



Cement Task Force

Final Report



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Appendix 1 – Flagship Projects

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1. Background

Cement is an essential material for social infrastructure and has played a vital role in the development of economies around the world. The production process for cement itself is energy-intensive and requires a large amount of natural resources for fuel and raw materials. Consequently, the aggregate amount of carbon dioxide (CO₂) emitted from the global cement industry has reached about 1.5 billion tons, accounting for approximately 5% of total man-made CO₂ emissions.

Against this background the partners of the Asia-Pacific Partnership on Clean Development and Climate, accounting for 61% of global cement production, are expected to have considerable potential to reduce CO₂ emissions and to conserve energy further increasing the energy efficiencies of process operations, by way of sharing insights on clean technologies and by cooperating to further diffuse and deploy such technologies.

Clean technologies to reduce emissions include technologies for improved energy efficiencies, such as: Dry processing technologies through pre-heater installations; Grinding technologies; Electricity generation using waste heat recovery technologies; Co-processing technologies using alternative fuels and Optimized plant operation for clinker coolers, raw materials preparation and cement grinding.

Over the longer term, transformative technologies, such as carbon capture and storage, present additional options but need further development.

Meanwhile, greater utilization of wastes and by-products based on the characteristics of the cement production process has been promoted in an effort to offset the energy-intensity requirements of clinker production. The development, diffusion, deployment and transfer of such technologies and approaches will contribute to the development of resource-recycling societies and the reduction of greenhouse gases.

Given the different national and local circumstances that influence the potential for widespread energy conservation and alternative options in cement industries, international discussions on the future potential can be considered a major milestone for reducing global emissions by identifying best practices and the multitude of drivers and barriers to the introduction of clean technologies. Moreover, concerted efforts to reduce greenhouse gas emissions will result in co-benefits including the reduction of particulates, SO_x and NO_x, which are essential in the global initiative to reduce pollutants.

2. Action Plan

2.1 Objectives

The Task Force's objectives are to conduct surveys on the current situation, develop performance indicators and benchmarks and share information and experiences on the clean technologies in order to conserve energy, to reduce emissions of greenhouse gases to promote use of AFR, and to control air pollution in the cement industry of each Partner. Subsequent meetings will discuss further ways to diffuse and deploy clean technologies.

2.2 Project Overview

The cement task force currently has 10 projects, which can be divided into the following four categories: Data Collection and Analysis, Study and Research, Capacity Building and Technology Transfer, with their brief description given below:

2.2.1 Data Collection and Analysis

CMT-06-01: Status Report

This project is to collect and put together basic data relating to the cement industry in the Partner countries as well as the CO₂ emissions and energy consumption intensities in the countries based on the CSI CO₂ protocol. It also intends to study the use of alternative fuels and raw materials (AFR).

CMT-06-02: Benchmarking

This project is to develop performance indicators, set benchmarks for evaluating CO₂ emissions and energy efficiency and calculate the emissions reduction potential based on the CSI CO₂ protocol. Institutional and economic barriers are identified to meet the potential.

2.2.2 Study and Research

CMT-06-03: Barriers and Drivers of Cement Plant Energy Efficiency and Greenhouse Gas Emission Reductions

The project is to carry out studies to identify legal and regulatory barriers to, and incentives for, CO₂ emissions reduction in the cement industry, and promotes clean cement manufacturing and formulation.

CMT-06-04: Lifecycle Evaluation of Concrete Building Construction as a

Strategy for Sustainable Cities

The project is to evaluate the effects of applications of concrete that mitigate the climate change impact of buildings.

CMT- 06-04 sub. 2: Life Cycle Analysis and Costing Tools for Concrete Highways

The project is to assess the applicability, and facilitate the transfer of technologies and tools that will help improve the sustainability of highways.

CMT-06-06: Cement Kiln Co-generation (completed)

The project is to document the economic and energy efficiency gains obtained by utilizing cement plant waste heat to generate electricity.

CMT-06-07: Hazardous Wastes – Best Practices for Co-Processing and Management in Cement Kilns

The project is to facilitate introduction of best practices in hazardous waste as alternative fuel and examines how to reduce costs and improve efficiency in processing.

CMT-06-07 sub. 1 : Hazardous Waste Co-processing in India

The project is to involve implementation of best practices in co-processing of hazardous waste in Indian Cement Industry. This project will mitigate problems of coal shortage and also provide effective and sustainable solution for disposal of hazardous waste.

CMT-07-07 sub. 2 : Maximising the Use of Solvents in Cement Kilns

The project is to develop and demonstrate techniques to scientifically transform hazardous wastes as a fuel for use in cement kilns and thereby providing safe and effective disposal of hazardous wastes.

CMT-07-07 sub.3 : Utilising Biosolids in Cement Kilns

The project is to examine the feasibility of introducing biosolids from industrial wastewater as an alternative renewable energy source in to the Waurin Ponds Cement plant and the viability of biosolids as a fuel utilised in the cement kiln. The project will also develop control strategies to capture and contain mercury emissions from biosolids processed at the plant.

CMT-07-08: High Energy Biomass Fuels for Cement Production

The project is to study technical and economic opportunities for using biomass fuels in the cement manufacturing process, and produce and publish reports on the studies.

CMT- 07-08 sub. 1 : Technical and Economic Opportunities for Using Biomass Fuels for Reducing GHG Emissions from Cement Production

The project never managed to receive funding and recommendation was to take this project off the list, as duplicative efforts are taking place elsewhere as well.

CMT- 07-08 sub. 2 : Industrial Recycling of CO₂ from Cement Process into High Energy Algal Biomass Coal Equivalent Fuel

The project activity is to involve screening of appropriate high yielding algae culture, development of bioreactor on bench scale, scaling up the technology to pilot scale and then demonstration of the same at the commercial scale.

CMT- 07-08 sub. 3 : Algal Biomass from Cement Kiln CO₂ Emissions

The project is to demonstrate the viability, on a commercial scale, of a technology that will utilize cement kiln stack gas to produce algae, which in turn will be utilized as fuel.

CMT-07-09: The Effect of Cement Concrete as a CO₂ Sink

The project is to develop an estimation model for CO₂ absorption by concrete structures and to suggest revision of the CO₂ emissions calculation protocol to IPCC based on the results.

2.2.3 Capacity Building

CMT-06-05: Center of Excellence

The project promotes the use of data, information and experience gain through various activities under the Cement Task Force. It provides a mechanism for the diffusion and adoption of best practices as capacity building.

CMT- 06-05 sub. 2 : Supplementary Cementitious Materials

The project is to diffuse and deploy existing and emerging technologies to optimize the use of Supplementary Cementitious Materials (SCM) as a means of substantially reducing greenhouse gas emissions relate to cement.

2.2.4 Technology Transfer

CMT-07-10: Performance Diagnosis

In this project, Japan, the lead country, dispatches experts to cement plants in China and India to carry out performance diagnosis related to energy saving and environmental conservation, and offers suggestions and proposals for improvement.

3. Activity Review

Eight taskforce meetings held to date are shown in the following table.

