

PROMEEC (INDUSTRY) 2006 IN LAO PDR

**PROMEEC Post-Workshop
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1

Outline

- 1. Energy audit**
- 2. Seminar**

2

1

Energy audit

3

Auditing Background

- Industry type: **Cement**
- Auditing dates: **2 - 5 October 2006**
- Venue:
 1. **Vangvieng Cement Factories No.1**
 2. **Vangvieng Cement Factories No.2,
Vientiane, Lao PDR**

4

Photos of the two cement factories



5

Information of Vangvieng cement factory No. 1

6

General Information of the factory

- **Established Year: 1996**
- **Employees: 244**
- **Energy consumed per year:**
 - Electricity: 8,307,924 kWh
 - Anthracite: 15,500 Ton
 - Fuel: 191,156 L

7

Information of Vangvieng cement factory No. 2

8

General Information of the factory

- **Established Year: 2001 October**
- **Employees: 294**
 - Technology engineer: 1
 - Mechanical Engineers: 5
 - Electrical Engineers: 3
 - Maintenance service technicians: 45
 - Operators: 18

9

Design capacity

- Clinker: 210,000 t/y
- Cement: 240,000 t/y
- Heat Consumption:
850Kcal/Kg-cl
- Electric Power: 115 kWh/t cem.

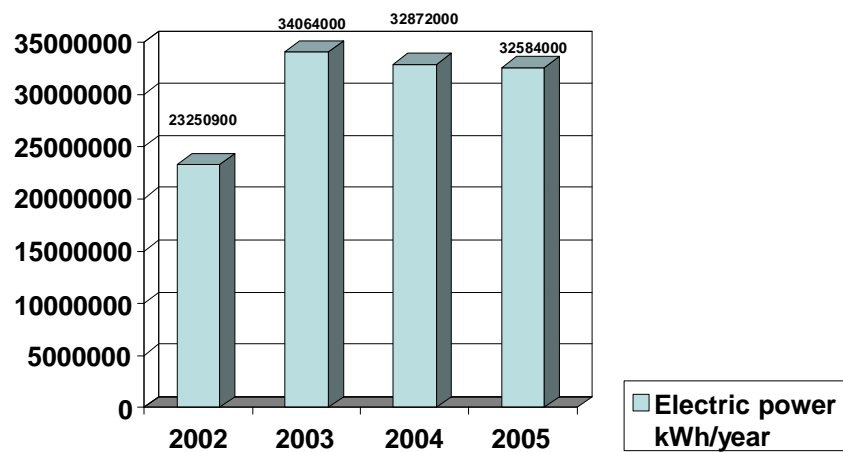
10

Energy consumption (2005)

1. Electricity: 30,957,252 kWh
2. Anthracite: 31,071 T
3. Diesel: No data

11

Power average consumption 137.98 Kwh/t of cement



12

Energy consumption(Anthracite)

Item	2002	2003	2004	2005
Clinker(т)	179,220	226,821	224,747	205,157
Coal (т)	26,428	35,634	33,090	31,071
Heat Consumption	811 Kcal/kg cl	864 Kcal/kg cl	809 Kcal/kg cl	832 Kcal/kg cl

