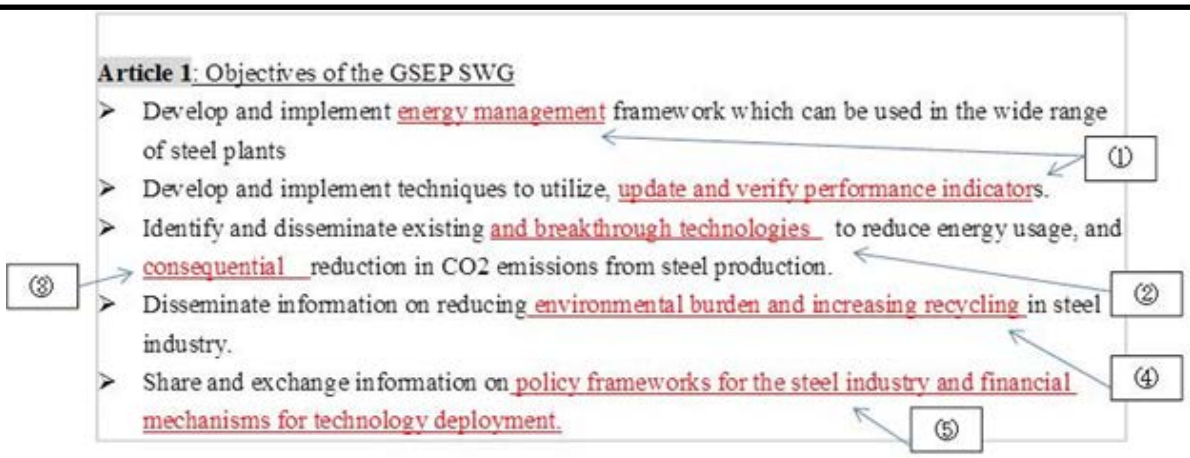
As for future steps, Japan, as chair country, is to prepare a communication paper in accordance with the proposal made by the USA and member country registration is to be solicited.

In the next chapter we provide a general outline of the GSEP Steel WG on the basis of a summary of the communication paper.



Source: Communication Paper of GSEP Steel WG

Fig. 9 Organogram of GSEP Steel WG



Article 1: Objectives of the GSEP SWG

- Develop and implement energy management framework which can be used in the wide range of steel plants ①
- Develop and implement techniques to utilize, update and verify performance indicators.
- Identify and disseminate existing and breakthrough technologies to reduce energy usage, and consequential reduction in CO2 emissions from steel production. ③ ②
- Disseminate information on reducing environmental burden and increasing recycling in steel industry. ④
- Share and exchange information on policy frameworks for the steel industry and financial mechanisms for technology deployment. ⑤

① Energy management system (EMS) is newly referred since the United States played a leading role for EMS (ISO 50001).

② APP-STF focused on only existing technologies i.e. BAT/State-of-art clean technologies. GSEP also considers long-term viewpoints and breakthrough technologies in addition to existing technologies.

③ GSEP focuses more on energy saving as it referrers to "reduction of energy consumption and consequential reduction in CO2." "Green House Gases (GHG)."is not mentioned on the guideline.

④ "Environmental burden" and "increasing recycling" are newly referred.

⑤ Sharing and exchange of information on financial mechanisms which eliminate main financial barrier is newly referred. This financial mechanism includes not only international financial mechanism for technology diffusion under the United Nations, but also the concepts of appropriate financial supports from governments for domestic technology diffusion in each country.

Fig. 10 Objectives of the GSEP SWG

4. About the GSEP Steel WG

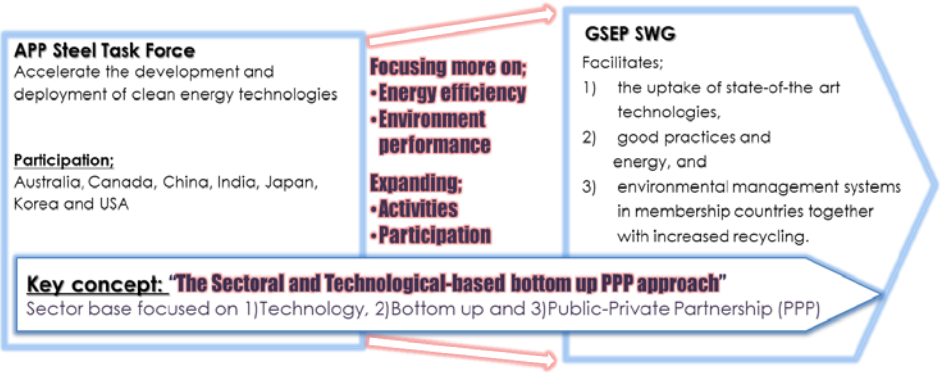
4.1. Outline of the GSEP and 5 objectives

The GSEP Steel WG is defined in the guidelines as 'The GSEP Steel Working Group (SWG) members account for significant portion of the world's steel production. SWG shall facilitate the uptake of state-of-the art technologies, good practices and energy and environmental management systems in membership countries together with increased recycling. The SWG provides a unique forum for public-private dialogue and cooperation, which will contribute to the development of a viable long-term clean energy strategy, addressing energy security, economic development, and environmental challenges'.

