Asia-Pacific Partnership on Clean Development and Climate

Cement Task Force

Junichi KITAMI, Ph. D.

Chair of Cement Task Force

APP PIC meeting, Seattle, the U. S.

19-20 May, 2008

Outline of presentation

1. Activities of CTF since PIC meeting in Tokyo

2. Progress of Flagship Projects etc.

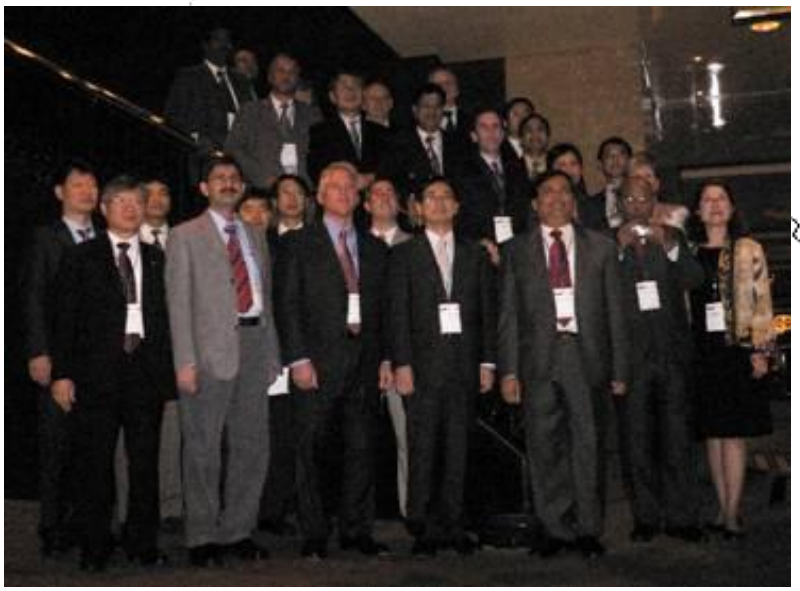
3. Next steps

Activities since PIC meeting in Tokyo

- September 2007: 4th Task Force Meeting in Melbourne, Australia
- December 2007: Exchange of information and view between Japanese CTF Secretariat and IEA, WBCSD/CSI
- May 12 2008: Platform Meeting with WRI
- May 13-15 2008: 5th Task Force Meeting in Charleston, South Carolina, the United States
- May 19 2008: Cooperation with the joint Workshop by WBCSD/CSI and WRI

4th Task Force Meeting in Australia

- September 12-13, 2007, in Melbourne, Australia
- Participation by 50 governments and private members from all 6 partners
- Jointly with Centre of Excellence Co-processing workshop & plant visit



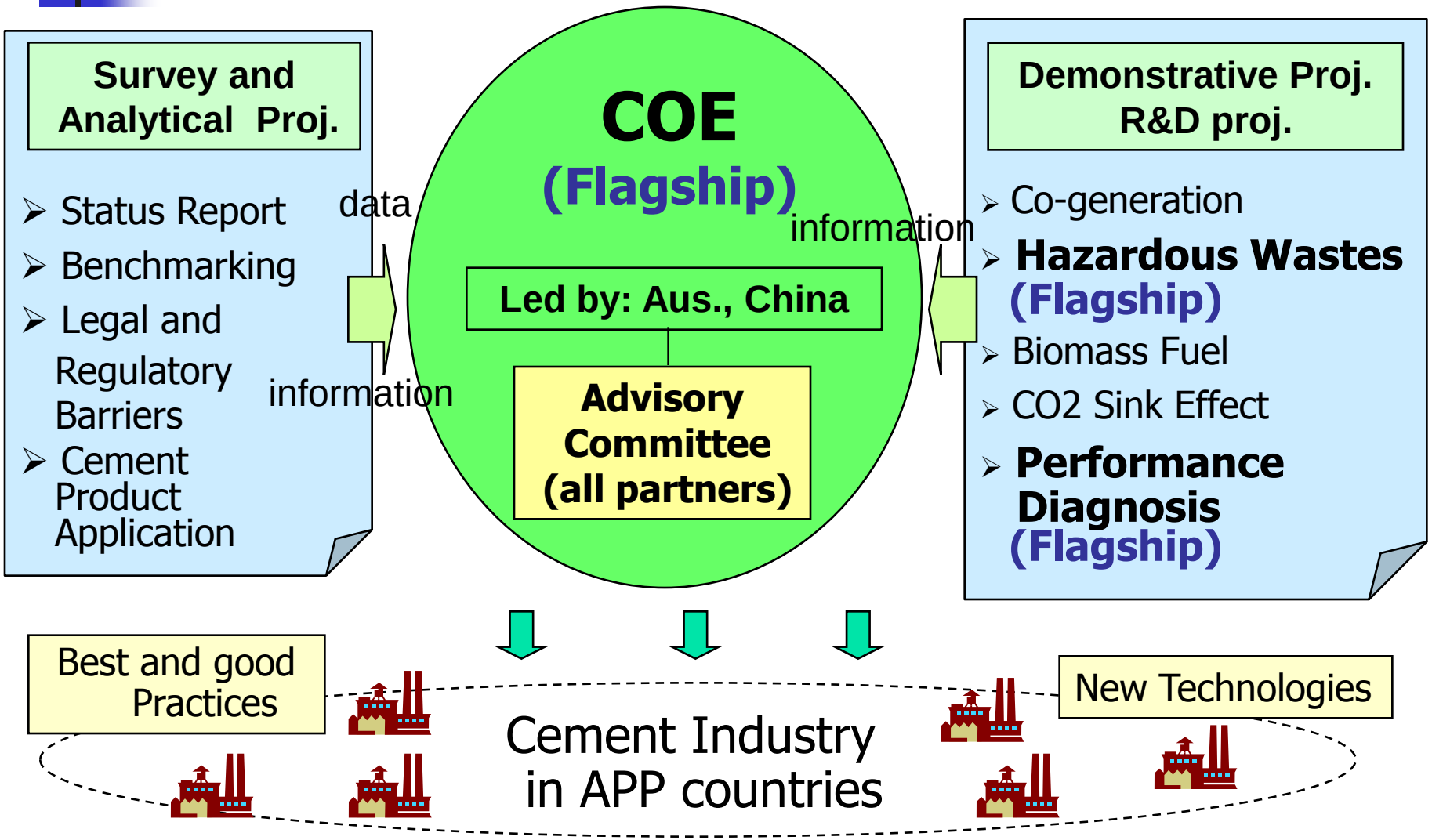
5th Task Force Meeting in the United States