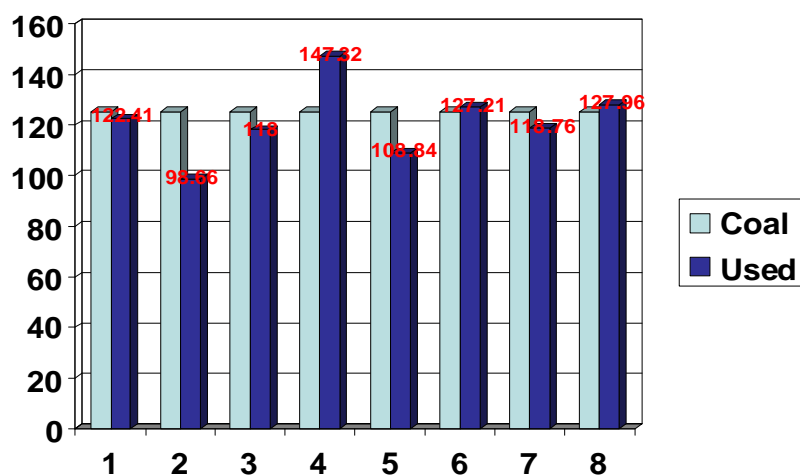
13

Activities of Energy Saving

- Policy for Energy saving from the end of Year 2005
- Beginning from Electricity energy in January 2006. First training held in cement plant No II
- Making and monitoring of monthly records, analyzing of records
- Goal or objective determination **125 kWh/t cement**
- Results from January-August/2006 **133.49kWh/t cement**

14

Electric power used 1-8.2006 Kwh/t cement



15

Future plan of Energy Efficiency and Conservation in the Cement factory

- Raising awareness of Energy Efficiency and Conservation to all employees;
- Enhancing efficiency on machine and equipment maintenance to avoid the unscheduled shutdown;
- Keeping or increasing the productivities (quantity and quality)
- Establishment of Energy Efficiency and Conservation Committee to monitor the energy consumption and energy saving in the factory

16

Pre-audit coordination

- Contacting the two Vangvieng Cement factories that proposed to be audited and asking them to fill up questionnaires for discussion during our visit.
- Organising a small team to join the on-the-job training on energy audit in the factory;
- Arranging a seminar on Promotion of Energy Efficiency and Conservation in Industry in Southeast Asia on 6 October 2006 including invitation of 80 participants.

17

List of participants



- Ministry of Energy and Mines, Lao PDR : **4**
- ECCJ, Japan : **3**
- ACE : **2**
- PTM, Malaysia : **2**
- The factories : **18**

Total: 29 people

18

Audit Items & Measurement

	Items		Measurement
Heat	Heat & material balance	Factory 1 Factory 2	Clinker (t/d), coal to kiln (t/d), coal to precalciner (t/d), Temperature (SP exit gas, cooler exit gas, clinker)
	Waste heat recovery	Factory 1 Factory 2	Same as above
	Air leakage		O2 Balance (gas analysis)
Electricity	Big motor load factor		Motor power, pressure balance
	Transformer load factor & power factor		
	Air compressor		Motor power, pressure balance
Energy Management	Data management	Factory 1 Factory 2	Recording, targeting (SEC)
	Employee awareness	Factory 1 Factory 2	SEC reporting, training, promotion committee