The passing on of the basic principles of 'bottom-up thinking based on technology' and 'public-private cooperation' referred to above are points worthy of special mention. (Fig. 11)

In line with the basic principles mentioned above, the five objectives that the GSEP Steel WG is aiming to achieve are outlined below.

(1) Develop and implement energy management framework which can be used in the wide range of steel plants
(2) Develop and implement techniques to utilize, update and verify performance indicators.
(3) Identify and disseminate existing and breakthrough technologies to reduce energy usage, and consequential reduction in CO2 emissions from steel production.
(4) Disseminate information on reducing environmental burden and increasing recycling in steel industry.
(5) Share and exchange information on policy frameworks for the steel industry and financial mechanisms for technology deployment.



Source: Communication Paper of GSEP Steel WG

Fig. 11 From APP Steel Task Force to GSEP Steel WG

4.2. Principles and membership of the GSEP

PPP is the major principle underpinning the GSEP Steel WG and this is reflected not just in its operations but also in its guidelines since there are at least two representatives elected from each member country (one from the public sector and one from the private) and so it is clear that it has been established on the basis of a close cooperative relationship between public and private interests.

The membership qualifications are that the GSEP is open to all IPEEC and Clean Energy Ministerial members and that, in the case of new affiliates, having demonstrated their consent to cooperate with and participate in the GSEP's activities, such new affiliates should agree with the concept of public-private cooperation with the key requirement that being that all members agree to these conditions. In other words, the door is open to all nations provided that they participate on the basis of a tightly knit coordination between government and private interests.

4.3. Future initiatives

Once a formal register of members has been compiled on the basis of the collected communication papers, the following action plans, having been revised to reflect the opinions expressed by the member nations, are to be put into effect with a view to collaboration with the GSEP Energy Management WG. (Table 3)

Table 3 Action plan

Source: Communication Paper of GSEP Steel WG

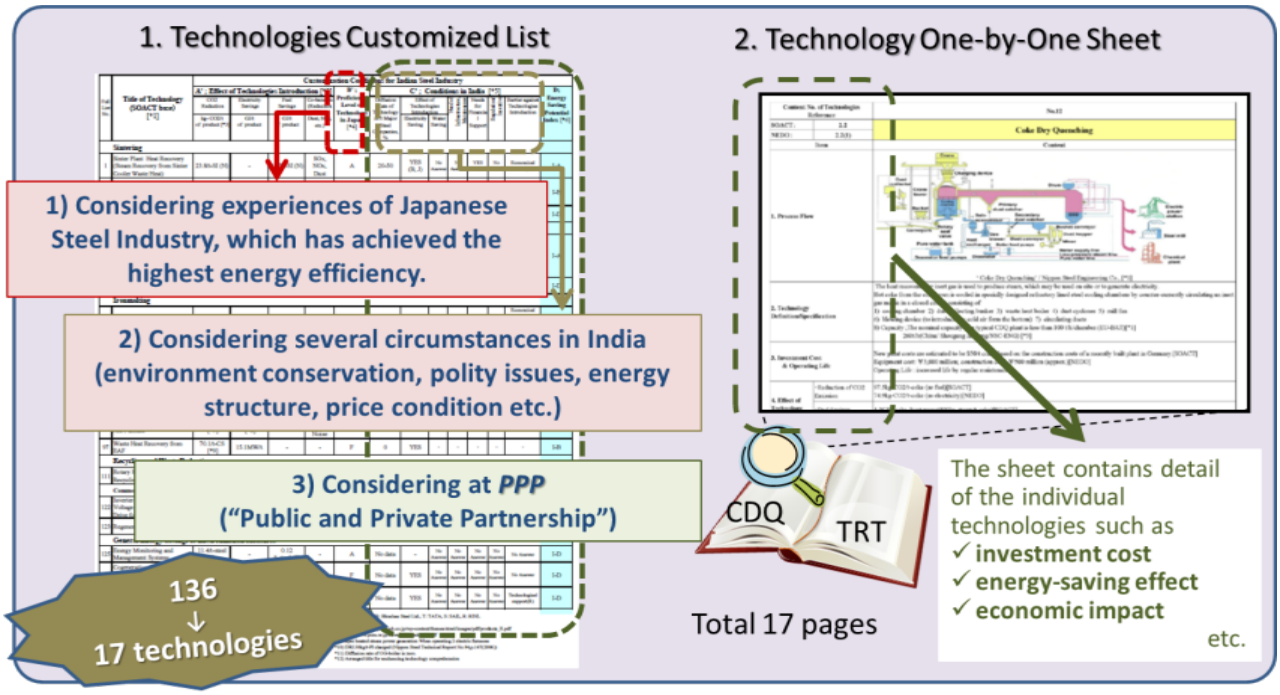
1. Develop and implement energy management framework which can be used in the wide range of steel plants
2. Develop and implement techniques to utilize, update and verify performance indicators.
3. Identify and disseminate existing and breakthrough technologies to reduce energy usage, and consequential reduction in CO2 emissions from steel production.
4. Disseminate information on reducing environmental burden and increasing recycling in steel industry.
5. Share and exchange information on policy frameworks for the steel industry and financial mechanisms for technology deployment.

