OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

23204

United Nations Industrial Development Organization

Energy Conservation and GHG Emissions Reduction

in Chinese TVEs

Cement Sector Replication Projects for Energy Efficiency（2）

Contract No. 05/034/ML,PO. No.16000841

EG/CPR/99/G31

Final Report

Nanjing Triumph Cement Technology Engineering Co., Ltd.

南京凯盛水泥技术工程有限公司

2006.03.21

We are honoured to obtain the subcontract signed between United Nations Industry Development Organization(UNIDO) and the Nanjing Triumph Cement Technology Engineering Co., Ltd. (NTCTEC) for the provision of Technical Services relating to the Cement Sector Replication Projects for Energy Efficiency (2) in the PEOPLE'S REPUBLIC OF CHINA (Contract No. 05/034/ML,PO. No.16000841).

We are very honoured to participate this work as a sub-contractor and share the happiness of this successful operation, hereon, we thank UNIDO and PMO for trusting Nanjing Triumph Cement Technology Engineering Co., Ltd. sincerely and giving us the opportunity to participate in this project.

From June 21, 2005 to November 20, 2005, The tasks under this subcontract have been completed. Summarizing the final report (the activities and results achieved along with all the outputs of the contract implementation) as follows:

1、The implementing circumstance of the tasks under this subcontract

The tasks under this subcontract involve consulting services for 10 potential replication plants, including carrying out an assessment and feasibility study on energy efficiency, setting up (or strengthen the existing system if one already exists) a plant-wide management system and delivering personal trainings in this regard. Specific tasks are as follows.

（1）Review the experience and outputs of subcontracts regarding technical renovation and production management for energy efficiency in the there pilot plants.

（2）Conduct a comprehensive assessment of each of the cement plants identified.

（3）Based on the above assessment and in consultation with plant management, propose a list of measures and investments to the plant management to upgrade the existing production technologies and equipment, which will result in improved product quality, less energy consumption, and a more profitable enterprise in the long run. The energy-saving or power generation target for each replication project should be at least 8,200 tons of coal equivalents

(tce), or 21,000,000 kWh, per year on average. The contractor may draw on the successful experiences of the pilot plants in terms of technology, equipment, and management, but the proposed renovation measures and investments must suit the conditions of the potential replication plants.

（4）Conduct a feasibility study of the proposed measures and investments (including energy savings). The feasibility study must abide by the applicable regulations in China as well as other requirements for technical renovation projects.

（5）Assist each plant management to set up a system (or strengthen the existing system if one already exists) and an energy efficiency baseline,and devise projected energy savings and emissions reduction in each of the replication plants (detail requirements see Annex 1),so as to improve the current practices of production management energy management,quality inspection,personnel training,and other areas that may require attention.

（6）Facilitate plant management participation in training and workshops organized by stakeholders of the project,and provide them with necessary support when and where repuired.

（7）The contractor should be responsible for following up the project progress of each of the plants,and making reports when required by stakeholders of the project after the completion of the contract.

According to the work schedule determined in the project starting report，the project group of Contract No. 05/034 have been implementing the 11 activities regulated in the contract orderly and normally to accomplish the subcontract tasks. Contents of 11 activities including:

Activity 1: Project briefing and inception

Activity 2: Pilot plant review

Activity 3: Collecting information

Activity 4: Preliminary technical design

Activity 5: Feasibility study

Activity 6: Feasibility study appraisal（internal）

Activity 7: Feasibility study approval（external）

Activity 8: Technical services

Activities 9：Training

Activity 10: Project follow- up

Activity 11：Draft and final report

The circumstance of the Activitys implementing See Annex I 【The circumstance of the Activitys implementing】.

2、The results and effect achieved along with all the outputs of the contract implementation

The objective of the above-named UNIDO project is to reduce greenhouse gas emissions from the Chinese township and village enterprises (TVEs). The project aims to remove key policy, market, technology, and financial barriers to the adoption of energy-efficient technologies in the brick, cement, metal casting, and coking sectors.

This subcontract is to replicate the successful experiences and best practices of the pilot plants by implementing technology upgrading to improve energy efficiency and product quality in 10 non-pilot cement TVEs.

By implementing this subcontract, the achievements and influence of project mainly include the following aspects:

（1）The effect of energy saving and reducing discharging

According to the feasibility studies of ten participating enterprises, if all the ten projects are done, the effects summary of energy saving and reducing discharging is in the following table.

10 participating plants Baseline		10 participating plants Targeted goals	
Total Energy Consumption	CO_2 Emissions	Energy Saving	CO_2 Emissions Reduction
(t tce/y)	(t/y)	(t tce/y)	(t/y)
1525444	3802932	-136535	-340382

See Annex 2 【Baseline Data and projected Energy Savings and EmissionsReduction at

participating TVEs】.

