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UNDP/GEF

Energy Conservation and GHG Emissions Reduction

in Chinese TVEs—Phase II

—Brick Sector Replication Projects for Energy Efficiency (2)

Energy Conservation Renovation for

the Replicated enterprises in Xianyang

Final Report

Project No. EG/CPR/99/G31

Contract No. 05/029

Organizer: United Nations Industrial Development Organization

Executant: Xi'an Kaisheng Building Materials Engineering Co. Ltd.

May 26, 2006

Board chairman: Hao Wang (professor)

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I Introduction and thanks

1.1 Introduction

This is a final report about UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) for 14 brick making enterprises in Xianyang submitted to UNIDO and PMO by Xi'an Kaisheng Building Materials Engineering Co. Ltd.

The *Final Report* is a summary of task and achievement completed from March to November, 2005, which is made up of the following two sections

(1) Summary of technical renovation for 14 brick-making enterprises in Xianyang

- Tasks of the subcontract
- Summary of achievement completed
- Summary of the project expenditure
- Summary of the project activities

(2) Recommendation of the technical renovation for 14 brick making enterprises in Xianyang.

1.2 Thanks to

Xi'an Kaisheng Building Materials Engineering Co. Ltd. and Xianyang Commission for Economic and Trade have completed the project and abtained achievements under the guidances of Ms.Latrech (Contract Officer of UNIDO), Ms. Wang Guiling (Deputy Director of PMO), Mr. Zhang Zhihong and Mr.Xu Litong (Chief technical advisers), Mr. Song Dongfeng (Contract Officer) and Mr. Wang Hai (General Manager of Beijing Hongyuan Company), so we give them our heartfelt thanks. At the same time, we should like to thank all those who have contributed to the project.

II Summary of technical renovation for 14 brick-making enterprises in Xianyang

2.1 Tasks of the subcontract

In order to help Chinese Township and Village Brick-making Enterprises reduce greenhouse gases emission by adopting energy-efficient technologies, remove 4 types of barrier (policy barriers, market barriers, technology barriers and financing barriers), UNIDO has put forward the project "Energy Conservation and Greenhouse Gas Emission Reduction in Chinese Township and Village

Enterprise—Phase II—Energy Efficiency Popularization in Brick sector ".

The subcontract was intended to replicate the successful experiences and best practices from the pilot brick plants by implementing technology to improve energy efficiency and product quality at non-pilot brick plants. UNIDO and the Project Management Office (PMO) of the Ministry of Agriculture have identified 14 brick plants that are willing and qualified to participate in project replication in Xianyang. The tasks under this subcontract consist of two parts:

Part one: Provided consulting service for the 14 brick-making enterprises, including:

- Evaluatation of the 14 brick-making enterprises and compiling the project *Proposal* and *Feasibility Study Rreport.*
- Set up a management system for each plant.

Part two: Provided engineering technical service for the 14 brick making enterprises, including:

- Engineering design and construction.
- Equipments purchase and installation .
- Personnel training.

Specific tasks are as follows.

Part One Consulting Services

1. Conduct a comprehensive assessment of each of the brick plants identified (see Annex 1), including but not limited to the following aspects:
   a) Production processes
   b) Technologies and equipments
   c) Raw materials
   d) Energy and electricity use
   e) Products, output, and markets
   f) Production workers and technical personnel
   g) Ownership, fixed assets, loans, and other financial information.
2. 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 target for each replication project should be at least 600 tons of coal equivalent (tce) 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.

3. Conduct a feasibility study of the proposed measures and investments (including energy savings) and devise an implementation plan for engineering design and construction, eguipment purchase and installation, testing and commissioning, training of operators, as well as financing arrangement. In the feasibility study, the contractor should devise in detail the use of the 70 percent reserved for equipment purchase and construction for the beneficiary plants as mentiond in article **IV. Budget Allocation** of the TOR.
4. Ensure that the proposed renovation project is fully agreed by the plant management and that co-financing can be and will be arranged to implement the project. The minimum co-financing requirement from the recipient plants to the complete technical renovation project budget is 4:1 (includes technical services and equipment procurement). It is imperative that co-financing of the beneficiary plant will be made available for project implementation in the timeframe specified in the implementation plan.
5. Assist each plant management to set up a system (or strengthen the existing system if one already exists) so as to improve the current practices of production management, energy management, quality inspection, personnel training, and other areas that may require attention.

Part Two: Engineering Services

1. Based on the feasibility study and implementation plan agreed by the plant management, conduct engineering design for each of the renovation projects.

2. Assist the plant management in selecting and purchasing the required equipments and ensure their installation, testing, and commissioning.
3. Ensure that the renovation projects meet relevant environmental and safety standards and the projects are approved by the local environmental and other relevant authorities.
4. Provide relevant training to the plant operators and technical personnel as necessary.
5. Provide other engineering services to the plant management to ensure smooth operation of the new equipment and processes so that they meet the specified parameters and targets.

2.2 Summary of achievement completed

(1) Intensify consciousness of energy conservation and GHG emissions reduction of brick-making enterprises by the technology renovation. At the same time, the coal consumption and electric energy consumption have been reduced drastically and CO_2 emission has reduced.

Before the renovation, the enterprises only pay attention to quality and output and pay very little attention to energy conservation and GHG emissions reduction. Therefore, the energy consumption and cost of product is higher. After the renovation for 14 brick-making enterprises in Xianyang, 14396 t standard coals can be saved and CO_2 emission has reduced by 35890t yearly. Now each enterprise can save standard coal more than 600t every year and the renovation purpose has been accomplished.

In sum, brick-making enterprises have increased consciousness of energy conservation and GHG emissions reduction and get good economic benefit by renovation, which stimulates them to have further efforts to save energy and reduce CO_2 emission for their benefits.

(2) Each enterprise has set up management system of energy conservation and GHG emissions reduction

Before renovation, the enterprises only increase output blindly in order to get good economic benefit and pay very little attention to production management. Through renovation, enterprises have reinforced a series of management and set a series of energy consumption indicator. At the same time, they made a personnel training and let

operators know the target of rate of finished products and energy consumption full well so that energy conservation and GHG emissions reduction can be managed scientificly.

(3) Enterprise has attached more importance to technology and taken the initiative in upgrading installation and choise energy-saving equipment

The renovations make enterprises abtain more enery-saving knowledge and know importance of technology. Now enterprises pay more attention to training employee and like to invest funds to update equipment and install energy-saving equipment. All these measures have brought good economic benefit for the enterprises.

(4) Idea and notion of enterprises have been changed

Before renovation, brick-making enterprise only had short-term plan without long-term plans. In this renovation, each enterprise has worked out a medium–long term development program in new products, energy conservation and GHG emissions reduction, production management and employee training, which can get a good grounding in market campaign of the enterprise.

2.3 Summary of the project expenditure

The total budget for the subcontract is $168,000, of which 30 percent ($50,400) was used for consulting services and engineering service and 70 percent is reserved for equipment purchase and construction for the beneficiary plants. Now Xi'an Kaisheng Building Materials Engineering Co. Ltd., has helped 14 plants complete all technical renovations proposed in the *Feasibility Report*. The parts of the engineering construction have completed. The actual investment of the project is 7, 630, 576 yuan (RMB), of which the UNINO subsidy fund is $168,000, and the beneficiary plant capital is 6, 549, 469 yuan (RMB). The average investment proportion between beneficiary plants and UNIDO fund is 4. 7: 1.

The expenditures of enterprises can be found in the *M & E Form: Brick-making Sebsector Replication Project* (for 14 brick-making enterprises in Xianyang)

2.4 Summary of the project activities

Xi'an Kaisheng Building Materials Engineering Co. Ltd.was invited to bid for UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) in October 2004. Xi'an Kaisheng brought forward the proposal on 30 Nov.2004 in answer to the invitation. After being strictly examined by UNIDO and the Project Management Office (PMO) of the Ministry of Agriculture of China, UNIDO authorized the subcontract to Xi'an Kaisheng on 10 March, 2005 in Beijing. Thus, Xi'an Kaisheng signed the subcontract formally and started completing a series of activities about the project UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2). The details of the completed activities are described as follows.

Xi'an Kaisheng has completed the two parts of tasks subdivided into 13 activities according to the subcontract:

Part I: we have provided consulting service including 5 activities for the 14 brick-making enterprises in Xianyang.

Activities 1~2: Made the detailed assessment of each brick-making plant and writting the *Progress Report* and the *Assessment Report.*

Activity 3 Worked out technology renovation method and measures, provided a list of equipment added or innovated, worked out the amount of investment and target for technology renovation of the 14 replicated plants and produced the *Project Proposal*

Activity 4 Made a feasibility study for the technology renovation and investment, worked out an implementation plan of engineering service and financing arrangement and completed the *feasibility Study report.*

Activity 5 Assisted each plant to set up a management system and completing on-the-job training.

Part II: we have provided engineering technical service for the 14 brick making enterprises in Xianyang

Activity 6 Designedfor each item of the renovation and completed *work drawings* and *equipment list;*

Activity 7 Purchased or construct devices and equipment for each of the renovation item and completed *Purchasing equipment and Construction Report*

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Activity 9 Made running test for each technology renovation item;

Activity 10 Examined the practical effect of each technology renovation item;

Activity 11 Provided relevant technical training such as operating rules and technical skill;

Activity 12 Evaluated and accept the final effect of the project and accomplishing the *Draft of Final Report;*

Activity 13 Completed the *Final Report*;

In order to complete efficiently the two parts of tasks (subdivided into 13 activities) of the subcontract, Xian KaiSheng organized an implement action group for the project. Professor Hao Wang, board chairman in Xian KaiSheng, was director of the group and Yuhao Jiao, a senior engineer (process engineer), vice general manager in Xian KaiSheng, was associate director of the group. The other members included Zhoumin Zhao, a senior engineer, director of design department in Xian Kaisheng; Xiaolin Yu, a senior engineer, director of equipment department in Xian Kaisheng; Baozhong Wang, a senior engineer; Tongmei Hu, a senior engineer; Lianchang zhuo, a senior engineer; Liquan Wang, a senior engineer; and Qinlian Li, a national registered consulting engineer.

Xian KaiSheng gained following important results in November 2005, and some of them had been submitted to UNIDO and PMO.

Task 1: Provided consulting service for the 14 brick making enterprises in Xianyang.

Activity 1: Completed the *Progress Report* through investigating the practical progress of the renovation for14 replicated plants. It has been submitted to UNIDO and PMO. The details can be found in the *Progress Report* of energy conservation renovation for the replicated enterprises in Xianyang.

Members: Zhoumin Zhao, Xiaolin Yu, Baozhong Wang and Tongmei Hu.

Accomplished time: the 12th week (May 30, 2005)

Activity 2: Made the detailed assessment of each brick-making plant and written the *Assessment Report*.

Members: Hao Wang, Liquan Wang, Jiaoyu Hua, Tongmei Hu, BaozhongWang, Xiaolin Yu, Zhoumin Zhao, Lianchang Zhuo, Qinglan Li.

Accomplished time: the 4th week (March 27, 2005)

Activity 3 Worked out technology renovation method and measures, provided a list of equipment added or innovated, worked out the amount of investment and target for technology renovation of the 14 replicated plants and produced the *Project Proposal*

Members: Hao Wang, Liquan Wang, Jiaoyu Hua, Tongmei Hu, BaozhongWang, Xiaolin Yu, Zhoumin Zhao, Lianchang Zhuo, Qinglan Li.

Accomplished time: the 5th week (April 5, 2005)

Activity 4: Completed the *feasibility Study report* for technology renovation of 14 replicated plants in Xianyan. This *Feasibility Study Report* had been completely accepted by 14 replicated Plants and they have signed the *Letters of Commitment* in several. which had been submitted to UNIDO and PMO. The details see the *Feasibility Study report* of Energy Conservation Renovation for the 14 Replicated enterprises in Xianyang.

Members: Tongmei Hu, BaozhongWang, Xiaolin Yu and Qinglan Li.

Accomplished time: the 8th week (April 30, 2005)

Activity 5: Assisted each plant to set up a management system and completed on-the-job training. The details about training see following:

Training venue: Tangyu Holiday Village in Shaanxi Meixian

Training date: July 25, 2005~ July 28, 2005

Training experts: Hao Wang, Liquan Wang and other related experts in building materials equipment manufactures.

Trained personnel: The general managers, technicians and managers in the 14 brick making enterprises, fifty persons in all.

Training contents:

(1) The purpose and significance of the project (Energy Conservation and GHG Emissions Reduction); important technical measures; the effect and target of energy conservation and GHG emissions.

(2) The state of brick-making enterprise in China; the development trends of new technology about brick making in the world.

(3) Documents about national wall merials reform and tax preference policy.

(4) Means and methods of production management;

(5) Standards about brick and tile industry;

(6) The premises and methods of increasing product quality;

(7) Helped the plants set up a new management system which including the following contents:

- Improved management system and set up the quota responsibility system and reward and punishment system for the enterprise;
- Set up a good energy management system;
- Set up a good operating rules for machines;
- Set up a good quality inspection rules;

(8) Technologies of installation, adjusting and operating energy-saving equipment in brickworks;

(9) Management knowledge about energy-saving equipment and kiln

Training ways:

(1) Teaching, discussing and answering questions;

(2) Teaching and self–study but mainly on teaching way through the unitive textbook;

Training effect:

There were a series of lectures given by Xuan Zhou, vice director of The Center of Wall and Roof Materials Quality Monitoring Test under State Building Materials Industry and experts from Shaanxi Baoshen Building Material Machinery (group) Co. Ltd. At the same time, some of the technology problems had been discussed and answered by the experts. The training was regarded necessary and timeliness by general managers of the enterprises. The training contents were also practical and effictive. This was a good chance for study and intercommunion each other, and would give a great push forward for implementing the project succesfully. In conclusion, the training had abtained good effect and purposes desired.

(1) The general managers enlarged their managerial knowledge and defined the project target further and the key point in technical renovation. They are satisfied with initial effect of technical renovation, a sense of responsibility of subcontractor and work transparency.