Reference

Bilateral discussions between Japanese and Indian steel industry based on PPP are underway together with APP/GSEP and other bodies. Given this situation, the creation of a 'customised technology list' has begun. This is a selective, customised list created from the 'full technology list' (which encompasses worldwide energy conservation technologies), the contents of which make great use of information shared by the abovementioned APP/GSEP and is really designed to be particularly suitable for India's steel industry by satisfying the three points itemized below.

- Joint initiatives based on public-private cooperation between Japan and India
- Exploiting the 'experience' of Japan's global top-class steel industry. At present, the list has been distilled down to 17 technologies from the 136 technologies included in the 'full technology list' and further revisions to the list are scheduled. (Fig)
- Various Indian terms and conditions (environmental conservation, policy/technical problems and issues, energy configuration, pricing terms etc.)

At present, the list has been distilled down to 17 technologies from the 136 technologies included in the 'full technology list' and further revisions to the list are scheduled. (Fig)

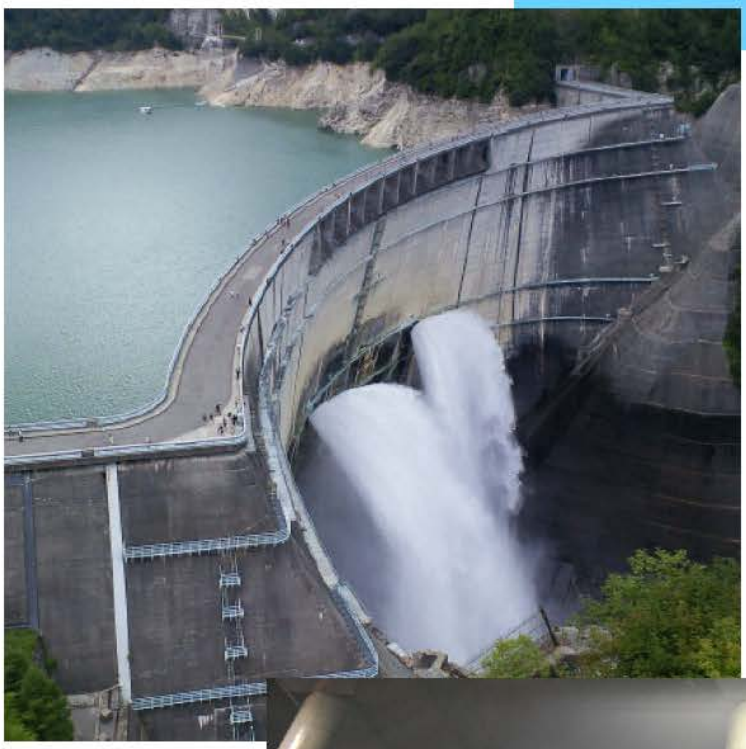


Source: The Japan Iron and Steel Federation

Fig. Technologies Customized List (draft) appropriate for Indian Steel Industry

Sectoral Approach
in the Cement Industry

Japan Cement Association



Sectoral Approach in the Cement Industry

Outline of Cement Working Group of the Global Superior Energy Performance Partnership

October 2012

Japan Cement Association

1. Background

The Global Superior Energy Performance Partnership (GSEP) is an initiative of the Clean Energy Ministerial (CEM) and the International Partnership for Energy Efficiency Cooperation (IPEEC). It is the successor of the APP (Asia Pacific Partnership on Clean Development and Climate) indicated in APPENDIX.

The GSEP cement working group (Cement WG) aims to reduce global energy use in industrial facilities and commercial buildings in order to improve energy security and to reduce global greenhouse gas emissions (GHG) by:

- Encouraging industrial facilities and commercial buildings to pursue continuous improvements in energy efficiency, and
- Promoting public-private partnerships for cooperation on specific technologies or in individual energy-intensive sectors.

On September 12th and 13th, 2011, in Washington D.C., the governments of the United States, Japan and Finland organized the GSEP workshop to bring together for the first time the participants of the sectoral working groups including Power, Steel and Cement and the other three groups under the GSEP.

This report describes outcomes of the GSEP workshop including the breakout session, and the proposed framework and work plans of the Cement WG.

2. GSEP workshop

Approximately 140 public and private sector representatives from 14 countries came together to define collective strategic objectives and discuss work plans for each working group. Plenary sessions allowed participants to better understand the activities of the other working groups and to identify possible opportunities for collaboration.

