VALIDATION REPORT

WASTE HEAT RECOVERY FOR POWER GENERATION PROJECT IN SGIS SONGSHAN CO., LTD. IN CHINA

REPORT NO. 2010-9118

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VALIDATION REPORT

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Summary:

Project Name: Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd.
Country: China
Methodology: ACM0012 **Version:** 3.2
GHG reducing Measure/Technology: waste heat for power generation
ER estimate: 99 880 tCO_2e per year (average)
Size
☒ Large Scale ☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested ☐ Clarifications Requested
☒ Full Approval and submission for registration ☐ Rejected

In summary, it is DNV's opinion that the project activity "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." in China, as described in the PDD, version 4.1 of 14 December 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0012, version 3.2. DNV thus requests the registration of the project as a CDM project activity.

Report No.: 2010-9118	Subject Group: Environment
Report title: Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. in China	
Work carried out by: Wang Ning, Deng Cuiping, Zhang Xiaojun, Zhang Yongkang, Seshan Ranganathan, Yang Xiaoshan	
Work verified by: Ole A. Flagstad, Luis Filipe Tavares	

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined Margin
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
DRC	Development and Reform Committee
EB	Executive Board
EIA	Environmental Impact Assessment
EPB	Environmental Protection Bureau
FSR	Feasibility Study Report
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of Approval
MP	Monitoring Plan
NDRC	National Development and Reform Committee
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
SCE	Standard coal equivalent
SCPG	South China Power Grid
SERC	State Electricity Regulatory Commission
UNFCCC	United Nation Framework Convention on Climate Change

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is China and the Annex I Party is Denmark. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA of China has confirmed that the project assists in achieving sustainable development. The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards China.

The project correctly applies the approved baseline and monitoring methodology ACM0012 version 3.2: Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects.

By utilizing waste heat for electricity generation, the project will displace fossil fuel based grid electricity and will result in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 99 880 tCO_2e per year over the fixed crediting period of ten years. The emission reduction forecast has been checked, and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." in China as described in the PDD version 4.1 of 14 December 2011 meet all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0012, Version 3.2. DNV thus requests the registration of the "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." as a CDM project activity.

Beijing and Oslo, 2011-12-22

Yang Xiaoshan
CDM Validator
DNV Beijing, China

Ole A. Flagstad
Approver
DNV Climate Change Services AS

2 INTRODUCTION

Danish Energy Agency has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." project in China (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0012 version 3.2 /37/. The validation was based on the recommendations in the Validation and Verification Manual /36/.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

/1/ Beijing Tianqing Power International CDM Consulting, Co., Ltd.: CDM-PDD for project activity "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." in China, version 2 dated 1 April 2010, version 3.2 dated 1 August 2011 and version 4.1 dated 14 December 2011.

/2/ Beijing Tianqing Power International CDM Consulting, Co., Ltd.: IRR calculation spreadsheet version 1 dated 14 December 2011.

/3/ Beijing Tianqing Power International CDM Consulting, Co., Ltd.: Emission Factor calculation spreadsheet version 1 dated 14 December 2011.

/4/ Zhongye Changtian International Engineering Co., Ltd.: The FSR of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd., in September 2008.

Guangdong Economic and Trade committee: The FSR Approval of the project, dated 8 January 2009.

/5/ Shaoguan Environmental Science and Technology Institute: The EIA of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. in SGIS Songshan Co., Ltd., dated 5 February 2009.

Shaoguan Environmental Protection Agency: The EIA Approval of the project dated 10 February 2009.

/6/ SGIS Songshan Co., Ltd.: Power Generation Report in 2009 issued in January 2010.

/7/ Guangdong Provincial Price Bureau: Tariff notification of Shaoguan City, dated 1 July 2008.

http://www.gdpi.gov.cn/dfjg/85597.htm

/8/ SGIS Songshan Co., Ltd.: Board meeting minute of CDM consideration of Guangdong Shaoguan Iron & Steel Group Co., Ltd. Shaogangjigai [2009] No.69, dated 1 March 2009.

/9/ SGIS Songshan Co., Ltd.: The notification of intention to seek CDM status to NDRC, dated 29 July 2009.

/10/ SGIS Songshan Co., Ltd.: The notification of intention to seek CDM status to UNFCCC, dated 26 October 2009.

/11/ SGIS Songshan Co., Ltd. and Danish Energy Agency: ERPA, dated 18 December 2009.

/12/ SGIS Songshan Co., Ltd. and Zhejiang Xizi United Engineering Co., Ltd.: The Engineering Procurement Contract (EPC) and Technical Annex of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. dated 29 January 2010.

/13/ SGIS Songshan Co., Ltd.: Energy balance of SGIS Songshan Co., Ltd. in 2009.

/14/ SGIS Songshan Co., Ltd.: Completion acceptance report of No. 5 sintering machine indicates that the project was completed on 31 May 2005.

/15/ SGIS Songshan Co., Ltd.: Engineering procurement and construction of No.6 sintering machine indicates that the project completion date of No. 6 sintering machine is 7 July 2008.

/16/ SGIS Songshan Co., Ltd.: Completion acceptance report of No. 6 and No.7 TRT plant indicates that the project was completed on 16 March 2007.

/17/ SGIS Songshan Co., Ltd.: Completion acceptance report of No. 8 TRT plant indicates that the project was completed on 25 October 2009.

/18/ SGIS Songshan Co., Ltd.: Completion acceptance report of coal dry quenching (CDQ) 4.3m power and heat plant indicates that the project was completed on 20 June 2009.

/19/ SGIS Songshan Co., Ltd.: Completion acceptance report of coal dry quenching (CDQ) 6m power and heat plant indicates that the project was completed on 31 October 2008.

/20/ SGIS Songshan Co., Ltd.: Completion acceptance report of 50 MW cogeneration plant indicates that the project was completed on 30 November 2001.

/21/ SGIS Songshan Co., Ltd.: Completion acceptance report of 120 MW cogeneration plant indicates that the project was completed on 4 January 2006.

/22/ Zhongye Jiaonai Engineering Technique Co., Ltd.: Feasibility study report of coal dry quenching (CDQ) 4.3 m power and heat plant indicates that the operation life time of the project is 20 years, issued in December 2007.

/23/ Zhongye Jiaonai Engineering Technique Co., Ltd.: Feasibility study report of coal dry quenching (CDQ) 6 m power and heat plant indicates that the operation life time of the project is 20 years, issued in December 2007.

/24/ Guangdong Metallurgy Construction Design Institute: Feasibility study report of 50 MW cogeneration plant indicates that the operation life time of the project is 30 years, issued in April 1996.

/25/ Guangdong Power Design Institute: Feasibility study report of 120 MW cogeneration plant indicates that the operation life time of the project is 30 years, issued in July 2003.

/26/ Guangdong SGIS Design Institute: Feasibility study report of No. 6 and No.7 TRT plants indicates that the operation life time of the project is 15 years, issued in February 2004.

/27/ Maanshan Steel&Iron Design Institute: Feasibility study report of No. 8 TRT plant indicates that the operation life time of the project is 15 years, issued in June 2004.

/28/ SGIS Songshan Co., Ltd.: Annual electricity consumptions report of year 2009, issued in January 2010.

/29/ SGIS Songshan Co., Ltd.: Equipment arrangement of SGIS Songshan Co., Ltd. and whole-plant technical design process flow chart.

/30/ Zhongye Changtian International Engineering Co., Ltd.: The calculation process explanation of installed capacity of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd., dated 6 December 2011.

/31/ Zhongye Changtian International Engineering Co., Ltd.: The Preliminary Design Report (PDR) of No.5 and No.6 sintering machines project of SGIS Songshan Co., Ltd., issued in September 2003 and January 2007 respectively.

/32/ Zhongye Changtian International Engineering Co., Ltd.: The explanation of annual operation hour for the Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd., dated 6 December 2011.

/33/ SGIS Songshan Co., Ltd.: Employee month payroll in November 2011 of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd., issued in November 2011.

3.1.2 Letters of approval

/34/ National Development and Reform Commission (DNA of China): *Letter of approval* for Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. dated 21 May 2010.

http://qhs.ndrc.gov.cn/qjfzjz/t20100518_347537.htm

/35/ Ministry of Climate and Energy (DNA of Denmark: *Letter of approval* dated 24 August 2010.

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

/36/ CDM Executive Board: Validation and Verification Manual. Version 1.2 dated 30 July 2010.

/37/ CDM Executive Board: ACM0012 version 3.2 "Consolidated Baseline Methodology for GHG Emission Reductions from Waste Energy Recovery Projects".

/38/ CDM Executive Board: Answer to DNV's request for deviation of Chinese project activities from AM0005, received on 1 December 2005. To be found on http://cdm.unfccc.int/Projects/Deviations

/39/ CDM Executive Board: Tool for the demonstration and assessment of additionality, version 05.2 of 16 May 2008.

/40/ CDM Executive Board: the Guidelines on the Assessment of Investment Analysis version 5 of EB 62 Annex 5 dated 15 July 2011.

/41/ CDM Executive Board: Tool to calculate the emission factor for an electricity system version 2.2.0 dated 3 June 2011.

/42/ Kyoto protocol ratification: http://unfccc.int/parties_and_observers/parties/items/2352.php

/43/ CDM Executive Board: Guidance for the reporting and validation of plant load factors (version 01), EB 48 Annex 11 dated 17 July 2009.

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

/44/ Shaoguan Daily: Notification of stakeholder to CDM of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd., dated 5 March 2010.