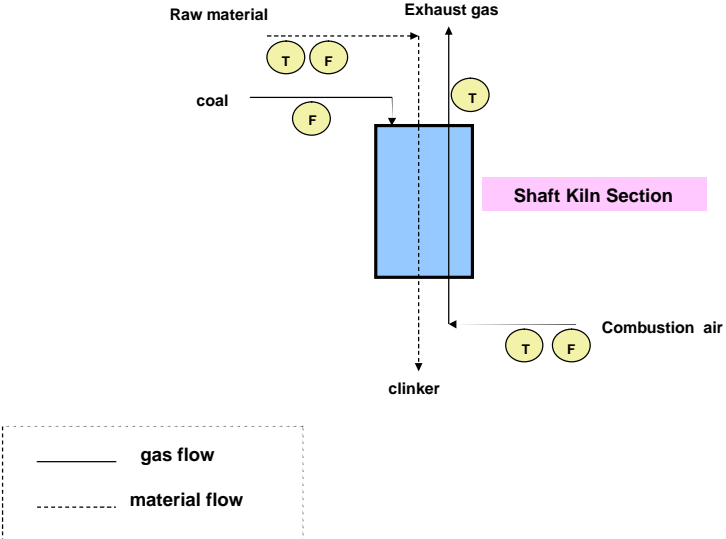
19

Measuring Instrument List

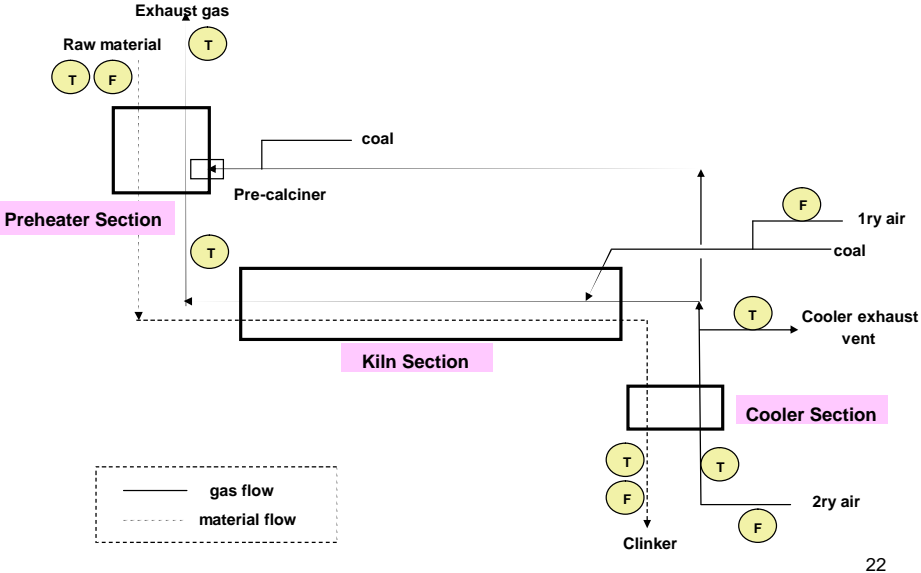
Kanomax	PTM	Grate cooler air(2ry air), Coal comb air (1ry air)
Contact thermometer	PTM	Ambient air
Power monitor	PTM	
Radiation thermometer	ECCJ	Kiln surface (3 locations) Cooler surface (3 locations) SP surface

20

Data collection in Factory 1



Data collection in Factory 2



**Participants
measuring the
temperature of
the kiln**



Monitoring of SEC & Key Variables

Process	Calculation	Unit
Raw Mill	= Electric Power / Raw Material Charge	(kWh/kg-raw mat'l)
Burning	= Fuel / Clinker production = O ₂ % of Kiln Exhaust Gas	(kcal/kg-cl) (%)
Cement Mill	= Electric Power / Cement Production	(kWh/kg-cement)

**Participants
closely
analyzing
the data**



**Participants
paid attention
at controlling
system**



Recommendations to the factories

27

Energy Management System

Aspect		Major Activity
Organization	Accountability	Employee education (awareness)
	Organization	EE&C promotion committee Appoint an energy manager
Monitoring	Monitoring	Data recording & Sharing by all employees
	Targeting	Specific energy consumption (SEC) Key efficiency parameters (O2%)
Technology		Technical review (energy audit)
Operation & maintenance (O&M)	House keeping	Product yield (avoid off-spec product)
		Preventive maintenance (avoid unscheduled shutdown)

28

Energy Saving Measures in Cement Factory

	Raw material section	Clinker burning section	Finishing section
First step	1) Selection of raw materials 2) Management of particle fineness 3) Management of grinding media	1) Prevention of unscheduled shutdown 2) Selection of fuel 3) Prevention of leakage	1) Management of particle fineness 2) Management of grinding media
Second step	1) Replacement of fan rotor 2) Improvement of temperature and pressure control system 3) Improvement of mixing & homogenization system 4) Installation of closed circuit mill (separator)	1) Use of industrial waste (waste tire, etc) 2) Heat recovery of pre-heater exhaust gas and cooler exhaust gas (drying of raw material and generation of electricity) 3) Replacement of cooler dust collection from multiclone to EP	1) Installation of closed circuit mill (separator) 2) Installation of feed control system
Third step	1) Conversion from wet process to dry process 2) Replacement of ball or tube mill by vertical roller mill 3) Pneumatic transfer of raw material to mechanical transfer	1) Conversion of fuel from petroleum to coal 2) Conversion of SP to NSP 3) Conversion of planetary cooler to grate cooler	1) Use of industrial waste (slag, pozzolan)