- May 13-15, 2008, in Charleston, South Carolina, the United States
- Participation by 61 governments and private members from all 7 Partners
- Trade Expo of U.S. Clean Cement Technology & plant visit

Feature of Cement Task Force Meeting

- **Holding a Seminar or Workshop**
- **Plant Visit (Cement, Recycle etc.)**
- **Sharing information on other relevant activities**
- **Increase in the number of participants**
  - 1st meeting: U.S. (Berkeley) 28
  - 2nd meeting: China (Xian) 41
  - 3rd meeting: India (Delhi) 45
  - 4th meeting: Australia (Melbourne) 50
  - 5th meeting: U.S. (Charleston) 61

Project Formation of CTF



Flagship Projects of Cement TF

1. Centre of Excellence (CMT-06-05)

2. Hazardous Wastes (CMT-07-07)

– Best Practices for Co-Processing and Management in Cement Kilns

3. Performance Diagnosis (CMT-07-10)

Flagship(1) :Centre of Excellence

Establishment of COE

Opening Ceremony
January 21, 2008
Beijing, China

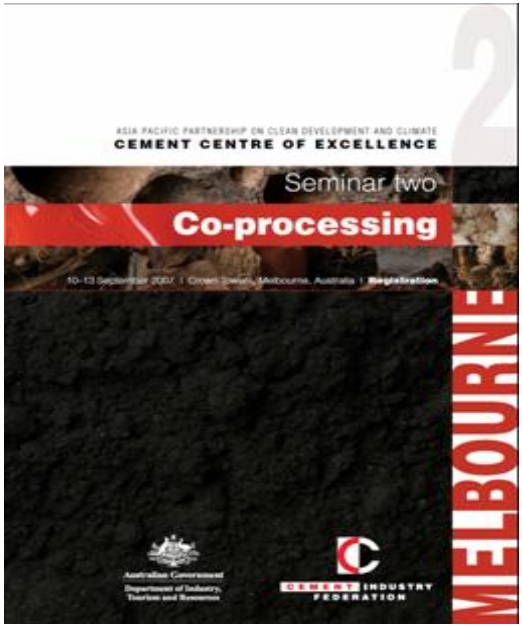
COE Secretariat funded by Australia and China

Flagship(1) :Centre of Excellence

Technology Diffusion through COE

Co-processing Workshop

- September 10-13, 2007, in conjunction with the 4th APP CTF meeting, Melbourne, Australia
- Site visit to Geocycle CO. (waste oils), Waurn Ponds Cement plant and Melbourne Water (mercury contaminated biomass)



Flagship(1) :Centre of Excellence

Capacity Building by COE

CSI CO2 Protocol Training Workshop

- January 22-23, 2008 Beijing, China
- 15 delegates from APP partners and International organizations, and 52 participants from Chinese cement companies etc.