/45/ 35 copies of stakeholder investigation questionnaires on 10 March 2010.

/46/ Registration Form of stakeholder consultation meeting on 10 March 2010.

/47/ The Economic Assessment method and Parameters for Construction Project", version 3, published by NDRC and the Ministry of Construction of China in 2006.

/48/ NDRC: The emission factor calculation for each power grid of China, dated 2 July 2009. NDRC official website:
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2413.pdf

/49/ China's Regional Grid Baseline Emission Factor Calculation (OM) issued by NDRC dated 2 July 2009.
NDRC official website:
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2331.xls

/50/ China's Regional Grid Baseline Emission Factor Calculation (BM) issued by NDRC dated 2 July 2009.
NDRC official website:
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2332.doc

/51/ China Electric Power Yearbook 2004 to 2008.

/52/ China Energy Statistical Yearbook 2006 to 2008.

/53/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

/54/ China Steel Yearbook 2001-2007, which is the only official and authoritative public source regarding Iron and Steel industry in China.

/55/ Producer Price Index (PPI) of industrial products increased recently.
http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm

/56/ VAT:
State Council: Provisional Regulations of the People's Republic of China on Value Added Tax, State Council No.134 [1993], issued on 13 December 1993 and effective on 1 January 1994.
http://www.jsgs.gov.cn/Page1/StatuteDetail.aspx?StatuteID=2439 (1 of 6)

/57/ Income tax:
Law of the People's Republic of China on Enterprise Income Tax, Promulgated by Decree No.63 of the President of the People's Republic of China on 16 March 2007, effective on 1 January 2008.

/58/ State Administration of taxation: Notification about confirming the implement time of the adjusted company's rate of residual value' Guoshuihan [2005] No. 883 dated 14 September 2005:
http://www.chinatax.gov.cn/n8136506/n8136563/n8193451/n8193526/n8194270/8245508.html

/59/ State Council: Interim Regulation of the People's Republic of China on surtax for education expenses dated on 1 October 2005.

http://www.law-lib.com/law/law_view1.asp?id=99771

/60/ State Council: Provisional Regulations of the People's Republic of China on City Maintenance and Construction Tax dated on the 8 February 1985. http://202.108.90.130/chinatax/jibenfa/jibenfa0401.htm

/61/ State Administration of taxation: Notification about confirming the implement time of the adjusted company's rate of residual value.

/62/ Ministry of Finance, Industrial entity financial policy issued on the 30 December 1992.

http://www.people.com.cn/item/flfgk/gwyfg/1992/215509199208.html

/63/ Guangdong Provincial Price Bureau: The latest tariff notification of Shaoguan City dated 20 November 2009.

http://www.gdpi.gov.cn/dfjg/85640.htm

/64/ Guangdong Price Bureau: Water price statistics in Shanguan City in 2008.

/65/ Shanghai Xiqin Gas Equipment Co., Ltd.: The price of Industry Nitrogen dated April 2010 valid till 6 June 2011.

http://b2b.hc360.com/supplyself/43147535.html

/66/ Angang Sinter Machine Waste Heat Recovery and Generation Project: The 2nd Monitoring Report of Angang Sinter Machine Waste Heat Recovery and Generation Project version 1 dated 7 January 2011.

http://cdm.unfccc.int/UserManagement/FileStorage/F0NZKUG6L5VQMTWYSIX7EPO2R9BA31

/67/ State Council: Decision on the Establishment of a Unified Enterprise Workers Basic Pension Insurance System, issued 1997.

/68/ Shaoguan City Government: Shaoguan urban basic medical insurance implementation measures, issued on 16 June 2009.

/69/ State Council: National Regulations on Unemployment Insurance No. 258. issued on 22 January 1999

/70/ Financial Department of China: The Regulation of Enterprise Staff Education and Training Funding Collect, Use and Management, issued in August 2006.

/71/ Construction Department & Financial Department and China Central Bank:The Guideline on Some Issues of the Housing Fund Management No.[2005] 5, issued on 10 Janury 2005.

/72/ Guangdong Pulaikesi Practical Gas Co., Ltd.: Nitrogen invoice issued in November 2011.

/73/ Shaoguan Xiaokeng Reservoir: Water invoice, issued in November 2011.

3.2 Follow-up interviews with project stakeholders

On 20 and 21 May 2010 DNV visited the Guangdong Shaoguan Iron & Steel Group Co., Ltd. and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/74/	20 and 21 May 2010	Zeng Wenshan	Vice General Manager	➢ Information of project construction ➢ The development of wind power project in Guangdong Province the project located ➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval) ➢ Project management ➢ Emission reduction monitoring plan ➢ Consulting process for stakeholder's comments
/75/	20 and 21 May 2010	Li Xiaofeng	Consultant	➢ Baseline determination of the project ➢ Applicability of selected methodology ACM0012 ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation ➢ Monitoring plan and project management

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd." in China is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

(b) The CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A **corrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 are repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1 Validation protocol tables

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.1 competence	TA 4.3 competence
Team leader (Validator)	Yang	Xiaoshan	China	✓		✓	✓			
Former Team leader (Validator)	Zhang	Xiaojun	China	✓		✓	✓		✓	
Former Team leader (Validator)	Deng	Cuiping	China	✓		✓				
Former Team leader (Validator)	Wang	Ning	China	✓	✓	✓				
Assessor under training	Zhang	Yongkang	China	✓		✓				
Expert	Ranganathan	Seshan	India	✓		✓				✓
Technical reviewer	Flagstad	Ole A.	Norway					✓		
Sector competence input to TR	Tavares	Luis Filipe	Brazil						✓	✓

The qualification of each individual validation team member is detailed in Appendix B to this report.

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation version 3.2 dated 14 December 2011.

4.1 Participation requirements

The project participants are SGIS Songshan Co., Ltd. of China and Danish Energy Agency of Denmark. The host Party (China) and the Annex I Party (Denmark) meet all relevant participation requirements.

A letter of approval (LoA) /34/ was issued by DNA of China on 21 May 2010, authorizing SGIS Songshan Co., Ltd. as project participant and confirming that the project assists in achieving sustainable development.

The letters of approval (LoA) /35/ from the DNA of Denmark was issued on 24 August 2010 and authorized Danish Energy Agency as project participant.

The letters of approval (LoA) were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /36/.

The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding from Annex I country towards China.

4.2 Project design

The project is located in Maba Town, Qujiang County, Shaoguan City, Guangdong Province, China. The project's exact geographical coordinates are E 113°38'08" and N 24°42'18", sourced from FSR /4/.

The project is a waste heat recovery and utilization project in Iron and Steel plant, owned by SGIS Songshan Co., Ltd. of China, in Guangdong province. The project involves a total of 25 MW waste heat power generation system on sintering plant of SGIS which has two 360 m^2 sintering machines with capacity of 2×3 700 000 t agglomerate sinter each year /4/, equipped with one set of turbine-generator unit and heat recovery boilers. According to the FSR of WHR, the annual power generation is 140 417 MWh (23.9 MW×80%×7 344 h=140 417 MWh), and annual net power supply is 126 768 MWh to SGIS Songshan Co., Ltd., with plant load factor of 64.1% (140 417 MWh/25 MW×8 760 h). Prior to implementation of the project activity, the waste heat has been released to atmosphere which can be proved by energy balance of SGIS Songshan Co., Ltd. in 2009 /13/ and consumed electricity imported from South China Power Grid (SCPG).

The electricity generated by the project will displace part of the electricity purchased by SGIS Songshan Co., Ltd. of China from the SCPG where the dominant fuels for power generation are fossil fuels /4/.

By promoting waste heat recovery and utilization, the project will contribute to sustainable development in China.

The project starting date has been defined as 29 January 2010, the date on which the Engineering Procurement Contract (EPC) was signed /12/.

And the designed operation life of the project is 15 years. The fixed crediting period 10 years were selected. The expected emission reduction is to be 99 880 t CO_2e per year over the 10 years of the fixed crediting period.

- The starting date of fixed crediting period is on 1 September 2011 or the date of registration, whichever is later. The length of fixed crediting period is 10 years. DNV can confirm they are defined clearly and reasonable.

