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Energy Conservation and GHG Emissions Reduction in Chinese TVEs  
Phase II - Design of Waste Heat Power Plant  
for Taiyuan Gangyuan Coke Company

Project No.: EG/CPR/99/G31  
Contact No.: 04/136

## Final Report

for

**Design of Waste Heat Power Plant for Taiyuan  
Gangyuan Coke Company**

Submitted By:

Baoding Huadian Electric Power Design & Research Institute Co.,Ltd

Design Certificates:031022-sy



August 29, 2006

**Abstract:**

The Waste Heat Power Plant Project of Taiyuan Gangyuan Coke Company is supported by the UNIDO project and designed by the contractor, BaoDing HuaDian Electric Power Design & Research Institute Co.,Ltd. The contract tasks were conducted in three phases, including feasibility study; preliminary design; layout and drawings design, and have been accomplished successfully. The whole design progress and productions in compliances with the TOR are generalized and stated in this report.

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## **1. PROJECT INTRODUCTION**

The Waste Heat Power Plant Project of Taiyuan Gangyuan Coke Company is subsidized by the UNDP. According to the Design contract signed between the Taiyuan Gangyuan Coke Company and BaoDing HuaDian Electric Power Design & Research Institute Co. Ltd, we designed the project in compliances with the TOR.

In this project, the high temperature flue gas exhausted by the 2×40Bore QRD-50 CLEAN COMPACTION HEAT RECOVERY COKE OVEN is utilized as the heat source to produce steam and electric power. According to the discharge quantity, 4 sets of medium pressure and medium temperature waste heat boilers fitted by 3X6MW condensing steam turbine power sets can be set up.

The total investment of the project is 61,850,000yuan, the payback is 4.14years, and the FIRR is 34.67%. The project has a stronger anti-risk capability; it is feasible in technique and economy.

## **2. PROJECT PROGRESS**

We have finished the whole design work including Feasibility Study, Preliminary design, Layout and Drawings Design. All the Design documents (the layout and drawings) have been submitted to the beneficiary and the UNIDO office according to the contract.

## **3. TOR PROGRESS**

We have finished the following work since we undertook this project:

**3.1 Feasibility study** (the products of this period had been submitted to the beneficiary in Dec. 2004)

### **a) Site survey**

From Oct, 30 to Nov, 3, the project team made site survey at the construction site and collected the necessary documents, which includes: The ingredients and the thermal data of the gas, general layout of the plant, weather data, hydrology data, and preliminary analysis report of the water quality, electrical connection system and earthquake

documents.

b) Compile the feasibility study report

From Nov., 4 to Nov., 26, we compiled the feasibility study report and relevant drawings.

c) Brief and Submit

On 30<sup>th</sup>, Nov., 2004, we went to BeiJing to debrief the first period of the TOR to Mrs., Wang Guiling, the Deputy Director of the UNDP/GEF Energy Conservation and Greenhouse Gas Emission Reduction in Chinese township & Village Enterprise. In the meantime, we submitted Two copies of the report (in Chinese) and two abstracts of report (in English) to Mrs., Wang Guiling .

d) With the summary report, we sent together two copies of the main equipment lists of the project mentioned above to you.

e) Main conclusions of the feasibility study

According to the quantity and calorific value of the high temperature flue gas, the project includes 4 sets of medium pressure and temperature 4×25t/h waste heat boilers fitted with 3X6MW condensing steam turbine power sets; the total investment of the project is RMB61, 850,000 yuan, the payback is 4.14years, the FIRR is 34.67%. The project has a stronger anti-risk capability, it is feasible in technique and economy; main technical and economical indicator.

**3.2 Preliminary design** (the products of this period had been submitted to the beneficiary in January, 2005)

3.2.1. Main working process

Four main process are as follow: plan and arrangement the task by the project manager; particular task of preliminary design by technicians; examine and approve the design by the quality supervisor and the chief engineer of the company; print the revised and perfected drawings at last.

3.2.2. Main production

During this period, the following layout and drawings has been finished:

- a) General layout of the plant
- b) Overall thermal system
- c) Air and gas system
- d) The main workshop construction structure
- e) Fire fighting system
- f) Heat supplying system
- g) Electric connection system
- h) Broken current calculation and equipment adjustment list
- i) Layout of the control center
- j) Layout of the power supply room
- k) Layout of the instrument and control room
- l) Thermal control system
- m) Chemically treated water system
- n) The layout of the chemically treated water workshop
- o) Layout of the plant pipeline

The specification of the preliminary design has been finished with the drawings above.