Flagship(2) :Hazardous Wastes

Sub-Project	Lead partner	Participants
sub1 - Hazardous Waste Co-Processing in India	IND	AUS, IND,US
sub2 - Solvent-Based Fuels in Cement Kilns in Australia	AUS	AUS, CHN,IND
sub3 - Management of Mercury Emissions from Cement Kilns Co-Processing Biosolids	AUS	AUS, CHN,IND
sub4 - Best Practices for Management and Co-Firing of Hazardous and Other Industrial Wastes in Cement Kilns in US	US	All 6 parties

Flagship(2) :Hazardous Wastes

COE Technical Workshop on Co-processing:

- September 10-13, 2007, in conjunction with 4th CTF meeting, Melbourne, Australia

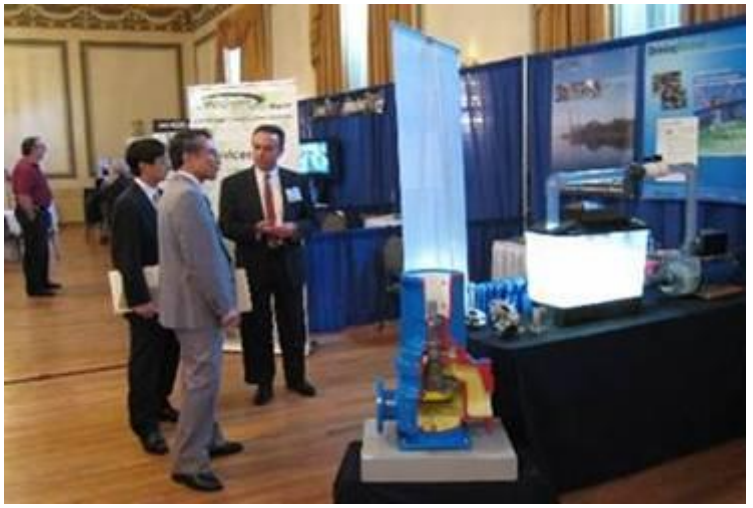
Solvent Based Fuels(sub2) & Biosolids(sub3) :

- Completed the detailed design for relevant technology(sub2)
- Reached to some key milestone such as MOU, testing, Stakeholder consultation(sub3)
- Australian government has vigorously promoted these projects through its funding.

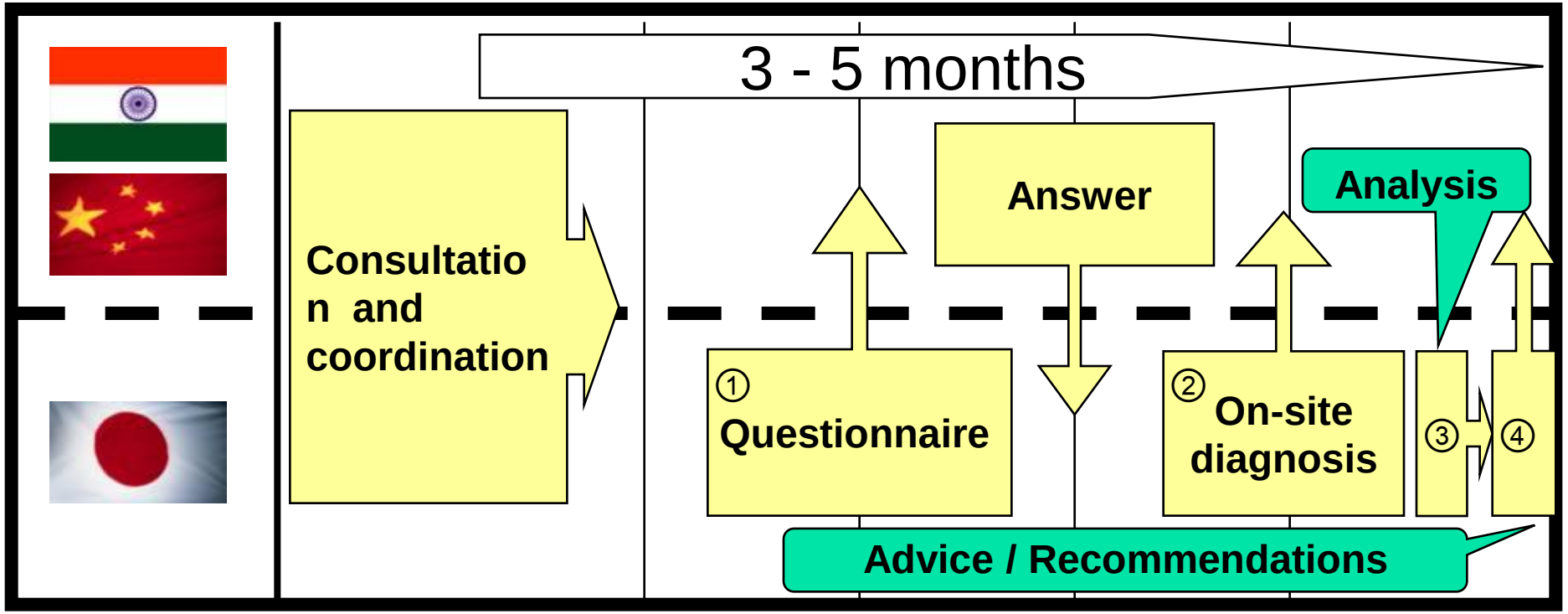
Flagship(2) :Hazardous Wastes

APP EXPO of US Clean Cement Technologies and Technical Seminar (sub4)

- May 13-15, 2008, in conjunction with 5th CTF meeting, Charleston, the United States.
- Expo visitors: 78 delegates from seven APP partners including trade delegations from China and India.