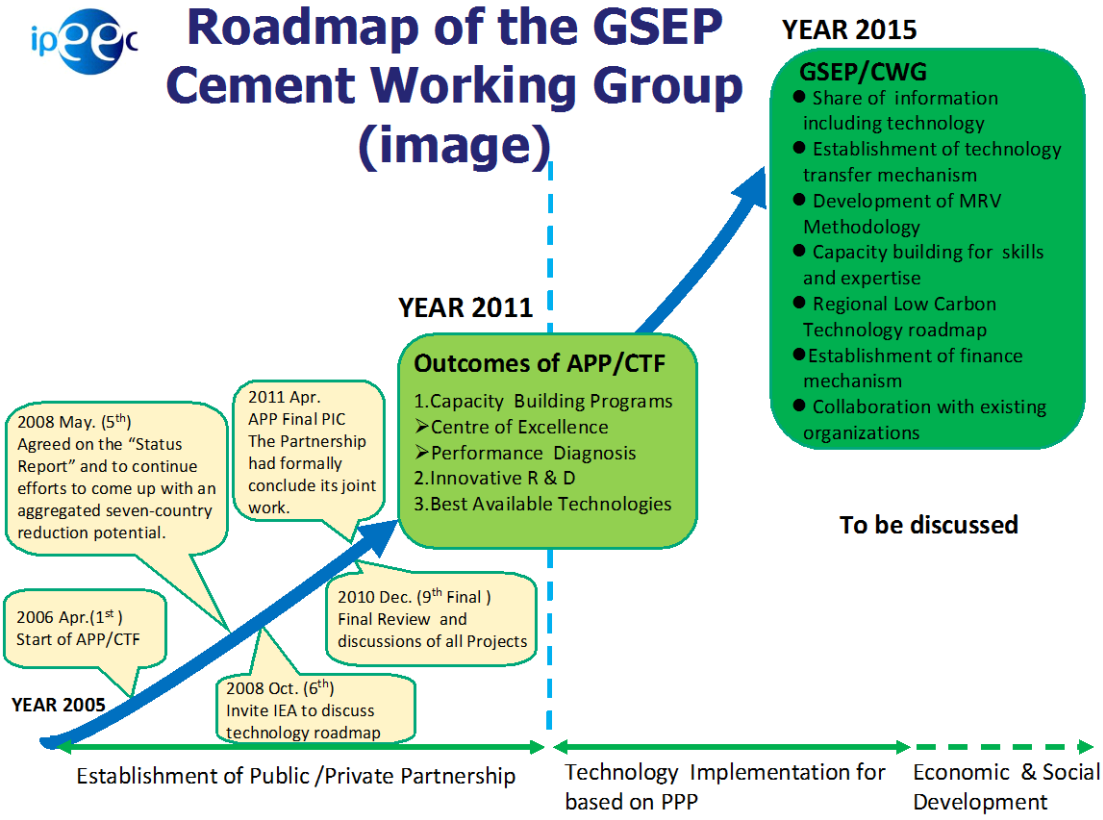
In order to establish the Cement WG under GSEP, government officials from the United States and Japan, and private representatives such as national trade associations and cement companies, participated in a breakout session of the cement sector. In the breakout session participants shared the view that APP left significant outcomes and discussed how to make further progress under the GSEP framework.

It was decided the 1st Cement WG meeting should be held to confirm goals, member countries and an operational guideline. The chair of the session also suggested to adopt the roadmap illustrated below, based on the APP Roadmap, for the GSEP WG.

All participants agreed the concept that the Cement WG creates a voluntary framework for international cooperation on the basis of public and private partnership. The following goals were then proposed:

- Collaboration on policies, programs and projects geared toward further enhancing the energy efficiency and reducing the GHG emissions of the cement manufacturing process.
- Promotion of sustainable applications of cement and concrete products as tools to enhance energy efficiency and avoid GHG footprints across the built environment.

The participants identified that securing participation of the governments of major economies, especially China and India, is indispensable for the continuation of GSEP.



3. Proposed Structures of the Cement WG

The Japan Cement Association (JCA) proposed the following structures of the Cement WG to the government through experiences of APP activities and also outcomes of the workshop:

3.1. Public private partnership as the significant framework

In order for the private sector to develop and transfer technologies based on a bottom-up approach, it is requested to share updated information on the status of climate initiatives, policies, technology, materials availability etc in member countries and have continuing dialogue with governments taking into consideration supporting policy measures. The JCA considerably expects the opportunity to discuss relevant policies with decision makers at the Cement WG as the succeeding initiative of APP.

3.2. Linking with finance organizations to facilitate effective technology diffusion.

The experience of the APP was that funding shortages result in difficulties in the continuation of projects. Therefore, a mechanism for financial support should be considered for each project of the Cement WG. At first, in order to encourage private funding of projects, the Cement WG should discuss project candidate criteria such as the kind of energy conservation or clean technologies and the required level of public financial support. This approach will link to the private sector engagement of the Green Climate Fund under the Durban agreement.

3.3. Collaboration with existing organizations and networks

Candidate organizations for the GSEP Cement WG to cooperate with are the Cement Sustainable Initiative (CSI), International Energy Agency (IEA) and European Cement Research Academy (ECRA).

The CSI is one of the international sector networks under the World Business Council for Sustainable Development (WBCSD), a global organization working towards sustainable development with many international company members. The CSI, consisting of global major and local cement companies, together with many trade associations, including JCA, as communication partners, has established a GHG data base incorporating data from all member companies and a few cement associations. The CSI has also developed tools and guidelines for environmental protection. Therefore, the Cement WG proposes to invite the CSI to collaborate and share its activities.

The IEA, having experienced the development of "The Cement Technology Roadmap 2009" and currently the India roadmap, shall be invited since the JCA thinks that the development of regional/country roadmaps for cement technologies is required in order to support the diffusion of clean technologies to developing countries and for the consideration of financial support.

The Cement WG should also invite ECRA to discuss innovative technologies including CCS as one of the key mitigation measures in the cement industry.

4. Proposed Working Plans

After consultation with the government, the JCA concluded the following working plans to be submitted to the partners:

- Enhancement and enlargement of the Center of Excellence in order to develop a methodology for technology transfer and capacity building
- Development of energy performance indicators
- Development of a positive list of the best available technologies in cement manufacturing
- Facilitate breakthrough technologies in energy conservation
- Develop a methodology for the Measurement, Reporting and Verification (MRV) of energy conservation and CO2 emissions
- Study funding methods

Main projects shall be considered as follows:

4.1. Sharing and diffusing good practices of production technologies

Since cement production involves a large consumption of heat energy and power, consideration of energy conservation is particularly important in view of energy security as well as climate change.