	Date	Host Country and Venue	Activity summary
CTF-1	April 19-21, 2006	Berkeley, U.S.A.	(1) Introduction on current status and policy of cement industry in member countries. (2) Japan presented related international activities of WBCSD/CSI, IEA, etc. (3) Exchanged views on future areas of collaboration and implementation schedule as stated in the CTF Action Plan.
CTF-2	September 20-21, 2006	Xi'an, China	(1) Agreed on the CTF Action Plan for six projects, including those proposed as Flagship Projects. (2) Held the first stakeholder meeting and experts review on benchmarking. (3) Site visit to Chinese cement plant, etc.
CTF-3	April 18-19, 2007	Delhi ,India	(1) Progress report of CTF projects and review of future planning. (2) Endorsed three new projects. (3) Information sharing from Japan on the new project proposal. (4) Plant visit to Shree Cement, Beawar.
CTF-4	September 12-13, 2007	Melbourne, Australia	(1) Mid-term/status report of CTF projects; agreed on progress to date of CTF activities for reporting to the PIC members. (2) Agreed on the new project proposed by Japan. (3) Held workshop on the flagship project CMT-06-05 Cement Centre of Excellence (COE) Co-processing workshop and CMT-06-07 Sub2: Maximizing the use of solvents in cement kilns.
CTF-5	May 13-15, 2008	Charleston, U.S.A.	(1) Reviewed and monitored progress of all CTF projects including Flagship Projects. (2) Agreed on the "Status Report" and to continue efforts to come up with an aggregated seven-country reduction potential. (3) "APP Exposition of U.S. Clean Cement Technologies" for Flagship Project CMT-06-07 Sub4: Best practices for management and co-firing of hazardous and other industrial wastes in cement kilns in the U.S. (4) Cement plant tours - Holcim, Giant, and Lafarge.
CTF-6	October 24, 2008	Tokyo ,Japan	(1) Proposed preparing a technical booklet on Best Practices. (2) Reviewed and monitored progress of CTF Flagship Projects. (3) Exchanged views and information with IEA and WBCSD/CSI. (4) Plant visit to Kumagaya Plant of Taiheiyo Cement.

CTF-7	July 14, 2009	Seoul, South Korea	(1) Reviewed and monitored progress of CTF Flagship Projects. (2) Exchanged views on the future position of CTF activities. (3) Exchanged views and information with European Cement Research Academy (ECRA), IEA and WBCSD/CSI. (4) Plant visit to Danyang Plant of Hanil Cement Co. Ltd.
CTF-8	March 24, 2010	Vancouver, Canada	(1) Reviewed and monitored progress of CTF Flagship Projects. (2) Discussion on the paper for the strategic way of thinking for CTF. (3) Exchanged views and information with IEA and WBCSD/CSI. (4) Exchanged views on the standardization of CSI CO2 Protocol. (5) Concrete and green buildings tour.
CTF-9	December 14-15, 2010	Hawaii, U.S.A.	(1) Final Reviewed and Discussions of CTF all Projects. (2) Discussion on the Post CTF/APP. (3) Discussion on the Other Issues for Future Activity.

4. Outcomes and Next Steps

The proposed next steps for Flagship and Other projects are summarized as follows.

4.1 Flagship Projects

Please see Appendix 1 for further details on the outcomes and next step of the Flagship Projects

Project no.	Title	Lead country	Proposed next step	Appendix no.
CMT-06-05	Center of Excellence	China, Australia	To be continued	Appendix 1-1
CMT-06-05 sub2	Transferring High Volume Supplementary Cementing Material (HVSCM) Technology to China.	Canada	To be continued	Appendix 1-2
CMT-06-07 sub1	Hazardous waste co-processing in India	India	To be continued	No submission
CMT-07-07 sub2	Maximising the Use of Solvents in Cement Kilns	Australia	To be continued	Appendix 1-4
CMT-07-07 sub3	Utilising Biosolids in Cement Kilns	Australia	To be continued	Appendix 1-5
CMT-07-10	Performance Diagnosis	Japan	To be continued if funding available	Appendix 1-6

4.2 Other projects

Please see Appendix 2 for further details on the outcomes and next step of Other CTF Projects

Project no.	Title	Lead country	Proposed next step	Appendix no.
CMT-06-01	Status Report	Japan	Completed and to be discontinued	Appendix 2-1
CMT-06-02	Benchmarking	Japan	To be refocused with MRV concept	Appendix 2-2
CMT-06-03	Barriers and Drivers of Cement	USA	To be continued if	Appendix 2-3

	Plant Energy Efficiency and Greenhouse Gas Emission Reductions		funding available	
CMT-06-04	Lifecycle Evaluation of Concrete Building Construction as a Strategy for Sustainable Cities	USA	To be continued	Appendix 2-4
CMT-06-04 sub2	Infrastructure Sustainability Initiative	Canada	To be continued	Appendix 2-5
CMT-06-06	Cement Kiln Co-generation	Australia	Completed and discontinued	Appendix 2-6
CMT-07-08 sub1	Technical and economic opportunities for using biomass fuels for reducing GHG emissions from cement production	USA	Completed and to be discontinued	Note*
CMT-07-08 sub2	Industrial recycling of CO2 from cement process into high energy algal biomass coal equivalent fuel	India	To be continued	No submission
CMT-07-08 sub3	Using Algae for Carbon Capture and Storage at Cement Kilns	Canada	To be continued	Appendix 2-8
CMT-07-09	The Effect of Cement Concrete as a CO2 Sink	Korea	To be completed in 2011 and discontinued	Appendix 2-9

Note*:

This project never managed to receive funding, and recommendation was to take this project off the list, as duplicative efforts are taking place elsewhere as well.

5. Recommendations for Future APP/CTF

This chapter describes the key common issues to the APP Task Forces based on past achievements and experiences of cement task force's activities as well as provides suggestions on the strategic way forward for the task force and APP as a whole.

5.1 The Public-Private-Partnership (PPP) Framework

The CTF Partners and the Flagship Review strongly support the public-private partnership foundation of the APP and recognize it as a key strength of the initiative. The Flagship Review found (Key Finding (d)) that the APP is:

'... well-positioned to facilitate both technology commercialization and economic recovery following the Global Financial Crisis, by combining public and private funding initiatives with industry knowledge and expertise.'

The CTF, occupies a unique position within the context of global cement sector initiatives and organizations on climate and clean development, as it is the foremost public-private partnership amongst the global cement sectoral.

Among the many strengths of this platform is the recognition that both government and industry must work collaboratively to effectively and efficiently address clean development and climate. The public sector is a necessary partner in the industry's efforts to advance clean technologies and practices. As discussed in the Flagship Review "the involvement of the private sector in Flagship Projects creates the potential to deliver and employ technologies to large national and international corporate groups and networks."

In developing countries in general, the cement industry is regarded as one of the key industries essential to its economic growth and development. The involvement of governmental policy making bodies is required to facilitate data collection, capacity building, and technology transfer in this sector, and to ensure the economic viability of the industry.

The Flagship Review found (Key Finding (f)) that public-private and international collaborative activities under the APP can be strengthened by domestic regulatory measures and policy initiatives that complement and further the APP's vision and objectives.

Moreover, in order for the APP to play a complementary role in discussions concerning the global GHG reduction effort in the UNFCCC/COP, the unique public-private partnership structure of the APP will be even more helpful in delivering effective messages that represent both the governments and private enterprises.

5.2 Enhanced Global Outreach

The CTF has undertaken dialogue with other global cement sector initiatives on sustainable development and climate change. These initiatives include the World Business Council on Sustainable Development Cement Sustainability Initiative and the International Energy Agency Cement Roadmap. The CTF has provided input into the initiatives underway by these forums including the UNFCCC sectoral dialogue.

As part of the efforts to expedite the negotiation at the UNFCCC, the US has initiated the MEF and plans to work out action plans for individual technology areas. Among others, the MEF has put forward an objective of "Promoting Energy Efficiency in Industry Sector".

Further, the CTF has reached out to national cement industry associations and organizations outside of the APP Partnership, including the European cement industry association, CEMBUREAU, the Brazil Cement Association and the European Cement Research Academy. This collaboration supports knowledge-sharing and the transfer of best practices.

Through its Action Plan and engagement with other international organizations, the Cement Task Force is recognized by the cement industry, governments, and other stakeholders as an established global cement sectoral forum addressing clean development and climate.

As the Flagship Review found (Key Finding (j)) some Projects have helped create an enabling environment to assist in the achievement of development and deployment of clean technologies. The sharing of best practices, undertaking international site visits to conduct performance diagnosis, development of on-line resources to share technology resources and projection of best practice guides have an important role within industry sectors to help identify commercially viable projects, bring key partners together and attract interest from private sector investors.

Therefore, the CTF should continue to engage with non-APP organizations and stakeholders at every opportunity, and should consider new ways of promoting the work of the Task Force and its future potential, especially in enhancing technologies in developing economies to minimize greenhouse gas emissions.