29

Monitoring of SEC & Key Variables

Section	Monitored Item	Unit
Raw Mill	SEC = Electric Power / Raw Material Charge	(kWh/kg-raw mat'l)
Clinker Burning	SEC = Fuel / Clinker production O2% of Kiln Exhaust Gas	(kcal/kg-cl) (%)
Cement Mill	SEC = Electric Power / Cement Production	(kWh/kg-cement)

30

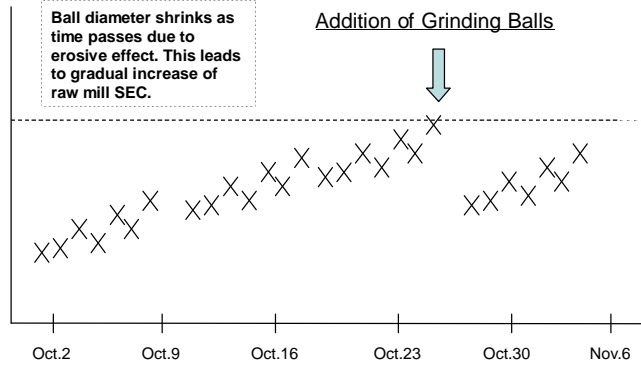
Recording of SEC on a Graph

Grinding Ball Management

SEC should be monitored daily, and when SEC arrives at certain level, grinding balls is compensated.

Raw mill SEC
(kWh/kg-mat'l)

Filling level of grinding balls is also important in grinding efficiency. Optimum level of filling should be maintained.



Monitor raw mill SEC daily and add grinding balls in right timing
→ 10% energy saving expected

31

2

Seminar

32

Seminar Background

- **Seminar title:** Seminar on the promotion on Energy Efficiency and Conservation (PROMEEC) for Major Industries in Southeast
- **Seminar held:** 6 October 2006
- **Venue:** Don Chan Palace, Vientiane, Lao PDR

33

Seminar Background

- **Presenters:**
- **ECCJ: 2, ACE:2, Malaysia: 1, Myanmar:1, The Philippines: 1, Lao PDR: 3**
- **Participants: 60**

34

Session 1

Policy and Initiatives on EE&C

- Overview of EE&C Programs of ASEAN/ACE
- Overview of Plans and Programs on EE&C in Lao PDR, Ministry of Energy and Mines
- Initiatives and Programs of ECCJ on EE&C in Industry in Japan Mr. Hideyuki TANAKA, ECCJ

35

Session 2

EE&C Best Practices in Industries

- Presentation: Case Study 1 (Cement factory and Hydropower plant, Lao PDR)
- Presentation: Case Study 2 (Textile, Glass and Food Malaysia) **Best Practices for Energy Efficiency and Conservation for the Textile, Glass and Food Industries in Malaysia**
- Presentation: Case Study 3 (Oil Refinery, Myanmar) **Best Practices for Energy Efficiency and Conservation for the Oil Refinery Industry in Myanmar**
- Presentation: Case Study 4 (Iron and Steel, Philippines) **Best Practices for Energy Efficiency and Conservation for the Steel/Iron, Cement and Food Industries in the Philippines**

36

Session 3

The Way Forward

- **Presentation from ECCJ**
- **Presentation: Updates on the Development of Technical Directory ACE**
- **Presentation: Updates on the Development of Database/ Benchmark/ Guideline for Industry ACE**

37

**Thank you
for your attention**

38