（2）Enterprise policy

By implementing this subcontract, the government and trading committee realize the energy saving potential and direction of high energy consumption cement industry in China, the technology of participating enterprises meets the technology policy, which is establish the scientific developing concept and the circulation economy operation system, put forward by national government. That forms the phases, one is the application of low temperature waste heat generation technology and new type dry method cement production technology supported and advocated plug by government and calling committee, another is project approval, land requisition and environment evaluation supported by policies. For example, since 2005, the Chinese cement calling association and local government have hold the meetings about low temperature waste heat generation technology several times, the local management and technology persons have been invited. The design company controlling the low temperature waste heat generation technology gave the introduction, visit the domestic low temperature waste heat generation equipment manufacturer and visit the existing production line of low temperature waste heat generation. The good demonstration effects have been achieved.

（3）Energy saving technology and information

By implementing this subcontract, including the experience summarizing and technology services of pilot enterprises and staff training of participating enterprises, the participating enterprises can easy get the energy saving technology and information, realize the reliability, practicability and advancement and eliminate the obstruction of obtaining the technology and information. For example, the participating enterprise Jiangsu Henglai Building Materials Stock Co., Ltd., before they only knew the technology about this energy saving technology of low temperature waste heat generation. But the imported system is very expensive, whether the domestic technology is reliable or not, whether the plant has the construction conditions to

implement this technology or not and how about the power benefit after complete this project, the enterprise could not get these technology and information itself. By implementing this subcontract, the enterprise know the necessity of constructing the low temperature waste heat generation project, carry out the construction conditions, decide the project technical proposal and submit the application report for the government. In recent days, it has signed the contract about the low temperature waste heat generation project with Nanjing Triumph Company. Other participating enterprises, before they did not know these technology, by implementing this subcontract, they have obtained the technology and information of energy saving, carried out the construction conditions, decided the project technical proposal and signed the contract about the low temperature waste heat generation project with Nanjing Triumph Company. They are ready for implementing this modification project.

(4) Market

Because China carried out new macroeconomic control policy in 2004, the scale of the fixed asset investment of the whole society and the developing speed were compressed, and the need of building materials such as cement, steel was changed from rapid development to steady need. However, after year 2001, many new projects were intensive in part of areas, the development of production capacity was too fast, so the cement situation was from "demand exceed supply" changed to "supply exceed demand". The cement market was in drastic competition and the cement price in some parts was reduced largely, while the resource supply in China was intense, the price was increased gradually, and some cement plant even was in power-controlled situation. The profit of cement products was largely declined and even to the bad, and the situation even endanger to survive of some cement enterprises.

The participating enterprises will realize the necessity of waste heat generation construction by the implement of subcontract. Although those enterprises adopt the calciner technology outside of kiln, there were still middle temperature and low temperature waste heat generation not to be used completely, and it caused energy waste and produced big quantity of waste gas.

The waste heat generation has two advantages: one is to reduce the temperature of waste gas and the density of dust exhaust; another is to make comprehensive use of waste heat resource from cement production line, recovery the heat of high-temperature fume and reduce the production cost. At the same time, the nervous situation of power supply of the cement plant will be relaxed. So, the energy conservation technology is a good way to reduce the cement production cost, improve the benefit of enterprise, and enhance the strength of market competition. Take the common example of new type dry method cement production line with the capacity of 2500t/d, in the prerequisite of not affecting normal cement production, about 22 million RMB should be invested. The waste heat generation system with the installed capacity of 3MW , of which average generation power is counted as 3000kW, the generating capacity can be reached to 2117×10^4kWh/year, the power supply can be reached to 1948×10^4kWh/year after deduct own demand. The cost can be saved by 10 million RMB per year, and all the investment can be recovered by three or four years. The cement cost will be reduced by 10 yuan/ton, which is above 5% of total cost of cement production, at the same time, it may relax the production antinomy caused by short of power supply. At present, the profit of cement production in some parts of area is 10 yuan/ton and even to the bad. So the implement of spreading the energy conservation technology can improve market competition capacity of products and survive capacity of enterprises. In the not boom environment of cement market, it is important to the survival and important of TVEs.

(5) Finance

The cost of implementing the subcontract is free to these ten participating enterprises, which means the cost of parts of prior work of these ten participating enterprises will be provided. It may start-up and drive the prior work of these projects, and improve the activity of enterprises.

The implement of subcontract provides feasibility study to these participating enterprises. The feasibility includes construction progress of project, investment evaluation of project,

financial evaluation of company at present, increment benefit of energy conservation technology modification, the total financial evaluation of company after energy conservation modification and the capacity of loan repayment, which may convenient for project loan bank to have project evaluation and have technology and economy evaluation with copartner, and provide detailed basic data of project financing for participating enterprises.