5.3 Cross-Sectoral Linkages

The CTF has engaged in discussion on the potential for linkages with other APP Task Forces at the project level. The following project linkages are examples where synergies may exist between the Cement Task Force and other APP Task Forces:

Cement Task Force Project	Potential Task Force Linkage
Project 4 – Lifecycle Evaluation of Concrete Building Construction as a Strategy for Sustainable Cities	Buildings and Appliances Task Force
Project 7 – Hazardous Wastes - Best Practices for Co-Processing and Management in Cement Kilns	Cleaner Fossil Energy Task Force
Project 8 – Project sub2 - CO2 Recycling through Algal Bio-reactor	Renewable Energy and Distributed Generation Task Force

The purpose of developing linkages is to facilitate the advancement of projects and knowledge-sharing across sectors. Further, more collaborative project financing may potentially be explored.

This approach is supported by the Flagship Review (Key Finding (e)) that pointed

out that increased coordination and communication:

'... could potentially give rise to a number of benefits that may not otherwise be captured, including: (i) increased knowledge sharing ... ; and (ii) strengthening of relationship networks between Task Forces ...'

5.4 A Cooperative Sectoral Approach

Prior to the formation of the CTF meetings, there had been no place for the cement associations of the seven APP member countries to get together and discuss common issues relating to energy conservation and environmental protection.

On the day before the last CTF meeting in Korea, national cement industry associations of the member countries, CEMBUREAU and Brazilian Cement Association met to discuss policy related issues on cooperative sectoral approaches and came to share the following common perspectives concerning the sectoral approaches:

- Acknowledges how the cement industry is particularly well-suited for a sectoral approach.
- Facilitates long-term strategy and certainty
- Can be integrated into UNFCCC
- Accommodates views of developed and developing nations
- Nationally-focused, differentiated actions and initiatives
- Reflects government –industry collaboration
- Policies drawn from sectoral approach could be mandatory on a national basis.
- Designed to mitigate trade distortions (avoid “leakage”)
- Endorses common reporting and verification (“MRV” monitoring, reporting and verification) mechanisms
- Establishes a framework that facilitates the dissemination of best practices, knowledge (capacity building) and technology application transfer mechanisms (measures such as alternative fuel use, increasing blended cement and etc)

Anticipated future tasks may include the development of means by which to incorporate cement industry suggestions into UN dialogues.

5.5 Enhanced Capacity Building

Supporting the development of skills and know-how related to MRV (monitoring, reporting and verification) is one of the most important activities that help to address

and appraise correctly the CO2 reduction efforts of developing countries.

The Flagship Review reported that Task Force meetings have been an important forum for the creation of networks within sectors and networking beyond the APP, through the establishment of productive relationship with external stakeholders. To this end, China and Australia, the lead partners of CMT-5 Centre of Excellence project have developed activity programs and organized seminars and workshops for local cement manufacturers in China to disseminate and share information and experiences gained through CTF activities as well as training courses for familiarizing them with CO2 emissions calculation methods.

Experts from member countries, as well as that from the WBCSD/CSI were dispatched to support these seminars and workshops. In this regard, an annual program to be developed and shared in advance will be highly desirable in facilitating the related activities.

For the purpose of introducing the MRV concept and practice in place in the cement industry, it is desirable that a common methodology be developed based on the CSI CO2 protocol and diffused through joint efforts among organizations such as WBCSD/CSI and other standardization institutes like CEN, ISO, etc.

During the Flagship Review stakeholders from the Cement Centre of Excellence revealed the development of new networks between China and other development countries seeking advanced technology at relatively low cost. Expansion of these external networks will help accelerate deployment of new technologies globally.

In addition, further effort is required to tailor the program to the precise needs of the Chinese cement industry as the beneficiary.

The Flagship Review found (Recommendation (e)) that increased capacity building initiatives within both Task Forces and relevant complementary activities could become a point of increased focus for the APP and the Flagship Projects, in accordance with the APP's Vision Statement and Flagship Project Guidelines. The CTF will seek to look for opportunities for future capacity building including initiatives directed at technology developers and providers, and financiers and investors, to increase their understanding of their investment opportunities and potential financial returns offered by technologies and projects developed and implemented under the APP.

5.6 Technology Transfer

The Communique of the Third APP Ministerial Meeting (October 2009) stated that

Ministers:

'... reaffirm the critical role of technology in combating climate change and the need to accelerate technology development, diffusion, and transfer.'

Most of the energy conservation and environmental protection technologies used in the cement industry are non-proprietary technologies, and we are not aware of a situation where technology transfer from developed to developing countries is hindered by intellectual property protection. The technology transfer should be mainly focused on existing and established technologies rather than new, state-of-the-art ones. In recent years, China, with the world's largest number of cement plants, has been advancing the conversion of inefficient old and outdated cement production facilities to the NSP (leading edge technology) kilns, and targeting a 70% adoption rate in all cement plants across the country by 2010, as outlined in its 11th Five-Year Plan.

However, the results of CMT-10 Performance Diagnosis revealed that some of the Chinese cement plants equipped with cutting-edge facilities (NSP) encountered problems with facility management and operation that lead to unnecessary energy losses and inconsistent product quality. It is anticipated that the future task will be more on how to improve production management and operation in these Chinese cement plants when considering energy conservation and environmental protection.

However, as discussed in the Flagship Review (Key Findings (m)) Projects covering steel plants, cement facilities and coal mines technology improvement projects are generally of significant capital intensity. More detail on financing options and mechanisms to implement these measures are required to make the investment decisions required.

The Flagship Review has highlighted that attracting more funding to complete existing Projects and to secure new financing for expansion of Projects is a major barrier to achieving the vision of the APP.

Regarding the technology transfer, it would also be beneficial for the parties involved to refer to technologies listed in the APP/CTF Technology booklet or the ECRA technology papers.

5.7 Barriers to Technology Transfer

The utilization of waste materials as alternative raw material in the cement industry helps promote a recycling-oriented society, while its utilization as alternative fuels is effective as one of the means to reduce CO₂ emissions, as exemplified by Project

CMT-7 where methods for effective utilization of hazardous waste materials in the cement industry are being studied. In this regard, the next step should be for the public as well as private sectors to jointly work out an acceptable- and non-acceptable listing of waste materials for disposal in cement kilns. The utilization of waste materials as alternative fuel or raw material in cement kilns is also incorporated in IEA's Cement Roadmap as one of the effective means for curbing CO2 emissions.

In its 11th Five-Year Plan, China too put forward the use of waste materials in the cement industry. With this strategy, the utilization of wastes materials in China is expected to increase steadily.

However, since waste processing is subject to environmental regulations as well as close scrutiny of neighborhood residents, barriers to technology transfer in the cement industry are mostly associated with waste material disposal. Project CMT-3 has been carried out to identify the barriers to technology transfer in the US cement industry. The scope of this project is expected to expand to all other member countries.

Other technology barriers could be that although some technology solutions are viable at large scale, they may not be viable at a smaller scale. This was evident in the Flagship Review when stakeholders indicated that smaller scale producers among China's 5,000-plus cement companies will face greater economic hurdles to investing in clean technology than the larger, integrated facilities. It will be important to increase the APP's focus on the identification and removal of barriers to the development and deployment of clean technologies. The Flagship Review stated that Partner Countries can support clean technology deployment by introducing clean, certain and stable domestic regulatory frameworks and policy settings to govern activities in relevant sectors. Properly aligned, public-partner and international collaborative activities under APP can be complemented by domestic measure to promote the development and deployment of clean energy technologies, mitigation of climate change and promotion of energy efficiency and security within Partner Country jurisdictions.

5.8 Technology Development

As mentioned earlier, except for some innovative technologies such as CCS, most of the energy conservation and environmental protection technologies used in the cement industry are non-proprietary technologies.

As the fight against global warming progresses, developments in technologies with potential to lead to new businesses are expected to be pursued more actively through further collaboration between task force members and possibly involving plant makers.