The annual electricity and heat demand of the industry facilities prior to implementation of the project activity was verified by checking the annual electricity consumptions report of the year 2009 provided by the project owner /28/. The electricity consumptions are broken down as follows:

Descriptions	**Electricity Quantity**	**Share (%)**
Electricity generation from the captive power plants	1 327 951.365 MWh	66%
Electricity imported from the grid	674 012.680 MWh	34%
Total electricity consumption in the year 2009	**2 001 964.045 MWh**	**100%**

Prior to implementation of the project activity, there are totally six captive power plants installed and operated in the SGIS Songshan Co., Ltd., including two cogeneration plants, two TRT plants and two CDQ power plants as the existing captive power plants implemented in the SGIS Songshan Co., Ltd.. The details of the captive power plants are as follows:

No.	**Type of the captive plant**	**Source of fuel**	**Operation starting date**	**Energy supplied**	**Designed operation lifetime**	**Data source**
1	50 MW cogeneration	Coal and waste gas	30 November 2001	Electricity and heat	30 years	/20/ /24/
2	120 MW cogeneration	Coal and waste gas	4 January 2006	Electricity and heat	30 years	/21/ /25/
3	6# and 7# TRT power plant	Waste pressure	16 March 2007	Electricity	15 years	/16/ /26/
4	8# TRT power plant	Waste pressure	25 October 2009	Electricity	15 years	/17/ /27/
5	Coal dry quenching 4.3 m power	Waste heat produced from CDQ	20 January 2009	Electricity and heat	20 years	/18/ /22/

	and heat plant (15 MW)					
6	Coal dry quenching 6 m power and heat plant (15 MW)	Waste heat produced from CDQ	31 October 2008	Electricity and heat	20 years	/19/ /23/

From above table, it can be confirmed that two existing cogeneration plants generated heat and electricity by using the coal and waste gas. These two existing cogeneration plants have been started in 2001 and 2006 respectively both with 30 years operation period /24/ /25/, therefore the remaining life time is more than 10 years of crediting period for the project. The two TRT power plants generated electricity by using the waste pressure, and they have been started in 2007 and 2009 respectively both with 15 years operation period /26/ /27/, therefore the remaining life time is more than 10 years of crediting period for the project. The two CDQ plants generated heat and electricity by using the waste heat, and they have been started in 2008 and 2009 respectively both with 20 years operation period /22/ /23/. All the captive power plants can only supply 66% of the power demand of SGIS Songshan Co., Ltd., and the proposed project can only supply 6.3% (126 768 MWh/2 001 964.045 MWh) of the power demand of SGIS Songshan Co., Ltd. /28/. Therefore, SGIS Songshan Co., Ltd. has to purchase the rest of power demand from the SCPG.

Furthermore, due to all of the six captive plants can only supply 66% of the power demand of SGIS Songshan Co., Ltd., and the proposed project can only supply 6.3% of the power demand of SGIS Songshan Co., Ltd., which has to purchase the remaining electricity from the SCPG /28/. Therefore, considering the enough remaining lifetime of the six existing power plant, the implementation of the project activity cannot have any impact on the operation of the existing power plants.

In addition, it was identified during the site visit that the energy source of the two cogeneration plants is coal and waste gas, the energy source of the two TRT plants is waste pressure, therefore the energy source of the two cogeneration plants and the two TRT plants are different from the energy source of the project. It was also verified by checking the FSRs of the captive power plants /24/ /25/ /26/ /27/. Although the energy source of the two CDQ plants are waste heat, the same as the proposed project, the energy source of the two CDQ plants is from the process of coal quenching /22/ /23/, and the energy source of the proposed project is from the process of sintering /4/, which is different process with CDQ in the steel/iron industry and the waste heat pipe of the CDQ plants and the proposed project do not have any connections verified by checking the equipment arrangement and technical process flow chart of SGIS Songshan Co., Ltd. /29/, which can be deemed as reasonable and reliable. Therefore, based on the above validation on the energy source and technical review, it is DNV's opinion that the implementation of the project activity will have no impact on the operation of the existing power plants.

DNV considers the project description of the project contained in the PDD /1/ to be complete and accurate. The PDD /1/ complies with the relevant forms and guidance for completing the PDD /1/.

4.3 Application of selected baseline and monitoring methodology

The project correctly applies the approved consolidated baseline and monitoring methodology ACM0012 version 3.2 *"*Consolidated Baseline Methodology for GHG Emission Reductions from Waste Energy Recovery Projects*"* /37/.

This methodology can be applied for two types of project activities, Type I and Type II. This project was defined to Type I which was stated in the PDD:

- *All the waste energy in identified WECM stream/s that will be utilized in the project activity is, or would be flared or released to atmosphere in the absence of the project activity at the existing or new facility.*

According to FSR /4/, this project belongs to the existing project and the demonstration of the waste heat release to atmosphere. It will reduce the environmental pollution from waste heat.

Furthermore, there is no installed equipment for waste heat recovery and utilization from this sintering plant under the proposed project prior to the implementation of this proposed project. This has been verified by DNV during site visit /74/ /75/.

- The waste heat is an energy source for generation of electricity.
- The following applicable conditions in this methodology:

Criterion 1: *If the project activity is based on the use of waste pressure to generate electricity, electricity generated using waste pressure should be measurable.*

The waste heat is used in the proposed project. There is no involvement of use of waste pressure in the project.

Criterion 2: *Energy generated in the project activity may be used within the industrial facility or exported from the industrial facility.*

The electricity generated in the project activity will be used within SGIS Songshan Co., Ltd. which was stated in FSR /4/ and indicated on "Power generation year report of Shaogang in 2009" /6/.

Criterion 3: *The electricity generated in the project activity may be exported to the grid or used for captive purposes.*

The electricity generated in the project activity will be used within SGIS Songshan Co., Ltd. which was stated in FSR /4/.

Criterion 4: *Energy in the project activity can be generated by the owner of the industrial facility producing the waste energy or by a third party (e.g. ESCO) within the industrial facility.*

Electricity in the project activity will be generated by the owner of the industrial facility producing the waste heat /4/.

Criterion 5: *Regulations do not constrain the industrial facility that generates waste energy from using fossil fuels prior to the implementation of the project activity.*

Regulations do not constrain the industrial facility generating waste heat from using the fossil fuels being used prior to the implementation of the project activity;

Criterion 6: *The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.*

For this project, the waste heat will be from the existing facility. The waste heat of the project is from No. 5 and No. 6 sintering machine in the SGIS Songshan Co., Ltd.. It can be confirmed that No.5 sintering machine was operated on 31 January 2005 /14/, and No. 6 sintering machine was operated on 7 July 2008 /15/. The details are presented as follows:

No.	Type of the captive plant	Source of fuel	Operation starting date	Energy supplied	Data source
1	No. 5 sintering machine	Waste heat produced from sintering machine	31 January 2005	Electricity	/14/
2	No. 6 sintering machine	Waste heat produced from sintering machine	7 July 2008	Electricity	/15/

This was confirmed as during site visit the project construction was being prepared. There is no plan to expansion /74/ /75/.

Criterion 7: *The emission reductions are claimed by the generator of energy using waste energy.*

The emission reductions are claimed by SGIS Songshan Co., Ltd. which is the power plant using waste energy /4/.

Criterion 8: *In cases where the energy is exported to other facilities, an official agreement exists between the owners of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) with the recipient plant(s) that the emission reductions would not be claimed by the recipient plant(s) for using a zero-emission energy source.*

The energy is not exported to other facilities /4/.

Criterion 9: *For those facilities and recipients included in the project boundary, that prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods:*

- *The remaining lifetime of equipments currently being used; and*
- *Credit period*

The project is a new initiative and waste heat is generated energy on site from the existing built sintering machine, which the remaining lifetime are longer than 10 years fixed crediting period /4/ /12/. It can be found in the above table that the waste heat of the project is from No. 5 and No. 6 sintering machine in the SGIS Songshan Co., Ltd.. It can be confirmed that No.5 sintering machine was operated on 31 January 2005 /14/, and No. 6 sintering machine was operated on 7 July 2008 /15/. Therefore the remaining life time is more than 10 years of crediting period for the project. Hence, emission reductions will be claimed for the whole crediting period.

Criterion 10: *Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.*

Credit will not be claimed when the waste energy released from heat recovery boiler under abnormal operation and the waste heat is released.

Criterion 11: *This methodology is not applicable to projects where the waste heat/heat recovery project is implemented in a single-cycle power plant (e.g. heat turbine or diesel generator) to generate power. However, the projects recovering waste energy from such power plants for the purpose of generation of only heat only can apply this methodology.*

According to the methodology ACM0012 version 3.2, the baseline scenarios were not applicable to projects where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power.

The project activity recovers and utilizes waste heat from the sintering machine for electricity generation. No involvement of the single-cycle power plant (e.g. heat turbine or diesel generator) to generate power, which is confirmed from FSR /4/.

The analysis above substantiate that the project meets all applicability criteria of the methodology ACM0012. Therefore, the methodology ACM0012 is applicable to the specific project.

The assessment of the project's compliance with the applicability criteria of ACM0012 (version 3.2) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

According to ACM0012, the geographical extent project boundary shall include the following:

(1) the industrial facility where waste energy is generated, including the part of the industrial facility where the waste gas was utilized for generation of captive electricity prior to implementation of the project activity);

(2) The facility where process heat in the element process/steam/electricity/mechanical energy is generated (generator of process heat/steam/electricity/mechanical energy). Equipment providing auxiliary heat to the waste energy recovery process shall be included within the project boundary; and

(3) The facility (ies) where the process heat in the element process/steam/electricity/ mechanical energy is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

The electricity from this project will be supplied to SGIS Songshan Co., Ltd. production lines as recipient are included in project boundary. However, it is requested by China power grid that the electricity generated from captive power plant must be wheeled through the grid to the consuming facility /48/. It means the electricity generated from captive power plant should be connected to grid before supplied to facility (ies). Thus the project boundary will be extended to the connected power grid (SCPG) including Guangdong Province, Guangxi Province, Guizhou Province and Yunnan Province Power Grids.

The gases and sources included in the project boundary are followed table:

	GHGs involved	Description
Baseline emissions	CO_2	Emissions due to the combustion of the fossil fuels in power plants within SCPG.
Project emissions	CO_2	Supplemental electricity consumption for this project activity.
Leakage	N/A	No leakage According to the approved consolidated baseline and monitoring methodology ACM0012, no leakage is applicable.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0012 (version 3.2) /37/.

4.5 Baseline identification

According to ACM0012 version 3.2 /37/ the baseline should be considered through following steps:

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations

• For the industrial facility where the waste energy is generated; and

• For the facility where the energy is produced; and

• For the facility where the energy is consumed.