(2) By exchanging thoughts among the general managers of enterprises, local officer and subcontractor, they made an agreement about the project, which could ensure the project completed successfully.

(3) The local officers expressed their heartfelt thanks to UNIDO and PMO for giving chances to local enterprises. They would sum up experiences and replicate them in more large scope so as to drive forward the local economy.

Task 2: Provided engineering technical service

In accordance with the conditions and renovation intentions of the 14 replicated enterprises and implementation plan in the Feasibility Study Report, the members of project team had individually made construction design and equipments purchasing for each of the 14 replicated enterprises. The specific circumstances of them are respectively introduced as following.

1. Zhou Ling Hollow Brick Plant

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 6th week (April 15, 2005)

The main contents completed:

1. Reconstruction of annular kiln.

(1) Designed for a new annular kiln with 30 chambers;

(2) Proposed repair plan for the primary 34-chamber annular kiln;

2. Renovation of equipment: Proposing renovation plan for auger of extruder.

3. Proposed renovation plan of electric engineering.

The details of three items of design above-mentioned can be found on Pages 7~8 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Zhou Ling Hollow Brick Plant).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, and Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Equipment has been purchased according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 1.

Table 1 List of equipment purchased, installed, renovated

No.	Name of equipment	Type	Quantity
1	A new annular kiln	30 chambers	1
2☼	Repairing 34-chamber annular kiln	34 chambers	1
3	Saving energy high-vacuum pump	MH-2/100	2
4	Vertical mud column cutter and brick cutter	QT20	2
5	Extruder auger	Matching with extruder type 450	1
6	Electric power compensator	WMJ series	10

(The mark "☼" in the table denotes an item invested by UNIDO fund.)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Constructed a new 30-chamber annular kiln according to working drawing for annual kiln;

2. Repaird the original 34-chamber annular kiln according to the Working Drawing;

3. Installed saving energy high-vacuum pump in accordance with the process design.

4 Installed vertical mud column cutter and brick cutter in accordance with the process design;

5. Installed brick cutter in accordance with the process design;

6. Renovated the extruder auger according to renovation plan and installing it;

7. In accordance with the renovation plan proposed, Installed electric power compensator for 10 equipment, such as box feeder, coal crusher, coal feeder, roller mill, double-shaft mixer, double-stage extruder, vertical brick column cutter, brick cutter and 2 blowers.

The details of seven items of installation and construction of equipment above-mentioned can be found on Pages 9~13 in the *Installation and Commissioning Report* for

the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Zhou Ling Hollow Brick Plant).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 1. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 9~13 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Zhou Ling Hollow Brick Plant).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, and Baozhong Wang

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 1 for a month, desired effect of the project has attained: 1035.69t standard coal can be saved and CO_2 emissions has reduced by 2581.98t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

Place of training: Construction site

Time of training: the 18th week (July 15, 2005)

Training experts: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Personnel: Post operators

Training ways: The operators at key positions were trained timely during construction to increase their work skill.

Training contents:

(1) Basic knowledge.

- Enterprise management knowledge;
- Basic knowledge about energy conservation and GHG emissions reduction;
- Operating knowledge for thermal equipment;
- Brick-Shaping process and repairing technology for machine.

(2) Manipulative skill.

- Operational program and routine maintenance for machine;
- control of firing curve in kiln;
- The program and methods in dealing with an emergency

(3) Set up responsibility system for key positions

2. Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 7th week (April 17, 2005)

The main contents completed:

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for high-speed coal crusher.
3. Proposed renovation plan for extruder mouth.
4. Designed for a new annular kiln with 38 chambers.
5. Proposed renovation plan of electric engineering.

The details of five items of design above-mentioned can be found on Page 9 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Liucun Brick Plant, Dizhang, Weicheng District, XianYang).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 29, 2005)

The contents completed:

Purchased equipment according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 2.

Table 2 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	New annular kiln	38 chambers	1
2☼	High speed fine roller mill	70×50	1
3	High speed coal crusher	600×630	1
4	Mouth of the extruder	450	1
5	Transducer control system	ACS400 series	1
6	Electric power compensator	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund.)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang , Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Constructed a new annular kiln with 38 chambers according to working drawing for annual kiln;

2. Installed high speed fine roller mill in accordance with the process design.

3. Installed high speed coal crusher in accordance with the process design.

4. Installed mouth of the extruder;

5. In accordance with the renovation plan of electric engineering, following works has been done.

- Installed a speed transducer for exhaust blower;
- Installed control system of non- power compensation for double-stage extruder.

The details of six items of installation and construction of equipment above- mentioned

can be found on Page 13~17 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 2. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 13~17 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 3 for a month, desired effect of the project has attained: 1017.15 t standard coal can be saved and CO_2 emissions has reduced by 2535.75t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

3. Xiwu Vacuun Brick Plant, Xingping City

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 6th week (April 15, 2005)

The main contents completed:

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for high-speed coal crusher.
3. Proposed renovation plan for extruder mouth.
4. Proposed repairing plan for original 22-chamber annular kiln.
5. Designed for a new annular kiln with 24 chambers.
6. Proposed renovation plan for electric engineering.

The details of six items of design above-mentioned can be found on Page 11 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Xiwu Vacuun Brick Plant, Xingping City).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 3.

Table 3 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	A new annular kiln	24 chambers	1
2☼	Repairing annular kiln	22 chambers	1
3	High speed fine roller mill	LP10X8	1
4☼	High speed coal crusher	600X630	1
5	Mouth of the extruder	450	1
6	Vertical mud column cutter	QT20	1
7☼	Transducer for blower	ACS400 series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund).

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Constructed an a new 24-chamber annular kiln according to working drawing of the annual kiln;

2. Repaired the original 22-chamber annular kiln in accordance with repairing plan;

3. Installed high speed fine roller mill;

4. Installed high speed coal crusher in accordance with the process design;

5. Installed mouth of the extruder in accordance with the process design;

6. In accordance with the renovation plan of electric engineering, installed a speed transducer for exhaust blower.

The details of six items of installation and construction of equipment above- mentioned can be found on page 17~19 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Xiwu Vacuun Brick Plant, Xingping City).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 3. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 17~19 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Xiwu Vacuun Brick Plant, Xingping City).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 5 for a month, desired effect of the project has attained: 743.77 t standard coal can be saved and CO_2 emissions has reduced by 1854.22 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

4. Zhouling Zhuoxing Hollow Brick Plant

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 6th week (April 15, 2005)

The main contents completed:

1. Designed for a new annular kiln with 30 chambers.
2. Proposed renovation plan for electric engineering.

The details of two items of design above-mentioned can be found on Page 13 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Zhouling Zhuoxing Hollow Brick Plant).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipments according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 4.

Table 4 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	A new annular kiln	30 chambers	1
2☼	Saving energy high-vacuum pump	MH-2/100	2
3	Extruder auger		
4☼	Vertical mud column cutter	JW503	1
5☼	Electric power compensator	WMJ series	4

(The mark "☼" in the table denotes an item invested by UNIDO fund).

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang,Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Constructed the new 30-chamber annular kiln according to working drawing for annual kiln;

2. Installed saving energy high-vacuum pump in accordance with the process design;

3. Installed extruder auger in accordance with the process design;

4. Installed vertical mud column cutter in accordance with the process design;

5. In accordance with the renovation plan of electric engineering, installed a speed transducer for exhaust blower.

The details of five items of installation and construction of equipment above- mentioned can be found on pages 19~20 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Zhouling Zhuoxing Hollow Brick Plant).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 4. Commissioning proved that they

were in good running condition. The details of equipments commissioning can be found on pages 19~20 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Zhouling Zhuoxing Hollow Brick Plant).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 4 for a month, desired effect of the project has attained: 861.34 t standard coal can be saved and CO_2 emissions has reduced by 2147.32t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

5. Nanyuzi Hollow Brick Plant

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 7th week (April 19, 2005)

The main contents completed:

1. Proposed air tightness and heat insulation plan for 24-chamber annular kiln.
2. Installation drawing for exhaust blower.
3. Constructed a group of manpower–setting dryer.
4. Proposed renovation plan of electric engineering.

The details of four items of design above-mentioned can be found on page 14 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Nanyuzi Hollow Brick Plant).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipments according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 5.

Table 5 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1☼	Reconstructing the annular kiln	24-chamber	1
2	Constructing an new dryer	circulation pattern	1
3☼	Fly-ash box feeder	800X4000	1
4	Stone-eliminating drum screen	GT140	1
5	Energy saving blower	ZFJ-8	1
6	Transducer control system for extruder and kiln blower	ACS400Series	2
7	Control system of non-power compensation for extruder	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund).

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Repaired the original 22-chamber annular kiln in accordance with repairing plan;
2. Constructed a group of manpower-setting dryer according to working drawing;
3. Installed high speed coal crusher in accordance with the process design;
4. Installed stone-eliminating drum screen in accordance with the process design;
5. Installed energy saving blower in accordance with installation drawing;
6. In accordance with the renovation plan of electric engineering, added transducer control systems for extruder and kiln blower and adding control system of non-power compensation for extruder.

The details of six items of installation and construction of equipment above- mentioned can be found on pages 21~24 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Nanyuzi Hollow Brick Plant).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 5. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 21~24 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Nanyuzi Hollow Brick Plant).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 5 for a month, desired effect of the project has attained: 986.45 t standard coal can be saved and CO_2 emissions has reduced by 2459.23 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

6. Chatian Brick Plant, Maquan Town, Qindu District

Activity 6: Designed for each renovation item

Members: Yuhua Jiao, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 6th week (April 15, 2005)

The main contents completed:

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for high-speed coal crusher.
3. Installation drawing for de-airing extruder;
4. Worked drawing for a new 26-chamber annular kiln;
5. Proposed renovation plan of electric engineering

The details of five design items above-mentioned can be found on page 15 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Chatian Brick Plant, Maquan Town, Qindu District).

Activity 7: Purchased and constructing devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 6.

Table 6 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	A new annular kiln	26 chambers	1
2☼	High speed fining roller mill	LP10 X8	1
3	High speed coal crusher	500	1
4	De-airing extruder	JZK450	1
5	Transducer control system for extruder and kiln blower	ACS400 series	2
6	Control system of non-power compensation for extruder	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua

Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Constructed a new 26-chamber annular kiln according to working drawing;
2. Installed high speed fining roller mill in accordance with the process design;
3. Installed high speed coal crusher in accordance with the process design;
4. Installed de-airing extruder in accordance with the process design;
5. In accordance with the renovation plan of electric engineering, following works has been done.

- Installed a speed transducer for exhaust blower;
- Installed control system of non- power compensation for extruder.

The details of six items of installation and construction of equipment above- mentioned can be found on page 25~27 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Chatian Brick Plant, Maquan Town, Qindu District).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 6. Commissioning proved that they were in good running condition.

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 6 for a month, desired effect of the project has attained: 1092.0 t standard coal can be saved and CO_2 emissions has reduced by

2722.37 t yearly The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

7. Dongjiao Construction Materials Co., Weicheng District, Shaanxi Province

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 6th week (April 15, 2005)

The main contents completed:

1 Proposed the repairing plans for the annular kiln;

① Built residual heat utilization system.

② Spreat annular kiln with fire-resistance and heat-insulating spraying materials to reduce air-leakage and heat loss of the kiln.

2. Worked drawing for a new manpower-setting dryer.

3. Installation drawing for high-speed fine roller mill.

4. Installation drawing for high-speed coal crusher.

5. Installation drawing for exhaust blower of the kiln.

6. Proposed renovation plan of electric engineering and installing transducer control system for exhaust blower of kiln.

The details of six items of design above-mentioned can be found on page 16 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Dongjiao Construction Materials Co., Weicheng District, Shaanxi Province).

Activity 7: Purchased and constructing devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 18, 2005)

The contents completed:

Purchased equipment according to the list of new added equipment in the *Feasibility*

Study Report about this plant. The details of the new added equipments see table 7.

Table 7 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	Repairing annular kiln	24 chambers	1
2	Constructing a new dryer	Circle pattern	1
3	High speed fine roller mill	GD70X50	1
4☼	High speed coal crusher	500	1
5☼	Heat suction blower	Y_4-73-12N_O.9D	1
6	Transducer for exhaust blower	ACS400 series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Repaired the original 24-chamber annular kiln according to repairing plan;
2. Constructed a new manpower-setting dryer according to the working drawing;
3. Installed the high-speed fine roller mill in accordance with the process design;
4. Installed the high-speed coal crusher in accordance with the process design;
5. Installed the exhaust blower of the kiln according to installation drawing;.
6. Installed transducer for the exhaust blower of kiln according to renovation plan of electric engineering .

The details of six items of installation and construction of equipment above- mentioned can be found on pages 27~30 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Dongjiao Construction Materials Co.,Weicheng District, Shaanxi Province).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 7. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 27~30 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Dongjiao Construction Materials Co.,Weicheng District, Shaanxi Province).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 7 for a month, desired effect of the project has attained: 772.39 t standard coal can be saved and CO_2 emissions has reduced by 1925.57t yearly. The technical parameter before renovation and after renovation is shown in table *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

8. Pingling Jingwei Brick Plant, Qindu District

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 6th week (April 15, 2005)

The main contents completed:

1. Proposed the reconstruction plan for annular kiln.
2. Installation drawing for double stage de-airing extruder.
3. Installation drawing for kiln blower.
4. Proposed renovation plan for electrical engineering.

The details of four items of design above-mentioned can be found page 18 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Pingling Jingwei Brick Plant, Qindu District).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipments in the *Feasibility Study Report* about this plant. The details of the new added equipments see table 8.

Table 8 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	Repairing the annular kiln	34 chambers	1
2	Extruder	450	1
3☼	Numerical control automatic brick column cutter and brick cutter	ZQT300X200 ZQP24	1
4☼	Inherent fuel feeder	600X3000	1
5	Energy-saving blower	ZFJ-8	2
6☼	Transducer control system for extruder and kiln blower	ACS400 series	2
7☼	Control system of non-power compensation for extruder	WMJ series	1
8	Installing capacitors for 8 equipments, such as box feeder etc.	WMJ series	8

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: The 15th week (June 25, 2005)

The contents completed:

1. Repaired annular kiln with 34-chamber according to the repairing plan;
2. Installed the double-stage extruder in accordance with the process design;
3. Installed vertical column cutter in accordance with the process design;
4. Installed cutter in accordance with the process design;
5. Installed energy-saving blower according to installation drawing;.