The budgetary estimate for investment of the power plant has also been finished.

The detailed equipment lists of each specialty were finished and sent to the beneficiary.

### 3.2.3. Brief and Submit

On 30<sup>th</sup>, Dec., 2004, we went to BeiJing to meet Ms. Wang Guiling, the Deputy Director of the UNDP/GEF Energy Conservation and Greenhouse Gas Emission Reduction in Chinese township & Village Enterprise. In the meantime, we submitted two copies of the preliminary design (in Chinese) and two copies of the summary of the second period of work for the Waste Heat Power Plant Project of Taiyuan Gangyuan Coke Company (in English) to Ms. Wang Guiling. On 4<sup>th</sup> Jan. 2005, we submitted two copies of the preliminary design (in Chinese) to Taiyuan Gangyuan Coke Company.

### 3.3 Engineering design (the products of this period had been submitted to the beneficiary in February, 2005)

The main outputs during this period include engineering drawings, an equipment list and relevant illuminations related to the following items:

- a) Turbine and boiler
- b) Electrical engineering
- c) Civil engineering
- d) Thermal control engineering
- e) Water cycling engineering
- f) Chemical water
- g) Ash disposal
- h) Heating and ventilation
- i) Engineering economy

### **3.4 Review and evaluate**

Leaders and experts from the Taiyuan Gangyuan Coke Company have been invited to examine the work as mentioned above. Necessary adjustments and amendments have been made accordingly.

### **3.5 Design approval**

The feasibility study report and the initial design have been reviewed and approved by the Trade and Economic Commission of Shanxi Province, the local governmental authority in charge.

## **4. Site service after submission of the design**

### **4.1 Explain the working drawings to the beneficiary**

We have sent our technicians of varied specialties to the site and explain the working drawings to them. Some simple modifications have been made after the explanations.

### **4.2 Delay of the project implementation and adjustment of the design**

After the design documents submission on the date of 21<sup>st</sup> July 2005, because of market weak for the Chinese coke business, the project had to be paused by the Taiyuan Gangyuan Coke Company for the shortage of money. With the market becoming resuscitative in this first half year, the Company decided to restart the construction but with some principal design change that the coke company requests to change the type of the boiler and also the generator which means the main principal of the design alternative has to be modified. After two months of discussing of discussing between the design institute and the Coke Company, the design change request was cancelled, now the latter begins the project construction.



## 5. Submission list

According to the contract, we have submitted the following outputs and reports.

ITEM	UNIDO HQs	The Company	PMO/CTA
Feasibility Study	Summary (English, 2 copies)	Full Study (Chinese, 2 copies)	Full study (Chinese, 3 copies) Summary (English, 3 copies)
	Time of delivery: Dec. 2004		
List of Equipments	English, 2 copies	Chinese, 2 copies	Chinese, 3 copies English, 3 copies
	Time of delivery: February, 2005		
Layout and drawings & Progress report	Progress Report (English, 2 copies)	Full set of layout and drawings (Chinese, 2 copies)	Progress Report (Chinese, 3 copies) (English, 3 copies)
	Time of delivery: February, 2005		
Draft final report & revised layout and drawings	Draft final Report (English, 2 copies)	Revised layout and drawings (Chinese, 2copies) Draft final Report (Chinese, 1 copy)	Draft final Report (Chinese, 3 copies) (English, 3 copies)
	Time of delivery: July,2005		

## 6 Attachment to the final report

6.1 *Feasibility Study* (submitted to the beneficiary in December. 2004)

6.2 *Preliminary Design* (submitted to the beneficiary in January, 2005)

6.3 *List of main Equipments and materials* (submitted to the beneficiary in January, 2005)

The copy of the documents mentioned above has been attached in the final draft report.