（6）Application of energy conservation project and approve of government

The implement of subcontract provides feasibility study based on the existing rule, law and other relevant industry technology standard for these ten participating enterprises. The feasibility study is directly used to apply the permission of interconnected waste heat generation engineering to the local power section, consign environment evaluation section to compile environment affecting evaluation report and apply the project approve to the local government.， At present, Jiangsu henglai Cement Building Material Co.,Ltd, Chongqing Jigjiang Cement Co., Ltd, Huizhou Guangda Co., Ltd have applied the interconnected permit to the local section, and applied to the local government for signing design contract of waste heat generation engineering with Nanjing Triumph Cement Co., Ltd. These cement companies prepare to construct energy conservation modification project. And other companies besides ten participating enterprises signed engineering design contract with Nanjing Triumph Co., Ltd after then got information of waste heat generation technology; Guangdong Xingning Ningjiang Building Material Co., Ltd, Fujian Longyan Chunchi Group have been permitted by government to sign the engineering design contract with Nanjing Triumph Co., Ltd, and at present they have called for tender of main engine machine.

Anyhow, by this UNIDO project implementing, technology instructing and project applying, after the government approval and construction implementing, most of the cement enterprises will adopt this energy saving and discharging reducing technology. It is estimated that the production capacity of the dry method cement production in the whole country will reach 450 million ton in 2005. If all the plants adopt pure low temperature generating system,

total installed capacity will reach 1500MW; the annual power supply Capac city is 9 billion kWh, in other words it economizes the standard coal 3,450,000 ton every year and reduces CO_2 emission 8,625,000 ton every year, it will reduce air pollution and greenhouse effect to the environment greatly and improve the market competition capability of products and the survival capability of enterprise. At present, the swim of low temperature waste heat generation technology has been formed in Chinese cement industry.

3、Consideration and Suggestion

The energy conservation and greenhouse gas emission of TVEs, and the energy conservation spread project were carried out in China by UNDIO have got success. The main reasons for success have the following aspect in our understanding:

（1）Good choice of project technology. After China entered into the 21th century, with the rapid development of GDP, the short supply of energy resource was distinct gradually, the environment protection was extruded increasingly. The problems of energy resource and environment are two antinomies caused by China economy and nature during the rapid development of China economy. The energy conservation and emission technology chose by UNDIO just encircle these two antinomies appeared in rapid development of China economy, and confirm with practice of TVEs.

（2）Good choice of project occasion. China government carried out new macroeconomic control policy form year 2004 , because these two antinomies were extruded increasingly in rapid development of China economy. The cement situation was from "demand exceed supply" changed to "supply exceed demand". The cement market was in drastic competition and the cement price in some parts was reduced largely and even to the bad. The survivals of parts of cement enterprises were in danger. The reduce of cement production cost especially energy consumption cost is the big problem to settle in the survival and development of enterprises, while the pilot energy conservation technology is a effective way to reduce the cost of energy resource consumption, improve economic benefit of enterprises and enhance

the market competitive power.

(3) UNIDO and PMO successfully operated the choose of energy saving technology, calling, pilot enterprise and participating enterprise, the determination of T.O.R., the choose and instruction of sub-contractor, the instruction and inspection of the activities of sub-contractor and the training and instruction of participating enterprise.

As we took part in this project, we give the following suggestions for the future similar works which need to be improved:

(1) During the activities of determination of T.O.R. and Start Report, can invite the relevant officers of project approval department (Government Revolution Committee or Economy Trade Committee), it is easy to let the project approval department to realize the project's technology and information, energy saving and discharging effects and the general situation of participating enterprise, also it is easy to get the approval for the project.

(2) Among these participating enterprise, we choose some enterprise which have good construction situations and fast project procedure, giving a certain detailed design fee, which can fasten the implementing procedure of project. It can be the good example.

(3) During the whole operation of project, if there is a political bank to take part in this project, it is good to eliminate the project financing obstacle and fasten the project procedure.

Nanjing Triumph Cement Technology Engineering Co., ltd.

2006.03.21

Annex I : The circumstance of the Activitys implementing

Subject: The final Report of Energy Conservation and GHG Emissions Reduction in Chinese TVEs, Cement Sector Replication Projects for Energy Efficiency（2）（EG/CPR/99/G31 Contract No. 05/034/ML,PO. No.16000841）.

Time: 2005,6,21,～2005,10,21,

Location:

Nanjing Triumph Company（Activity 1：Project briefing and inception）

Zhejiang Shenhe Cement Stock Co., Ltd.（Activity 2：Pilot plant review）

The participating plants（Activity 3：information collection）

Nanjing Triumph Company（Activity 4：Primary technical design of the participating plants）

Nanjing Triumph Company（Activity 5：Feasibility study）

Nanjing Triumph Company（Activity 6：Feasibility study appraisal（internal））

Nanjing Triumph Company（Activity 7：Feasibility study appraisal（external））

The participating plants and Nanjing Triumph Company（Activity 8：Technical services）

Hangzhou ,Zhejiang Province（Activity 9：Training）

Activity Holder: Project manager：Feng Jianhua

Activity attendees:

Project manager: Feng Jianhua

Project Vice-manager: Ni Yongming、Wu Xiusheng、Luo Libo

Project Technical syndics: Wang Huixing、Li Anping

Team mambers

Project Management Office（PMO）:

Wang Guiling: Vice-director, the Project Management Office（PMO）

Xu Litong: Senior expert of project management（UNIDO）

Wang Hai: General Manager, Beijing Hongyuan Environmental Energy Science and Technology Development Company.