These technologies include: (i) Reduction of CO2 emission from the clinker production process through the use of alternative raw material, novel catalysts, etc.; (ii) Life cycle assessment analysis of concrete buildings (CMT-4); (iii) reduction of clinker content in cement by increasing the use of Supplementary Cementitious Materials(CMT-5 sub2). (iv) Utilization of biomass fuels (CMT-8); (v) CO2 absorption by concrete structures (CMT-9), and (vi) Low carbon cements, (vii) Carbon Capture and Storage, etc.

Furthermore, in the general efforts for technology development, it is advisable to concentrate on those technologies that have a potential of actual application within the medium term (i.e. 10 to 15 years). It is also important that the targets for the development be selected paying attention to published references such as the “APP Energy Efficiency and Resource Saving Technologies in Cement Industry”, the “ECRA Technical Paper”, and IEA’s “Cement Technology Roadmap”.

The development and deployment of technologies will require ongoing funding. As discussed in the Flagship Review, the APP can build on its established model to undertake a proactive engagement with the private finance and investment sector to accelerate investment in, and commercialization of, technologies that address climate change and clean development. Therefore, the CTF supports the recommendations in the Flagship Review.

5.9 Principles for Collaboration

All CTF activities are implemented on a voluntary basis and agreements are not binding on the members.

This is one of the reasons behind the difficulties experienced in collecting data for projects CMT-1 and CMT-2. With regard to MRV (monitoring, reporting and verification), which is expected to be further discussed in the negotiations for the next framework, the most effective methodology for the cement industry needs to be discussed within the CTF as well, with all members sharing as much information as possible.

It is expected that developing a mechanism for smooth information exchange and sharing will enable formation of a more robust partnership among the parties.

6. Conclusion

6.1 Proposal on Transition to a New Platform

On 14th and 15th of December 2010, the 9th and the last Cement Task Force

Meeting was held in Honolulu, Hawaii, with the participation of 27 delegates from full seven member countries to the APP.

In the introductory session, the Chair presented an overview of the “September 2010 PIC Guidance to the Task Force”. Following that, an item by item review was made on a total of 16 projects and sub-projects established under the CTF for the accomplishments made so far with related discussions on post-APP/CTF directions for them.

As a result of the above review and discussions, the CTF came to a conclusion that 11 projects should be continued and expanded under a new international framework of cooperative activities. In particular, with respect to the Project CMT-06-05 Centre of Excellence (COE) activities, strong expectations have been identified for it to expand its role as a technology dissemination center and to play an even more important role in the future. Meanwhile, it was determined that 4 projects completed their initial objectives and therefore should be discontinued at this juncture, whereas one project, CMT-06-02, should be refocused with a new subject. The disposition for individual projects is summarized in the tables inserted at the end.

As for the new platform under which the projects and other activities are to be conducted, the Chair made a proposal that a Cement Working Group (WG) be established under the framework of International Partnership for Energy Efficiency Cooperation (IPEEC)/Global Superior Energy Performance (GSEP).

In the ensuing discussions concerning the proposal from the Chair, while no unwillingness or outright opposition to considering the proposal was voiced by the members, bearing in mind that the activity of the Cement Working Group shall be focused specifically on international cooperation, facilitating exchange of information and creation of practical projects by key experts and leaders from public, private, and academic/research sectors, and building upon the scope of work introduced under the APP/CTF.

Some concerns were raised with regard to the lack of basic information on GSEP or IPEEC in terms of their scope of activity, governance, budgeting, stakeholder engagements as well as other issues of their Modus Operandi. Member countries in general and China, India, and Korea in particular, also pointed out the need for approvals or guidance from their respective governments before committing to the new framework.

As the general consent of the Cement Task Force, it was concluded that the process of establishing the GSEP Cement WG be carried forward after more information has

been gathered by the Japan Secretariat and disseminated to all CTF members.

6.2 Recommendations toward Future Perspective

The APP/CTF since its inception in 2006 has met nine times so far and deepened the partnership. It also has pursued a cooperative relationship and/or alignment with non-APP organizations such as IEA, CEMBUREAU, WBCSD/CSI, ECRA and VDZ. Further, additional activities such as site visits or workshops have been organized along with the main CTF meetings to promote the partnership.

In the final CTF meeting, discussions were held concerning the areas for future activities, where a number of very useful opinions and comments were presented. They are enumerated below as suggested points of consideration for the future perspectives:

- Enhancement and expansion of Centre of Excellence (CoE), including establishment of technology transfer mechanism and capacity building;
- Development of relevant performance indicators such as energy efficiency;
- Development and dissemination of best-practice cement technologies;
- Promotion of innovative R&D on energy conservation technologies;
- A platform to discuss the standardization of a protocol for sector-wise measurement and monitoring of energy consumption and CO₂ emissions;
- Study and preparation for criteria and/or conditions for financing aid for the cement industry in combating global climate change, etc.

In conclusion, while the APP/CTF activity will come to an end, it is highly advisable to pursue the possibility of sustainable development utilizing our past experience but under a new international framework.

Appendix 1 – Flagship Projects

Project no.	Title	Lead country	Appendix no.
CMT-06-05	Centre of Excellence	China, Australia	Appendix 1-1
CMT-06-05 sub2	Transferring High Volume Supplementary Cementing Material (HVSCM) Technology to China.	Canada	Appendix 1-2
CMT-06-07 sub1	Hazardous waste co-processing in India	India	No submission
CMT-07-07 sub2	Maximising the Use of Solvents in Cement Kilns	Australia	Appendix 1-4
CMT-07-07 sub3	Utilising Biosolids in Cement Kilns	Australia	Appendix 1-5
CMT-07-10	Performance Diagnosis	Japan	Appendix 1-6

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-05	Title of Project: Centre of Excellence
Lead Partner Country: China, Australia	
Participating Partner Countries and Organizations: Japan, USA, India Australia, Japan, China Building Materials Academy (CBMA), Australian Cement Industry Federation (CIF)	
Project Location: China and Australia	
Project Manager Information	
Name: Dr. SUI Tongbo	
Organization: Sinoma International Engineering Co.Ltd.	Phone: +86-13910720269
Address: No.16 Wangjing North Road, Chaoyang District, Beijing 100102, P.R. China	Fax: +86-10-64399005
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Name: Ms. Margie Thomson	
Organization: Australian Cement Industry Federation	Phone: +61-2-62607222
Address: PO Box 4178 , Manuka, ACT 2603 Australia	Fax: +61-2-62607333
	Email: mthomson@cement.org.au
Project Start Date: January 2008	Proposed Project End Date: 8 February 2011
Project Description: The project provides a mechanism to disseminate information about novel and best available technologies and customised cement industry energy analysis tools within APP member nations with a view to enhancing wider adoption and further development. It provides for technical seminars, scholarships and skilled worker exchanges that will have the greatest impact in reducing cement plant greenhouse gas emissions.	
Project Objectives: To share information on best practices and research emerging technologies to promote improved environmental performance in the cement industry of APP partners.	
2008	
1. Training Seminar on Cement Cleaner Production for Developing Countries being implemented from June 4 to June 23, 2008.	
2. 2008 International Expert Workshop on Cement & Concrete Technology for Sustainable Development being implemented from 7th October to 12th October, 2008 in 3 cities in China.	
3. Elkem Workshop on Application of Silica Fume (China) implemented on 7 November, 2008 in Beijing.	
4. CSI Protocol Workshop Beijing (Stage 2) being implemented in Zhuhai, China during 18-21 December, 2008.	
2009	
1. 2009 International Expert Workshop on Cement & Concrete Technology for Sustainable Development being implemented from 6th May-12th May, 2009, in Beijing, Xi'an, Mianyang of China.	
2. Training Seminar on Cement Cleaner Production for Developing Countries has been implemented during 22nd May- 11th June, 2009 in Beijing.	
3. The 3rd Cement Sustainability Initiative (CSI) Protocol Training Workshop being held during 7 and 11 July, 2009 in Beijing, China.	
2010	