Key energy conservation technologies and their diffusion rates in Japan are shown in following table.
The JCA believes that Japanese clean technologies should not simply be offered to developing countries, but subject to a strategy for technology transfer and diffusion taking into account economic criteria, weather and national policies in the developing country. For example, developing countries in which power prices are relatively low should also consider the utilization of waste heat and drying of raw materials. Waste heat recovery facilities are usually not applied to rainy countries since the waste heat has to be utilized for drying of the raw materials.
When legal barriers to technology development and diffusion are identified in developing countries, all national institutional information on clean technology diffusion and environmental registration should be shared among government officials from the Cement WG members.
In addition to the installation of energy efficient facilities, it would be necessary to provide software such as operational know-how and energy management.

4.2. Methodology of MRV

There already exists the CSI Cement CO2 and Energy Protocol, a “CO2 and Energy Accounting and Reporting Standard for the Cement Industry,” as the de facto global standard for cement CO2 emissions and energy consumption. Also, the European Committee for Standardization (CEN) is now developing a European standard on GHG emissions for energy intensive industries based on this protocol. Meanwhile, China has developed its national standard on CO2 emissions for the cement industry, also aligned with the CSI’s protocol. Therefore, the JCA deeply considers that the CSI’s Cement CO2 and Energy Protocol should be adopted by the Cement WG”

In future, for transparency and effectiveness, any GSEP energy conservation project shall be assured using the protocol. An improvement in the transparency of projects is required for both financial and technical support. Furthermore the JCA shall propose a new energy performance indicator for reporting.

Technology	Diffusion rate as of 2010	Energy conservation [per technical unit]
Waste heat recovery for power generation	60%	Approximately 35～40kWh/t-cli. power conserved
High performance vertical mill to grind blast furnace slag	73%	Maximum 40kWh/t-cem. power conserved
Roller mill system to pre-grind clinker	46%	10～20% improved of specific power consumption during finishing process
Air beam type cooler for clinker	50%	42～167kJ/kg-cli. of energy conservation 0.5～1.5kWh/t-cli. of power saving
High performance separator	53%	10%～20% improved of specific power consumption
Vertical coal mill	90%	20～25% improved of specific power consumption
Vertical roller mill to grind raw materials	46%	Approximately 30% improved of specific power consumption during raw material preparation process

4.3. Performance Diagnosis

Developing countries such as China and India request that a capacity building program for local experts be implemented in order to enable performance diagnosis at cement plants.

However, such a program should be carefully addressed since the JCA has serious concerns about the protection of know-how and proprietary information. Also, since the implementation of such a program would require a large budget, the Cement WG has to discuss a mechanism for linking to financial aid.

5. Conclusions

Participating in GSEP on the basis of a public private partnership provides a sectoral approach to technology transfer and diffusion based on a bottom-up approach and the sharing of environmental information. Furthermore, if discussions on climate protection are well integrated with the establishment of recycling based societies, the cement industry can make a huge contribution towards sustainable society.

APPENDIX

Experiences of cement sector action through the Asia Pacific Partnership on Clean Development and Climate

Yoshito IZUMI, Taiheiyo Cement Corporation, Japan

Toshio HOSOYA, Japan Cement Association, Japan

Figure 2: APP Cement task force meeting in Tokyo

The seven countries of the Asia-Pacific Partnership on Clean Development and Climate (APP) — Australia, Canada, China, India, Japan, the Republic of Korea and the United States of America — have been cooperating since 2006 to meet both their increased energy needs and associated challenges, including those related to air pollution, energy security and greenhouse gas intensities.

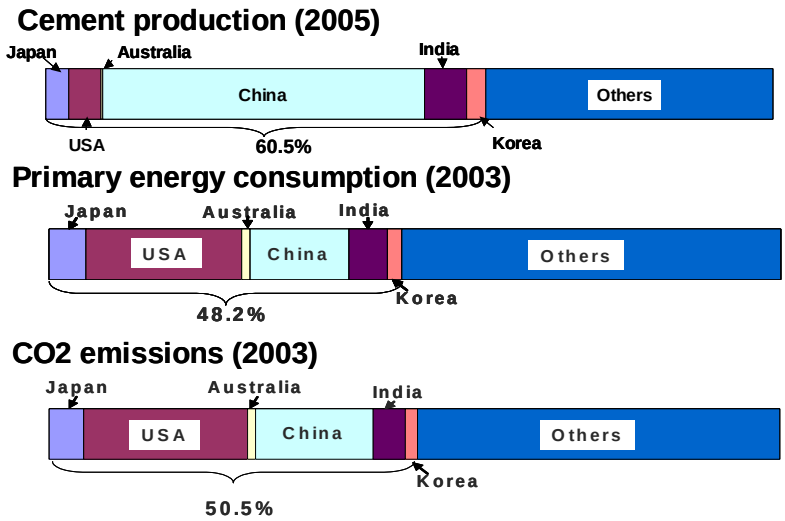
The Partnership established public-private task forces in eight key sectors: (1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminum; (6) cement; (7) coal mining; and (8) buildings and appliances. The task forces are designed to meet Partnership goals through international cooperation to facilitate the development, diffusion, deployment and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient technologies and practices among the Partners through substantial cooperation leading to concrete action so as to achieve practical results. This paper describes cement sector program and progress.