6. In accordance with the renovation plan of electric engineering, installing following equipment:

(1) Transducer control system for extruder and kiln blower.

(2) Installed electric power compensators for 8 equipment, such as box feeder, coal crusher, coal feeder, roller mill, double-shaft mixer, double-stage de-airing extruder, vertical brick column cutter and brick cutter.

The details of six items of installation and construction of equipment above- mentioned can be found on pages 30~33 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Pingling Jingwei Brick Plant, Qindu District).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 8. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 30~33 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Pingling Jingwei Brick Plant, Qindu District).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 8 for a month, desired effect of the project has attained: 744.26 t standard coal can be saved and CO_2 emissions has reduced by 1855.44 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project*.

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

9. Jianqiang Brick Plant, Qindu District

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 7th week (April 18, 2005)

The main contents completed:

1 Worked drawing for a new 26-chamber annular kiln

2. Installation drawing for hammer crusher.

3. Proposed renovation plan for electrical engineering and added electric power compensators for 4 equipments such as extruder, hammer crusher, brick column cutter and green brick cutter.

The details of three items of design above-mentioned can be found on page 19 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Jianqiang Brick Plant, Qindu District).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipment in the *Feasibility Study Report*. The details of the new added equipments see table 9.

Table 9 List of equipment purchased, installed and renovated

NO.	Name of equipment	Type	Quan-tity
1	Newly Constructing annular kiln	26chambers	1
2☼	Hammer mill	250	1
3☼	Vertical brick column cutter	QT24	1

4☼	Inherent fuel feeder	ZJ100	1
5	Coattail slide-rail cutter	QP1.9	1
6	Capacitance compensator	WMJ series	4

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: The 15th week (June 25, 2005)

The contents completed:

1. Construction a new annular kiln with 26-chamber according to the working drawing;

2. Installed the hammer mill in accordance with the process design;

3. Installed vertical brick column cutter in accordance with the process design;

4. Installed inherent fuel feeder in accordance with the process design;

5. Installed coattail slide-rail cutter according to installation drawing;.

6. In accordance with the renovation plan of electric engineering, installed electric power compensators for 4 equipments, such as double-stage de-airing extruder, hammer mill, vertical brick column cutter, coal feeder, roller mill, double-shaft mixer, vertical brick column cutter and coattail slide-rail cutter.

The details of six items of installation and construction of equipment above- mentioned can be found on pages 33~35 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Jianqiang Brick Plant, Qindu District).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 9. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found

on pages 33~35 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Jianqiang Brick Plant, Qindu District).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 17 for a month, desired effect of the project has attained: 947.26 t standard coal can be saved and CO_2 emissions has reduced by 2361.53 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

10. Lingzhao New Building Material Co.,Xi'an

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 6th week (April 15, 2005)

The main contents completed:

1. Standardized process flow chart;
2. Proposed repairing plan for the original annular kiln;
3. Installation drawing for high-speed fine crushing roller mill;
4. Proposed renovation plan for mouth, core bridge and mouth throat of the extruder;
5. Proposed renovation plan for electrical engineering.

The details of five items of design above-mentioned can be found on page 20 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Lingzhao New Building Material Co., Xi'an).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipment in the *Feasibility Study Report*. The details of the new added equipments see table 10.

Table 10 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1☼	Demolishing the original kiln roof and reconstructing a new kiln roof	34 chambers	1
2	Replacing kiln air damps and the covers of fire holes	Made by the plant	34
3	High speed fine roller mill	φ800 X 500	2
4☼	Inherent fuel feeder	450	1
5	Vertical brick column cutter and vertical brick cutter	GD60X4	1
6☼	Conveyor	B500	1
7	Mouth, core bridge and mouth throat	Matching with extruder type 450	1
8	Transducer control system for extruder and kiln blower	ACS400 series	2
9	Control system of non-power compensation for extruder	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang,Yuhua Jiao,

Accomplished time: The 15th week (June 25, 2005)

The contents completed:

1. Repaired the original annular kiln according to the repairing plan proposed.
2. Installed high speed fine roller mill in accordance with the process design;
3. Installed inherent fuel feeder in accordance with the process design;
4. Installed vertical brick column cutter in accordance with the process design;
5. Installed vertical brick cutter in accordance with the process design;
6. Installed conveyor in accordance with the process design;
7. Renovated mouth, core bridge and mouth throat according to the renovation plan

proposed

8. In accordance with renovation plan of electric engineering, installed transducer control system for extruder and kiln blower and control system of non- power compensator for extruder.

The details of nine items of installation and construction of equipment above- mentioned can be found on pages 36~39 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Lingzhao New Building Material Co.,Xi'an).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 10. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 36~39 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Lingzhao New Building Material Co.,Xi'an).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: the 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 10 for a month, desired effect of the project has attained: 1022.73 t standard coal can be saved and CO_2 emissions has reduced by 2549.66 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical

skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

11. Weihe Jigang Building Materials Co.

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 6th week (April 15, 2005)

The main contents completed:

1. Standardized process flow chart;
2. Designed for a new annular kiln with 32 chambers
   ① General plan of process;
   ② Worked drawing for 32-chamber annular kiln.
   ③ Installation drawing for added equipments:
   - Installation drawing for Type ZJK45/40-20 double stage de-airing extruder;
   - Installation drawing for Type GD800×4000 box feeder;
   - Installation drawing for Type 4800×600 high-speed roller mill;
   - Installation drawing for Type SJY301 double-shaft mixer.
3. Proposed repairing plan for the original annular kiln.

The details of three items of design above-mentioned can be found on pages 22~23 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Weihe Jigang Building Materials Co.).

Activity 7: Purchased and constructing devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Purchased equipments according to the list of new added equipments in the *Feasibility Study Report*. The details of the new added equipments see table 11.

Table 11 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	A new annular kiln	32 chambers	1
2	Reconstructing the annular kiln	28 chambers	1
3	Two stage de-airing extruder	JZK45/40-20	1
4	Box feeder	GD800X4000	1
5☼	High speed fining roller mill	4800X600	1
6	Double-shaft mixer	SJY301	1
7	Belt conveyor	B500	1
8	Brick column cutter and vertical brick cutter	T107	1
9	Transducer control system	ACS400 series	1
10	Electric power compensators	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 15th week (June 25, 2005)

The contents completed:

1. Constructed a new annular kiln with 32 chambers according to the working drawing and repaired the original annular kiln with 28 chambers according to the repairing plan.

2. Installed two stage de-airing extruder in accordance with the process design;

3. Installed box feeder in accordance with the process design;

4. Installed high speed fining roller mill in accordance with the process design;

5. Installed double-shaft mixer in accordance with the process design;

6. Installed belt conveyor in accordance with the process design;

7. Installed brick column cutter in accordance with the process design;

8. Installed brick cutter in accordance with the process design;

9. In accordance with renovation plan of electric engineering,following work has been done

(1) Installed transducer control system for the blower (28-chamber annular kiln)

(2) Installed electric power compensator for the blower(28-chamber annular kiln).

The details of ten items of installation and construction of equipment above- mentioned can be found on pages 39~42 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Weihe Jigang Building Materials Co.).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 11. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 39~42 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Weihe Jigang Building Materials Co.).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 11 for a month, desired effect of the project has attained: 2330.80 t standard coal can be saved and CO_2 emissions has reduced by 5810.68 t yearly. The technical parameter before renovation and after renovation is shown in table *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operated rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

12. Chang'an Zhoudu Wall Materials Co.Ltd

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 5th week (April 10, 2005)

The main contents completed:

1. Standardized process flow chart;
2. Proposed repairing plan for the original annular kiln with 34 chambers;
3. Installation drawing for high-speed fine crushing roller mill;
4. Proposed renovation plan for mouth, core bridge and mouth throat of the extruder;
5. Proposed renovation plan for electrical engineering.

The details of five items of design above-mentioned can be found on page 24 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Chang'an Zhoudu Wall Materials Co.Ltd).

Activity 7: Purchased and constructing devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: the 8th week (April 30, 2005)

The contents completed:

Purchased equipment according to the list of new added equipment in the *Feasibility Study Report*. The details of the new added equipments see table 12.

Table 12 List of equipment purchased, installed and renovated

No.	Name of equipment		Type	Quantity
1☼	Reconstructing the annular kiln	Demolishing kiln roof and reconstructing kiln roof	34 chambers,	1
2		Replacing kiln air dampers and the covers of fire holes		74, 1000
3	High speed fining roller mill		600 X 600	1
4	Inherent fuel feeder		600 X 630	1
5	Vertical brick column cutter and brick cutter		QT20	1
6	Conveyor		B500	1
7	Mouth, core bridge and mouth throat		Matching with extruder type 450	1
8	Transducer control system for Extruder and kiln blower		ACS400 series	2
9	Control system of non-power compensation		WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua

Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Repaired the original annular kiln with 28 chambers according to the repairing plan.

2. Installed high speed fining roller in accordance with the process design;

3. Installed inherent fuel feeder in accordance with the process design;

4. Installed vertical brick column cutter in accordance with the process design;

5. Installed brick cutter in accordance with the process design;

6. Installed conveyor in accordance with the process design;

7. Installed mouth, core bridge and mouth throat for extruder in accordance with the process design;

8. In accordance with renovation plan following equipment have been added:

① Added transducer control system for extruder and kiln blower.

② Added control system of non- power compensator for extruder.

The details of nine items of installation and construction of equipment above- mentioned can be found on pages 43~45 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Chang'an Zhoudu Wall Materials Co.Ltd).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 12. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 43~45 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Chang'an Zhoudu Wall Materials Co.Ltd).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 12 for a month, desired effect of the project has attained: 1005.40 t standard coal can be saved and CO_2 emissions has reduced by 2506.46 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

13. Chang'an District Xidu Building Materials Co.Ltd.

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: The 7th week (April 17, 2005)

The main contents completed:

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for strengthening- mixing extruder;
3. Proposed renovation plan for mouth, core bridge and throat of the extruder;
4. Proposed repairing plan for the original annular kiln
5. Proposed renovation plan for electrical engineering: Added transducer control system for kiln blower.

The details of five items of design above-mentioned can be found pages 25~26 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Chang'an District Xidu Building Materials Co.Ltd.).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Purchased equipments according to the list of new added equipments in the *Feasibility Study Report*. The details of the new added equipments see table 13.

Table 13 List of equipment purchased, installed and renovated

No.	Name of equipment		Type	Quantity
1☼	Repairing the drying yard and reconstructing annular kiln	Demolishing kiln roof and reconstructing kiln roof	44 chambers	
2		Replacing kiln air dampers and the covers of fire holes		44 600
3		Repairing drainage system in the yard	35000m^2	
4☼	Inherent fuel feeder		ZJ100	1
5	Strengthening mixing extruder		SJJ300X35	2
6	High-speed fine crushing roller mill		Φ800 X 600	1
7	Conveyor		B500	1
8	Mouth, core bridge and throat of extruder		Matching with extruder type 450	1
9	Vertical brick column cutter and a vertical brick cutter		DT24	1
10	Coal and slag crusher		600 X 630	1
11	Transducer control system for kiln blower		ACS400 series	1
12☼	Control system of non-power compensation for extruder		WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang,Yuhua Jiao,

Accomplished time: the 15th week (June 25, 2005)

The contents completed:

1. Reconstructed the original annular kiln according to the renovating plan.
2. Installed strengthening mixing extruder in accordance with the process design;
3. Installed high-speed fine crushing roller mill in accordance with the process design;
4. Installed conveyor in accordance with the process design;
5. Installed mouth, core bridge and mouth throat for extruder in accordance with the process design;

6. Installed vertical brick column cutter in accordance with the process design;

7. Installed brick cutter in accordance with the process design;

8. Installed coal and slag crusher in accordance with the process design;

9. In accordance with renovation plan following equipment have been added:

① Added transducer control system for kiln blower.

② Added control system of non- power compensation for extruder.of electric engineering.

The details of ten items of installation and construction of equipment above- mentioned can be found on pages 45~48 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment installation for Chang,an District Xidu Building Materials Co.Ltd.).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 13. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 45~48 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Chang'an District Xidu Building Materials Co.Ltd.).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang,Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 13 for a month, desired effect of the project has attained: 866.80 t standard coal can be saved and CO_2 emissions has reduced by 2160.93 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

14. Luxing Xinzhuang Brick Plant

Activity 6: Designed for each renovation item

Members: Jiaoyu Hua, Lianchang Zhuo, Tongmei Hu, Baozhong Wang,

Accomplished time: the 6th week (April 12, 2005)

The main contents completed:

1. Installation drawing for high-speed fine roller mill;
2. Proposed repairing plan for the original annular kiln with 34 chambers
3. Installation drawing for high-speed fine crushing roller mill
4. Proposed renovation plan for mouth, core bridge and throat of the extruder
5. Proposed renovation plan for electrical engineering
   ① Added transducer control system for extruder and kiln blower.
   ② Added control system of non- power compensator for extruder.

The details of six items of design above-mentioned can be found on page 27 in the *Progress Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of engineering design for Luxing Xinzhuang Brick Plant).

Activity 7: Purchased and constructed devices and equipment for each of the renovation item

Members: Yuhua Jiao, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang

Accomplished time: The 8th week (April 30, 2005)

The contents completed:

Purchased equipments according to the list of new added equipments in the *Feasibility Study Report*. The details of the new added equipments see table 14.