For the use of waste heat, the realistic and credible alternative(s) may include

W1: WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized;

W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized;

W3: Waste energy is sold as an energy source;

W4: Waste energy is used for meeting energy demand;

W5: A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared;

W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

For this proposed project, the waste energy is waste heat, so W5 and W6 was excluded as W5 and W6 refer to use of waste gas. For W3, it is correctly excluded. Though the waste heat can

be recovered to be used for potential civil or industrial demand adjacent to the proposed project, However, the region of the project location is to southeast of China, there is no demand of heating for citizen and other users near to the project area. It is common practice that the waste heat in iron and steel industry was released to the atmosphere and there is no regulation to require utilization. Therefore, W1 or W2 and W4 are the remaining plausible baseline alternatives. And because for the waste heat recovery project, the W1 is the same as W2, therefore, W2 and W4 are the remaining plausible baseline alternatives.

For power generation, the realistic and credible alternative(s) may include:

P1 Proposed project activity not undertaken as a CDM project activity;

P2 On-site or off-site existing/new fossil fuel fired cogeneration plant;

P3 On-site or off-site existing/new renewable energy based cogeneration plant;

P4 On-site or off-site existing/new fossil fuel based existing captive or identified plant;

P5 On-site or off-site existing/new renewable energy based existing captive or identified plant;

P6 Sourced Grid-connected power plants;

P7 Captive Electricity generation from waste energy (if project activity is captive generation with waste energy, this scenario represents captive generation with lower efficiency than the project activity);

P8 Cogeneration from waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity).

P9: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;

P10: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;

P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

For this project, the waste heat from Sintering machines is only for electricity generation and is not cogeneration plant. So the alternatives P2, P3 and P8 are excluded; the waste energy is waste heat rather than waste gas, so the alternatives P9, P10 and P11 are excluded.

P4 is not realistic alternative and excluded:

There is no existing fossil fuel based captive plants on-site or off-site. Newly constructed fossil fuel based captive plants is not in conformity with regulation which is on Strictly Prohibiting Constructing Thermal Power Units with the Capacity under 135MW.

For P5, There are two cogeneration plants, two TRT and two CDQ power plants implemented in SGIS Songshan Co., Ltd.. However all the captive power plants can only supply 66% of the power demand of SGIS Songshan Co., Ltd. /28/. Therefore, SGIS Songshan Co., Ltd. has to purchase the rest of power demand from the SCPG.

For P7, No additional waste heat can be utilized by the project activity. It is impossible to generate the same power with lower efficiency than the project.

Therefore P4, P5 and P7 are excluded.

After combination of four options for the use of waste heat and power generation, the realistic and credible baseline scenarios are for further discussion:

Scenario 1: the project activity not undertaken as a CDM project activity, a combination of W4 and P1;

Scenario 2: the current practice i.e. waste heat released to the atmosphere and power supplied by the grid SCPG, a combination of W2 and P6.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The additionality of the project activity is demonstrated according to the "Tool for the demonstration and assessment of additionality" version 05.2 /39/.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

Project starting date:

The starting date shall be considered as the date at which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. DNV has verified that 29 January 2010, i.e. the date on which the project participant signed the Engineering Procurement Contract (EPC), including purchasing and construction. It represents the earliest financial commitment for the project as all purchasing contracts relative to the project have been signed after this date. Therefore, 29 January 2010 is considered as the starting date of the project activity.

Serious consideration of CDM and efforts to secure CDM status:

The feasibility study report (FSR) was finalized in September 2008 and approved on 8 January 2009. The FSR shows the financial unattractiveness of the project (the project IRR is below benchmark). The board of SGIS Songshan Co., Ltd. considered CDM incentive for the project on their meeting held on 1 March 2009.

SGIS Songshan Co., Ltd. sent the notification of intention to seek CDM status to NDRC on 29 July 2009 /9/, prior to the project start.

SGIS Songshan Co., Ltd. sent the notification of intention to seek CDM status to UNFCCC on 26 October 2009 /10/.

On 18 December 2009, the ERPA was signed between SGIS Songshan Co., Ltd. and Danish Energy Agency /11/.

On 10 March 2010, the stakeholders were consulted through questionnaires /45/.

DNV could confirm that the CDM has been considered well.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

As mentioned in section 4.4.4., the following scenarios were identified as feasible alternatives to the project activity:

Scenario 1: the project activity not undertaken as a CDM project activity, a combination of alternatives W4 and P1;

Scenario 2: the current practice i.e. waste heat released to the atmosphere and power supplied by the grid, a combination of alternatives W2 and P6.

4.6.3 Investment analysis

Investment analysis: Choice of approach

Since the project generates revenues in addition to the CDM revenues and the alternative to the project activity does not involve any investments for the project participants, the benchmark analysis is justified.

Investment analysis: Benchmark selection

According to "*The Economic Assessment method and Parameters for Construction Project", version 3*, published by NDRC and the Ministry of Construction of China in 2006 /47/, the post-tax equity IRR of Iron and Steel Industry project is 13%. DNV can confirm this is suitable and reasonable as follows:

(a) DNV can confirm that the benchmark 13% for post-tax equity IRR of Iron and steel industry in China is suitable for the type of financial indicator presented which was determined by China government.

(b) The risk premiums in this industry have been considered in determining the benchmark.

(c) This benchmark was valid for iron and steel industry in China although it was issued in 2006.

Investment analysis: Input parameters

DNV has validated the input parameters used according to the EB *Guidance on the Assessment of Investment Analysis* (Version 3.1) /40/. The following steps have been followed to assess the investment analysis.

Step 1: Assess the sources of the input parameters

DNV has verified all the input values used for the IRR calculations. It has been confirmed that the input values have been sourced from the feasibility study report (FSR) which has been prepared in September 2008 by Zhongye Changtian International Engineering Co., Ltd., an independent design entity authorized by NDRC. The FSR was approved by Guangdong Economic and Trade committee on 8 January 2009 /4/.

Step 2: Confirm that the values used in the PDD are fully consistent with the FSR (or PDR)

It is verified that there is no inconsistency for the input parameters in the PDD (IRR spreadsheet) with the assumptions in the FSR /4/.

Step 3: Assess the period of time between the finalization of the FSR (or PDR) and the investment decision

The FSR of the proposed project was approved on 8 January 2009, which is one year prior to decision to proceed with the project activity (i.e. the date on which the project participant signed the general contract of equipment purchasing and construction) which was on 29 January 2010. Given this relative short period of time between finalization of the FSR and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed and that it is thus reasonable to assume that the approved FSR have been the basis of the decision to proceed with the investment in the project. Validation team therefore can confirm that it is unlikely that the input values from FSR would have materially changed when making investment decision, which is in line with the EB 51 Annex 58 /40/.

DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR and was able to confirm that the values applied are consistent with the values stated in the FSR /4/.

Step 4: Cross-check the parameters used in the financial analysis with the parameters used by other similar projects

According to the VVM Version 1.2 /36/ paragraph 95, DNV performed the cross-check analysis from authentic documentation for other similar projects in China, shown in the Table 1 below to assess the appropriateness of the assumption in the PDD for the proposed project.

The input parameters used in the financial analysis were compared with the data reported for other similar WHR CDM projects in China as shown in Table 1, comparing investment costs per kW, O&M costs, PLF and percentage of O&M costs relative to total investment costs. And it is not included tariff comparison because in China the tariff is quite different and incomparable from different provinces and different power grids. Furthermore, Guangdong Province which the proposed project is located is a coastal province while Yunnan, Guangxi and Guizhou which other provinces connected to South China Power Grid are all inland provinces; therefore the investment environment is different from other provinces in SCPG. Thus, the tariff comparison is not included.

By comparing the proposed project with the other similar projects, the appropriateness of the assumptions for the proposed project has been evaluated and the main input parameters are assessed by DNV as the following and DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

Table 1 Sintering WHR projects (with the available data) comparison in China

Projects Name	Total investment (RMB)	Investment cost per kW (RMB/kW)	PLF (based on gross generation)	O&M costs (RMB)	O&M cost/total investment	O&M Cost /GrossPower Generation (RMB/kWh)
Shanxi Taigang Stainless Steel Co., Ltd. Sinter Machine Waste Heat Recovery and Generation Project Ref No. 1705	228 150 000	7 130	67%	30 376 500	13.31%	0.1446
Angang Sinter Machine Waste Heat Recovery and Generation Project Ref No. 1709	173 290 000	8 664	74%	24 480 000	14.13%	0.1883
Low Temperature Heat Recovery and Power Generation Project of Wugang Agglomeration Plant	231 272 500	6 607	--	23 550 000	10.18%	--
The proposed project	**215 000 000**	**8 600**	**64.1%**	**26 653 000**	**12.39%**	**0.1898**

1. Total static investment

The total static investment includes the construction, equipment purchase, installing and other relative expenses. DNV verified that total static investment is 215 000 000 RMB in the FSR /4/, and PDD/IRR spreadsheet /1/ /2/ applied the same. DNV read through the FSR and confirmed that the construction cost is estimated based on the guidelines for similar size WHR projects and the installation cost is estimated based on the guidelines for installation charges of similar size projects; and those investments estimation are in compliance with governmental economic regulations by Zhongye Changtian International Engineering Co., Ltd., who is an independent design entity authorized by NDRC and FSR got approval by Guangdong Economic and Trade committee. The total investment cost per kW installed is 8 600 RMB. When compared with the similar projects in Table 1, the figure of the proposed project is in line with other WHR projects, whose RMB/kW investment is in the range of 6 607 to 8 664 RMB. The investment cost per kW of the project is in the highest range compared with the other similar WHR projects in China, which can be considered

as reasonable given that the standardized design capacity of turbine (25 MW) chosen by the project participant is larger than the actual output of the project determined by the energy balance. The detailed discussion is presented in below section.