1 Cement Task Force

1.1 Background of cement sector

Partners in the sector account for 61 percent of global cement production (refer to Figure 1). The cement task force therefore has significant potential to reduce CO_2 emissions and conserve energy by sharing information on clean technologies and by cooperating further to diffuse such technologies. In addition, the Partnership's emphasis on public-private partnership will catalyze a sectoral approach (see Figure 2).

Figure 1: Cement Production and Energy & CO2 emissions in APP Partners



Currently, Partners individually challenge voluntary initiatives or national programs. For example, the Australian cement industry was one of the first to voluntarily monitor, measure and manage CO_2 and other emissions, resulting in a 24% reduction of CO_2 per ton of cement. The Chinese government is funding cement projects through national bonds for projects that utilize waste and other by-products, reduce energy consumption and promote environmental protection. The Indian cement sector has in recent years increased the use of alternative fuels and raw materials (AFR) for co-processing of wastes, which have resulted in reductions in greenhouse gas emissions and yielded other environmental benefits. In Japan, while the industry has achieved one of the world's most efficient production systems by using SP and NSP kilns, it is further working through Keidanren voluntary initiatives to reduce its energy intensity per ton of cement

by 3.8% from 1990 levels by 2010. The Korean cement industry is implementing ways to reduce air pollutants such as SOx and NOx, and have installed monitoring equipment for this purpose. The U.S. cement industry has committed to reducing its greenhouse gas intensity and, through the Climate Vision program, has adopted a voluntary goal of a 10% reduction in CO_2 emissions per ton of product from a 1990 baseline by 2020.

1.2 Objectives

The task force's objectives are to conduct surveys on the current situation, develop performance indicators, share information and experiences on clean technologies in order to conserve energy, manage emissions of greenhouse gases and air pollutions, promote use of AFR, and thereby diffuse and deploy such clean technologies in the cement industry of each Partner. Ways to diffuse and deploy clean technologies are explored at task force meetings.

1.3 Key Actions

The task force meetings have already been held in 7 locations as shown in Table 1.

One of the key components of the cement task force's effort is to collect reliable data. Another important element of this group's work is to share information on good/best practices so that these may be replicated where appropriate in this very de-centralized sector (Figure3).

Addressing barriers to the utilization of clean technologies could assist Partners to more effectively address their greenhouse gas emissions whilst recognizing that differing national circumstances may influence the potential for energy conservation in domestic cement industries. In addition, concerted efforts to reduce SOx, NOx and dust are essential to the global efforts to reduce air pollutants.

Figure 4: CSI CO2 Protocol training seminar in China

2 Major Projects and Outcomes

2.1 Survey of the industry's current situation

A questionnaire survey of the current cement industry of each Partner was carried out to collect useful basic information. The results, published as an interim report in October 2007, can be viewed on the APP website. With the addition of new data from Canada the report was updated in the fall of 2008. [1]

Furthermore, adoption of the CSI CO_2 Protocol, developed by the WBCSD CSI, was agreed as the first calculation tool for the collection of plant data. Japan has improved the calculation sheet to provide additional data such as energy-efficiency indicators and air pollutants. Since China has not yet used the CSI CO_2 Protocol for the

Figure 3 : Key Major Streams of Cement Sector Activity

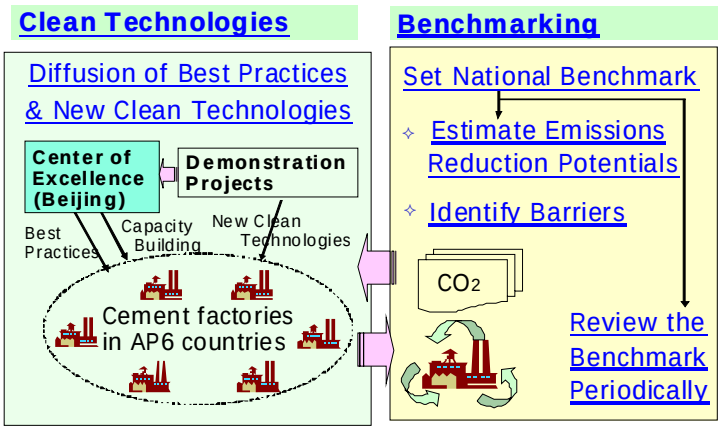


Table 1: The task force meetings

1st	April 18-21,	2006 Berkley, California, USA
2nd	September 20-21,	2006, XIAN, China
3rd	April 18-19,	2007, Delhi, India
4th	September 12-13,	2007, Melbourne, Australia
5th	May 13–14,	2008, Charleston, SC, USA
6th	Oct 24,	2008, Tokyo, Japan
7th	July 15–16,	2009, Seoul, Korea (plan)

calculation of CO_2 emissions, Australia, Japan and the USA provided support to China through training seminars held jointly with the WBCSD CSI in Beijing and Zhuhai during 2008. Further seminars will be held in China during 2009 as part of the capacity building program that helps trainees from every region of China understand the needs for implementing climate protection measures. During the training seminars (Figure 4), actual reference data is input into the calculation sheets of the Protocol.