1. The 4th Cement Sustainability Initiative (CSI) Protocol Training Workshop being implemented during 21 January and 22 January, 2010 in Beijing, China.
2. Seminar on SoS Software for High Volume Supplementary Cementing Materials (HVSCM) being held on March 4th, 2010 in Beijing.
3. The 7th International Symposium Concrete (ISCC2010) and the 11th International Conference on Advance in Concrete Technology and Sustainable Development has been held during May 9-12, 2010 in Ji'nan, China.
4. The 5th CSI Training Program for about 40 Chinese Engineers from China Resources Group on Energy Efficiency and Clean Development of Chinese Cement held during November 3 and November 4, 2010 in China.
5. The 6th CSI Training Program for about 40 Chinese Engineers from China National Materials Group Corporation Ltd. (SINOMA) on Energy Efficiency and Clean Development of Chinese Cement is to be held during November 16 -17, 2010 in China.
6. China-Australia technical workshop on energy efficiency and emissions reduction held during November 28-30, 2010 in Melbourne, Australia.
7. DevourX technology trialed in Australia through Cement Australia Ltd

Project Status and Outcomes:

1. CSI Protocol Training - There are six CSI Training Workshops for Chinese cement industry with totally 300 Chinese engineers' participation. Through the workshops, 220 engineers got training certificates. 5 Chinese cement companies joined the CSI family in 2009, and 5 Chinese experts are trained as trainers for future CSI training. It is with the Chinese CSI experts that the 5th CSI training has been organized in China in November, 2010.
2. The Serial International Workshops on Cement & Concrete Technology for Sustainable Development
Totally 1100 Chinese researchers and engineers participated in the three Workshops organized by CoE, APP-CTF.
3. The 7th International Symposium on Cement and Concrete (ISCC2010) and the 11th International Conference on Advance in Concrete Technology and Sustainable Development
More than 300 participants with over 200 papers from all over the world attended the Conference focusing on Cement and Concrete-Contributing to Global Sustainability all the time.
4. Training Seminar on Cement Cleaner Production for Developing Countries
About 136 officials from 34 developing countries' key government ministries and departments of cement and environmental protection have benefited from the events.
5. DevourX project trial found technology to have potential as an alternative to grind cement

Future Direction and Recommendation:

The project has achieved fruitful results in enhancing the capacity building, energy saving and emission reductions, especially for Chinese cement industry. CoE will play an important role as an international platform for technical exchange in the future. It is proposed that Australia visit the bio-algae plant in Vancouver before completion of the project.

Other Information and Reference:

APP Cement Task Force's Project Final Report Form

Project Number: CMT- 06-05 sub. 2	Title of Project: Supplementary Cementitious Materials
Lead Partner Country: Canada	
Participating Partner Countries and Organizations: EcoSmart Foundation	
Project Location: China	
Project Manager Information Name: Michel de Spot Organization: EcoSmart Foundation Address: Suite 501, 402 West Pender Street Vancouver, British Columbia <div style="float: right;"> Phone: (604) 689-4021 x 121 Email: michel@ecosmart.ca </div>	
Project Start Date: July 1, 2009	Proposed Project End Date: March 31, 2011
Project Described : To diffuse and deploy existing and emerging technologies to optimize the use of Supplementary Cementitious Materials (SCM) as a means of substantially reducing greenhouse gas emissions relate to cement.	
Project Status and Outcome: Consult Chinese construction industry and determine requirements and scope – Completed Develop and establish partnerships in China – Completed Collaborate to determine the extent of existing information on SCM use, cement properties, climatic data, codes of practice, business models, etc., available in China that would be required to link with the SCM Optimization System (SOS) knowledge base – Ongoing Fill data gaps - Ongoing Diffuse lessons learned in China and Canada – Ongoing Promote the development of a Chinese SOS version - Underway	
Future Direction and Recommendation: This project will be completed by March 31, 2011. Two options are possible for continuation of this work: Option 1. Phase 2 to expand the work in China. Option 2. Initiation of a similar project in India.	
Other Information and Reference:	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-07-07	Title of Project: Maximising the Use of Solvents in Cement Kilns
Lead Partner Country: Australia	
Participating Partner Countries and Organizations: China and India, Relevant Ministries, cement companies and cement associations	
Project Location: Geocycle Pty Ltd, Cement Australia Holdings Pty Ltd	
Project Manager Information	
Name: Mr Andrew Ward	Phone: +61 7 3375 0455
Organization: Geocycle Pty Limited	Fax: +61 7 3375 0473
Address: PO Box 293, Richlands DC Queensland Australia	Email: andrew.ward@cemaust.com.au
Project Start Date: 2008	Proposed Project End Date: February 2010
Project Described :	
<p>The objectives of the study were to develop and demonstrate techniques to scientifically transform hazardous wastes as a fuel for use in cement kilns, as a replacement for fossil fuels (coal, oils, natural gas) and thereby providing safe and effective disposal of hazardous wastes. The project coupled together existing and new technologies to maximise the volume of hazardous waste that can be utilised as a fuel in cement kilns.</p>	
Project Status and Outcome:	
<p>The project is completed.</p> <p>The project achieved the following outcomes:</p> <ul style="list-style-type: none"> • The successful pre-processing, handling, transportation, storage and firing of high viscosity fuels (HVF) at cement kilns to replace non-renewable fuels as demonstrated at the Cement Australian Kiln in Railton, Tasmania. This has the current potential for around 10% coal substitution without adverse impact on the kiln process or emissions. • Automated emptying and cleaning of steel drums containing difficult to remove liquid and solid residues so that waste conversion to fuel is maximised <p>The other proposed objectives relating to solvent dewatering and the production of High Calorific Distillate processes did not process due to funding difficulties associated with the GFC.</p>	
Future Direction and Recommendation:	
<p>The APP project has been completed (apart from the objectives listed above). There is significant potential to utilise the technology, both domestically and internationally. While the use of liquids like waste oils and solvents in cement kilns is well developed, the technology for firing high viscosity and solid content fuels to cement kilns is still under development. The Railton project has demonstrated this technology, replacing 10% of coal without adverse process impacts on the kiln. Similarly, the Drum Emptying & Recycling System has demonstrated the technology required to produce high viscosity kiln fuel from a wide range of wastes, while recycling steel waste containers. What makes the technology particularly applicable is that it is aligned with the changing waste market in most countries. The general trend is toward the recycling of waste oils and solvents to higher value applications, while sludge and solid wastes are becoming more available as governments strive to reduce disposal of wastes to landfill. This trend is expected to continue and accelerate as governments recognise that sustainable alternatives exist, and legislate to discourage landfill of waste. Information on the Geocycle plant has been provided to a cement company in the USA who are currently seeking environmental approval for construction of a similar plant. It is anticipated that further enquiries will be received as the changing market supports investment in the technology.</p>	
Other Information and Reference:	
See previous reports provided	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-07-07 (3)	Title of Project: Utilising bio-solids in Cement Kilns
Lead Partner Country: Australia	
Participating Partner Countries and Organizations: China, India, Melbourne Water Corporation, Blue Circle Southern Cement Ltd (a subsidiary of Boral)	
Project Location: Waurm Ponds, Victoria, Australia	
Project Manager Information	
Name: Mr Jim Young	Phone: +61 3 5240 6070
Organization: Blue Circle Southern Cement Ltd	Fax: +61 3 5241 8310
Address: PO Box 63 Belmont Victoria 3216 Australia	Email: jim.young@boral.com.au
Project Start Date: November 2006	Proposed Project End Date: November 2010
Project Described :	
<p>The project will examine the feasibility of introducing biosolids from industrial wastewater as an alternative renewable energy source in to the Waurm Ponds Cement plant and the viability of biosolids as a replacement fuel for traditional fossil fuels utilised in the cement kiln. The project will also develop control strategies to capture and contain mercury emissions from biosolids processed at the plant. The project engages Australian, Indian and Chinese government and industry, as well as providing an innovative solution to the problem of disposing of biosolids, a by-product of the industrial and household waste sewage treatment process.</p>	
Project Status and Outcome:	
<p>The project is not complete. The completion of the project has been delayed by performance issues with the mercury injection and measuring system used on the Mercury Demonstration Plant. The remainder of the work is complete.</p> <p>The issues with the mercury injection and measuring equipment are close to resolution and the test work on the Demonstration Plant will be completed before December 24 2010. A draft final report will be available by that date. The final report will not be available until February 2011. The delay will be caused by the need to obtain externally verified test results to corroborate the in-house test data.</p> <p>Subject to the satisfactory outcome from the Mercury Demonstration Plant, the project has shown that up to 60,000 tpa dry tonnes equivalent of the biosolids sourced from the Melbourne Water Western Treatment Plant can be processed into a form that can be satisfactorily combusted in the cement plant at Boral Cement Waurm Ponds. The use of biosolids can reduce greenhouse gas emissions from the site by 30,000 tpa.</p> <p>The Biosolids can be effectively used at the Waurm Ponds site to replace 0.6PJ of natural gas and 36,000 tpa of raw materials with no detriment to product quality or process operation.</p> <p>The approach used to establish, implement and administer the various aspects of this project is immediately applicable to other cement plants in APP member countries. The key steps in the methodology were</p> <ul style="list-style-type: none"> ▪ characterising the biosolids ▪ developing a specification and project objectives to ensure the effective use of the biosolids as an alternative energy source in the cement kiln ▪ developing a processing concept to ensure the biosolids satisfy the specification and project objectives ▪ proving the processing concept would meet the desired objectives through practical demonstration, modelling and comparison with existing processes <p>The experience gained in the conduct of this project can be made readily available to other cement operations in APP</p>	