Furthermore, the investment costs were further cross-checked against the real costs in the Engineering Procurement Contract (EPC) /12/. This contract (actual value is RMB 226 256 359) is 5.2% higher than the total investment costs as stated in the FSR (RMB 215 000 000) /4/. Therefore, from the comparison it has been confirmed that investment costs in the FSR were reasonable.

Hence, the investment cost per kW is deemed to be reasonable and appropriate by DNV.

Base on the above analysis, DNV can confirm that the total static investment used in the PDD /1/ is valid and applicable at the time of investment decision.

2. Electricity tariff

In China the tariff is quite different and incomparable from different provinces and different power grids. Guangdong Province which the proposed project is located is a coastal province while Yunnan, Guangxi and Guizhou which other provinces connected to South China Power Grid are all inland provinces; therefore the investment environment is different from other provinces in SCPG. The applied tariff in PDD of proposed project /1/ is 0.5694 RMB/kW (including tax), verified by DNV based on "The tariff of Shaoguan City" issued by the Guangdong Province Price Bureau /7/. This is in line with the tariff applied in the FSR /4/. It is also confirmed by cross-checking with the latest tariff notification issued by the Guangdong Province /63/ that the tariff is 0.5655 RMB/kW (including tax), which is even lower than the tariff applied in the project.

Therefore, the tariff applied in the project is deemed as reasonable and appropriate.

3. Annual Power Generation

One option in the guideline for validation of plant load factors (Annex 11 of CDM EB's 48th meeting report) /43/ is to use plant load factor provided to the government while applying the project activity for implementation approval. The FSR /4/ is the basis for approval and hence in accordance with above guideline, checking that the values are in line with the FSR /4/ can be considered sufficient for validation of plant load factor.

According to the approved FSR /4/ and energy balance of the project /13/, in the condition that all the waste heat utilized to generate electricity and the efficiency of all the process equipment (boiler, steam turbine and the generator) is on ideal condition (the efficiency is 100%), the maximum output of the project (rated capacity) would be equal to the heat input to the steam turbine and can reach 23.9 MW. The detailed calculations of the rated capacity have been further clarified by the FSR author, Zhongye Changtian International Engineering Co., Ltd. /30/, based on the heat balance of the project. DNV reviewed the calculations, and confirm they are found appropriate. Therefore, according to the EB guidance on FSR (EB 48 meeting report), the rated capacity of the project is considered reasonable.

However because of historical reason and technical limitation in China, the model capacity of steam turbines are standardized as 6 MW, 12 MW and 25 MW, etc, therefore 25 MW is chosen as the optimal designed capacity for the steam turbine**.**

As described above, the 23.9 MW is the rated capacity of the project calculated on the condition that the efficiency of all the process equipment (boiler, steam turbine and the generator) is on ideal condition (their efficiency is 100%). However, when estimating the actual power generation, the actual efficiency of the process (including boiler, steam and generator) should be considered and included in the calculation. According to technical annex of the equipment /12/ and the evidence issued by Zhongye Changtian International Engineering Co., Ltd. /30/, the efficiency of the boiler is 85%, the efficiency of the steam turbine is 95% and the efficiency of the generator is 97%. Therefore, the general efficiency of equipment of project activity should be 85%×97%×95%=78.32%. Hence the overall efficiency of the power plant of 80% used to estimate the actual output is considered reasonable and conservative.. Therefore, the rated capacity (23.9 MW) multiplying the process efficiency (80%) results in the actual output of 19.12 MW.
According to the FSR /4/ the actual operation hour of the project is 7 344 hours annually. This is on the basis that the annual operational hours of the two 360 m^2 sintering machines is 8 160 hours /4/, and the annual operational hours of the project is 90% (operation rate) of the sintering machine's operational hour. i.e. 8 160×90%= 7 344 hours. The operational hours (8 160) of two 360 m^2 sintering machines can be verified by checking the PDR of the sintering machines project of SGIS Songshan Co., Ltd. /31/. The PDR was also prepared by Zhongye Changtian International Engineering Co., Ltd.. In addition, the annual operational hour of the project is 90% (operation rate) of the sintering machine's operation hours (8 160 hours), which accounts for the required planned outage hours, forced outage hour and maintenance hour. This percentage (90%) can be verified by "The explanation of annual operation hour for the Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd.", prepared by Zhongye Changtian International Engineering Co., Ltd. /32/.

Therefore, based on the above outlined the suitability of annual operational hours of the project (7 344 hours) applied in the PDD can be deemed as sufficient and this is also in line with the approved FSR /4/.

Therefore, the estimated annual power generation is 140 417 MWh (23.9 MW×80%×7 344 h=140 417 MWh) with plant load factor of 64.1% and annual net power supply is 126 768 MWh to SGIS Songshan Co., Ltd. (the auxiliary electricity consumption rate is 9.72%).

Furthermore, the PLF has been assessed by comparing with other similar projects in Table 1. Although the PLF (gross generation) of this project is lower than the other similar projects (PLF 67% and 74% respectively). The reason for the lower PLF of the proposed project is primarily because of the mismatch between the available heat for this project and the standardized turbine sizes. The operation hours is found to be reasonable (7 344 hours) for this type of activity.

Moreover, the PLF applied in the PDD is consistent with the approved FSR, which is deemed as reasonable.

Finally, the auxiliary electricity consumption rate is 9.72%, which is verified by comparing with other similar projects in below table.

Projects Name	Power generation (MWh)	Power supplied (MWh)	Aux consumption
Shanxi Taigang Stainless Steel Co., Ltd. Sinter Machine Waste Heat Recovery and Generation Project	210 000	189 000	11.11%
Angang Sinter Machine Waste Heat Recovery and Generation Project	130 000	117 700	10.45%
The proposed project	**140 417**	**126 768**	**9.72%**

The relative auxiliary consumption for the project is found to be lower than for comparable projects and is deemed as reasonable.

Therefore, based on a series of analysis above and in accordance with the requirements of Para 111 in VVM version 1.2 /36/, DNV can confirm that the annual supplied electricity estimated in FSR /4/ is reasonable.

4. O&M costs

The O&M costs are fully reflected in the FSR as O&M costs covering payroll, employee welfare, operation and maintenance expense (overhaul costs, material costs), water and nitrogen consumption costs and other costs.

The annual O&M cost for the proposed project is 26 653 000 RMB which accounts for 12.39% of total investment. DNV compared the O&M cost relative to total investment for the proposed project with other available WHR projects in Table 1. For these projects, the O&M cost relative to the total investment is in the range of 10.18% to 14.13%.

In addition, in order to justify the suitability of the O&M cost of the project, the ratio of O&M cost and net power generation can also be used for comparison. However, the data for only 2 other projects are available for this comparison so that the average value of these projects may not be representative. Nevertheless, the ratio (annual O&M to gross power generation) of the project of 0.1898 RMB/kWh is similar (less than 1% higher) to one of the project in the comparison (0.1883 RMB/kWh for "Angang Sinter Machine Waste Heat Recovery and Generation Project"") in the table 1. This is found acceptable given that these values are estimates and, it can be confirmed that the O&M cost used in the project is reasonable and appropriate.

Further validation of the suitability of O&M cost of the project can be presented by breakdown listed in the below table:

The breakdown of O&M costs

No.	Description		Value (RMB)
1	Payroll	40 employee×50 000 RMB/year/person	2 million
2	Employee welfare	Employee insurance (14% of salary)	0.28 million
		Welfare fund, Education, housing provident fund and Labor union funds (26 % of salary)	0.52 million
		Sub-total (40% of salary)	

3	Operation and maintenance expense	Cost of overhaul (4% of total investment)	8.6 million
		Cost of materials (0.050 RMB/kWh)	7.02 million
		Other expenses (3.0% of total investment)	6.45 million
4	Expenditure on power	Nitrogen	0.088
		Water	1.694
	Total O&M costs		26.653 million

a) Payroll

According to the actual payroll list issued by Personnel Department of SGIS Songshan Co., Ltd. in November 2011 /33/, the total payroll for 40 employees this month is 50 139 RMB, which is higher than the estimated value of 50 000 RMB in the FSR. Therefore, the payroll used in the O&M costs is conservative and reasonable.

b) Employee Welfare

The Employee Welfare is listed in the table below:

Table The percentage and references of employee welfare

Item	Percentage	References
Pension insurance fund	20%	State Council's Decision on the Establishment of a Unified Enterprise Workers Basic Pension Insurance System /67/
Basic medical insurance	6.5%	Shaoguan urban basic medical insurance implementation measures /68/
Labor insurance	2%	National Regulations on Unemployment Insurance /69/
Education funding	1.5%	The Regulation of Enterprise Staff Education and Training Funding Collect, Use and Management. /70/
Housing Fund	12%	The Guideline on Some Issues of the Housing Fund Management /71/
Total	42%	

All the data are sourced from public and transparent information and regulations issued by Chinese government, it can be deemed as reliable. It can be found from above table that the actual total percentage of the employee welfare is 42% of employee salary which is larger than the value of 40% used in the IRR calculation. Therefore, the calculation in O&M cost is conservative and reasonable.

c) Operation and Maintenance Expense

Operation and maintenance expense is sourced from the approved FSR, including cost of overhaul, cost of materials and other expenses. To demonstrate the suitability of the operation and maintenance expense, the project is compared with the registered similar projects.