Table 14 List of equipment purchased, installed and renovated

No.	Name of equipment	Type	Quantity
1	Reconstructing annular kiln	34 chambers	1

2☼	Inherent fuel feeder	ZJ100	1
3☼	Conveyor	B500	1
4☼	Vertical brick column cutter and brick cutter	QT20	1
5	High speed roller mill	600X 600	1
6	Mouth, core bridge and mouth throat	Matching with extruder type 450	1
7	Transducer control system for extruder and kiln blower	ACS400 series	2
8	Control system of non-power compensation for extruder	WMJ series	1

(The mark "☼" in the table denotes an item invested by UNIDO fund)

Activity 8 Constructed each item of the renovation and installed devices and equipment;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: The 15th week (June 25, 2005)

The contents completed:

1. Reconstructed the original annular kiln according to the renovating plan;
2. Installed inherent fuel feeder in accordance with the process design;
3. Installed conveyor in accordance with the process design;
4. Installed vertical brick column cutter in accordance with the process design;
5. Installed brick cutter in accordance with the process design;
6. Installed high-speed fine crushing roller mill in accordance with the process design;
7. Installed mouth, core bridge and mouth throat for extruder in accordance with the process design;

8 In accordance with renovation plan following equipment have been added:

① Added transducer control system for kiln blower.

② Added control system of non- power compensation for extruder of electric engineering.

The details of nine items of installation and construction of equipment above- mentioned can be found on pages 49~50 in the *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang(description of equipment installation for Luxing Xinzhuang Brick Plant).

Activity 9 Made running test for each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao,Xiaolin Yu, Baozhong Wang ,Yuhua Jiao,

Accomplished time: The 16th week (July 1, 2005)

The contents completed:

Made commissioning of equipment listed in table 14. Commissioning proved that they were in good running condition. The details of equipments commissioning can be found on pages 49~50 in *Installation and Commissioning Report* for the energy conservation renovation for the replicated enterprises in Xianyang (description of equipment commissioning for Luxing Xinzhuang Brick Plant).

Activity 10 Examined the practical effect of each technology renovation item;

Members: Lianchang Zhuo, Zhoumin Zhao, Xiaolin Yu, Baozhong Wang, Yuhua Jiao,

Accomplished time: The 17th week (July 8, 2005)

The contents completed:

By test running of equipment listed in table 14 for a month, desired effect of the project has attained: 970.30 t standard coal can be saved and CO_2 emissions has reduced by 2418.97 t yearly. The technical parameter before renovation and after renovation is shown in *M & E Form: Brick-making Sebsector Replication Project.*

Activity 11 Provided relevant technical training such as operating rules and technical skill;

The details of technical training see the relevant information in Zhou Ling Hollow Brick Plant.

III Recommendation

In this renovation for the replicated enterprises in Xianyang, we have gotten a lot of achievements and completed the tasks of the subcontract, but, compared with foreign country, we also have heaps of work to do because we have some technology gaps in energy saving, especially in harmful gas emissions reduction. In the project, only carbon dioxide emissions have been reduced, whereas harmful gas continues to discharge, so the

following problems should be solved:

- To remove sulfur, carbon dioxide, fluorin, organic matter in the discharged gas
- To work out standard for discharge of gases in brick and tile industry
- To determine test method and instrument
- To research gas cleaning method and equipment