Flagship(3) :Performance Diagnosis



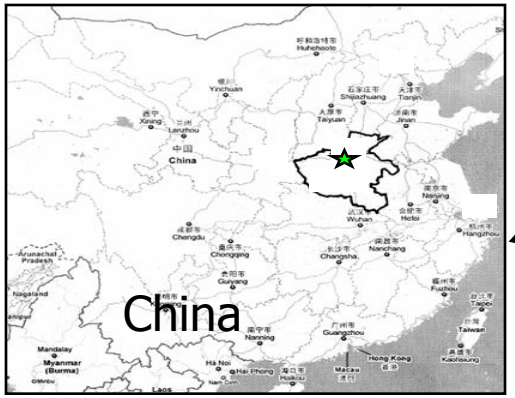
Case Study, Best Practice

All APP partners
(through CTF meeting, COE etc.)

Flagship(3) :Performance Diagnosis

- 4 factories were selected by Chinese and Indian government, respectively.
- **Carried out 1st performance diagnosis in China (Jan. 2008) and India (Feb. 2008)**

  Discuss with Chinese / Indian experts to finalize each report including recommendation.
- Make 2 more diagnoses respectively by Mar. 2009.
- Hold a COE seminar in mid 2009 to APP members to disseminate outcomes of diagnoses carried out by then.



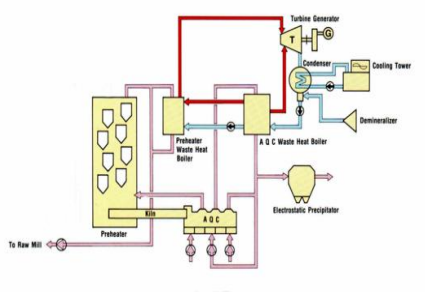
Flagship(3) :Performance Diagnosis

<Preliminary observation of 1st diagnosis>

- Because of introducing the most up-to-date equipments, the energy efficiency level of both factories in China and India are high.
- However, further energy saving will be possible by introduction of facilities for higher energy efficiency etc.

(Reports will be finalized through discussion by experts.)

Waste Heat Power Generation

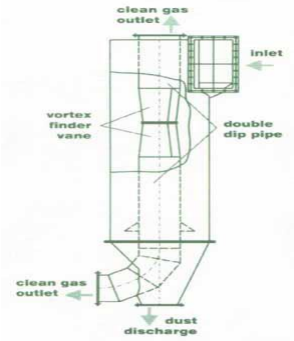


Unit-1 Clinker Cooler Exhaust Gas
Unit-2 Preheater& Clinker Cooler Exhaust Gas
* Preheater Exhaust Gas in Unit 1:installed