Song Dongfeng: Project Contract Officer, Beijing Hongyuan Environmental Energy Science and Technology Development Company.

Zheng Ge: Project Assistant, the Project Management Office（PMO）

During June 21, 2005 to October 21, 2005, the project team of Contract No. 05/034 carried out the following activities:

Activity 1: Project briefing and inception

June 21, 2005, 9.00am. The Project briefing and inception meeting about the project of Energy Conservation and GHG Emissions Reduction in Chinese TVEs, Cement Sector Replication Projects for Energy Efficiency(2)(EG/CPR/99/G31 Contract No. 05/034/ML,PO. No.16000841）was hold in Nanjing Triumph Company, the holder was Ms. Wang Guiling. During the meeting, Ms. Wang Guiling and Mr. Feng Jianhua introduced the project team and the members of Nanjing Triumph experts' team; Mr. Xu Litong explained the purpose of the meeting and the situations of GEF project; Mr. Luo Libo did the starting report of Cement Sector Replication Projects for Energy Efficiency（2）（EG/CPR/99/G31 Contract No. 05/034/ML,PO. No.16000841）; then the attendees discussed and researched the subcontracting working schedule and formed The inception meeting minutes of Energy Conservation and GHG Emissions Reduction in Chinese TVEs, Cement Sector Replication Projects for Energy Efficiency（2）（EG/CPR/99/G31 Contract No. 05/034/ML,PO. No.16000841）.This "The inception meeting minutes" and modified starting report would be submitted to the Project Management Office（PMO） at June 25, 2005.

Activity 2: Pilot plant review

From June 22, 2005 to June 23, 2005, The members of project group leaded by Mr. Feng Jianhua seven people was leaded to the pilot enterprise Zhejiang Shenhe Cement Stock Co., Ltd. by Ms. Wang Guiling and other members of project team five people. The president and general manager of Zhejiang Shenhe Cement Stock Co., Ltd. and Mr. Zhang Fu who is the director of generation department in Tianjin Cement Industry Institute which is the design unit for low temperature waste heat generation project of Zhejiang Shenhe Cement Stock Co., Ltd.

received the project group from Nanjing Triumph and introduced the main technical schedule of modificating low temperature waste heat generation project of Zhejiang Shenhe Cement Stock Co., Ltd., the implementing situation of project and the experiences of plant supervision; and we did the technical communication and discussion.

June 24, 2005, Nanjing Triumph Cement Technology Engineering Co., ltd. Based on the investigation and research of Zhejiang Shenhe Cement Stock Co., Ltd., combined with the low temperature waste heat generation technology of Nanjing Triumph Company, Mr. Feng Jianhua, Mr. Ni Yongming, Mr. Wu Xiusheng, Mr. Luo Libo, Mr. Wang Huixing and Mr. Li Anping did the research and made "the summary of low temperature waste heat generation technology of pilot enterprise" which would be submitted to the Project Management Office （PMO） at June 28, 2005.

Activity 3: Collecting Information

From June 27, 2005 to July 11, 2005, the project group was divided into three small groups which were leaded by Mr. Ni Yongming, Mr. Wu Xiusheng and Mr. Luo Libo to do the survey and collect the information in the site of each potential enterprise respectively, and provided the primary schedule of technical modification of energy saving and discussed and determined it with each pilot enterprise. There into:

Cement Project Group: Project vice-manager Mr. Luo Libo, raw materials engineer Mr. Li Anping, general layout engineer Mr. Wang An, process engineer Mr. Huang Yida, electric engineer Mr. Fang Hua, automatic control engineer Mr. Liu Haiyun and water supply and sewerage engineer Mr. Zeng Jian invested Guangdong Xingning Ningjiang Building Materials Industry Company and Fujian Longyan Chunchi Gourp.

Generation Project Group: Project vice-manager Mr. Ni Yongming, general layout engineer Mr. Yang Jingping, electric engineer Mr. Wu Junfu, water supply and sewerage engineer Mr. Tu Zhengrui, architecture engineer Mr. Zhang Gechang and structure engineer Mr. Gao Aiguo invested Suzhou Dongwu Cement Co., Ltd., Jidong Cement Jilin Co., Ltd., Jiangsu Henglai Cement Building Materials Stock Co., Ltd. and Huizhou Guangda Cement Co., Ltd.

Generation Project Group: Project vice-manager Mr. Wu Xiusheng, process engineer Mr. Liu Yongchang, automatic control engineer Mr. Li Huizhong and budgeting engineer Mr. Ni Jian invested Jiangxi Zhengda Cement Co., Ltd., Zhejiang Changshan Tianma Cement Co., Ltd., Chongqing Jinjiang Cement Co., Ltd. and Zhejiang Longyou Qinglongshan Cement Co., Ltd.