Appendix 1: M & E Form: Brick-making Sebsector Replication Project

Appendix 1: M & E Form: Brick-making Sebsector Replication Project

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation	Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
1	Zhou Ling Hollow Brick Plant	The Plant was built in 1997, which is a township and village brick-making enterprise with acreage 6.67 ha. *The Plant had fixed* assets of 3.1 million Yuan (RMB) with annual capacity of 50 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant *has fixed assets of 3.75* million Yuan (RMB) with annual capacity of 56 million bricks (equal to common brick). Now the Plant has 205 employees (including 11 technicians). Monthly average wage is 900 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary material is slag. There are two kinds of main products: fired perforated brick (perforation 26%) with *dimension of* 240mm × 115mm×90mm, sold at 0.38 Yuan (RMB) / brick; fired hollow brick (perforation 46%) with dimension of 240mm × 240mm×115mm, sold at 1.00 Yuan (RMB) / brick. The qualified product rate increases from 84% before technology renovation to 92% after renovation. The products are sold in and around Xi'an and Xianyang district.	Technical Process: Box clay feeder + Coal crusher + Coal Feeder → Roller mill → Double-shaft mixer → Two-stage de-airing extruder → Mud column cutter → Cutter → Conveying machine for green brick → Natural drying → Firing by the annular kiln Major Energy-use Equipments: ①A new 30-chamber annular kiln and a repaired 34-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ Roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	*Internal combustive slag (t)*	18,000.00	0.197	3,546.00	Coal:	1.170	tce/10,000 boe	5,000	10,000 boe/a./	6,241.23	2.493	15,559.37	① *Reconstructing annular kilns* ● Demolishing the 30-door kiln and reconstructing a new energy saving annular kiln according to new-style drawings. ● Dealing with the 34-door annular kiln by airtightness and heat insulation. Carrying away the backfilling clay in surface, then repairing the air-leakage flue and kiln roof, lastly tamping backfilling clay enough completely. ② Reconstructing processing equipment ● Adding two MH-2/100-type saving energy high-vacuum pumps, with power 5.5kw for each one. ● Adding two sets of vertical mud column cutter and cutter. ● Rreconstructing the extruder auger. ③ Reconstructing electrical engineering ● Adding and installing electric power compensators for all electromotors of equipment. ④ Improving the environment ● Cultivating more vegetations so as to improve environment in the plant. ⑤ *Training employees* ● Training all employees for 5 ~7 days so as to increase the whole technology and management level of the plant.	*65.0022*	*8,400.00*	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	0.86	year	5,600	10,000 common bricks /a.	Coal:	0.998	toe/10,000 boe	1,035.69	2,581.98	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value *of the fuel*/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after *renovation*. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (inchading coal and power) comes from practical measurement.
				External combustive coal (t)	2,350.00	0.903	2,302.65	Power:	0.079	tce/10,000 boe									Entrustment Loan	0		IRR	77.76	%			Power:	0.065	toe/10,000 boe			
				Power/MWh	1,025.00	0.383	392.58															NPV	*197.77*	¥10,000							
				Sum total			6,241.23	C energy consumption	1.248	tce/10,000 boe									*Self-Funding*	*58.0554*		Cost of energy saving	86.07	¥1/tce			C energy consumption	1.063	toe/10,000 boe			
																			Financial Assistance	0											
合计																	65.0022	8400		58.0554									1035.69	2581.98	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	EE Baseline											Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results									Remarks
				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）			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
2	Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang	The Plant was built in 1984, which is a village brick-making enterprise with acreage 4,002 ha. The Plant had fixed assets of 1.1 million Yuan (RMB) with annual capacity of 37.5 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.50 million Yuan (RMB) with annual capacity of 41 million bricks (equal to common brick). Now the Plant has 100 employees (including 8 technicians). Monthly average wage is 1000 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag (before renovation , an auxiliary material was coal). There are three kinds of main products: fired common brick with dimension of 240mm ×115mm× 53mm, sold at 0.14Yuan (RMB) / brick; fired perforated brick (perforation 26%) with dimension of 240mm × 115mm×90mm, sold at 0.28 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 0.80 Yuan (RMB) / brick. The qualified product rate increases from 84% before techno	**Technical Process:** Clay+Slag→ Roller mill→ Double-shaft mixer→ Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying green brick by manual work →Natural drying→ Setting by manual work →Firing by the annular kiln **Major Energy-use Equipments:** ①A new 38-chamber annular kiln; ②Box feeder; ③Coal crusher; ④ Coal feeder; ⑤Roller mill; ⑥Double-shaft mixer; ⑦Two-stage de-airing extruder; ⑧ Vertical automatic mud column cutter; ⑨ Cutter; ⑩ Two Blowers.	Internal combustive coal	5,799.96	0.643	3,729.37	Coal:	1.170	tce/10,000 bce	3,750	10,000 boe/a./	4,650.32	2.493	11,593.24	① Firing brick with slag as internal combustive coal fuel by admixing slag into raw material. ② Strengthening crushing of raw materials by installing a high speed fine roller mill. ③ Strengthening crushing of slag by installing a new high speed coal crusher. ④ Reconstructing the extruder mouth, promoting de-airing extruding pressure and ensuring high strength for green brick to shape while slag adding to materials. ⑤ Demolishing the original annular kiln with 38 chambers and reconstructing a new annular kiln. ⑥ Installing a speed transducer for exhaust fan so as to save electric energy.	50.7365	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	0.97	year	4,100	10,000 common bricks /a.	Coal:	0.936	tce/10,000 bce	1,017.15	2,535.75	1.基准年为2004年； 2.企业基本情况栏中的数据来自于实地调查； 3.能源消耗实物量来自于该厂可行性研究报告； 4.内燃炉渣和外燃煤的折标系数是由实测该燃料的发热量按公式快算而来，即折标系数=燃料的实测发热量/标煤发热量； 5.总投资和项目支持资金来自于咸阳地区推广企业技术改造进度报告； 6.财务评价中的投资回收期来自于该企业可行性研究报告，内部收益率和净现值是根据该企业技术改造后的基础数据计算而来的。 7.预期效果栏中的单位产品煤耗和电耗来源于实际效果测定。
				External combustive coal (t)	1,023.50	0.643	658.11	Power:	0.070	tce/10,000 bce								Commercial loan	0			IRR	68.94	%				Power:	0.056	tce/10,000 bce			
				Power/MWh	686.25	0.383	262.83											Entrustment Loan	0													
																		Self-Funding	43.7897			NPV	132.09	￥10,000							
				Sum total			4,650.32	C energy consumption	1.240	tce/10,000 bce								Financial Assistance	0			Cost of energy saving	63.29	￥1/tce				C energy consumption	0.992	tce/10,000 bce			
合计																50.7365	8400		43.7897											1017.15	2535.75	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline											Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
3	Xiwu Vacuum Brick Plant, Xingping City	The Plant was built in 1996, which is a township and village brick-making enterprise with acreage 13.34 ha. The Plant had fixed assets of 1.5 million Yuan (RMB) with annual capacity of 38 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 2 million Yuan (RMB) with annual capacity of 42 million bricks (equal to common brick). Now the Plant has 120 employees (including 4 technicians). Monthly average wage is 900 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag (before renovation , an auxiliary material was coal). There are two kinds of main products: fired common brick with dimension of 240mm ×115mm×53mm, sold at 0.12Yuan (RMB) / brick; fired perforated brick (perforation 26%) with dimension of 240mm ×115mm×90mm, sold at 0.33 Yuan (RMB) / brick. The qualified product rate increases from 84% before technology renovation to 92% after renovation. The products are sold in and around Xi' an and Xianyang district.	**Technical Process:** Clay+slag→Roller mill→Double-shaft mixer→de-airing extruder→Mud column cutter→Cutter→Conveying green brick by manual work→Natural drying→Setting by manual work→Firing by the annular kiln **Major Energy-use Equipments:** ①A new 24-chamber annular kiln and a repaired 22-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ Roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Vertical mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal	3,802.95	0.643	2,445.30	Coal:	1.170	tce/10,000 bce	3,800	10,000 boe/a./	4,712.34	2.493	11,747.85	① Firing brick with complete internal combustive fuel by admixing slag into raw material. ② Strengthen crushing of raw materials by installing a high speed fine roller mill. ③ Strengthen crushing of slag by installing a new high speed coal crusher. ④ Renovating the die and increasing extrusion pressure of de-airing extruder, which can ensure high strength of the green bricks after adding slag into clay. ⑤ Adopting vertical automatic mud column cutter so as to increase the quality of the mud column. ⑥Reconstructing annular kiln with 22 doors Using fire-resistance and heat-insulating spraying materials for annular kiln and reducing air-leakage and heat loss of kiln. ⑦Constructing a new 24-door annular kiln Demolishing the original annular kiln and reconstructing a new 24-door annular kiln. ⑧Installing a speed transducer for exhaust fan so as to save energy.	50.1576	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	0.91	year	4,200	10,000 common bricks /a.	Coal:	0.998	toe/10,000 bce	743.77	1,854.22	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, "The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	3,111.51	0.643	2,000.70	Power:	0.070	tce/10,000 bce									Entrustment Loan	0							Power:	0.065	tce/10,000 boe			
				Power/kWh	695.40	0.383	266.34												Self-Funding	43.2108			IRR	73.33	%							
				Sus total			4,712.34	C energy consumption	1.240	tce/10,000 bce									Financial Assistance	0			NPV	141.52	¥10,000							
																							Cost of energy saving	72.06	¥1/tce		C energy consumption	1.063	tce/10,000 bce			
合计																	50.1576	8400		43.2108										743.77	1854.22	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
4	Zhoulin g Zhuoxi ng Hollow Brick Plant	The Plant was built in 1997, which is a village brick-making enterprise with acreage 4.002 ha. The Plant had fixed assets of 1.2 million Yuan (RMB) with annual capacity of 32 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.6 million Yuan (RMB) with annual capacity of 34 million bricks (equal to common brick). Now the Plant has 85 employees (including 6 technicians). Monthly average wage is 1500 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag. There are two kinds of main products: fired perforated brick (perforation 26%) with dimension of 240mm × 115mm×90mm, sold at 0.32 Yuan (RMB) / per brick; fired hollow brick (perforation 46%) with dimension of 240mm × 240mm×115mm, sold at 0.90 Yuan (RMB) / per brick. The qualified product rate increases from 84% before technology renovation to 99% after renovation. The products are sold in and around Xi'an and Xianyang district.	**Technical Process:** Box feeder→Coal crusher→Coal Feeder →Roller mill →Double-shaft mixer→ Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying machine for green brick→ Natural drying→ Firing by the annular kiln **Major Energy-use Equipments:** ①A new 30-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ Roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Vertical mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive slag	8,000.00	0.197	1,576.00	Coal:	1.223	tce/10,000 bce	3,200	10,000 bce/a./	4,157.87	2.493	10,365.58	① Constructing annular kiln with 30 doors Demolishing the 28-door kiln, and constructing a new energy- saving 30-door annular kiln according to formal standard drawings, at the same time, the quality of the kiln should be controlled strictly so as to ensure good heat insulation and airtight performance, which will attain the purpose of saving energy and increasing output. ② Purchasing a new 50-type loader Mining raw material in vertical section can ensure a good admixture of topsoil and subsoil, which can increase the output. ③ Installing two new MH-2/100-type saving energy high-vacuum dumps Disusing the old vacuum pump (15kw) with high energy consumption and lower efficiency, and installing two new MH-2/100-type saving energy high-vacuum dumps with power 5.5kw for each one. ④ Installing a vertical mud column cutter. ⑤ Installing electric power compensator for all electromotor of equipments so that the electrical energy can be saved by 8%, and the electricity consumption for 10,000 bce is below 175kWh.	58.2208	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.5	year	3,400	10,000 common bricks /a.	Coal:	0.980	toe/10,000 bce	861.34	2,147.32	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	2,440.00	0.958	2,337.52	Power:	0.076	tce/10,000 bce									Entrustment Loan	0			IRR	45.59	%			Power:	0.066	toe/10,000 bce			
				Power/MWh	638.00	0.383	244.35												Self-Funding	51.2740			NPV	85.11	¥10,000								
				Sum total			4,157.87	C energy consumption	1.299	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	95.55	¥1/tce			C energy consumption	1.046	toe/10,000 bce			
合计															58.2208	8400		51.274												861.34	2147.32	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
5	Nanyuzi Hollow Brick Plant	The Plant was built in 1992, which is a township brick-making enterprise with acreage 4.002 ha. The Plant had fixed assets of 0.9 million Yuan (RMB) with annual capacity of 24 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.4 million Yuan (RMB) with annual capacity of 20 million bricks (equal to common brick). Now the Plant has 102 employees (including 8 technicians). Monthly average wage is 800 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is fly ash ((before renovation the auxiliary materials was coal and fly ash). There are two kinds of main products: fired perforated brick (perforation 26%) with dimension of 240mm × 115mm×90mm, sold at 0.40 Yuan (RMB) / brick; fired hollow brick (perforation 46%) with dimension of 240mm × 240mm×115mm, sold at 0.99 Yuan (RMB) / brick. The qualified product rate increases from 81% before technology renovation to 96% after renovation. The products are sold in and around Xi'an and Xi	**Technical Process:** Box clay feeder+ Box fly ash feeder→ Roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying machine for green brick→ dryer→Firing by the annular kiln **Major Energy-use Equipments:** ① A repaired 24-chamber annular kiln; ② Box clay feeder; ③fly ash box feeder; ④ Roller mill ; ⑤Double-shaft mixer; ⑥Two-stage de-airing extruder; ⑦ Mud column cutter; ⑧ Cutter; ⑨ Blower.	Internal combustive coal+fly ash (t)	1,850.00	0.246	455.10	Coal:	1.212	tce/10,000 boe	2,000	10,000 boe/a./	2,564.04	2.493	6,392.16	① Adding a new grab ② Installing a drum screen so as to eliminating the larger lime nodules existed in raw material. ③ Dealing with the 24-door annular kiln by airtightness and heat insulation Carrying away the backfilling clay in surface, then repairing the air-leakage flue and kiln roof, lastly backfilling clay enough tamping completely. ④ Installing a fly-ash feeder and a mixer, and adding 30% fly-ash into clay. ⑤ Replacing a professional energy-saving fan which can increase fan draught and reduce energy consumption. ⑥ Constructing a group of manpower-setting dryer so as to increase the semi-qualified product rate. ⑦ Innovating electric appliance ● Adding transducer control system for extruder and kiln fan; ● Adding control system of non-power compensation for extruder.	49.6200	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.4	year	2,400	10,000 common bricks /a.	Coal:	0.805	tce/10,000 boe	986.45	2,459.23	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal +fly ash(t)	8,000.00	0.246	1,968.00	Power:	0.070	tce/10,000 boe									Entrustment Loan	0			IRR	49.20	%								
				Power/MWh	368.00	0.383	140.94												Self-Funding	42.6732			NPV	81.16	¥10,000								
				Sum total			2,564.04	C energy consumption	1.282	tce/10,000 boe									Financial Assistance	0			Cost of energy saving	64.03	¥1/tce			C energy consumption	0.871	tce/10,000 boe			
合计															49.6200	8400		42.6732												986.45	2459.23	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	EE Baseline										Proposed Technical Renovation [3])	Project Investment				Project Status	Anticipated Results									Remarks
				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）			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
6	Chatian Brick Plant, Maquan Town, Qindu District	Chatian Brick Plant, Maquan Town, Qindu District was built in 1985, which is a township and village brick-making enterprise with acreage 6.67 ha. The Plant had fixed assets of 1.0 million Yuan (RMB) with annual capacity of 32 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.6 million Yuan (RMB) with annual capacity of 35 million bricks (equal to common brick). Now the Plant has 100 employees (including 8 technicians). Monthly average wage is 800 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag (before renovation an auxiliary material was coal). There are two kinds of main products: fired perforated brick (perforation 26%) with dimension of 240mm × 115mm×90mm, sold at 0.35 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 0.9 Yuan (RMB) / brick. The qualified product rate increases from 90% before technology renovation to 99% after renovation. The products are sold in and	**Technical Process:** Clay +Slag→ Roller mill→ Double-shaft mixer→De-airing extruder→ Mud column cutter→ Cutter→ Conveying green brick by manual work →Natural drying→ Setting by manual work →Firing by the annular kiln **Major Energy-use Equipments:** ①A reconstructed 26-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ Roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	4949. 30	0.643	3,182.40	Coal:	1.170	tce/10,000 bce	3,200	10,000 bce/a./	4,000.00	2.493	9,972.01	① Firing brick with slag as Internal combustive fuel by adding slag into raw material. ② Strengthening crushing of raw materials by installing a high speed fine roller mill. ③ Strengthening crushing of slag by installing a new high speed coal crusher. ④ Installing a new de-airing extruder, promoting vacuum extruding pressure and ensuring high strength for green brick to shape while slag adding to materials. ⑤ Demolishing the original 26-door kiln, and reconstructing a new energy saving annular kiln. ⑥ Installing a speed transducer for exhaust fan so as to save energy.	58.7997	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.7	year	3,500	10,000 common bricks /a.	Coal:	0.878	tce/10,000 bce	1,092.00	2,722.37	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of ' Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	873.41	0.643	561.60	Power:	0.080	tce/10,000 bce									Entrustment Loan	0			IRR.	39.90	%			Power:	0.060	tce/10,000 bce			
				Power/MWh	668.41	0.383	256.00												Self-Funding	51.8529			NPV	70.13	￥10,000								
				Sum total			4,000.00	C energy consumption	1.250	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	70.3	￥1/tce			C energy consumption 2):	0.938	tce/10,000 bce			
合计																	58.7997	8400		51.8529										1092.00	2722.37	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline											Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results									Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
7	Dongjiao Construction Materials Co.,Weicheng District, Shaanxi Province	The Plant was built in 2004, which is a joint-stock enterprise with acreage 8.404 ha. The Plant had fixed assets of 1.8 million Yuan (RMB) with annual capacity of 20 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 2.30 million Yuan (RMB) with annual capacity of 22 million bricks (equal to common brick). Now the Plant has 120 employees (including 8 technicians). Monthly average wage is 1000 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary materials are slag and faulty coal. There are two kinds of main products: fired perforated brick (perforation 27%) with dimension of 240mm × 115mm × 90mm, sold at 0.35 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm × 115mm, sold at 0.9 Yuan (RMB) / brick. The qualified product rate increases from 80% before technology renovation to 95% after renovation. The products are sold in and around Xi' an and Xianyang district.	**Technical Process:** Clay + Slag + faulty coal→ Double-shaft mixer→ High speed roller mill→ Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying green brick by manual work →Manpower dryer→ Firing by annular kiln **Major Energy-use Equipments:** ①A repaired 24-chamber annular kiln; ② Manpower dryer ③Box feeder; ④ Coal crusher; ⑤Double-shaft mixer; ⑥ High speed roller mill; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	3,443.23	0.643	2,214.00	Coal:	1.230	tce/10,000 bce	2,000	10,000 bce/a./	2,600.17	2.493	6,482.23	① Firing brick with slag and fly-ash as Internal combustive fuel by admixing slag and fly-ash into raw material. ② Reconstructing annular kiln ● Building residual heat utilization system. ● Using fire-resistance and heat-insulating spraying materials for annular kiln and reducing air-leakage and heat loss of kiln. ③Constructing an new manpower dryer which can utilize the residual heat and smoke heat to dry green brick so as to attain the purpose of saving energy and reducing energy consumption. ④ Strengthen crushing of raw materials by installing a high speed fine roller mill. ⑤ Strengthen crushing of slag by installing a new high speed coal crusher. ⑥ Carrying residual heat to manpower dryer from annular kiln by installing a heat suction fan. ⑦ Installing a speed transducer for exhaust fan so as to save energy.	50.1989	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.8	year	2,200	10,000 coom on bricks /a.	Coal:	0.898	tce/10,000 bce	772.39	1,925.57	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	382.58	0.643	246.00	Power:	0.070	tce/10,000 bce									Entrustment Loan	0			IRR	36.41	%			Power:	0.051	tce/10,000 bce			
				Power/Hour	366.00	0.383	140.18												Self-Funding	43.2521			NPV	51.71	¥10,000								
				Sum total			2,600.17	C energy consumption	1.300	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	90.03	¥1/tce			C energy consumption	0.949	tce/10,000 bce			
合计																50.1989	8400		43.2521											772.39	1925.57	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	EE Baseline											Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
8	Pinglin g Jingwei Brick Plant, Qindu District	The Plant was built in 2001, which is a township and village brick-making enterprise with acreage 4,669 ha. The Plant had fixed assets of 0.5 million Yuan (RMB) with annual capacity of 30 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.0 million Yuan (RMB) with annual capacity of 33 million bricks (equal to common brick). Now the Plant has 90 employees (including 5 technicians). Monthly average wage is 900 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary materials is slag (before renovation , auxiliary materials were coal and slag). There are two kinds of main products: fired perforated brick (perforation 26%) with dimension of 240mm × 115mm×90mm, sold at 0.31 Yuan (RMB) /brick; fired hollow brick (perforation 40%) with dimension of 240mm ×240mm× 115mm, sold at 0.9 Yuan (RMB) / brick. The qualified product rate increases from 80 % before technology renovation to 90% after renovation. The products are sold in and around Xi'an and Xianyi	**Technical Process:** Box clay feeder+ Coal crusher +Coal Feeder→ Roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Vertical mud column cutter →Cutter→ Conveying machine for green brick→ Firing by the annular kiln **Major Energy-use Equipments:** ①A repaired 34-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ Roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal+slag (t)	6,200.00	0.429	2,657.94	Coal:	1.229	tce/10,000 bce	3,000	10,000 boe/a./	3,847.60	2.493	9,592.07	① Reconstructing annular kiln Demolishing the original kiln roof and side wall, tamping backfilling clay again and reconstructing the kiln roof can ensure good heat insulation and airtight performance, which will attain the purpose of saving energy and increasing output. ② Reconstructing process equipment ● Purchasing a new loader ● Purchasing a new two-stage de-airing extruder can ensure the quality of hollow brick ● Eliminating the arc mud column cutter and installing a new vertical mud column cutter can increase semi-finished product rate by 8%. ● Eliminating the original device for adding internal combustivefuel to clay and purchasing a new special inherent fuel feeder. ● Eliminating the original centrifugal fan and purchasing a new special energy saving fan. ③ Electrical engineering reconstruction ● Adding transducer control system for extruder and kiln fan ● Adding control system of non-power compensation for extruder ● By installing electric power compensator to all electromotor of equipments, annual electricity can be saved by 1 ④ Training all technicians fo	49.7234	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.2	year	3,300	10,000 common bricks /a.	Coal:	0.990	tce/10,000 bce	744.26	1,855.44	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	1,600.00	0.643	1,028.80	Power:	0.054	tce/10,000 bce									Entrustment Loan	0			IRR	57.10	%			Power:	0.067	tce/10,000 bce			
				Power/MWh	420.00	0.383	160.86												Self-Funding	42.7766			NPV	100.41	¥10,000								
				Sum total			3,847.60	C energy consumption	1.283	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	87.55	¥1/tce			C energy consumption	1.057	tce/10,000 bce			
合计																49.7234	8400		42.7766										744.26	1855.44	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline											Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				Energy Type	Energy consumption (physical quantity)	Conversion Factor	Energy use (tce)	Energy Use/Unit Product			Output Before Renovation		Total energy use (tce)	CO2 Coeffkient	CO2 Emissions (t/a.)		Total (RMB ¥ 10,000)	GEF (US$)	Others (RMB¥ 10,000)			Start-end date	Financial Evaluation			Production after renovation	Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
9	Jianqing Brick Plant, Qindu District	The Plant was built in 2001, which is a township and village brick-making enterprise with acreage 4.002 ha. The Plant had fixed assets of 1.0 million Yuan (RMB) with annual capacity of 31 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.5 million Yuan (RMB) with annual capacity of 35 million bricks (equal to common brick). Now the Plant has 120 employees (including 6 technicians). Monthly average wage is 600 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary materials are slag and coal. There are two kinds of main products: fired perforated brick (perforation 22%) with dimension of 240mm × 115mm×90mm, sold at 0.31 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 0.85 Yuan (RMB) / brick. The qualified product rate increases from 81% before technology renovation to 91% after renovation. The products are sold in and around Xi'an and Xianyang district.	**Technical Process:** Box clay feeder→ Hammer mill →Coal Feeder→ Roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying machine for green brick→ Natural drying→ Firing by the annular kiln **Major Energy-use Equipments:** ①A new 26-chamber annular kiln; ② Box feeder; ③ Hammer mill (Coal crusher); ④ Coal feeder; ⑤Roller mill; ⑥Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive slag (t)	8,200.00	0.197	1,615.40	Coal:	1.203	tce/10,000 bce	3,100	10,000 bce/a./	3,979.31	2.493	9,920.41	① Constructing a new annular kiln with 28 doors Demolishing the original kiln and constructing a new 28-door annular kiln according to formal standard drawings, at the same time, the quality of the kiln should be controlled strictly so as to ensure good heat insulation and airtight performance, which will attain the purpose of saving energy and increasing output. ② Purchasing a new Model 250 hammer mill, which can crush slag 40 t every day. The addition of slag as inherent fuel can be increased so that the coal is not need to be as inherent fuel. ③ Disusing the old arc mud column cutter and installing a new vertical mud column cutter and increasing semi-finished product rate by 8%. ④ Eliminating the original device for adding internal combustive fuel to clay and purchasing a new special internal combustive fuel feeder. ⑤ Purchasing a new conttnil slide-rail cutter so as to ensure the appearance quality of brick. ⑥ By installing electric power compensator to all electromotor of equipments. ⑦ Training all employees for 5~7 days so as to increa	49.6200	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.0	year	3,500	10,000 common bricks /a.	Coal:	0.948	tce/10,000 bce	947.26	2,361.53	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	2,440.00	0.866	2,113.04	Power:	0.081	tce/10,000 bce									Entrustment Loan	0		IRR	64.53	%		Power:	0.065	tce/10,000 bce			
				Power/kWh	655.00	0.383	250.87												Self-Funding	42.6732		NPV	118.34	¥10,000							
				Sum total			3,979.31	C energy consumption	1.284	tce/10,000 bce									Financial Assistence	0		Cost of energy saving	68.60	¥1/tce		C energy consumption ②	1.013	tce/10,000 bce			
合计																49.6200	8400		42.6732										947.26	2361.53	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results									Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
10	Xi' an Lingzhao New Building Materials Co.	The Plant was built in 1993, which is a township and village brick-making enterprise with acreage 10,005 ha. The Plant had fixed assets of 1.0 million Yuan (RMB) with annual capacity of 26 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.4 million Yuan (RMB) with annual capacity of 28 million bricks (equal to common brick). Now the Plant has 100 employees (including 20 technicians). Monthly average wage is 810 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag. There are five kinds of main products: fired perforated bricks (perforation 26%) with dimension of 240mm × 115mm×90mm, 240mm ×115mm×180mm, 240mm ×115mm× 190mm, 240mm × 115mm×200mm,sold at 0.40 Yuan,0.85 Yuan,0.90 Yuan,0.95 Yuan (RMB) / brick in turn; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 1.00 Yuan (RMB) /brick. The qualified product rate increases from 78% before technology renovation to 95% after renovation. The products are sold in	**Technical Process:** Box clay feeder+ Coal crusher +Coal batch machine (inherent fuel) →Roller mill →Double-shaft mixer→ Two-stage de-airing extruder→ Vertical mud column cutter →Cutter→ Conveying machine for green brick→ Firing by the annular kiln **Major Energy-use Equipments:** ①A repaired 34-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal batch machine; ⑤ High speed roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	4,185.07	0.643	2,691.00	Coal:	1.150	tce/10,000 boe	2,600	10,000 boe/a./	3,209.08	2.493	8,000.23	① Standardizing of process flow; ② Reconstructing the 34-door annular kiln with main treatment of heat preservation and preventing air leakage; ● Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage; ● Replacing kiln air dampers and the covers of fire holes.	39.6960	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.5	year	2,800	10,000 common bricks /a.	Coal:	0.800	tce/10,000 boe	1,022.73	2,549.66	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient'= Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from 'The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of ' Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	465.01	0.643	299.00	Power:	0.084	tce/10,000 boe									Entrustment Loan	0		IRR	45.57	%			Power:	0.069	tce/10,000 boe			
				Power/MWh	572.00	0.383	219.08												Self-Funding	32.7492		NPV	72.51	¥10,000								
				Sum total			3,209.08	C energy consumption	1.234	tce/10,000 boe									Financial Assistance	0		Cost of energy saving	60.89	¥1/tce			C energy consumption	0.869	tce/10,000 boe			
合计															39.6960	8400		32.7492											1022.73	2549.66	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results									Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation	Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
11	Weihe Jigang Building Materials Co.	The plant was built in 1996, which is a private enterprise with acreage 23.345 ha. The Plant had fixed assets of 1.45 million Yuan (RMB) with annual capacity of 23 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 2.25 million Yuan (RMB) with annual capacity of 55 million bricks (equal to common brick).Among which the old brickwork has fixed assets of 1.45 million Yuan (RMB) and a new brickwork has 0.8 million Yuan (RMB). Now the Plant has 150 employees (including 20 technicians). Monthly average wage is 1500 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary material is slag (before renovation , an auxiliary material was coal). There are two kinds of main products: fired perforated brick (perforation 22%) with dimension of 240mm × 115mm×90mm, sold at 0.48 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 1.25 Yuan (RMB) / brick. The qualified product rate increases from 75% before techno	**Technical Process:** Box clay feeder+ Coal crusher +Coal Feeder→High speed roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying machine for green brick→ Natural drying→ Firing by the annular kiln **Major Energy-use Equipments:** ①A new 32-chamber annular kiln and a repaired 28-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Coal feeder; ⑤ High speed roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	3,240.00	0.767	2,485.08	Coal:	1.201	tce/10,000 boe	2,300	10,000 bce/a/	2,955 00	2.493	7,366.81	① Standardization of process flow ② Constructing a new production line of 32-door annular kiln ③ Repairing the air-leakage of the annular kiln, replacing kiln brake and installing new speed adjuster and energy-saving device.	82.0880	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	0.51	year	5,500	10,000 common bricks /a.	Coal:	0.800	tce/10,000 boe	2,330.80	5,810.68	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Paybsck period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	360.00	0.767	276.12	Power:	0.084	tce/10,000 boe									Entrustment Loan	0			IRR	130.53	%			Power:	0.061	tce/10,000 boe			
				Power/kWh	506.00	0.383	193.80												Self-Funding	75.1412			NPV	467.38	￥10,000								
				Sum total			2,955.00	C energy consumption	1.285	tce/10,000 boe									Financial Assistance	0			Cost of energy saving	37.38	￥1/tce			C energy consumption[2]	0.861	tce/10,000 bce			
合计															82.0880	8400		75.1412												2330.80	5810.68	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results									Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation	Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
12	Chang'an Zhoudu Wall Materials Co. Ltd	The Plant was built in 2003, which is a private enterprise enterprise with acreage 23.345 ha. The Plant had fixed assets of 1.5 million Yuan (RMB) with annual capacity of 25 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 2.0 million Yuan (RMB) with annual capacity of 27.5 million bricks (equal to common brick). Now the Plant has 300 employees (including 30 technicians). Monthly average wage is 800 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary material is slag (before renovation an auxiliary material was coal). There are two kinds of main products: fired perforated brick (perforation 22%) with dimension of 240mm × 115mm×90mm, sold at 0.40 Yuan (RMB) / brick; fired hollow brick (perforation 47%) with dimension of 240mm × 240mm×115mm, sold at 1.00 Yuan (RMB) / brick. The qualified product rate increases from 75% before technology renovation to 91% after renovation. The products are sold in and around Xi'an and Xianyang district.	**Technical Process:** Box clay feeder→ hammer crusher→ *Internal* combustive fuel feeder→ High speed roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Mud column cutter→ Cutter→ Conveying machine for green brick→ Firing by the annular kiln **Major Energy-use Equipments:** ①A new 34-chamber annular kiln and a repaired 38-chamber annuler kiln; ② Box feeder; ③ Hammer coal crusher; ④ Internal combustive fuel feeder; ⑤ High speed roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	4,320.00	0.625	2,700.00	Coal:	1.200	tce/10,000 boe	2,500	10,000 boe/a/	3,191.50	2.493	11.00	① Standardizing of process flow; ② Reconstructing the 36-door annular kiln with main treatment of heat preservation and preventing air leakage; ● Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage; ● Replacing kiln air dampers and the covers of fire holes; ③ Replacing the equipments ● Installing a new high speed fine crushing roller mill; ● Installing a new internal combustive fuel feeder; ● Self-manufacturing a conveyor; ● Installing a new machine set of vertical mud column cutter and a vertical cutter; ④ Innovating the machinery Manufacturing die, core bridge and die throat; ⑤ Innovating electric appliance ● Adding transducer control system for extruder and kiln fan; ● Adding control system of non-power compensation for extruder.	49.7027	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.4	year	2,750	10,000 common bricks /a.	Coal:	0.850	tce/10,000 bce	1,005.40	2,506.46	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	480.00	0.625	300.00	Power:	0.077	tce/10,000 bce									Entrustment Loan	0			IRR	47.11	%			Power:	0.061	tce/10,000 bce			
				Power/MWh	500.00	0.383	191.50												Self-Funding	42.7559			NPV	76.29	¥10,000								
				Sum total			3,191.50	C energy consumption	1.277	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	62.26	¥1/tce			C energy consumption[2]	0.911	tce/10,000 bce			
合计																	49.7027	8400		42.7559										1005.40	2506.46	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation (3)	Project Investment				Project Status	Anticipated Results									Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
13	Changan District Xidu Building Materials Co.Ltd	The Plant was built in 1993, which is a township and village brick-making enterprise with acreage 6.67 ha. The Plant had fixed assets of 1.5million Yuan (RMB) with annual capacity of 25 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.95 million Yuan (RMB) with annual capacity of 27.5 million bricks (equal to common brick). Now the Plant has 120 employees (including 6 technicians). Monthly average wage is 800 Yuan (RMB) per employee. The raw material in the plant is clay and auxiliary material is slag (before renovation , an auxiliary material was coal). There are two kinds of main products: fired perforated brick (perforation 28%) with dimension of 240mm × 115mm×90mm, sold at 0.42 Yuan (RMB) / brick; fired hollow brick (perforation 48%) with dimension of 240mm × 240mm×115mm, sold at 0.98 Yuan (RMB) / brick. The qualified product rate increases from 78% before technology renovation to 96% after renovation. The products are sold in and around Xi'an and Xianyang district.	**Technical Process:** Box clay feeder+ fly ash+ Internal combustive fuel feeder→ High speed roller mill→ Double-shaft mixer→ De-airing extruder→ Vertical mud column cutter →Cutter→ Natural drying→ Firing by the annular kiln **Major Energy-use Equipments:** ①A reconstructed 44-chamber annular kiln; ② Box feeder; ③ Coal crusher; ④Internal combustive fuel feeder; ⑤ High speed roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	2700.00	0.958	2,586.60	Coal:	1.150	toe/10,000 boe	2,500	10,000 boe/a./	3,065.50	2.493	11.00	① Replacing the equipments ● Installing a new high speed fine crushing roller mill; ● Installing a new coal(internal combustive fuel) feeder; ● Self-manufacturing a conveyor; ● Installing a new machine set of vertical mud column cutter and a vertical cutter; ② Innovating the machinery Manufacturing die, core bridge and die throat; ③ Reconstructing the 44-door annular kiln ● Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage. Replacing kiln air dampers and the covers of fire holes ④ Reconstructing electrical engineering ● Adding transducer control system for kiln fan; ● Adding control system of non-power compensation for extruder.	45.0798	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.3	year	2750	10,000 common bricks /a.	Coal:	0.850	toe/10,000 boe	866.80	2,160.93	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, "The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	300.00	0.958	287.40	Power:	0.077	toe/10,000 boe									Entrustment Loan	0			IRR	52.27	%			Power:	0.061	toe/10,000 boe			
				Power/MWh	500.00	0.383	191.50												Self-Funding	38.1330			NPV	80.42	￥10,000								
				Sum total			3,065.50	C energy consumption	1.226	toe/10,000 boe									Financial Assistance	0			Cost of energy saving	66.98	￥1/tce			C energy consumption	0.91	toe/10,000 boe			
合计																	45.0798	8400		38.133										866.80	2160.93	