A further survey was carried out by each Partner to identify barriers to achieving the maximum potential energy efficiency improvements and to the implementation of the good/best practices. The following are some examples. In Australia, permitting requirements necessitated by multiple-levels of government create challenges to the development, expansion and movement of cement-related products. China's large size and the diversity of local circumstances have created challenges in generating meaningful benchmarks and other measurement tools. In India, further increased use of AFR is hindered by insufficient regulatory measures and a lack of availability of the relevant foreign good/best practices. In Japan, existing high rates of efficiency in the cement sector mean that further increases are extremely challenging.

Table 2: Example of Best Practices

Raw materials	Vertical roller mill for raw materials
Preheater /Kiln	SP/NSP kiln system
	5-stage suspension preheater
	Vertical coal mill
	Air beam type clinker coolers
Finish Grinding	Improved separator
	Pre-grinding using roller mill system
	Vertical roller mill for blast-furnace slag grinding
Use of waste heat	Power generation utilizing waste heat

For Korea, the use of alternative fuels for reducing net CO_2 emissions is very limited because the current regulatory structure does not permit it and the supply of appropriate alternative fuels are inadequate to meet demand. In the United States stringent permitting requirements, limited market acceptance of blended cements and resistance to AFR use hinder advances in the sector.

A collection of the clean technologies used by each Partner was compiled into a booklet and published on the APP website in March 2009[2]. The APP booklet is not only shared with the Partners but also utilized for external reference such as for cement technology papers and the technology roadmaps developed by the IEA and CSI.

2.2 Benchmarking

For this project, the development of performance indicators and an estimation of reduction potentials were discussed in April 2007 and Partners agreed to select a cement-based emissions intensity of CO_2 (net) [kg-CO_2/ t-cement] as a common indicator and total energy intensity for clinker production (net) [MJ/ t-clinker] as a voluntary indicator.

Each Partner has been estimating the CO_2 reduction potential using the common indicator. Japan estimated the reduction potential by a bottom-up calculation of best practices at each plant as shown in Table 2. Aggregated results of all Partners will be reported.

Figure 6: Locations of Cement Plant performance diagnosis in China

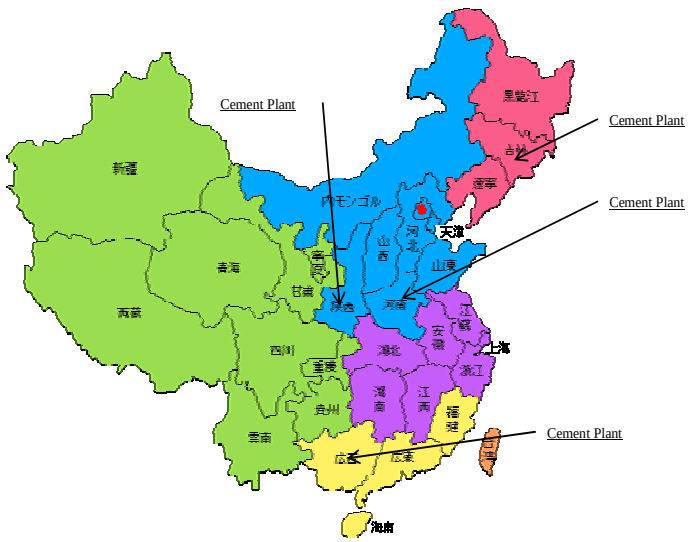


Figure 7: Locations of Cement Plant performance diagnosis in India

2.3 Performance Diagnosis

Experts in energy conservation, environmental management and ement production in the Japanese cement industry have visited cement plants in China (Figure 6) and India (Figure 7) for certain periods since 2008.

The experts carried out performance diagnosis, primarily for energy conservation and environmental management, and provided short-term and medium-to-long term recommendations on how, where appropriate, plants can optimize technologies and operational approaches. Japan will follow-up their actions after receiving the recommendations from the experts in 2009.

3 Findings

3.1 Enhancing Private Public Partnership

Each government and cement industry of the seven APP members play their own roles in the Partnership. Together they also represent public-private sector actions that are based on the transfer and deployment of existing clean technologies through mutual understanding of differentiated viewpoints and economic backgrounds of individual Partners.

3.2 Defining a Sectoral Approach

Through the Partnership the JCA and PCA, together with CEMBUREAU, developed a position paper on a sectoral approach to greenhouse gas management in March 2009. This position paper can be viewed on each association's website[3]. The next task force meeting in July will invite non-Partnership members, including CEMBUREAU, to discuss technology transfer and development of new clean technologies.

3.3 Removing Regulatory Barriers

Through the Partnership the JCA and PCA, together with respect to regulatory barriers preventing deployment of co-processing technologies for the utilization of wastes which will lead to CO_2 emissions reduction, the circumstances of each Partner have been identified and best/good practices will be further shared with the governments to remove such barriers through the APP activities.

3.4 Developing Incentivized Mechanism

It is necessary to create incentive mechanisms to drive investment and adoption of new technologies and to help overcome policy and financial barriers that today prevent the adoption of many cost-effective efficiency measures in developing countries.