In site work, the information of building site, production process, production technology, using situation of equipments, raw materials, energy and power, potential of energy saving (generation), products, market, worker and technical personnel, asset, load and other financial situations was collected, the complete evaluation of the participating plants had been carried out. the participating plants received each information collection group and introduced the present situation of enterprise and the potential of energy saving.

In site work, according to the tasks of subcontract and the technology summary report of pilot enterprise and combining with the real situation of pilot enterprise, Mr. Ni Yongming, Mr. Wu Xiusheng and Mr. Luo Libo put forward the primary schedule of energy saving technical modification for the participating plants enterprise and carried out the technical communication and discussion with them.

Activity 4: Primary technical design of the participating plants

July 15, 2005, Nanjing Triumph Cement Technology Engineering Co., Ltd., combining with the technology summary report of pilot enterprise and the real situation of the participating plants, Mr. Feng Jianhua, Mr. Ni Yongming, Mr. Wu Xiusheng, Mr. Luo Libo, Mr. Wang Huixing and Mr. Li Anping researched together and determined the Primary technical design of energy saving technical modification for the participating plants which were submitted to the Project Management Office（PMO）at July 18, 2005 as follows.

Summary sheet of the Primary technical design of the participating plants

No.	Name	Primary Proposal	Remark
	Waste heat generation project		
1	Suzhou Dongwu Cement Co., Ltd. 2500t/d cement production line project	3000KW Low temperature generation system	Single pressure system, Natural circulation
2	Jidong Cement Jilin Co., Ltd. 2500t/d cement production line project	3750KW Low temperature generation system	Double pressure system, Natural circulation
3	Jiangsu Henglai Cement Building Materials Stock Co., Ltd. 5000t/d clinker production line project	6500KW Low temperature generation system	Single pressure system, Natural circulation
4	Jiangxi Zhengda Cement Co.,Ltd. 2500t/d cement production line project	3000KW Low temperature generation system	Single pressure system, Natural circulation
5	Tianma Cement Co., Ltd. 2500t/d modification project of cement production line	3000KW Low temperature generation system	Single pressure system, Natural circulation
6	Chongqing Jiangjiang Cement Co., Ltd. 2500t/d cement production line project	3000KW Low temperature generation system	Single pressure system, Natural circulation
7	Qinglongshan Cement Co., Ltd. 2500t/d cement production line project	3000KW Low temperature generation system	Single pressure system, Natural circulation
8	Guangda Cement Co.Ltd. Longmen 2×5000t/d New type Dry method Cement production line	2×6500KW Low temperature generation system	Single pressure system, Natural circulation
	Cement Project		
9	Xingning Ningjiang Builing Material Co.Ltd. 2500t/d modification project of cement production line	2500t/d cement production line; Washout six existing vertical mills.	Raw mill: two Φ3.8×8.6m air swept mills; Five stages single steam cyclone preheater with online calciner; Φ4.0×60m rotray kiln; Coal powder preparation: Φ 3.2 × 8.5m air swept mills; burn anthracite; Cement mill: two Ø1400×650m roll squeezers Two Ø3.2×13m cement mills。
10	Longyan Chunchi Group 2500t/d production line	2500t/d cement production line; Washout three existing vertical mills.	Raw mill: 1 domestic roller mill; Five stages single steam cyclone preheater with online calciner; Φ4.0×60m rotray kiln; Coal powder preparation: Φ 3.2 × 8.5m air swept mills; burn anthracite; Cement mill: two HFCG120-45 roll squeezers Tow Ø3.2×13m Cement mills

Activity 5: Feasibility study

During July 21, 2005 to September 12, 2005, the project team of Contract No. 05/034 have completed professional feasibility study for each proposed renovation project base on Activity 1 Project briefing and inception、Activity 2 Pilot plant review、Activity 3 Collecting information and Activity 4 Preliminary technical design.

Every professional feasibility study under the feasibility study have been supervised by a chief engineer.

The feasibility study should be developed in accordance with Chinese currently effective laws, rules and related industrial technology standards. Contents of feasibility study including:

▲1 General introduction

▲2 Market analysis and predict

▲3 Construction conditions

▲3.1 Raw material and fuel

▲3.2 Power supply

▲3.3 Water supply

▲3.4 Transportation

▲3.5 Weather conditions

▲3.6 Earthquake intensity

▲4 Technology proposal

▲4.1 Raw material

▲4.2 Resource use

▲4.3 Production process

▲4.4 General layout and transportation

▲4.5 Electricity

▲4.6 Control of production processes

▲4.7 Water supply and sewerage

▲4.8 Construction & structure

▲4.9 Heating、ventilation、air-conditioning & power supply

▲5 Environment protection

▲6 Energy efficiency

▲7 Occupational Safety and Health(OSH)