## 7 Letter of Acceptance from the beneficiary

Attached at the end of the report

## **Letter of Acceptance**

**SUBJECT: EG/CPR/99/G31 – Energy Conservation and GHG Emissions Reduction in Chinese TVEs – Phase II –Design of Waste Heat Power Plant for Taiyuan Gangyuan Coke Company – Contact No.04/136**

**Subcontract: Design of Waste Heat Power Plant for Taiyuan Gangyuan Coke Company**

**Designed by: BaoDing HuaDian Electric Power Design & Research Institute Co. Ltd.**

**Receiving unit: Taiyuan Gangyuan Coke Company**

**Construction Site: Qingxu county, Shanxi province, P.R.CHINA**

**Date of completion: 2005-8-9**

**List of acceptance: see next page**

# List of Acceptance

## 接收清单

SUBJECT: EG/CPR/99/G31 – Energy Conservation and GHG Emissions Reduction in Chinese TVEs – Phase II –Design of Waste Heat Power Plant for Taiyuan Gangyuan Coke Company – Contact No.04/136

项目名称: EG/CPR/99/G31 –中国乡镇企业节能与温室气体减排示范项目—第二阶段—太原港源焦化有限公司余热电站设计—合同号: No.04/136

We confirm we have accepted the following work and service supplied by BaoDing HuaDian Electric Power Design & Research Institute Co., Ltd.

我公司确认收到保定华电电力设计研究院有限公司的如下工作和服务:

**1 The Feasibility Study Report, 2 copies**

可行性研究报告 2 份

**2 Specification of the preliminary design, 2 copies**

初步设计 2 份

**3 Main Equipment list, 2 copies**

主要设备清单 2 份

**4 Constructional drawing, 3copies**

施工图 3 份

**5 Draft final report, 2copies**

终草报告 2 份

**6 Explain the working drawings to the construction unit**

施工图交底

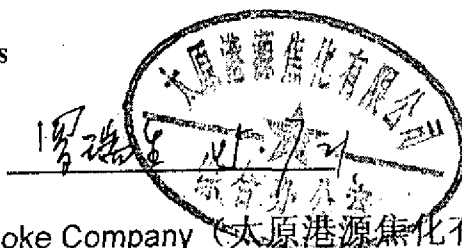
**7 On-site services and return visit**

现场服务和回访

**8 Final reports 2copies**

最终报告 2 份

Signature (签名)



太原港源焦化有限公司  
设计部  
张瑞生

Taiyuan Gangyuan Coke Company (太原港源焦化有限公司)

2005-7-21

NOTE: Both the English version and the Chinese version are of the same content.

备注:本清单中英文内容一致。

# List of Acceptance

## 接收清单

SUBJECT: EG/CPR/99/G31 – Energy Conservation and GHG Emissions Reduction in Chinese TVEs – Phase II –Design of Waste Heat Power Plant for Taiyuan Gangyuan Coke Company – Contact No.04/136

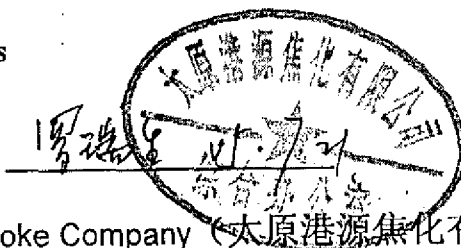
项目名称: EG/CPR/99/G31 –中国乡镇企业节能与温室气体减排示范项目—第二阶段—太原港源焦化有限公司余热电站设计—合同号: No.04/136

We confirm we have accepted the following work and service supplied by BaoDing HuaDian Electric Power Design & Research Institute Co., Ltd.

我公司确认收到保定华电电力设计研究院有限公司的如下工作和服务:

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- 4 Constructional drawing, 3copies  
施工图 3 份
- 5 Draft final report, 2copies  
终草报告 2 份
- 6 Explain the working drawings to the construction unit  
施工图交底
- 7 On-site services and return visit  
现场服务和回访
- 8 Final reports 2copies  
最终报告 2 份

Signature (签名)

A circular stamp of Taiyuan Gangyuan Coke Company is overlaid on the signature. The stamp contains the company name in Chinese characters and English, along with a date '2005-7-21' and a signature.

Taiyuan Gangyuan Coke Company (太原港源焦化有限公司)

2005-7-21

NOTE: Both the English version and the Chinese version are of the same content.

备注:本清单中英文内容一致。

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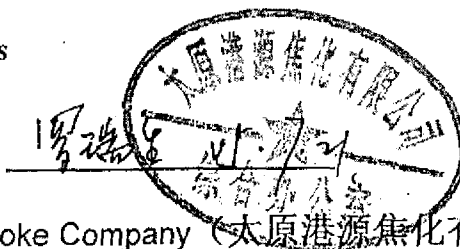
**7 On-site services and return visit**

现场服务和回访

**8 Final reports 2copies**

最终报告 2 份

Signature (签名)



太原港源焦化有限公司  
综合办公室

Taiyuan Gangyuan Coke Company (太原港源焦化有限公司)

2005-7-21

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