The comparasion of operation and maintenance expense

Project Name	Operation and Maintenance Expense (million RMB)	Operation and Maintenance Expense/ Total Investment
Shanxi Taigang Stainless Steel Co., Ltd. Sinter Machine Waste Heat Recovery and	26.09	11.4%

Generation Project		
Angang Sinter Machine Waste Heat Recovery and Generation Project	12.17	7.0%
The proposed project	**22.07**	**10.3%**

As indicated in the above table, the ratio of operation and maintenance expense (cost of overhaul, cost of materials and other expenses) to total investment of the project (10.3%) is in the range of similar projects (from 7.0% to 11.4%). Therefore, the operation and maintenance expense used in IRR calculation is considered suitable.

d) Other costs in O&M costs

As to the rate other costs takes in the O&M cost, it mainly involves such expenditures as management salary and benefit, company expenditure (expendable supplies, travel cost, office cost, entertainment cost etc.), benefit expenditure, social service cost, public welfare expenditure.

By comparing proposed project to other registered WHR projects of China (Table 2), DNV is of opinion that, the other cost of the proposed project is appropriate and reasonable.

Table 2 Comparison of Other costs, Water costs and Nitrogen cost

Projects Name	Other costs (RMB)	Other costs/total investment	Water expense (RMB)	Nitrogen cost (RMB)
Shanxi Taigang Stainless Steel Co., Ltd. Sinter Machine Waste Heat Recovery and Generation Project registered (Ref:1705)	6 844 500	3%	3 920 000	N.A
Angang Sinter Machine Waste Heat Recovery and Generation Project Registered (Ref:1709)	12 170 000 including Maintenance and other costs	7% including Maintenance and other costs	2 110 000	N.A
The proposed project	**6 450 000**	**3%**	**1 694 000**	**88 000**

e). Cost of Nitrogen and Water

The Nitrogen is used to clean the pipeline of the project. As an inert gas, Nitrogen is used to prevent the delicate apparatus and meters from being oxidized.

The water expense is 1 694 000 RMB per year and Nitrogen expense is 88 000 RMB per year as shown in Table 2, estimated in the FSR. The unit price of Nitrogen and Water used in the IRR calculation are 0.12 RMB/m^3 and 1 RMB/m^3 respectively. However, the actual unit price of nitrogen and water are 0.3337 RMB/m^3 and 1.584 RMB/m^3 respectively, which can be verified by the actual consumption of Nitrogen and Water invoices /72/ /73/. Therefore, the annual cost of Nitrogen and Water used in the project-IRR calculation is more conservative.

In addition, by comparing the proposed project with the other similar projects as shown in Table 2, the assumed consumptions of water was confirmed as reasonable in the opinion of the validation team (nitrogen comparison was not available).

In conclusion, the parameters used for calculating O&M costs are all reasonable and conservative. Therefore, the assumed O&M costs are verified as suitable for the project by using the available evidence and expertise and have been cross-checked against other public available sources /67/-/73/ in accordance with the requirements of Para 111 in VVM version 1.2 /36/.

5. Taxes

According to the current law in China, the Statute of People's Republic of China on value added tax, the VAT is defined as 17% for iron and steel industry /56/.

The income tax of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. is chosen 25% that is in line with the Law of the People's Republic of China on Enterprise Income Tax /57/.

The education tax for the project is 3%, which is in line with Interim Regulation of the People's Republic of China on surtax for education expenses /59/,

The Urban construction surcharge is 7% for the project which is derived from Provisional Regulations of the People's Republic of China on City Maintenance and Construction Tax /60/.

6. Life time and residual value

The 15 years operational life time reported in the FSR /4/ has been chosen by the qualified third party designing institute in accordance with the national standards "Industrial entity financial policy" article 32 and Annex I /62/ approved by the Chinese government.

The residual value of the assets is 5%, which is in line with the government document of Decree No. 883 of Guoshuifa [2005] issued by the State Administration of Taxation on 14 September 2005 /58/. The document mentions that the residual value of assets is stipulated to be 5% in China.

Based on the information verified, DNV is of the opinion that the all compared parameters are in the reasonable ranges and were cross-checked by available public sources, DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

Conclusion

Validation team reviewed the IRR calculation and confirmed that the IRR processing is consistent with the "Guidance on the assessment of investment analysis" (Annex of "Tool for the demonstration and assessment of additionality" version 05.2 /39/) and the data sources as well as the analysis approach are reliable and based on the FSR linking directive to the actual situation of the host country.

The IRR calculations were provided in a spreadsheet /2/. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The equity IRR without CDM revenues is 9.49%, which confirms that the project in the absence of CDM benefits and compared to the benchmark of 13% (post-tax) is not financially attractive. With CER revenues the project IRR increases to 13.49%, this is above the benchmark.

Sensitivity analysis

A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of the total investment, annual O&M costs, annual electricity output and tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

DNV was able to verify that the project IRR will touch the benchmark only if the above mentioned parameters change by values as mentioned below:

Key Indicator	***Variation of the parameter indicator needed to reach benchmark 13%***
Total investment	-14.75%
Annual operation and maintenance cost	-30.15%
Tariff	+13.7%
Annual electricity output	+13.7%

Total investment and Annual operation and maintenance cost

DNV has checked Producer Price Index (PPI) of industrial products from 2003 to 2007. The PPI increased by 2.3%, 6.1%, 4.9%, 3.0% and 3.1% respectively /55/. DNV was thus able to confirm that is unlikely to happen that the total investment can decrease 14.75%. Also that 30.15% decrease in the annual operation and maintenance cost is unlikely to happen because the wages and the price of raw materials are increasing /55/.

Tariff

Validation team from local DNV can confirm that the electricity tariff is strictly controlled by the central government, which is one of main options for the central government to counterbalance the inflation. According to "China Statistical Yearbook 2008" /52/, the tariff was increasing 2.22% on average annually from 2002 to 2007. The price employed by the PDD is 0.5694 (including VAT), which can be confirmed by the Guangdong Provincial Price Bureau (Yue Jia [2008] 224) /7/. Furthermore, the average annual electricity price increase rate from 2002 to 2007 of 2.22% is lower than the increase rate of annual operation & maintenance costs according to publicly accessible information. Based on such tariff trend in Guangdong recent years, it is unlikely for the project to become financial attractively by tariff increasing by 13.7%.

Annual electricity Output

The annual electricity supplied by the proposed project depends on the waste heat available at the project site. In the FSR, it is clearly stated that the annual electricity output is 140 417 MWh. It is calculated as follows: 23.9 MW×80%×7 344 h=140 417 MWh

In the condition that all the waste heat utilized to generate electricity, the actual rated power capacity is 23.9 MW (25 MW is chosen as the optimal standard model of equipment for the designed capacity). And the general efficiency of equipment of the project activity is 80% and actual operation hour is 7 344 hours annually according to FSR /4/. Therefore, the actual annual power generation is 140 417 MWh. If the annual electricity output increases by 13.7%, the annual operation hour would be 8 350 hours. Considering there will be 25 days (600 hours) overhaul and routine maintenance time of sintering plant annually /4/, this cannot happen as the operation hour of the project activity is limited to 8 160 h annually due to overhaul and routine maintenance time. Therefore, it is unlikely for the electricity output to increase by 13.7%.

The analysis above shows that very unrealistic favourable circumstances would be needed for the IRR to reach the benchmark. Therefore the project is not financially attractive.

In conclusion, the investment analysis and sensitivity assessment have shown that the project activity is not the most financially attractive option

4.6.4 Barrier analysis

Investment analysis has argued that the project is the economically less attractive without the revenue from the sale of CERs. Barrier analysis has not been considered for analysis.

4.6.5 Common practice analysis

The Guangdong province was selected as the geographical scope for common practice analysis since the policies regarding tax, electricity tariff and other socio-economic aspects are similar within the Guangdong province and controlled by the Guangdong province government. Hence DNV considers the selection of the geographical area as reasonable

According to the China Steel Yearbook 2001-2007, which is the only official and authoritative public source regarding Iron and Steel industry in China, no similar project (non CDM) has been noticed in Guangdong Province. Therefore, it can be concluded that the proposed project is first-of-kind in Guangdong Province. According to **"**Tool for the demonstration and assessment of additionality" (version 5.2) /39/, first-of-kind project means unprevailing practice in local area. As to the project, this kind project refers to project that utilizes low temperature waste heat produced in the process of sintering for power generation. Thus, the project activity is first-of-kind in Guangdong Province /4/.

In conclusion, it is DNV's opinion that the project activity is also not a common practice in the region. Hence the project cannot be considered as a business-as-usual scenario and is hence additional.

DNV can confirm all assumptions and analysis as well as the information source. It is deemed that this project is additional one.

4.7 Monitoring

The monitoring methodology ACM0012 version 3.2 is correctly applied /37/.

The project monitoring plan is in compliance with the monitoring methodology ACM0012 (version 3.2).

It is DNV's opinion, that the project participants are able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

The following parameters are determined *ex-ante* and verified by DNV.