▲8 Fire protection

▲9 Organization、employee recruit and training

▲10 Project proceeding

▲11 Investment estimate

▲12Analysis of profit

▲Appendix form of profit analysis

▲Draft drawings (general layout, technical process flow chart, electric system)

▲Annex 1 Baseline Data and projected Energy Savings and EmissionsReduction

Activity 6: Feasibility study appraisal（internal）

During September 13, 2005 to September 16, 2005, an internal appraisal meeting was hold in Nanjing Triumph Cement Technology Engineering Co., Ltd.. The meeting was presided by Mr. Feng Jianhua. Each feasibility study have been reviewed by the technical evaluation committee (Mr. Wang Huixing and Mr. Li Anping), and after amendment, the draft feasibility study (in Chinese) have been completed, and submitted to PMO 2 copies in Chinese and each participating plants 2 copies in Chinese for their review and comments at

September 20, 2005.

Activity 7: Feasibility study appraisal (external)

During September 20, 2005 to September 23, 2005, an external appraisal meeting was hold in Nanjing Triumph Cement Technology Engineering Co., Ltd.. The meeting was presided by Mr. Feng Jianhua. The proposed technical renovation plan of each draft feasibility study was evaluated by experts respectively according to real situations of participating plants. After amendment, the final feasibility study (in English) have been submitted to PMO 2 copies (in English) and UNIDO 2 copies (in English) at October 20, 2005.

Activity 8: Technical services

During September 20, 2005 to October 20, 2005, in Nanjing Triumph Cement Technology Engineering Co., Ltd. and the participating plants, Project Vice-manager (Mr. Ni Yongming, Mr. Wu Xiusheng, Mr. Luo Libo) have provide consultation service respectively according to the requirements of the participating plants to strengthen the existing system and an energy efficiency baseline, and devise projected energy savings and emissions reduction, so as to improve the current practices of production management, energy management, quality inspection, personnel training, and other areas that may require attention. Contents of feasibility study including:

(1) Post duty management system;

(2) Security technique rules;

(3) Production procedure management system;

(4) Training system (post duty system, security rules, operation rules and speciality technology);

(5) Exam system (speciality technology, management system, production task, equipment inspection and operation records);

(6) Operation rules (waste heat boiler, steam turbo, electric and relay protection, heating engineer instrument, automatic control, water treatment and public establishment)

(7) Equipment management system (technique file card, brand of equipment and equipment

lubricating card);

(8) Equipment fault and operation accident analysis;

(9) Danger precontrol and analysis.

Activities 9: Training

(1) Training meeting

During September 10, 2005 to October 12, 2005, The training meeting of waste heat power generation technology about the project of Energy Conservation and GHG Emissions Reduction in Chinese TVEs was hold in Hangzhou ,Zhejiang Province by PMO.

The NTCTEC have assistted POM to organize the relevant participate plants in the meeting and activities related to low temperature waste heat generation technology dissemination.

In the meeting, the NTCTEC have developed 【The training materials of low temperature waste heat generation technology and practice of new type dry method cement production lines】 and have submitted to PMO and each participating plants.

In the meeting, Project Vice-manager (Mr. Luo Libo) have prelected trainings for management and the operators of each participating plants on waste heat generation technology and practice of new type dry method cement production lines.

(2) According to the inception meeting minutes, the NTCTEC will provide training services on EE technology, production management and product marketing where and when required by the participating plants during the contract period.

Generally, the project group of Contract No. 05/034 have been implementing the works regulated in the contract orderly and normally according to the work schedule determined in the project starting report.

Annex 2 Baseline Data and projected Energy Savings and EmissionsReduction at participating TVEs