Installation of waste heat recovery system has been planned and FS in process

24

Low-Pressure-Drop Type Cyclone



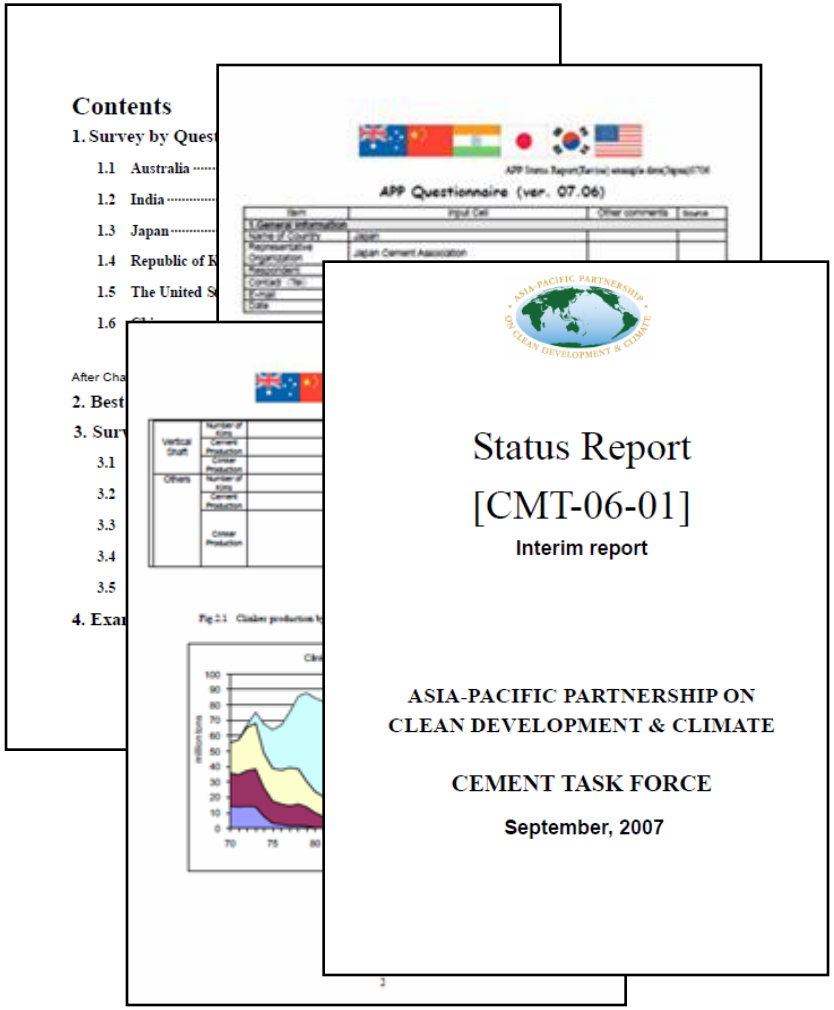
•HURRICLON®
Pressure Drop: 50%
Dust Emission: 10%
•HURRIVANE®
(Vortex Finder Vane)
Pressure Drop: 30%

to be discussed

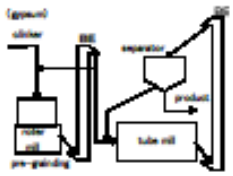
24

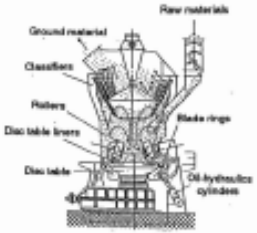
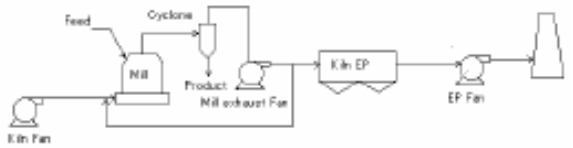
Other Projects(1) :Status Report

- October 2007: Published and Uploaded the Interim Report on APP Website
  http://www.asiapacificpartnership.org/APPProjects/Cement/CMT-06-01(Interim%20Report)071004.pdf
- May 2008:
  Confirmed the way to collect data in more detail, and the way to compile Best practices