M & E Form: Brick-making Sebsector Replication Project

No.	TVEs	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline										Proposed Technical Renovation [3]	Project Investment				Project Status	Anticipated Results										Remarks
				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)			Start-end date	Financial Evaluation			Production after renovation		Energy Use/Unit Product			Energy Savings (tce/a.)	CO2 emission Reduction(t/a.)	
14	Luoing Xinzhuang Brick Plant	The Plant was built in 2003, which is a private enterprise enterprise with acreage 6.67 ha. The Plant had fixed assets of 1.0 million Yuan (RMB) with annual capacity of 20 million bricks (equal to common brick) before technical renovation. After technical renovation, The Plant has fixed assets of 1.5 million Yuan (RMB) with annual capacity of 23.4 million bricks (equal to common brick). Now the Plant has 70 employees (including 6 technicians). Monthly average wage is 1000 Yuan (RMB) per employee. The raw material in the plant is clay and an auxiliary material is slag. The main product is fired hollow brick (perforation 42%) with dimension of 240mm × 240mm×115mm, sold at 0.95 Yuan (RMB) / brick. The qualified product rate increases from 75% before technology renovation to 92% after renovation. The products are sold in and around Xi'an and Xianyang district.	**Technical Process:** Box clay feeder→ hammer crusher→ Internal combustive fuel feeder→ High speed roller mill→ Double-shaft mixer→Two-stage de-airing extruder→ Vertical mud column cutter →Cutter→ Conveying machine for green brick→ Firing by the annular kiln **Major Energy-use Equipments:** ①A repaired 34-chamber annular kiln; ② Box feeder; ③ Hammer coal crusher; ④ Internal combustive fuel feeder; ⑤ High speed roller mill; ⑥ Double-shaft mixer; ⑦ Two-stage de-airing extruder; ⑧ Mud column cutter; ⑨ Cutter; ⑩ Blower.	Internal combustive coal (t)	2210.00	0.961	2,123.81	Coal:	1.25	tce/10,000 bce	2,000	10,000 bce/a./	2,667.12	2.493	11.00	① Standardization of process flow chart ② Reconstructing the 34-door annular kiln with main treatment of heat preservation and preventing air leakage ● Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage ● Replacing kiln damper and the covers of fire holes ③ Replacing the equipments ● Purchasing a new loader; ● Installing a new high speed fine crushing roller mill; ● Installing a new machine of admeasuring inherent fuel ● Self-manufacturing a conveyor ● Installing a new machine set of vertical mud column cutter and a vertical cutter ④ Innovating the machinery Manufacturing die, core bridge and die throat ⑤ Innovating electric appliance ● Adding transducer control system for extruder and kiln fan; ● Adding control system of non-power compensation for extruder. ⑧ Training all employees for 5 --7 days so as to increase the whole technology and management lever of the plant.	53.5565	8,400	Commercial loan	0	The project has been completed according to the renovation plan	2005.03.10 ~ 2005.08.31	Payback period	1.6	year	2,340	10,000 common bricks /a.	Coal:	0.850	tce/10,000 bce	970.30	2,418.97	① Base year is in 2004. ② The data on the column of 'Business Profile' come from field survey. ③ Energy consumptions (physical quantity) come from The Feasibility Study Report. ④The conversion coefficients of internal combustive coal and external combustive coal were calculated according to their calorific value that is measured practically. That is to say, 'The conversion coefficient = Practical calorific value of the fuel/ Calorific value of the standard coal. ⑤ The amount of total investment and GEF found on column of 'Project Investment 'come from The Progress Report (Energy Conservation Renovation for the Replicated enterprises in Xianyang). ⑥ Payback period in the column of 'Financial Evaluation' comes from The Feasibility Study Report and IRR and NPV are calculated from base data of the Plant after renovation. ⑦ Energy Use/Unit Product on the column of 'Anticipated Results' (including coal and power) comes from practical measurement.
				External combustive coal (t)	390.00	0.961	374.79	Power:	0.084	tce/10,000 bce									Entrustment Loan	0			IRR	41.92	%			Power:	0.069	tce/10,000 bce			
				Power/kWh	440.00	0.383	168.52												Self-Funding	46.6097			NPV	68.97	¥10,000								
				Sum total			2,667.12	C energy consumption	1.33	tce/10,000 bce									Financial Assistance	0			Cost of energy saving	72.91	¥1/tce			C energy consumption 2)	0.919	tce/10,000 bce			
合计															53.5565	8400		46.6097												970.30	2418.97	
总计															752.2021	117600		654.9469												14396.4	35890.1	

Appendix 2: Acceptance Certificate of the 14 Replicated enterprises in Xianyang

Zhou Ling Hollow Brick Plant

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Zhou Ling Hollow Brick Plant according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Reconstruction of annular kiln.