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation	Project Investment				Project Status
				Energy Type	Energy consumption (physical quantity)	Conversion Factor	Energy use (tce)	Energy Use/Unit Product			Output Before Renovation		Total energy use (tce)	CO2 Coeffic ient	CO2 Emissions (t/a.)		Total (RMB￥10,000)	GEF (US$)	Others (RMB￥10,000)		
1	Suzhou Dongwu Cement Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	115800	0.717	83036	coal-use (clinker)	0.1071	tce/t clinker	775000	t clinker/a.	122500	2.493	305393	3000kW waste heat power generation	2342.00		Commercial loan		Undecide
				Electricity(MWh)	103040	0.383	39464	Electricity-use(cement)	0.0352	tce/t cement	1120000	t cement/a.							Entrustment Loan	1342.00	
																			Self-Funding	1000.00	
				Sum Total			122500												Financial Assistance		
2	Jidong Cement Jilin Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	150000	0.590	88571	coal-use (clinker)	0.1143	tce/t clinker	775000	t clinker/a.	137595	2.493	343025	3750kW waste heat power generation	2720.16		Commercial loan		Undecide
				Electricity(MWh)	128000	0.383	49024	Electricity-use(cement)	0.0327	tce/t cement	1500000	t cement/a.							Entrustment Loan	1720.16	
																			Self-Funding	1000.00	
				Sum Total			137595												Financial Assistance		
3	Jiangsu Henglai Cement&Building Matrtial Co. Ltd	5000t/d(clinker)	rotary kiln, mill, larger fan.	Coal(t)	223960	0.702	157214	coal-use (clinker)	0.1014	tce/t clinker	1550000	t clinker/a.	190459	2.493	474814	6500kW waste heat power generation	4863.02		Commercial loan		Have signed th design contract, ry for th sanction.
				Electricity(MWh)	86800	0.383	33244	Electricity-use	0.0214	tce/t clinker	1550000	t clinker/a.							Entrustment Loan	2863.02	
																			Self-Funding	2000.00	
				Sum Total			190459												Financial Assistance		
4	Jiangxi Zhengda Cement Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	114400	0.726	83036	coal-use (clinker)	0.1071	tce/t clinker	775000	t clinker/a.	119421	2.493	297716	3000kW waste heat power generation	2286.48		Commercial loan		Undecided
				Electricity(MWh)	95000	0.383	36385	Electricity-use(cement)	0.0364	tce/t cement	1000000	t cement/a.							Entrustment Loan	1286.48	
																			Self-Funding	1000.00	
				Sum Total			119421												Financial Assistance		
5	Tianma Cement Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	110800	0.749	83036	coal-use (clinker)	0.1071	tce/t clinker	775000	t clinker/a.	121336	2.493	302490	3000kW waste heat power generation	2353.65		Commercial loan		Undecided
				Electricity(MWh)	100000	0.383	38300	Electricity-use(cement)	0.0383	tce/t cement	1000000	t cement/a.							Entrustment Loan	1353.65	
																			Self-Funding	1000.00	
				Sum Total			121336												Financial Assistance		

Anticipated Results															
Start-end date	Financial Evaluation			Production After Renovation		Energy Use/Unit Product			Capacity Added (MW)	Operation Hours/a.	Energy Savings (tce/a.)	Energy Recovered (tce/a.)	Total (tce/a.)	CO_2 emission Reduction (t/a.)	Remarks
	Payback period	4.80	year	775,000	t clinker/a.	coal-use (clinker)	0.1071	tce/t clinker	3	7057		7459	7459	18596	
	IRR	25.55	%	1,120,000	t cement/a.	Electricity-use (cement)	0.0352	tce/t cement							
	NPV	3103.82	¥10,000												
	Cost of energy saving	0.18	¥1/kwh												
	Payback period	5.40	year	775,000	t clinker/a.	coal-use (clinker)	0.1143	tce/t clinker	3.75	7000		8633	8633	21522	Contained the 140000 t clinker per year of buying outside.
	IRR	21.46	%	1,500,000	t cement/a.	Electricity-use (cement)	0.0327	tce/t cement							
	NPV	2672.00	¥10,000												
	Cost of energy saving	0.16	¥1/kwh												
2006.03-2006.12	Payback period	5.00	year	1,550,000	t clinker/a.	coal-use (clinker)	0.1014	tce/t clinker	6.5	7000		14799	14799	36894	The production is clinker.
	IRR	24.20	%	1,550,000	t clinker/a.	Electricity-use	0.0214	tce/t clinker							
	NPV	5881.00	¥10,000												
	Cost of energy saving	0.16	¥1/kwh												
	Payback period	5.20	year	775,000	t clinker/a.	coal-use (clinker)	0.1071	tce/t clinker	3	7057		7459	7459	18596	
	IRR	22.93	%	1,000,000	t cement/a.	Electricity-use (cement)	0.0364	tce/t cement							
	NPV	2534.00	¥10,000												
	Cost of energy saving	0.17	¥1/kwh												
	Payback period	4.90	year	775,000	t clinker/a.	coal-use (clinker)	0.1071	tce/t clinker	3	7057		7459	7459	18596	
	IRR	25.11	%	1,000,000	t cement/a.	Electricity-use (cement)	0.0383	tce/t cement							
	NPV	3034.00	¥10,000												
	Cost of energy saving	0.18	¥1/kwh												