member countries. The process and outcomes have been well documented and there is a willingness on the part of all the partners involved in the project to disseminate the learnings through published papers and discussions with interested parties.

Future Direction and Recommendation:

The project should be allowed to continue to completion. The findings from the project will inform other biosolids to energy projects in the cement sector and the mercury removal demonstration project, a subset of the total project, will showcase a new technology for removal of mercury from flue gas. The mercury removal technology will be of interest to the cement and power sector in an environment where regulations for control of mercury emissions from fuel burning equipment are being tightened and plant owners are seeking alternatives to the existing mercury removal technology

Other Information and Reference:

APP Cement Task Force's Project Final Report Form

Project Number: CMT-07-10	Title of Project: Performance Diagnosis		
Lead Partner Country: Japan			
Participating Partner Countries and Organizations: China, India			
Project Location: China, India			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> Project Manager Information Name: Michiya Miura , Hiroshi Yamakawa Organization: Housing Industry, Ceramics and Construction Materials Division, Manufacturing Industries Bureau, Ministry of Economy, Trade and Industry (METI). </td> <td style="width: 50%; vertical-align: top;"> Address: 1-3-1 Kasumigaseki, Chiyodaku Tokyo 100-8901 JAPAN Phone: +81-3-3501-0529 Fax: +81-3-3501-6799 Email: miura-michiya@meti.go.jp yamakawa-hiroshi@meti.go.jp </td> </tr> </table>		Project Manager Information Name: Michiya Miura , Hiroshi Yamakawa Organization: Housing Industry, Ceramics and Construction Materials Division, Manufacturing Industries Bureau, Ministry of Economy, Trade and Industry (METI).	Address: 1-3-1 Kasumigaseki, Chiyodaku Tokyo 100-8901 JAPAN Phone: +81-3-3501-0529 Fax: +81-3-3501-6799 Email: miura-michiya@meti.go.jp yamakawa-hiroshi@meti.go.jp
Project Manager Information Name: Michiya Miura , Hiroshi Yamakawa Organization: Housing Industry, Ceramics and Construction Materials Division, Manufacturing Industries Bureau, Ministry of Economy, Trade and Industry (METI).	Address: 1-3-1 Kasumigaseki, Chiyodaku Tokyo 100-8901 JAPAN Phone: +81-3-3501-0529 Fax: +81-3-3501-6799 Email: miura-michiya@meti.go.jp yamakawa-hiroshi@meti.go.jp		
Project Start Date: November 2007	Proposed Project End Date: March 2010		
<p>Project Described :</p> <p>Performance diagnosis will cooperate to play a role in diffusing in the partner countries, through flagship projects, Best Practices that have been identified in status reports, and new technologies that have been identified in other demonstration projects. The main purpose is as follows:</p> <p>Provide short-term and medium-to-long term advice on energy saving and environmental management that is appropriate to local conditions in cement factories with diversity in China and India.</p> <p>With short-term and medium-to-long term advice and recommendations based on the diagnosis, the cement industries in the partner countries will be able to exercise well-informed judgments as to what existing factories should improve, recognizing energy saving and environmental management technologies that can lead to improved efficiency and productivity.</p>			
<p>Project Status and Outcome:</p> <p>Upon conducting any performance diagnosis, the project will do the following:</p> <ul style="list-style-type: none"> • Arrange and form a diagnostic specialist team of an appropriate number of people; • After agreeing on requirements and methods for conducting the diagnosis between managing parties and recipient parties. • Sending/answer of questionnaire to/from acceptable factories; • Visit factories during a sufficient period of time to conduct the diagnosis (approximately 3 days for each factory); and prepare practical and feasible advice and recommendations, based upon thorough, detailed communications with counterparts in acceptable factories. • Report the outcome of diagnosis to the Task Force and hold an explanatory meeting in the recipient countries. • Upload the summary of on-site survey's outcome on homepage of the New Energy and Industrial Technology Development Organization (NEDO). <p>FY2007: Selected a total of eight cement factories as demonstration sites through preliminary consultations between managing parties, governments, and industries in the recipient countries. And Implemented first diagnoses and explanatory meeting were held in the recipient countries.</p> <ul style="list-style-type: none"> • Name of the plant surveyed : Tianrui Ruzhou (China) Beawar Cement (India) <p>FY2008: Implemented second diagnoses in the recipient countries. And also explanatory meetings for diagnoses were held in recipient countries.</p>			

- Name of the plant surveyed: Yatai Haerbin Cement (China)
Shanxi Qinling Cement (Cina)
ACC Galgal Cement Works (India)
Grasim-Cement Divishin South Works (India)

FY2009: A review on all recipients of performance diagnosis for their views and opinions were conducted. And third diagnoses were implemented and explanatory meeting were held in the recipient countries.

- Name of the plant surveyed: Guangxi Yufeng Cement (China)
J.K.Lakshmi Cement (India)

The results of diagnosis and the technology diffusion seminars in India and China held so far and provided some feedback from the beneficiaries. The diagnostic recommendations brought about some positive results.

Future Direction and Recommendation:

- Terminate.
- Japan deems the Project 10 (Performance Diagnosis) was wrapped up by the FY 2009 program.
- However, taking advantage of this experience to proceed to the next step will be important.
- When Japan addressed the fact that the project is almost completed, India and China both proposed that their respective experts join the Performance Diagnosis activities to build their own capabilities in this field.
- Feasibility of the requests, including possibility of funding, is to be considered in terms of a new project, once CTF is transferred into a new framework.

Other Information and Reference:

Appendix 2 – Other Projects

Project no.	Title	Lead country	Appendix no.
CMT-06-01	Status Report	Japan	Appendix 2-1
CMT-06-02	Benchmarking	Japan	Appendix 2-2
CMT-06-03	Barriers and Drivers of Cement Plant Energy Efficiency and Greenhouse Gas Emission Reductions	USA	Appendix 2-3
CMT-06-04	Lifecycle Evaluation of Concrete Building Construction as a Strategy for Sustainable Cities	USA	Appendix 2-4
CMT-06-04 sub2	Infrastructure Sustainability Initiative	Canada	Appendix 2-5
CMT-06-06	Cement Kiln Co-generation	Australia	Appendix 2-6
CMT-07-08 sub1	Technical and economic opportunities for using biomass fuels for reducing GHG emissions from cement production	USA	Note*
CMT-07-08 sub2	Industrial recycling of CO ₂ from cement process into high energy algal biomass coal equivalent fuel	India	No submission
CMT-07-08 sub3	Using Algae for Carbon Capture and Storage at Cement Kilns	Canada	Appendix 2-8
CMT-07-09	The Effect of Cement Concrete as a CO ₂ Sink	Korea	Appendix 2-9

Note*:

This project never managed to receive funding, and recommendation was to take this project off the list, as duplicative efforts are taking place elsewhere as well.