① Designing for a new annular kiln with 30 chambers

The main technical parameters of the new annular kiln are as following:

- Fired product type: Clay perforated brick, clay hollow brick;
- Arch type: semi-circular arch;
- Dimension of firing chamber (width×height): 4.1m×2.7m;
- Number of kiln chamber: 30;
- Daily output: 150,000 bricks (one fire flame);;
- Proportion of inherent fuel: 90%;
- Exhausting smoke capacity: 46,000m^3/h;

② Proposing repair plan for the outdated 34-chamber annular kiln;

Carrying away the backfilling clay in surface of kiln roof, then repairing the air-leakage flue and kiln roof, lastly backfilling clay enough tamping completely.

2. Renovation of equipments: Proposing renovation plan for auger of extruder.

① Changing the cross-section shape of auger

Changing the cross-section shape of auger from trapezoid to saw tooth pattern

② Increasing the elevation angle of auger

Increasing the elevation angle of auger from 20° to 25°

③ Increasing the screws pitch of auger

The screws pitch of auger is increased from 1/4 to 1/2.

3. Proposing renovation plan of electric engineering.

Installing electric power compensators for 10 pieces of equipment such as box feeder, coal crusher, coal feeder, roller mill, double-shaft mixer, double-stage extruder, vertical brick column cutter, brick cutter and 2 blowers;

II **Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition** (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1: List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	A new annular kiln	30 chambers	1
2☼	Repairing 34-chamber annular kiln	34 chambers	1
3	Saving energy high-vacuum pump	MH-2/100	2
4	Vertical mud column cutter and brick cutter	QT20	2
5	Extruder auger	Matching with extruder type 450	1
6	Electric power compensator	WMJ series	10

III **Developing a lot of technology and management training for the relative post**

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 1035.69 t standard coals can be saved and CO_2 emission has reduced by 2581.98 t yearly.

Zhou Ling Hollow Brick Plant

Representative 周令林

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.30

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

I Completing the following designs:

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for high-speed coal crusher.
3. Proposing renovation plan for extruder mouth.
   ① Increasing the length of the extruder mouth;
   In accordance with the characteristics of raw materials, the length of the extruder mouth has been increased from 170mm to 220mm, which can improve the density and eliminate concentric circles cracks in green brick.
   ② Enlarging the cone angle of the extruder mouth;
   In according with the characteristics of raw materials, the cone angle of the extruder mouth has been enlarged from 2° to 4° , which can increase the density of the green brick.
4. Constructing a new 38-chamber annular kiln.
   The main technical parameters of the new annular kiln are as following:
   ① Fired product type: Clay perforated brick, Clay hollow brick;
   ② Arch type: semi-circular arch;
   ③ Dimension of firing chamber (width×height): 4.1m×2.7m;
   ④ Number of kiln chambers: 38;
   ⑤ Daily output: 150,000 bricks (one fire flame);
   ⑥ Proportion of inherent fuel: 90%;
   ⑦ Exhausting smoke capacity: 46,000m^3/h;
5. Proposing renovation plan of electric engineering.
   ① Selecting a speed transducer for exhaust blower;
   ② Installing control system of non- power compensation for double-stage extruder

(this item, which has not been proposed in the Feasibility Study Report, was added in practical construction. Therefore, all expenses caused by this item are financed by the Plant);

Ⅱ Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	New annular kiln	38 chambers	1
2☼	High speed fine roller mill	70×50	1
3	High speed coal crusher	600×630	1
4	Mouth of the extruder	450	1
5	Transducer control system	ACS400 series	1
6	Electric power compensator	WMJ series	1

Ⅲ Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 1017.15 t standard coals can be saved and CO_2 emission has reduced by 2535.75 t yearly.

Liucun Brick Plant, Dizhang, Weicheng District, Xian Yang

Representative 刘建和

Date 2006. 5. 30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006. 7. 7

Xiwu Vacuun Brick Plant, Xingping City

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Xiwu Vacuun Brick Plant, Xingping City according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Installation drawing for high-speed fine roller mill.
2. Installation drawing for high-speed coal crusher.
3. Proposing renovation plan for extruder mouth.
   ①Increasing the length of the extruder mouth;
   ②Enlarging the cone angle of the extruder mouth;
4. Proposing repairing plan for original 22-chamber annular kiln.
   Spreading fire-resistance and heat-insulating spraying materials at air-leakage of annular kiln;
5. Constructing a new 24-chamber annular kiln;
   Demolishing the original 24-chamber annular kiln and reconstructing a new kiln, the main technical parameters of the new annular kiln are as following:
   ① Fired product type: Clay perforated brick, Clay hollow brick;
   ② Arch type: semi-circular arch;
   ③ Dimension of firing chamber (width×height): 4.1m×2.7m;
   ④ Number of kiln chambers: 24;
   ⑤ Daily output: 150,000 bricks (one fire flame);
   ⑥ Proportion of inherent fuel: 90%;
   ⑦ Exhausting smoke capacity: 46,000m^3/h;
6. Proposing renovation plan for electric engineering and selecting a speed transducer for exhaust blower.

II **Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition** (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	a new annular kiln	24 chambers	1
2☼	Repairing annular kiln	22 chambers	1
3	High speed fine roller mill	LP10X8	1
4☼	High speed coal crusher	600X630	1
5	Mouth of the extruder	450	1
6	Vertical mud column cutter	QT20	1
7☼	Transducer for blower	ACS400 series	1

III **Developing a lot of technology and management training for the relative post**

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 743.77 t standard coals can be saved and CO_2 emission has reduced by 1854.22t yearly.

Xiwu Vacuun Brick Plant, Xingping City

Representative 尚金凤

Date 2006. 5. 30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Zhouling Zhuoxing Hollow Brick Plant

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Zhouling Zhuoxing Hollow Brick Plant according to the technical renovation schedule proposed in the *feasibility study report*s. The plant has reached to a destination for technology renovation.

I Completing the following designs

1. Constructing a new 30-chamber annular kiln.The main technical parameters of the new annular kiln are as following:
   ① Fired product type: Clay perforated brick, Clay hollow brick;
   ② Arch type: semi-circular arch;
   ③ Dimension of firing chamber (width×height): 4.1m×2.7m;
   ④ Number of kiln chamber: 30;
   ⑤ Daily output: 150,000 bricks (one fire flame);;
   ⑥ Proportion of inherent fuel: 90%;
   ⑦ Exhausting smoke capacity: 46,000m^3/h;
2. Proposing renovation plan for electric engineering.
   Installing electric power compensators for 4 equipments such as extruder, high speed fine roller mill, brick column cutter and brick cutter.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	A new annular kiln	30 chambers	1
2☼	Saving energy high-vacuum pump	MH-2/100	2
3	Extruder auger		

4☼	Vertical mud column cutter	JW503	1
5☼	Electric power compensator	WMJ series	4

III **Developing a lot of technology and management training for the relative post**

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 861.34 t standard coals can be saved and CO_2 emission has reduced by 2147.32 t yearly.

Zhouling Zhuoxing Hollow Brick Plant

Representative 邢建强

Date 2006. 5. 30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative 王院

Date 2006. 5. 31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006. 7. 7

Nanyuzi Hollow Brick Plant

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Nanyuzi Hollow Brick Plant according to the technical renovation schedule proposed in the *feasibility study report*s. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Proposing air tightness and heat insulation plan for 24-chamber annular kiln.
   Carrying away the backfilling clay in surface of kiln roof, then repairing the air-leakage flue and kiln roof, lastly backfilling clay enough tamping completely.
2. Installation drawing for exhaust blower.
3. Constructing a group of manpower–setting dryer.
   Strictly constructing the dryer by the working drawing, all brick masonry has been conglutinated with cement mortar. Partition wall should be faced twice with cement mortar. The floor of the dryer is paved with brick, and the ceiling with concrete board and filling 30cm (thickness) clay at the top of the board. Lastly, the surface of roof is paved with mortar for heat preservation.
4. Proposing renovation plan of electric engineering.
   ① Adding transducer control systems for extruder and kiln blower.
   ② Adding control system of non- power compensation for extruder.

Ⅱ Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition

(The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1☼	Reconstructing the annular kiln	24-chamber	1
2	Constructing an new dryer	circulation pattern	1

3☼	Fly-ash box feeder	800X4000	1
4	Stone-eliminating drum screen	GT140	1
5	Energy saving blower	ZFJ-8	1
6	Transducer control system for extruder and kiln blower	ACS400Series	2
7	Control system of non-power compensation for extruder	WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 986.45 t standard coals can be saved and CO_2 emission has reduced by 2459.23 t yearly.

Nanyuzi Hollow Brick Plant

Representative _____

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative _____

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative _____

Date June 6. 7

Chatian Brick Plant, Maquan Town, Qindu District

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Chatian Brick Plant, Maquan Town, Qindu District according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Installation drawing for high-speed fine roller mill;
2. Installation drawing for high-speed coal crusher.
3. Installation drawing for de-airing extruder;
4. Working drawing for a new 26-chamber annular kiln. The main technical parameters of the new annular kiln are as following:
   ① Fired product type: Clay perforated brick, Clay hollow brick;
   ② Arch type: Semi-circular arch;
   ③ Dimension of firing chamber (width×height): 4.1m×2.7m;
   ④ Number of kiln chamber: 26;
   ⑤ Daily output: 150,000 bricks (one fire flame);
   ⑥ Proportion of inherent fuel: 90%;
   ⑦ Exhausting smoke capacity: 46,000m^3/h.
5. Proposing renovation plan of electric engineering (the transducer control system and the electric power compensator for extruder, which have not been proposed in the Feasibility Study Report, were proposed in practical construction. Therefore, all expenses caused by these items are financed by the Plant).
   ① Adding transducer control system for extruder and kiln blower.
   ② Adding control system of non- power compensation for extruder.

Ⅱ Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	A new annular kiln	26 chambers	1
2☼	High speed fine roller mill	LP10 X8	1
3	High speed coal crusher	500	1
4	De-airing extruder	JZK450	1
5	Transducer control system for extruder and kiln blower	ACS400 series	2
6	Control system of non-power compensation for extruder	WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 1092.00 t standard coals can be saved and CO_2 emission has reduced by 2722.37 t yearly.

Chatian Brick Plant, Maquan Town, Qindu District

Representative 郭永锋

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Dongjiao Construction Materials Co.,Weicheng District

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Dongjiao Construction Materials Co.,Weicheng District, Shaanxi Province according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1 Proposing the repairing plans for the annular kiln;

① Building residual heat utilization system.

② Spreading annular kiln with fire-resistance and heat-insulating spraying materials to reduce air-leakage and heat loss of the kiln.

2. Constructing a new manpower-setting dryer. Its main technical requirement is as following:

The new manpower-setting dryer has 600 square meters with length 40m, width 15mm. There are 10 rooms in the new dryer. The characteristics of the new annular kiln are as following:

① The new dryer with 40mm thick roof (floorboard), 24mm thick brick wall, the whole ground of dryer can emit heat.

② There is a channel of hot wind from annular kiln to dryer, which dimension is 1.5cm high and 0.8cm wide.

3. Installation drawing for high-speed fine roller mill.

4. Installation drawing for high-speed coal crusher.

5. Installation drawing for exhaust blower of the kiln.

6. Proposing renovation plan of electric engineering: installing transducer control system for exhaust blower of kiln.

Ⅱ Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition

(The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	Repairing annular kiln	24 chambers	1
2	Constructing a new dryer	Circle pattern	1
3	High speed fine roller mill	GD70X50	1
4☼	High speed coal crusher	500	1
5☼	Heat suction blower	Y_4-73-12N_O.9D	1
6	Transducer for exhaust blower	ACS400 series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 772.39 t standard coals can be saved and CO_2 emission has reduced by 1925.57 t yearly.