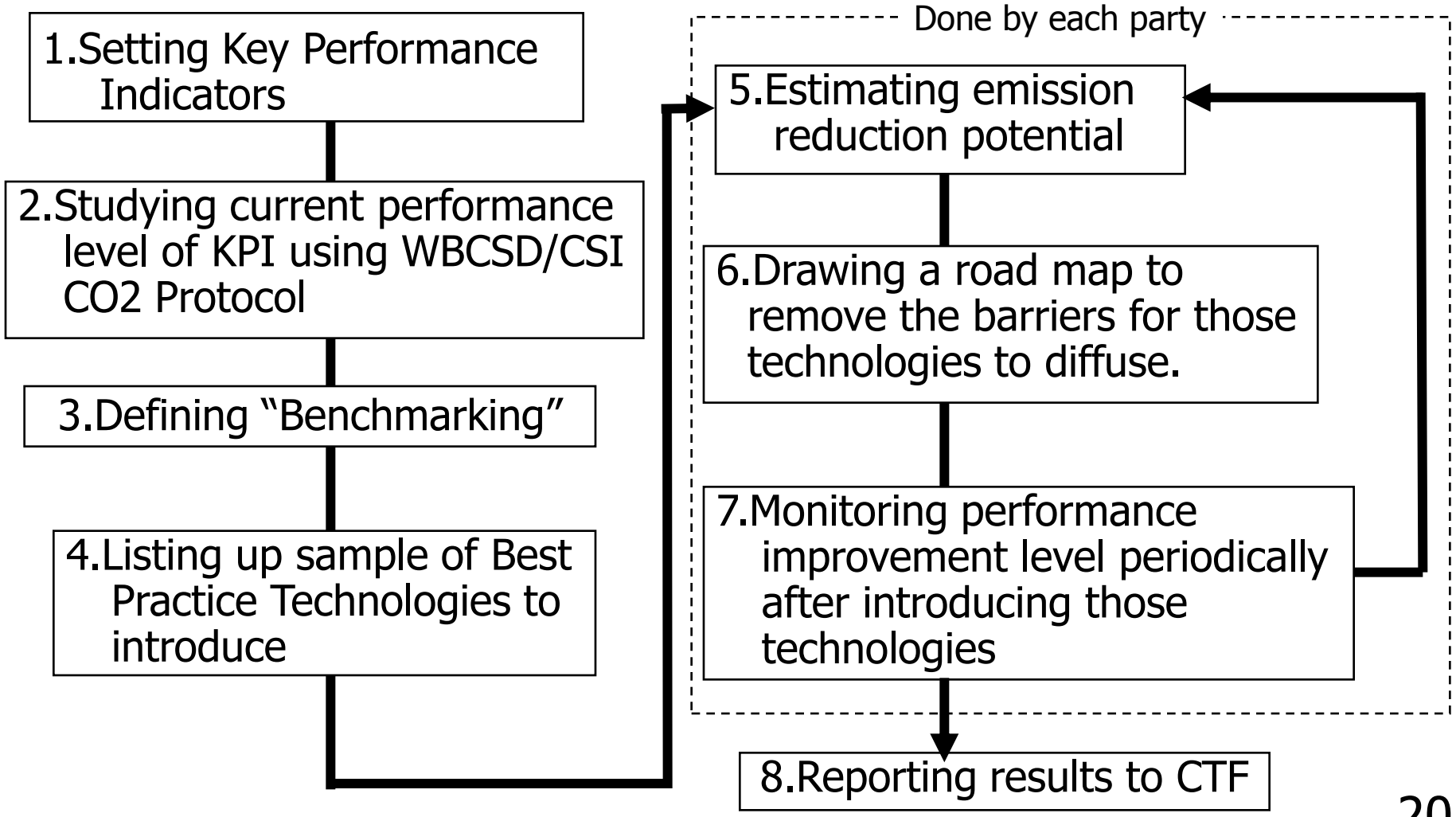
Other Projects(1) :Status Report

Item	Pre-grinding of roller mill system	Application process	Introduced time
		Finishing process	1980s (latter half)
Background	For the purpose of decreasing the specific electrical power consumption in the finishing process, this installs a vertical roller mill for pre-grinding of clinker in the upstream of the tube mill. The roll press system preceded as pre-grinding system, but there are many machinery troubles (flake and crack of roll surface, damage of roll shaft and bearing) for high pressure. This system was developed on the vertical roller mill which has achieve satisfactory results. It was introduced from the latter half of the 1990s, and the introduction rate in 2000 is 13%.		
Technical contents	This system installs a vertical roller mill (of high grinding efficiency) for a pre-grinding in the upstream of the tube mill. Clinkers are milled the turn table and 2~4 rollers. The basic structure is the same as vertical roller mills for raw materials or cement. But the roller mill for pre-grinding have no classifier and air sweep. Pre-ground clinkers were discharged outside mill. Fine particles are separated from pre-ground clinkers with vibrating screen, and they are fed to finishing tube mill. The structure (Fig.1) and the flow (Fig.2) are shown below.  Fig.1 Structure  Fig.2 Flow [Note] 1) To decrease the specific power consumption in finishing process sufficiently, it is required to make the size of balls in finish mill smaller.		
Introduced effects	1) Grinding capacity of finish mill increases about 30~60%. 2) Specific power consumption in finishing process decreases 10~20%.		
Equipment cost	About 500~1000 million yen for production capacity about 100 t/h including associated facilities and installation		
Relative items	1) Introduction of raw material pre-grinding roll crusher		
References	1) Cement Manufacturing Technology Symposium, No.45, p.21 (1989) 2) Cement Manufacturing Technology Symposium, No.44, p.56 (1987)		