Data and Parameters	Unit	Value applied	Source of data used
Operating margin of SCPG (OM)	tCO_2/MWh	0.9987	China Energy Statistical Yearbook 2006-2008 /52/
Build Margin of SCPG (BM)	tCO_2/MWh	0.5772	China Electric Power Yearbooks 2004-2008 /51/
Emission factor of SCPG (CM)	tCO_2/MWh	0.7879	

4.7.2 Parameters monitored ex-post

The following data and parameters need to be monitored; these are considered appropriate.

$Q_{OE,y}$: Quantity of electricity generated in year y in MWh

$EG_{i,j,y}$: Power supplied to the SGIS internal electricity system in the year y in MWh

$EC_{PJ,y}$: The auxiliary electricity consumption from the SGIS internal electricity system in MWh

$EG_{i,j,y}$ will be measured continuously and recorded on a monthly basis at the recipient plant(s) and at the generation plant for cross check.

f_{wcm} is defined as 1. Because no additional fossil fuels is used.

The accuracy of meter is 0.5 or more accuracy. The calibration of meters will be conducted annually.

DNV can confirm that all the parameters need to be monitored ex post are complete and consistent with ACM0012 /37/.

4.7.3 Management system and quality assurance

The project's monitoring plan includes:

- Monitoring Objective
- Monitoring Organization
- Monitoring Equipment and program
- Data Collection
- Calibration
- Data Management
- Monitoring Report

Detailed procedures have been elaborated in the PDD. These will be maintained and implemented to enable subsequent verification of emission reductions

4.8 Algorithms and/or formulae used to determine emission reductions

The GHG emission reduction calculations are in accordance with the formulae given in the baseline and monitoring methodology ACM0012 version 3.2 /35/.

The emission reduction ER_y by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage ($L_{y)}$, as follows:

1 Baseline emissions: The baseline emission results from the electricity generated by project activity.

The combined margin emission factor EFgrid,CM has been determined ex-ante from the operating margin emission factor and built margin emission factor. This value will remain fixed for the entire crediting period. Aggregated generation and fuel consumption data are used due to the fact that more specific data for the power plants are not available in the SCPG (option C). Country specific data for net calorific value of each type of fossil fuel, country specific data for emission factors for the fuel, the IPCC 2006 default values for the oxidation factor of each type of fossil fuel and the total electricity delivered to the SCPG are deemed reasonable.

Operating margin: For the calculation of the OM emission factor, the simple OM calculation method is selected because dispatch data are not available and low-cost-must-run power plants constitute less than 50% of the total grid generation. Vintage data for the years 2005, 2006 and 2007 are used for operating margin calculation. The OM is determined to be 0.9987 tCO_2/MWh as a generation-weighted average for the three years.

Build margin. Because plant specific fuel consumption and electricity generation data is not publicly available in China, the EB guidance on the request for deviation titled "Application of AM0005 and AMS-I.D in China" /38/ has been applied for this project as follows:

- The capacity additions from the years 2005 to 2007 are chosen and reach 28.02% of total installed capacity /51/ /52/.
- The weight of installed capacity additions for thermal power plant is accounted for 83.97% of total installed capacity additions. Since specific data for each technology is not available, the fraction of fuels (coal 93.08%, natural gas 2.36% and oil 4.56%) /51/ /52/ was estimated from the CO_2 intensity for the fuels used in the SCPG.
- Use of the efficiency level of the best technology commercially available in the |provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption. This is 38.1% for coal power plants and 49.99% for oil power plants and gas power plants in 2007. These data became publically available after the project was submitted for validation. Considering that these values were more conservative in emission reduction factor calculation DNV accepted the use of these data.

The BM is calculated as 0.5772 tCO_2/MWh. The weights 0.5 and 0.5 for OM and BM are used to calculate CM as stipulated for other projects except wind and solar power generation project activity by "Tool to calculate the emission factor for an electricity system". The combined margin of 0.7879 tCO_2/MWh is fixed *ex-ante* for the entire crediting period.

The latest data has been used to calculate OM and BM as derived from China Energy Statistical Yearbooks 2006, 2007, 2008 and China Power Electric Power Yearbooks 2006,

2007, 2008. The calculation is in accordance with the calculation of the combined margin emission factor published by the DNA of China /48/ /49/ /50/.

1) The fraction of total energy generated （f_{wcm}）

According to FSR /4/ there is no auxiliary fuel for power generation, so f_{wcm} is 1.

2）Capping of baseline emissions （f_{cap}）

According to ACM0012 version 3.2 /35/, there are three methods for capping of baseline emissions.

For this project, the historical data on waste heat released is not available, so the method 1 cannot be applied.

For the method 2, the waste heat should be monitored directly. Due to technical limitations (i.e. high dust concentration in the air containing the waste heat and strong fluctuations in pressure and flow) direct measurement of waste heat does not provide a reliable basis for the determination of f_{cap} and would hence also not form a proper basis for subsequent monitoring.

For the method-3, Case 1 was selected and the output energy (electricity) in year will be monitored. The output electricity prior to this project was calculated based on data from FSR /4/.

$$f_{cap} = \frac{Q_{OE,BL}}{Q_{OE,y}} = 1,$$

$Q_{OE,BL}$ Output energy (electricity) that can be theoretically produced (MWh/a), to be determined on the basis of maximum recoverable energy from the WECM, which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of CDM project activity. In the project $Q_{OE,BL}$ =140 417 MWh/y which is in line with FSR /4/.

$Q_{OE,y}$ Quantity of actual output energy (electricity) during year y (MWh/a)

DNV can confirm that the fcap defined as 1 is reasonable.

2. Project emissions:

No project emission. The auxiliary electricity consumption was deducted from gross electricity supply generated by the power plant. There is no supplemental fossil fuel firing for this project activity /4/.

3. Leakage

According to ACM0012, no leakage is applicable under this methodology.

The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. The data sources mentioned have been verified by DNV.

In summary, the GHG calculations are complete and transparent, and their accuracy has been verified. No other project emission or leakage sources contributing more than 1% and not

mentioned by the methodology have been found.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 99 880 tCO2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

The EIA registration form of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd. was conducted by SGIS Songshan Co., Ltd. dated 5 February 2009 and the approval of EIA by Shaoguan Environmental Protection Agency dated 10 February 2009 /5/.

The conclusion of the report has been described in the PDD. The project will have positive impact on local environment.

4.10 Comments by local stakeholders

A stakeholder meeting was held on 10 March 2010 in SGIS Hotel. The meeting participants include the staff of SGIS, consultants, official government and residents in the neighbor area. The announcements of stakeholder consultation were published in Shaoguan Daily and www.tqcdmchina.com.

The project participants have also carried out a public survey on the project in the format of questionnaires; 35 questionnaires were sent /45/.

DNV have checked the stakeholder meeting records submitted by the project owner. A summary of the stakeholders comments have been included in the PDD.

DNV considers the local stakeholder consultation to have been carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 2 dated 1 April 2010, was made publicly available on the CDM website (http://cdm.unfccc.int/Projects/Validation/DB/VGQZXM6937EOS8YPHTK9D3N1CMQ4E0 /view.html) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 9 April 2010 to 8 May 2010.

No comments received.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	~~CAR 1~~ OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity						
A.1	**Title of the project activity**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes *If no, list where the PDD is not in accordance:*		OK
A.2	**Description of the project activity**					
A.2.1	How was the design of the project assessed?	/1/	DR	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) ☒ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO_2e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				☐ The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies *If a physical site inspection is not undertaken, justify why no site visit was undertaken:*		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	This WHR project is not a Greenfield project, so it is not necessary to describe the physical implementation of the project.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR	This is not a bundled small scale project, so it is not necessary to justify the sampling through a statistical analysis.		OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	Yes. The description in the PDD covers all relevant elements, such as the location, installed capacity and provides a clear understanding of the nature of the proposed CDM project activity.		OK
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	Yes, the project activity involves the existing sintering plant which generates the waste heat. There is no alteration for this project activity.		OK
A.2.6	Does the project design engineering reflect current good	/1/	DR	The project design engineering reflects current		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	practices?			good practices.		
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/	DR	The technology would result in a significantly better performance than any commonly used technologies in the host country. No transfer of technology from any Annex-I Party.		OK
A.3	**Participation requirements**					
A.3.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	The LoA from DNA of Denmark has not been provided.	~~CAR 1~~	OK
				China (host) / Denmark / Country Y		
	a) Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	b) Party has designated a Designated National Authority			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	c) The assigned amount has been determined			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
A.3.2	Do the letters of approval meet the following requirements?	/1/	DR	The LoA from DNA of Denmark has not been provided.	~~CAR 1~~	OK
				China (host) / Denmark / Country Y		
	a) LoA confirms that Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	b) LoA confirms that participation is voluntary			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	c) The LoA confirms that the project contributes to the sustainable development of the host country?			☒ Yes ☐ No / NA / NA		
	d) The LoA refers to the precise project activity title in the PDD			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	e) The LoA is unconditional with respect to (a) to (d) above			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
	f) The LoA is issued by the respective Party's DNA			☒ Yes ☐ No / ☒ Yes ☒ No / ☐ Yes ☐ No		
	g) The LoA was received directly by the DNA or the PP			☐ DNA ☒ PP / ☐ DNA ☒ PP / ☐ DNA ☐ PP		
	h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic					