Dongjiao Construction Materials Co.,Weicheng District

Representative

Date 2006. 5. 30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006. 7. 7

Pingling Jingwei Brick Plant, Qindu District

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Pingling Jingwei Brick Plant, Qindu District according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

I Completing the following designs

1. Proposing the reconstruction plan for annular kiln.
   ① Demolishing the original kiln roof and sidewall of the kiln;
   ② Tamping backfilling clay on the roof again;
   ③ Reconstructing kiln roof and sidewall of the kiln.
2. Installation drawing for double stage de-airing extruder.
3. Installation drawing for kiln blower.
4. Proposing renovation plan for electrical engineering.
   ① Adding transducer control system for extruder and kiln blower;
   ② Adding control system of non-power compensation for extruder
   Adding electric power compensators for 8 equipments, such as box feeder, coal crusher, coal feeder, roller mill, double-shaft mixer, double-stage de-airing extruder, vertical brick column cutter and brick cutter.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	Repairing the annular kiln	34 chambers	1
2	Extruder	450	1
3☼	Numerical control automatic brick	ZQT300X200 ZQP24	1

	column cutter and brick cutter		
4☼	Inherent fuel feeder	600X3000	1
5	Energy-saving blower	ZFJ-8	2
6☼	Transducer control system for extruder and kiln blower	ACS400 series	2
7☼	Control system of non-power compensation for extruder	WMJ series	1
8	Installing capacitors for 8 equipments, such as box feeder etc.	WMJ series	8

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 744.26 t standard coals can be saved and CO_2 emission has reduced by 1855.44 t yearly.

Pingling Jingwei Brick Plant, Qindu District

Representative

Date 2006. 5. 30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006. 7. 7

Jianqiang Brick Plant, Qindu District

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Jianqiang Brick Plant, Qindu District according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Working drawing for a new 26-chamber annular kiln. The main technical parameters of the new annular kiln are as following:
   ① Fired product type: Clay perforated brick, Clay hollow brick;
   ② Arch type: Semi-circular arch;
   ③ Dimension of firing chamber (width×height): 4.1m×2.7m;
   ④ Number of kiln chamber: 26;
   ⑤ Daily output: 150,000 bricks (one fire flame);
   ⑥ Proportion of inherent fuel: 90%;
   ⑦ Exhausting smoke capacity: 46,000m^3/h.
2. Installation drawing for hammer crusher.
3. Working out renovation plan for electrical engineering, installing electric power compensators for 4 equipments such as extruder, hammer crusher, brick column cutter and green brick cutter..

Ⅱ Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	Newly Constructing annular kiln	26 chambers	1
2☼	Hammer mill	250	1
3☼	Vertical brick column cutter	QT24	1

4☼	Inherent fuel feeder	ZJ100	1
5	Coattail slide-rail cutter	QP1.9	1
6	Capacitance compensator	WMJ series	4

Ⅲ Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 947.26 t standard coals can be saved and CO_2 emission has reduced by 2361.53 t yearly.

Jianqiang Brick Plant, Qindu District

Representative 刘建郎

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Lingzhao New Building Material Co., Xi'an

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Lingzhao New Building Material Co., Xi'an according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

I Completing the following designs:

1. Standardizing process flow chart.

   Adding the processes of weathering and ageing for raw materials;

2. Proposing repairing plan for the original annular kiln.

   ① Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage;

   ② Replacing air dampers and the covers of fire holes of the kiln.

3. Installation drawing for high-speed fine crushing roller mill.

4. Proposing renovation plan for mouth, core bridge and mouth throat of the extruder.

   ① Renovation plan for extruder mouth

   • increasing the length of the extruder mouth

   In accordance with the characteristics of raw materials, the length of the extruder mouth is increased from 170mm to 220mm, which can improve the density of the green brick and eliminate concentric circles cracks in the green brick.

   • enlarging the cone angle of the extruder mouth.

According to the characteristics of raw materials, enlarging the cone angle of the extruder mouth from 2° to 4° , which can increase the density of the green brick.

   ② Renovation plan for core bridge

   • enlarging the length between the end of big knife and the foreside of mouth from 200mm to 250mm in accordance with the characteristics of raw materials.

   • putting the two supports of core bridge into mouth throat of the extruder and embedding them in the wall of mouth in the two sides.

   ③ Renovation plan for mouth throat

   Enlarging the length of mouth throat from 100mm to 200mm;

5. Proposing renovation plan for electrical engineering.

① Adding transducer control system for extruder and kiln blower.

② Adding control system of non- power compensation for extruder.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1☼	Demolishing the original kiln roof and reconstructing a new kiln roof	34 chambers	1
2	Replacing kiln air damps and the covers of fire holes	Made by the plant	34
3	High speed fine roller mill	φ800 X 500	2
4☼	Inherent fuel feeder	450	1
5	Vertical brick column cutter and vertical brick cutter	GD60X4	1
6☼	Conveyor	B500	1
7	Mouth, core bridge and mouth throat	Matching with extruder type 450	1
8	Transducer control system for extruder and kiln blower	ACS400 series	2
9	Control system of non-power compensation for extruder	WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 1022.73 t standard coals can be saved and CO_2 emission has reduced by 2549.66 t yearly.

Lingzhao New Building Material Co., Xi'an

Representative _____

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative _____

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative _____

Date 2006.7.7

Weihe Jigang Building Materials Co.

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Weihe Jigang Building Materials Co. according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs:

1. Standardizing process flow chart;

   Adding some clay treatment processes such as weathering, ageing.

2. Designing for a new annular kiln with 32 chambers

   ① General plan of process;

   ② Working drawing for 32-chamber annular kiln. The main technical parameters of the new annular kiln are as following:

   - Fired product type: Clay perforated brick, Clay hollow brick;
   - Arch type: semi-circular arch;
   - Dimension of firing chamber (width×height): 4.1m×2.7m;
   - Number of kiln chamber: 32;
   - Daily output: 150,000 bricks (one fire flame);
   - Proportion of inherent fuel: 90%;
   - Exhausting smoke capacity: 46,000m^3/h;

3. Installation drawing for added equipments:

   ①Installation drawing for Type ZJK45/40-20 double stage de-airing extruder;

   ②Installation drawing for Type GD800×4000 box feeder;

   ③Installation drawing for Type 4800×600 high-speed roller mill;

   ④Installation drawing for Type SJY301 double-shaft mixer.

4. Proposing repairing plan for the original annular kiln.

   ① Reconstructing kiln with treatment of preventing air leakage;

② Replacing air dampers;

③ Adding transducer control system and non-power compensator for kiln blower.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 *List of equipment purchased, installed, renovated and commissioning*

No.	Name of equipment	Type	Quantity
1	A new annular kiln	32 chambers	1
2	Reconstructing the annular kiln	28 chambers	1
3	*Two stage de-airing extruder*	*JZK45/40-20*	1
4	Box feeder	GD800X4000	1
5☼	High speed fine roller mill	4800X600	1
6	Double-shaft mixer	SJY301	1
7	Belt conveyor	B500	1
8	Brick column cutter and vertical brick cutter	T107	1
9	Transducer control system	ACS400 series	1
10	Electric power compensators	WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 2330.80 t standard coals can be saved and CO_2 emission has reduced by 5810.68 t yearly.

Weihe Jigang Building Materials Co.

Representative 张纲

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative 王华

Date 2006·5·31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Chang'an Zhoudu Wall Materials Co.Ltd.

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Chang'an Zhoudu Wall Materials Co.Ltd. according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

I Completing the following designs

1. Standardization of process flow chart.

Adding some clay treatment processes such as weathering and ageing.

2. Proposing repairing plan for the original annular kiln with 34 chambers.

① Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage;

② Replacing kiln air dampers and the covers of fire holes;

3. Installation drawing for high-speed fine crushing roller mill.

4. Proposing renovation plan for mouth, core bridge and mouth throat of the extruder.

① Renovation plan for extruder mouth

Increasing the length of the extruder mouth from 170mm to 220mm and Enlarging the cone angle of the extruder mouth from 2° to 4°

② Renovation plan for core bridge

Enlarging the length between the end of big knife and the foreside of mouth from 200mm to 250mm, and Putting the two supports of core bridge into mouth throat of the extruder and embedding them in the wall of mouth.

③ Renovation plan for mouth throat

Enlarging the length of mouth throat from 100mm to 200mm;

5. Proposing renovation plan for electrical engineering;

① Adding transducer control system for extruder and kiln blower.

② Adding control system of non- power compensation for extruder.

II **Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition** (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment		Type	Quantity
1☼	Reconstructing the annular kiln	Demolishing kiln roof and reconstructing kiln roof	34 chambers,	1
2		Replacing kiln air dampers and the covers of fire holes		74, 1000
3	High speed fine roller mill		600 X 600	1
4	Inherent fuel feeder		600 X 630	1
5	Vertical brick column cutter and brick cutter		QT20	1
6	Conveyor		B500	1
7	Mouth, core bridge and mouth throat		Matching with extruder type 450	1
8	Transducer control system for Extruder and kiln blower		ACS400 series	2
9	Control system of non-power compensation		WMJ series	1

III **Developing a lot of technology and management training for the relative post**

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 1005.40 t standard coals can be saved and CO_2 emission has reduced by 2506.46 t yearly.

Chang'an Zhoudu Wall Materials Co.Ltd.

Representative 蒋22欽

Date 2006.5.26

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative 王[illegible]

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative [illegible]

Date 2006.7.7

Chang'an District Xidu Building Materials Co.Ltd.

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Chang'an District Xidu Building Materials Co.Ltd. according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

I Completing the following designs

1. Installation drawing for high-speed fine roller mill.
2. Installation drawing for strengthening- mixing extruder
3. Proposing renovation plan for mouth, core bridge and mouth throat of the extruder

   ① Renovation plan for extruder mouth

   Increasing the length of the extruder mouth from 170mm to 220mm and Enlarging the cone angle of the extruder mouth from 2° to 4°

   ② Renovation plan for core bridge

   Enlarging the length between the end of big knife and the foreside of mouth from 200mm to 250mm, and Putting the two supports of core bridge into mouth throat of the extruder and embedding them in the wall of mouth.

   ③ Renovation plan for mouth throat

   Enlarging the length of mouth throat from 100mm to 200mm;
4. Proposing repairing plan for the original annular kiln

   ① Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage;

   ② Replacing kiln air dampers and the covers of fire holes;
5. Proposing renovation plan for electrical engineering: Adding transducer control system for kiln blower.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment		Type	Quantity
1☼	Repairing the drying yard and reconstructing annular kiln	Demolishing kiln roof and reconstructing kiln roof	44	
2		Replacing kiln air dampers and the covers of fire holes		44 600
3		Repairing drainage system in the yard	35000m^2	
4☼	Inherent fuel feeder		ZJ100	1
5	Strengthening mixing extruder		SJJ300X35	2
6	High-speed fine crushing roller mill		800 X 600	1
7	Conveyor		B500	1
8	Mouth, core bridge and mouth throat		Matching with extruder type 450	1
9	Vertical brick column cutter and a vertical brick cutter		DT24	1
10	Coal and slag crusher		600 X 630	1
11	Transducer control system for kiln blower		ACS400 series	1
12☼	Control system of non-power compensation for extruder		WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 866.80 t standard coals can be saved and CO_2 emission has reduced by 2160.93 t yearly.

Chang'an District Xidu Building Materials Co.Ltd.

Representative

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative

Date 2006.7.7

Luxing Xinzhuang Brick Plant

Acceptance Certificate

Xi'an Kaisheng Building Materials Engineering Co. Ltd. has completed her mission in the project of UNDP/GEF Energy Conservation and GHG Emissions Reduction in Chinese TVEs—Phase II—Brick Sector Replication Projects for Energy Efficiency (2) —Technology Renovation for Luxing Xinzhuang Brick Plant according to the technical renovation schedule proposed in the *feasibility study reports*. The plant has reached to a destination for technology renovation.

Ⅰ Completing the following designs

1. Standardizing process flow chart

   Adding weathering, ageing process for raw materials;

2. Proposing repairing plan for the original annular kiln with 34 chambers

   ① Demolishing the original kiln roof and reconstructing kiln roof with treatment of preventing air leakage;

   ② Replacing air dampers and the covers of fire holes of the kiln.

3. Installation drawing for high-speed fine crushing roller mill

4. Proposing renovation plan for mouth, core bridge and mouth throat of the extruder

   ①Renovation plan for extruder mouth

   Increasing the length of the extruder mouth from 170mm to 220mm and Enlarging the cone angle of the extruder mouth from 2° to 4°

   ② Renovation plan for core bridge

   Enlarging the length between the end of big knife and the foreside of mouth from 200mm to 250mm, and Putting the two supports of core bridge into mouth throat of the extruder and embedding them in the wall of mouth.

   ③ Renovation plan for mouth throat

   Enlarging the length of mouth throat from 100mm to 200mm;

5. Proposing renovation plan for electrical engineering

   ① Adding transducer control system for extruder and kiln blower.

   ② Adding control system of non- power compensation for extruder.

II Completing purchasing, renovation, installing and running testing of the equipment listed in the table 1. At present, all equipment is in running condition (The mark "☼" in the table denotes an item invested by UNIDO fund).

Table 1 List of equipment purchased, installed, renovated and commissioning

No.	Name of equipment	Type	Quantity
1	Reconstructing annular kiln	34 chambers	1
2☼	Inherent fuel feeder	ZJ100	1
3☼	Conveyor	B500	1
4☼	Vertical brick column cutter and brick cutter	QT20	1
5	High speed roller mill	600X 600	1
6	Mouth, core bridge and mouth throat	Matching with extruder type 450	1
7	Transducer control system for extruder and kiln blower	ACS400 series	2
8	Control system of non-power compensation for extruder	WMJ series	1

III Developing a lot of technology and management training for the relative post

In the process of the project, Xi'an Kaisheng has carried out the technical training and business management training to the employees related. According to the situation of the plant, they have helped us set up an appropriate management system and provided good technical consultation and technical service.

After technical renovation of the production line by Xi'an Kaisheng and test running for 3 months, desired effect of the project has attained: 970.30 t standard coals can be saved and CO_2 emission has reduced by 2418.97 t yearly.

Luxing Xinzhuang Brick Plant

Representative _____

Date 2006.5.30

Xi'an Kaisheng Building Materials Engineering Co. Ltd.

Representative _____

Date 2006.5.31

The Project Management Office (PMO) of the Ministry of Agriculture of China

Representative _____

Date 2006.7.