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation	Project Investment				Project Status
				Energy Type	Energy consumption (physical quantity)	Conversion Factor	Energy use (tce)	Energy Use/Unit Product			Output Before Renovation		Total energy use (tce)	CO2 Coefficient	CO2 Emissions (t/a.)		Total (RMB¥10,000)	GEF (US$)	Others (RMB¥10,000)		
6	Chongqing Jinjiang Cement Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	117000	0.710	83036	coal-use (clinker)	0.1071	tce/t clinker	775000	t clinker/a.	121336	2.493	302490	3000kW waste heat power generation	2406.31		Commercial loan		Have signed the design contract, try for the sanction.
				Electricity(MWh)	100000	0.383	38300	Electricity-use(cement)	0.0383	tce/t cement	1000000	t cement/a.							Entrustment Loan	1406.31	
																			Self-Funding	1000.00	
				Sum Total			121336												Financial Assistance		
7	Qinglongshan Cement Co. Ltd.	2500t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	108200	0.767	83036	coal-use (clinker)	0.1071	tce/t clinker	775000	t clinker/a.	117506	2.493	292942	3000kW waste heat power generation	2330.05		Commercial loan		Have signed the design contract, try for the sanction.
				Electricity(MWh)	90000	0.383	34470	Electricity-use(cement)	0.0383	tce/t cement	900000	t cement/a.							Entrustment Loan	1330.05	
																			Self-Funding	1000.00	
				Sum Total			117506												Financial Assistance		
8	Guangda Cement Co. Ltd.	2×5000t/d(cement)	rotary kiln, mill, larger fan.	Coal(t)	466900	0.673	314429	coal-use (clinker)	0.1014	tce/t clinker	3100000	t clinker/a.	436682	2.493	1088649	2×6500kW waste heat power generation	9726.03		Commercial loan		Have signed the design contract, try for the sanction.
				Electricity(MWh)	319200	0.383	122254	Electricity-use(cement)	0.0364	tce/t cement	3360000	t cement/a.							Entrustment Loan	5726.03	
																			Self-Funding	4000.00	
				Sum Total			436682												Financial Assistance		
9	Xingning Ningjiang Builing Material Co. Ltd.	1×600t/d(cement); 6-Vertical kiln	rotary kiln, mill, larger fan.	Coal(t)	104000	0.759	78957	coal-use (clinker)	0.1371	tce/t clinker	576000	t clinker/a.	105920	2.493	264058	2500t/d New dry cement production line(rotary kiln); Shut up 6-Vertical kiln	21986.20		Commercial loan	4397.24	Have gained sanction, eginning to purchase main equipment
				Electricity(MWh)	70400	0.383	26963	Electricity-use(cement)	0.0383	tce/t cement	704000	t cement/a.							Entrustment Loan		
																			Self-Funding	17588.96	
				Sum Total			105920												Financial Assistance		
10	Longyan Chunchi Group	1×1000t/d(cement); 3-Vertical kiln	rotary kiln, mill, larger fan.	Coal(t)	51400	0.768	39478	coal-use (clinker)	0.1371	tce/t clinker	288000	t clinker/a.	52690	2.493	131357	2500t/d New dry cement production line(rotary kiln); Shut up 3-Vertical kiln	18510.50		Commercial loan	8000.00	Have gained sanction, eginning to purchase main equipment
				Electricity(MWh)	34496	0.383	13212	Electricity-use(cement)	0.0375	tce/t cement	352000	t cement/a.							Entrustment Loan		
																			Self-Funding	10510.50	
				Sum Total			52690												Financial Assistance		
	Total						1525444						1525444		3802932		69524.40			69524.40	

Anticipated Results																
Start-end date	Financial Evaluation			Production After Renovation		Energy Use/Unit Product			Capacity Added (MW)	Operation Hours/a.	Energy Savings (tce/a.)	Energy Recovered (tce/a.)	Total (tce/a.)	CO_2 emission Reduction (t/a.)	Remarks
2006.03-2006.12	Payback period	5.60	year	775,000	t clinker/a.	coal-use (clinker)	0.1071	tce/t clinker	3	7057		7459	7459	18596	
	IRR	20.59	%	1,000,000	t cement/a.	Electricity-use (cement)	0.0383	tce/t cement							
	NPV	2203.00	¥10,000												
	Cost of energy saving	0.18	¥1/kwh												
2006.03-2006.12	Payback period	4.90	year	775,000	t clinker/a.	coal-use (clinker)	0.1071	tce/t clinker	3	7057		7459	7459	18596	
	IRR	24.78	%	900,000	t cement/a.	Electricity-use (cement)	0.0383	tce/t cement							
	NPV	2940.00	¥10,000												
	Cost of energy saving	0.18	¥1/kwh												
2006.03-2006.12	Payback period	4.20	year	3,100,000	t clinker/a.	coal-use (clinker)	0.1014	tce/t clinker	13	7000		29598	29598	73788	
	IRR	30.62	%	3,360,000	t cement/a.	Electricity-use (cement)	0.0364	tce/t cement							
	NPV	17053.00	¥10,000												
	Cost of energy saving	0.16	¥1/kwh												
2006.01-2006.11	Payback period	6.00	year	775,000	t clinker/a.	coal-use (clinker)	0.1073	tce/t clinker			23104		23104	57598	Base on Vertical kiln
	IRR	19.29	%	900,000	t cement/a.	Electricity-use (cement)	0.0383	tce/t cement							
	NPV	20373.00	¥10,000												
	Cost of energy saving	485.06	¥1/tce												
2006.01-2006.11	Payback period	5.80	year	775,000	t clinker/a.	coal-use (clinker)	0.1073	tce/t clinker			23104		23104	57598	Base on Vertical kiln
	IRR	20.70	%	950,000	t cement/a.	Electricity-use (cement)	0.0375	tce/t cement							
	NPV	19538.00	¥10,000												
	Cost of energy saving	176.45	¥1/tce												
											46208	90327	136535	340382	