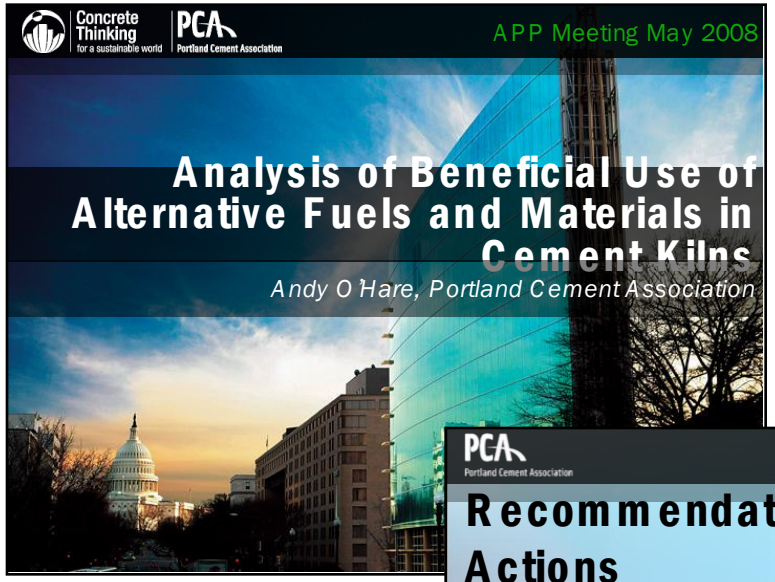
Item	Introduction of a vertical roller mill for raw materials	Application process	Introduced time
		Raw material process	Around 1980s
Background	The grinding of raw materials requires enormous energy. Formerly, tube mills were mainly used for the grinding of raw materials. But energy efficiency of tube mill is only a few %, so introduction of grinding equipment which has high energy efficiency was desired.		
Technical contents	The vertical roller mill has a high grinding energy efficiency and the area for installation is smaller compared with tube mills. In recent years, the vertical roller mills have been extensively adopted. A) Structure (1) The rollers are hydraulically pressed against a disc table and the feed is ground between the rollers and the disc table. (2) The classifier is housed above the roll ers. B) Feature (1) The specific power consumption of grinding is lower than that of tube (ball) mill. (2) The residence time of raw materials in this type of mill is much shorter than that in tube (ball) mill; therefore, the crushing section has a good response to the needs of the raw material mixing section and hence contributes to stable quality. (3) The area for installation is small and the noise level is low. (4) This type of mill can crush lumps too large to be fed into the tube (ball) mill. (5) The feed may be dried by using the flue gas from the kiln.  Fig.1 Vertical roller mill  Fig.2 Schematic process flow of vertical roller mill for grinding of raw materials Vertical roller mills are adopted in 20 cement plants (44 mills) in Japan. [Notes] Height of dam ring on disc table must be adjusted properly to keep high efficiency. Life of roller is 3,000 to 4,000 hrs and that of disc table liner is 5,000 to 6,000 hrs.		
Introduced effects	Table1 Energy saving effect of the vertical roller mill (Production: %; Ball mill: 100; Vertical roller mill: 160~180; Effect(%): 60~80(increase)) (Specific power consumption: kWh/t-RM; Ball mill: 20~26; Vertical roller mill: 14~18; Effect(%): About 30 (Reduction)) (The reduction of power consumption(*): kWh/y; Effect(%): 2,240,000) Note : The case of capacity: 200t/h at operation of 7,000h/y		
Equipment cost	About 1500 million yen for a vertical roller mill of about 200ton/hour including associated facilities and installation cost.		
Relative items			
References	Cement Manufacturing Technology Symposium, No.37, p.6 (1980)		

Other Projects(2): Benchmarking Development

Benchmarking Approach



Other rojects(3): Legal/regulatory issues



PCA Portland Cement Association

Project Objectives and Scope

- Increase utilization of alternative fuels and raw materials
- Refine understanding of challenges and opportunities; conduct material-specific analyses. Study focused on:
  - Cost issues
  - Technical issues
  - Regulatory issues
  - Supply/Logistics issues

rging Materials

PCA Portland Cement Association

Recommendations/Further Actions

- Develop partnerships between the cement sector and other industry sectors; there is a strong interest in examining these issues jointly.
- EPA should make a decision concerning the regulatory status of CSOS: Why is CSOS classified as a hazardous waste?
- EPA should make a decision concerning regulatory status of ASR: why is ASR classified as a "PCB waste?"

Other Projects(4): Product Application

Life-Cycle Evaluation of Concrete Building Construction as a Strategy for Sustainable U.S. Cities

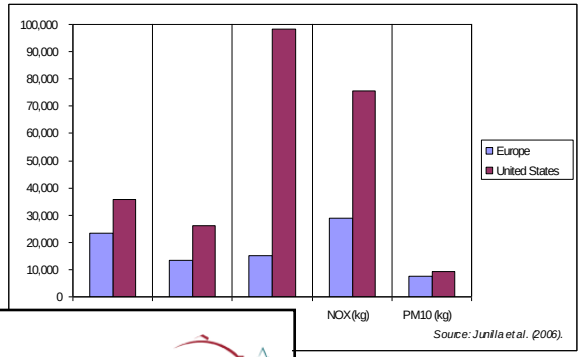
A Research Project for the Portland Cement Association

Eric Masanet, Ph.D.
Environmental Energy Technologies Division
Lawrence Berkeley National

Presented at the Asia Pacific Partnership 5th
Francis Marion Ho
Charleston, South Ca
May 13th, 2008

LAWRENCE BERKELEY NATION

Selected LCA results

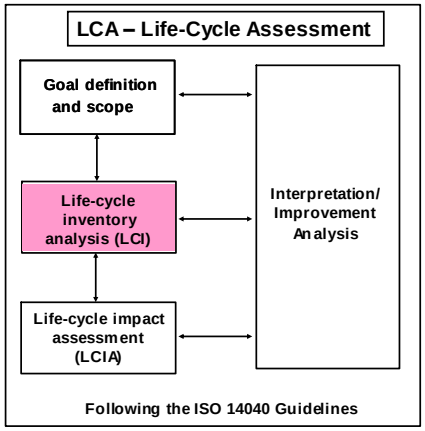


Source: Junilla et al. (2006).