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-01	Title of Project: Status Report
Lead Partner Country: Japan	
Participating Partner Countries and Organizations: Relevant ministries and cement associations of Partners.	
Project Location:	
Project Manager Information	
Name: Toshio Hosoya	Phone: 81-3-5200-5059
Organization: Japan Cement Association (JCA)	Fax: 81-3-5200-5062
Address: 1-9-4, Nihonbashihoncho, Chuo-ku, Tokyo 103-0023, Japan	Email: toshio-hosoya@jcassoc.or.jp
Project Start Date: July 2006	Proposed Project End Date: 2009.12(provisional)
Project Described :	
<ul style="list-style-type: none"> • This project is to conduct surveys relating to energy intensity of, actual emissions of CO₂ and air pollutants from, and alternative raw materials and fuels used in the cement industry of each Partner to serve as the basis for the development of benchmarks and subsequent projects 	
Project Status and Outcome:	
<ul style="list-style-type: none"> • Uploading on HP of APP the revised Interim Status Report. • Identifying Best/Good Practices in Relation to Cement Production Technology and compiling / uploading them on HP of APP in the form of the Booklet of Cement Technology based upon the information from Partners. • Holding training seminars to facilitate the uptake on data collecting measures (including CSI CO₂ Protocol). 	
Future Direction and Recommendation:	
<p>Since it seems rather difficult for some parties to collect necessary data due to various country situations, the further data collection will be discontinued. However, it would be recommended that each trade association can decide to link to the GNR data base of the CSI if the global data is necessary.</p>	
Other Information and Reference:	
<ul style="list-style-type: none"> • Some necessary data are still uncollected. 	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-02	Title of Project: Benchmarking (Benchmark Development)
Lead Partner Country: Japan, US	
Participating Partner Countries and Organizations: Relevant ministries and cement associations of Partners.	
Project Location:	
Project Manager Information	
Name: Toshio Hosoya	Phone: 81-3-5200-5059
Organization: Japan Cement Association (JCA)	Fax: 81-3-5200-5062
Address: 1-9-4, Nihonbashihoncho, Chuo-ku, Tokyo 103-0023, Japan	Email: toshio-hosoya@jcassoc.or.jp
Project Start Date: July 2006	Proposed Project End Date: 2009.12(provisional)
Project Described :	
<ul style="list-style-type: none"> • This project is to select key performance indicators based on the result of emissions surveys of CO₂ and air pollutants in the Partner's cement plants, and to develop benchmarks for evaluating the emissions reduction potential. • Further, barriers to reduce CO₂ emissions or improve energy efficiency in Parties are indentified and discussed with governments 	
Project Status and Outcome:	
<ul style="list-style-type: none"> • In accordance with the Action Plan, the stakeholder meeting was held to discuss about performance indicators and a concept of benchmarking in cement production. • Developed tools for benchmarking and adopted key performance indicators such as net CO₂ emissions intensity as a common indicator and total energy efficiency as a voluntary indicator • Since only limited Partners submitted the estimated CO₂ emissions reduction potential data, an aggregation of the data was not conducted. 	
Future Direction and Recommendation:	
<ul style="list-style-type: none"> • It would be recommended to focus on an improvement of the energy efficiency rather than CO₂ emissions reduction, to discuss about an efficient technology transfer mechanism and to develop a MRV tool of energy efficiency. • It would also be recommended to discuss appropriate measures how to support national improvement actions such as capacity building. • Due to lack of data, the total CO₂ emissions reduction potential in the APP cement sector has not been reported yet. 	
Other Information and Reference:	
<ul style="list-style-type: none"> • Due to lack of data, the total CO₂ emissions reduction potential in the APP cement sector has not been reported yet.. 	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-03	Title of Project: Barriers and Drivers of Cement Plant Energy Efficiency and Greenhouse Gas Emission Reductions
Lead Partner Country: U.S.	
Participating Partner Countries and Organizations: Australia, China, India, Korea and Japan	
Project Location: U.S. Environmental Protection Agency	
Project Manager Information Name: Andy O'Hare Phone: (202) 408-9494 Organization: Portland Cement Association Fax: (202) 408-0877 Address: 500 New Jersey Avenue, NW Email: aohare@cement.org Washington,, DC 20001	
Project Start Date: April 2007, First Phase	Proposed Project End Date: October 2008, First Phase
<p>Project Description: Using data provided by nations participating in the Asia Pacific Partnership Program, compile and analyze the technological and institutional barriers to enhancing cement process energy efficiency and greenhouse gas emission reductions. Use information collected through the survey conducted under Cement Task Force Project 1. The first phase of the project will explore the economic, regulatory and other barriers and opportunities for expanding the use of alternative fuels and raw materials by the U.S. cement industry to enhance energy efficiency and to reduce greenhouse gas and other pollutant emissions. The second phase was intended to explore the barriers and opportunities in the remaining APP nations, utilizing the information collected through Project 1 and gleaned from the analysis focused on the U.S. in the first phase of the project.</p>	
<p>Project Status and Outcomes: The first phase of the project was completed in October 2008 and the findings were presented to the APP cement task force at its meeting in Tokyo in October 2008. A copy of the first phase report was shared with all task force members. The information has proven very useful in the United States for those cement manufacturers seeking to expand the use of alternative fuels and materials at their facilities.</p>	
<p>Future Direction and Recommendation: The second phase of the project was intended to be an expansion of the analysis to include the rest of the countries participating on the APP cement task force. The ultimate objective was to be able to compare and contrast the various barriers and drives to the use of alternative materials and fuels in the APP countries and identify successful programs, strategies and approaches that could be employed in other nations. This second phase would still be very useful if funding can be secured for its completion.</p>	
Other Information and Reference:	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-04	Title of Project: Lifecycle Evaluation of Concrete Building Construction as a Strategy for Sustainable Cities
Lead Partner Country:	
Participating Partner Countries and Organizations: Canada	
Project Location: Lawrence Berkeley National Laboratory, Berkeley, CA USA	
Project Manager Information	
Name: Andy O'Hare	Phone: (202) 408-9494
Organization: Portland Cement Association	Fax: (202) 408-0877
Address: 500 New Jersey Avenue, NW Washington,, DC 20001	Email: aohare@cement.org
Project Start Date: January 2008	Proposed Project End Date: First Phase, March 2010; Second Phase, March 2011
Project Description:	
<p>An assessment of the environmental lifecycle of concrete pavements and structures with an emphasis on their long term energy efficiency and ability to minimize greenhouse gas emissions. The objective of the project is to prepare models, populated with cement and concrete lifecycle data, which may be used to predict the energy performance and greenhouse gas emission profile of concrete pavements and structures. The primary focus of the analysis is on low rise residential and commercial structures and concrete pavements.</p>	
Project Status and Outcomes:	
<p>Task 1: Literature Review: Summer 2008 (structures), Summer 2009 (pavements) Task 2: Collection of Lifecycle Data and Data Synthesis: Summer 2009 Task 3: Development of Lifecycle Inventory and Predictive Model: Fall/Winter 2009/2010 Task 4: Peer Review Model: Fourth Quarter 2010 Task 5: Develop Model Application Case Studies: Fourth Quarter 2010/First Quarter 2011 Task 6: Peer Review Case Studies: First Quarter 2011 Task 7: Prepare Project Report: First Quarter 2011</p> <p>The literature review addressing pavements was completed and published in March 2010. The findings were presented at the March 2010 APP cement task force meeting in Vancouver, where copies of the study were shared with all cement task force participants.</p>	
Future Direction and Recommendation:	
<p>The concrete structure lifecycle assessment (LCA) and associated case studies will be completed in the spring of 2011. This work has now been expanded to include a complete concrete pavement LCA by the Athena Institute (an affiliated part of this APP project being coordinated by the Cement Association of Canada and the Canadian Government). In addition, the Portland Cement Association in 2010 created a Concrete Sustainability Hub at the Massachusetts Institute of Technology (MIT). MIT is in the process of complete LCAs on concrete pavements and concrete structures.</p>	
Other Information and Reference:	