4 Next Steps

Since 2006, through participation in the APP, Japan has presented its numerous activities on clean development and climate both domestically and internationally so as to introduce Japanese advanced energy conservation technologies. Japan has been collating national environment data from each Partner, and working eagerly to share the information so as to increase the understanding of project activities and the environment in Partner countries. In order to collect further reliable data and encourage the transfer of clean technologies, Japan will continue efforts to support monitoring, reporting and the implementation of verifiable actions in developing countries.

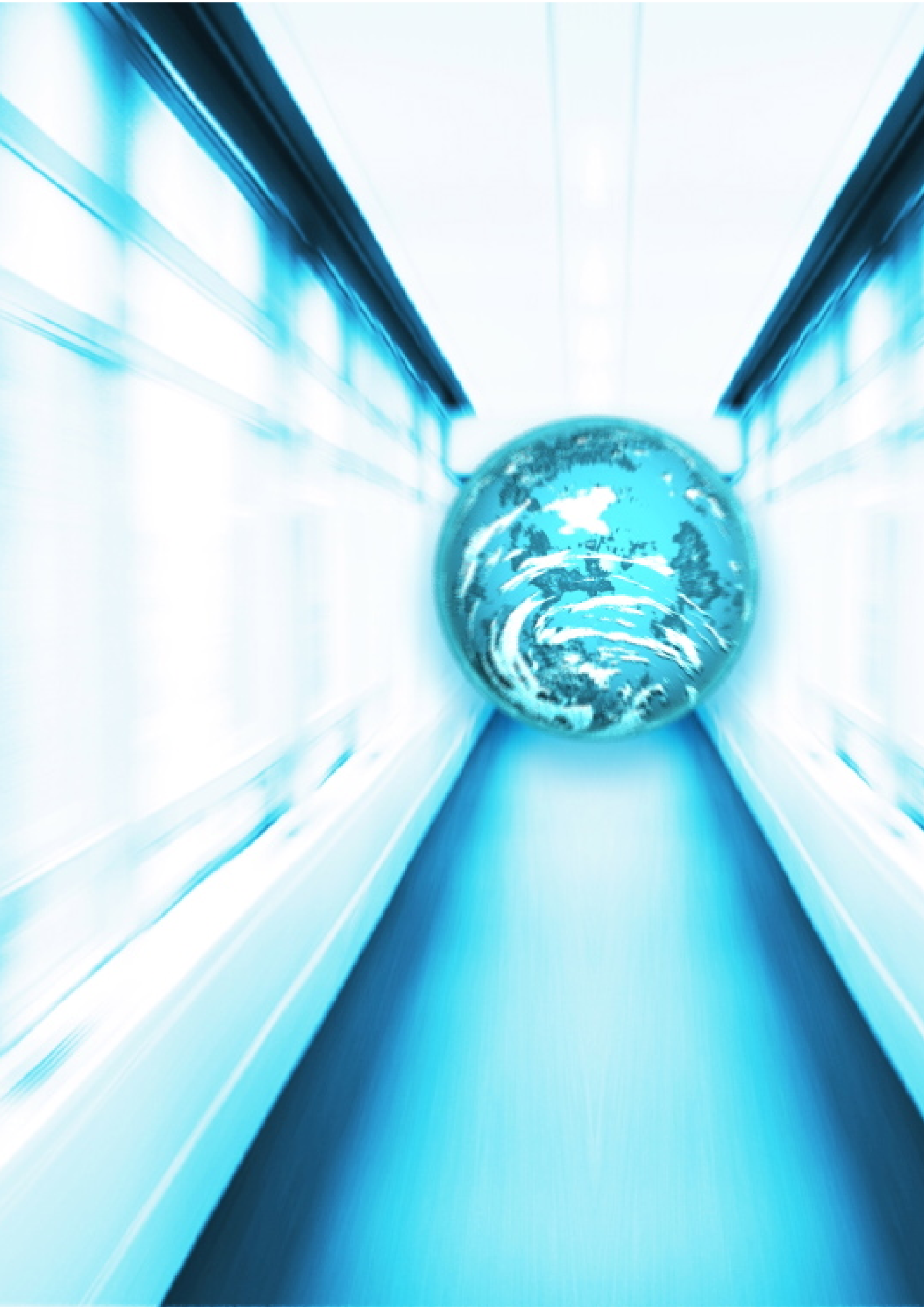
A future framework on climate change, which is currently under discussion, should require the participation of "all major emitting countries". Therefore, if the cement task force of the APP, which is one of the most practical sector actions in a sectoral approach, further cooperates with non-APP members, an international framework based on the transfer of clean technologies would be established among the cement associations of participant countries.

References

[1] http://www.asiapacificpartnership.org/pdf/Projects/Cement/PSU/CMT-06-01%28Interim%20Report%29071004.pdf

[2] http://www.asiapacificpartnership.org/pdf/Projects/Cement/APP_Booklet_of_Cement_Technology.pdf

[3] http://www.jcassoc.or.jp/cement/3pdf/ja1_08_16.pdf

Contact

Ministry of Economy, Trade and Industry
Email: kono-takashi@meti.go.jp
Power: The Federation of Electric Power Companies of Japan
Email: maedai@fepc.or.jp
Steel: The Japan Iron and Steel Federation
Email: okazaki.ek5.teruo@jp.nssmc.com
Cement: Japan Cement Association
Email: yoshito-izumi@jcassoc.or.jp