-62% -21%

ATIONAL LABORATORY

Life-cycle inventory (LCI)



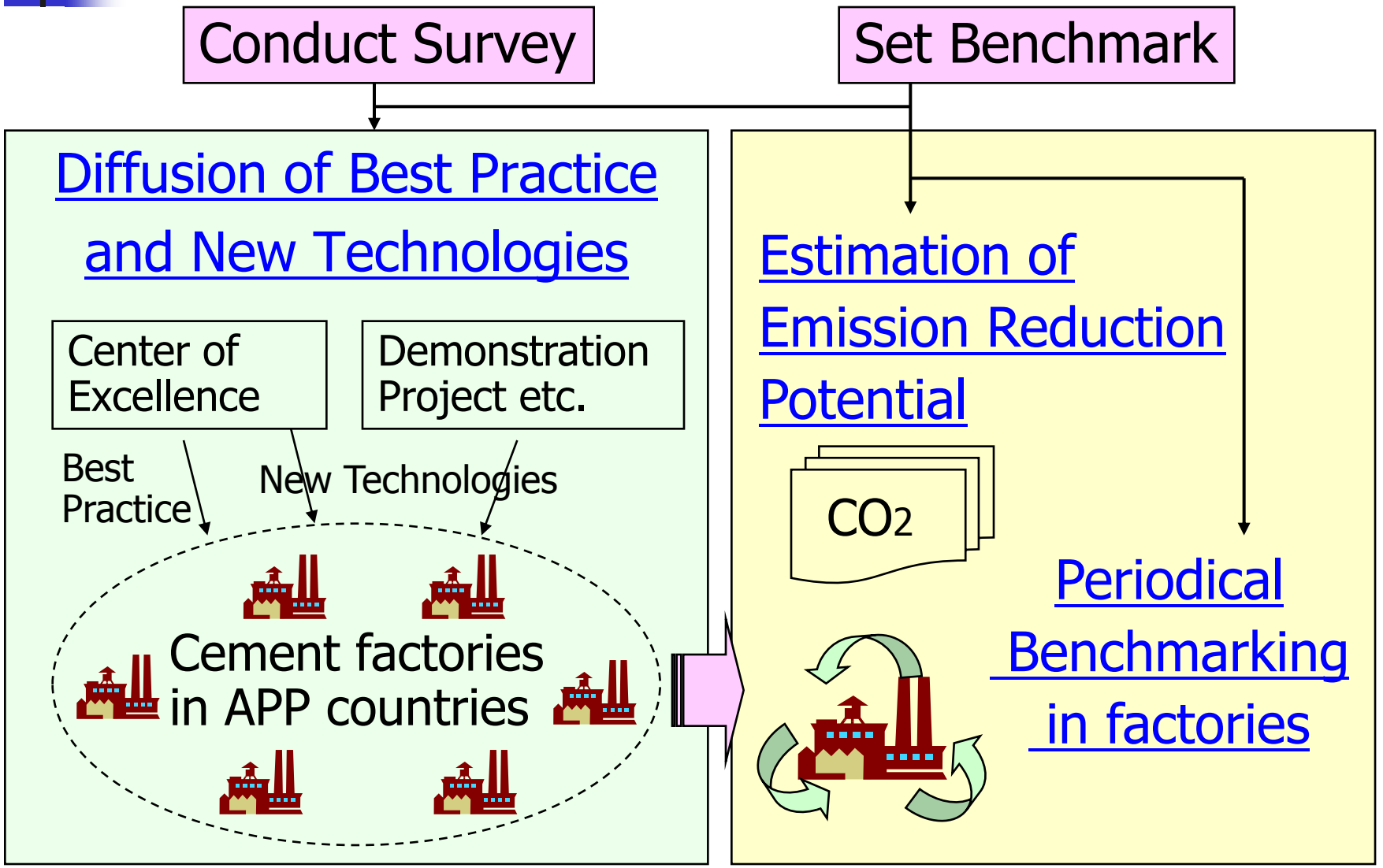
Key steps:

- Development of process flow diagrams
- Collection of process-level environmental data
- Data availability and quality are often key obstacles to compiling a complete LCI

LAWRENCE BERKELEY NATIONAL LABORATORY

Page 7

Two major streams of Cement Task Force Activity



Next Step for further progress

- Carry out activity of each project steadily
- Focus technical diffusion and capacity building through COE
  - 2nd CSI Protocol Workshop, Nov. 2008, China
- Facilitate outreach in cooperation with WBCSD/CSI, IEA etc.
- Figure out the APP7 aggregated CO2 reduction potential
- Holding the next TF meeting in 2008

Thank you for your attention.

Cement Task force