APP Cement Task Force's Project Final Report Form

Project Number: CMT- 06-04 sub. 2	Title of Project: Life Cycle Analysis and Costing Tools for Concrete Highways
Lead Partner Country: Canada	
Participating Partner Countries and Organizations: China	
Project Location: China	
Project Manager Information	
Name: Wayne Trusty	Phone: (613) 269-3795
Organization: Athena	Fax: (613) 269-3796
Address: 629 St. Lawrence St., Merrickville, Ontario	Email: wayne.trusty@athenasmi.org
Project Start Date: July 1, 2009	Proposed Project End Date: March 31, 2011
Project Described :	
<p>To assess the applicability, and facilitate the transfer, of technologies and tools that will help improve the sustainability of relevant above- and below-ground infrastructure. The geographic focus has been on China. The infrastructure focus has been on highways.</p>	
Project Status and Outcome:	
<p>Critical review of existing literature and research – Completed</p> <p>Initial goal and scope document on LCA/LCC tools for highways prepared - Completed</p> <p>Updating existing Canadian data - Completed</p> <p>Development of a prototype tool using Canadian data that can be used in other countries by replacing the Canadian data with data applicable to other countries - Ongoing</p>	
Future Direction and Recommendation:	
<p>This project will result in a prototype tool. In order for the tool to become useful in other countries, follow-up testing with data specific to that country, and debugging will be necessary.</p>	
Other Information and Reference:	

APP Cement Task Force's Project Final Report Form

Project Number: CMT-06-06	Title of Project: Cement Kiln Co-generation
Lead Partner Country: Australia	
Participating Partner Countries and Organizations: China and kiln manufacturers and co-generation technology manufacturers	
Project Location: Boral Ltd Cement Division, Berrima, New South Wales, Australia	
Project Manager Information	
Name: Mr Girish Yadwad	Phone: +61 2 4860 2264
Organization: Boral Ltd Cement Division	Fax: +61 2 4860 2388
Address: Locked Bag 4 New Berrima NSW 2577	Email: girish.yadwad@boral.com.au
Project Start Date: 2007	Proposed Project End Date: June 2009
Project Described :	
<p>The objective of the project was to assess the possible climate change benefits and financial viability of retrofitting co-generation and waste heat reclaim systems at cement plants in Australia. The project consisted of a feasibility study into the installation of co-generation technologies in cement plants in Australia. The feasibility study examined the technical and financial options such as connection to existing plant, energy and greenhouse gas savings and the implications on other factors such as water use. It was intended that if a demonstration plant appeared feasible, the study would progress to preliminary scoping for a business case to assist the company in the implementation of the project.</p>	
Project Status and Outcome:	
<p>The project is completed.</p> <p>The project sought to combine two established technologies – cement kiln operation and co-generation technology – to demonstrate the benefits to the cement industry. It examined the technical and engineering challenges involved in retrofitting co-generation facilities utilising cement kiln waste heat. In addition, the project assessed the impact on greenhouse gas emissions from cement production and cement kiln energy use, due to electricity generated by the co-generation plant.</p> <p>The feasibility study found that:</p> <ul style="list-style-type: none"> • A co-generation project had significantly higher equipment, labour and site-related costs in Australia; • The higher costs were not reduced sufficiently by sourcing a "turn-key" project from China to make a co-generation project economically viable in Australia, compared with grid-sourced electricity; • Both stand alone waste heat cogeneration systems and larger power plants were found to be uneconomical in Australia; • The project found that it was unlikely that the project would meet the economic hurdles for the candidate cement plant. 	
Future Direction and Recommendation:	
<p>Following the feasibility study, the decision was made not to proceed with the business case to retrofit co-generation to the candidate cement plant. The APP project has been completed.</p>	
Other Information and Reference:	
See previous reports provided	

APP Cement Task Force's Project Final Report Form

Project Number: CMT- 07-08 sub. 3	Title of Project: Algal Biomass from Cement Kiln CO ₂ Emissions
Lead Partner Country: Canada	
Participating Partner Countries and Organizations: India	
Project Location: Canada	
Project Manager Information Name: Chris Cory Organization: Pond Biofuels Phone: (416) 616-0866 Address: Email: chris.c@pondbiofuels.com 6 Collinsgrove Road, Toronto, Ontario	
Project Start Date: April 1, 2010	Proposed Project End Date: March 31, 2011
Project Described : To demonstrate the viability, on a commercial scale, of a technology that will utilize cement kiln stack gas to produce algae, which in turn will be utilized as fuel. In turn the algae can be used as fuel or as feedstock for producing chemicals.	
Project Status and Outcome: Verification of algae growth using stack gases from a cement kiln - Completed Construct and operate a pilot-scale, scalable bioreactor for growing algae - Completed Demonstration of technology for conversion of algae into forms useable as fuels, providing a “closed loop” energy system, greatly reducing the demand for external sources of energy Applicability of the technology to other industrial processes	
Future Direction and Recommendation: This project has strong potential for reducing greenhouse gas emissions in cement plants, and also has applicability to other large industrial emitter industries. Continuation of this work is recommended.	
Other Information and Reference:	

APP Cement Task Force's Project Final Report Form

Project Number: CMT 07-09	Title of Project: The effect of cement concrete as a CO ₂ sink															
Lead Partner Country: Korea																
Participating Partner Countries and Organizations: Australia, India, The US																
Project Location: Each partner country																
Project Manager Information Name: Mr. Choonsoo Cha Organization: Ssangyong Cement Ind.Co.,Ltd Address:	Phone: +82-2-2270-5600 Fax: +82-2-2270-5973 Email: cha@ssyc.co.kr															
Project Start Date: July 2007	Proposed Project End Date: October 2011															
Project Described : Sep.2008 : Acquire financial support from the government grants of international joint R&D program Nov.2008 ~ Oct.2009 : Start quantitative analysis and verification of CO ₂ sink capacity by cement paste and mortar CO ₂ uptake by concrete carbonation mechanism of CO ₂ carbonation Nov.2009 ~ Oct.2010 : Development of the quantitative analysis approach and prediction model for CO ₂ sink capacity of concrete structure with different condition. Nov.2010 ~ Oct.2011: Development of the absorption prediction model for CO ₂ dependent on the environment condition throughout the whole life cycle.																
Project Status and Outcome: <ul style="list-style-type: none"> - Project status <ul style="list-style-type: none"> : CMT 07-09 is all right and according to international joint R&D program schedule. : 3rd step program(Until Oct. 2011) is going according to plan. : Content and progress : Lifetime Prediction, Carbonation ratio, and CO₂ balance by numerical model. Consideration of the carbonation coefficient by the service life and type of concrete structure. Development of numerical model for calculating CO₂ balance. - Outcome <ul style="list-style-type: none"> : result of emission – absorption prediction model (in Korea). <table border="1" style="margin-left: 40px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="padding: 5px;">Concrete strength (24 MPa)</th> <th colspan="3" style="padding: 5px;">Ratio of absorption over emission of CO₂ (%)</th> </tr> <tr> <th style="padding: 5px;">40 years</th> <th style="padding: 5px;">60 years</th> <th style="padding: 5px;">80 years</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Concrete building structure</td> <td style="padding: 5px;">3.7</td> <td style="padding: 5px;">4.5</td> <td style="padding: 5px;">5.2</td> </tr> <tr> <td style="padding: 5px;">Concrete bridge</td> <td style="padding: 5px;">2.5</td> <td style="padding: 5px;">3.1</td> <td style="padding: 5px;">3.5</td> </tr> </tbody> </table>		Concrete strength (24 MPa)	Ratio of absorption over emission of CO ₂ (%)			40 years	60 years	80 years	Concrete building structure	3.7	4.5	5.2	Concrete bridge	2.5	3.1	3.5
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Future Direction and Recommendation: Terminate – International joint R&D program(CMT-07-09) is nearly finished.																
Other Information and Reference: KICET(Korea Institute of Ceramic Engineering and Technology)carry out the international joint R&D Program.																