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3.3	Have all private/public project participants been authorized by an involved Party?	/1/	DR	The LoA from DNA of Denmark has not been provided.	~~CAR 1~~	OK
A.4	**Technical description of the project activity**					
A.4.1	Is the project's location clearly defined?	/1/	DR	Yes. The project is located in Maba Town, Qujiang County, Shaoguan City, Guangdong Province, People's Republic of China. The project's exact geographical coordinates are E 113°38'08" and N 24°42'18".		OK
A.5	**Public funding of the project activity**					
A.5.1	In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards China.	~~CAR 1~~	OK
B	**Application of a baseline and monitoring methodology**					
B.1	**Methodology applied**					
B.1.1	Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes. The approved methodology ACM0012 "*Consolidated* Baseline Methodology for GHG Emission Reductions from Waste Energy Recovery Projects" version 3.2 is applied for the proposed project. This methodology was applied for two types of project activities, Type I and Type II. This project was defined to Type I which was stated by pp in PDD: ● All the waste energy in identified WECM stream/s that will be utilized in the project		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			activity is, or would be flared or released to atmosphere in the absence of the project activity at the existing or new facility. According to FSR /4/, this project belongs to the existing project and the demonstration of the waste heat release to atmosphere. It will reduce the environmental pollution from waste heat. a) The project participant would need to provide the energy balance or any other relative evidence because of TRT and CDQ were operated prior to the implementation of the project activity. b) The project participant would need to provide evidence that 'SGIS receives about 66% of its electricity demand from captive plants' stated in the PDD. ● The waste heat is an energy source for generation of electricity.	~~CL 1~~	OK
B.2 Applicability of methodology (and tools)					
B.2.1 How was it validated that project complies with the following applicability criteria 1: *If the project activity is based on the use of waste pressure to generate electricity, electricity generated using waste pressure should be measurable*?	/1/	DR	The waste heat is used in the proposed project.		OK
B.2.2 How was it validated that project complies with the following applicability criteria 2: *Energy generated in the project activity may be used within the industrial facility or exported from the industrial facility*?	/1/	DR	a) The project participant would need to provide the energy balance or any other relative evidence because of TRT and CDQ were operated prior to the implementation of the project activity. b) The project participant would need to provide evidence that 'SGIS receives about 66% of its electricity demand from captive plants' stated in the PDD.	~~CL 1~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.3	How was it validated that project complies with the following applicability criteria 3: *Electricity in the project activity will be generated by the owner of the industrial facility producing the waste heat*?	/1/	DR	The electricity generated in the project activity will be used within SGIS Songshan Co., Ltd which was stated in FSR.		OK
B.2.4	How was it validated that project complies with the following applicability criteria 4: *Energy in the project activity can be generated by the owner of the industrial facility producing the waste energy or by a third party (e.g. ESCO) within the industrial facility*?	/1/	DR	Electricity in the project activity will be generated by the owner of the industrial facility producing the waste heat.		OK
B.2.5	How was it validated that project complies with the following applicability criteria 5: *Regulations do not constrain the industrial facility that generates waste energy from using fossil fuels prior to the implementation of the project activity.*	/1/	DR	Regulations do not constrain the industrial facility generating waste heat from using the fossil fuels being used prior to the implementation of the project activity		OK
B.2.6	How was it validated that project complies with the following applicability criteria 6: *The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.*	/1/	DR	The project participant would need to provide the evidence when the existing facilities were operated.	~~CL 2~~	OK
B.2.7	How was it validated that project complies with the following applicability criteria 7: *The emission reductions are claimed by the generator of energy using waste energy.*	/1/	DR	The emission reductions are claimed by SGIS Songshan Co., Ltd which is the power plant using waste energy.		OK
B.2.8	How was it validated that project complies with the following applicability criteria 8: *In cases where the energy is exported to other facilities, an official agreement exists between the owners of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) with the recipient plant(s) that the emission*	/1/	DR	The energy is not exported to other facilities		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	reductions would not be claimed by the recipient plant(s) for using a zero-emission energy source.					
B.2.9	How was it validated that project complies with the following applicability criteria 9: *For those facilities and recipients included in the project boundary, that prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods: The remaining lifetime of equipments currently being used; and Credit period.*	/1/	DR	The project participant would need to state that the remaining lifetime of equipments currently being used; and Credit period	~~CL 3~~	OK
B.2.10	How was it validated that project complies with the following applicability criteria 10: *Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.*	/1/	DR	The credit will not be claimed under the abnormal operation of waste heat recovery facility		OK
B.2.11	How was it validated that project complies with the following applicability criteria 11: ACM0012 is not applicable to projects where the waste gas/heat recovery project is implemented in a single-cycle power plant to generate power.	/1/	DR	The waste gas/heat recovery project is not implemented in a single-cycle power plant to generate power		OK
B.2.12	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	It will be conducted when the ~~CL 1~~ ~~CL 2~~ ~~CL 3~~ are closed.	~~CL 1~~ ~~CL 2~~ ~~CL 3~~	OK
B.3	**Project boundary**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/	DR	The project participant would need to define the project's system boundaries in Figure B.1 in accordance with the methodology. The CO_2 from supplementary electricity consumption should be included in the project boundary	~~CAR 2~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	The major emission source of Baseline and Project activity is CO_2 and this is in line with the approved methodology ACM0012. The project participant would need to define the project's system boundaries in Figure B.1 in accordance with the methodology. The CO_2 from supplementary electricity consumption should be included in the project boundary	~~CAR 2~~	OK
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/	DR	There is no other emission sources involved in Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd.. And there is also no other sources contribute more than 1% of the estimated emission reductions of the project.		OK
B.4	**Baseline scenario determination**					
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	*Baseline determination* According to ACM0012 Version 3.2, the baseline candidates should be considered for the following facilities: *Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations* • For the industrial facility where the waste energy is generated; and • For the facility where the energy is produced; and • For the facility where the energy is consumed. For the use of waste heat, the realistic and credible alternative(s) may include		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			W1: WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized; W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized; W3: Waste energy is sold as an energy source; W4: Waste energy is used for meeting energy demand; W5: A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared; W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation. For this proposed project, the waste energy is waste heat, so W5 and W6 was excluded. The region of the project location is to southeast of China, there is no demand of heating for citizen and other users near to the project area. Additionally, sale of heat to surrounding consumers faces institutional barriers and transport of heat over long distance is not economical, so W3 was excluded. It is common practice that the waste heat in Sintering Plant was released to the atmosphere and there is no		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			regulation to require utilization. So W1 or W2 and W4 are the remaining plausible baseline alternatives. For power generation, the realistic and credible alternative(s) may include: P1 Proposed project activity not undertaken as a CDM project activity; P2 On-site or off-site existing/new fossil fuel fired cogeneration plant; P3 On-site or off-site existing/new renewable energy based cogeneration plant; P4 On-site or off-site existing/new fossil fuel based existing captive or identified plant; P5 On-site or off-site existing/new renewable energy based existing captive or identified plant; P6 Sourced Grid-connected power plants; P7 Captive Electricity generation from waste energy (if project activity is captive generation with waste energy, this scenario represents captive generation with lower efficiency than the project activity.); P8 Cogeneration from waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity). P9: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid; P10: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from **a captured portion** of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export; P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.	~~CL 4~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				For this project, the waste heat from Sinter machines is only for electricity generation and is not cogeneration plant. So the alternatives P2, P3 and P8 are excluded; the waste energy is waste heat rather than waste gas, so the alternatives P9, P10 and P11 are excluded. a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further		
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further.	~~CL 4~~	OK
B.4.3	What is the baseline scenario?	/1/	DR	a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded.	~~CL 4~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further.		
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	The determination of the baseline scenario is in accordance with the guidance in the methodology.		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further.	~~CL 4~~	OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes, the baseline scenario sufficiently takes into account relevant national and/or sectoral policies, macro-economic trends and political aspirations		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant	~~CL 4~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				was excluded. c) For P 7: The exclusion of this alternative should be clarified further.		
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/	DR	a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further.	~~CL 4~~	OK
B.5	**Additionality determination.**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/	DR	The tool used to assess additionality is "tool for demonstration and assessment of additionality" version 5.2. All the process of analysing the additionality in the PDD is in line with the methodology ACM0012 and additonality tool.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	The project participant would need to state the plant load factor in the PDD.	~~CL 6~~	OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes the sufficient evidence is provided to support the relevance of the arguments.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	The project additionality is mainly based on the investment analysis.		OK
	Prior consideration of CDM					
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/	DR	SGIS Songshan Co., Ltd. got the notification of intention to seek CDM status from NDRC on 29 July 2009 SGIS Songshan Co., Ltd got the notification of intention to seek CDM status from UNFCCC on 26 October 2009		OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/	DR	SGIS Songshan Co., Ltd. got the notification of intention to seek CDM status from NDRC on 29 July 2009 SGIS Songshan Co., Ltd got the notification of intention to seek CDM status from UNFCCC on 26 October 2009		OK
	Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7	What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/	DR	N/A		OK
B.5.8	When did the construction of the project activity start?	/1/	DR	N/A		OK
B.5.9	When was the project commissioned?	/1/	DR	N/A		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to	/1/	DR	N/A		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	secure CDM status?					
	Investment analysis					
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	No, the project activity will generate revenues apart from CDM. Yes, this is reflected in the PDD		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	The project activity is invested by SGIS Songshan Co., Ltd. Yes, this is reflected in the PDD		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	The equity benchmark analysis is chosen.		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	Yes the equity benchmark is in line with Economic Evaluation Method and Parameter of Construction Projects, published by China NDAC and Ministry of Construction of China in 2006 which is the latest available data at the time of decision		OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR	The financial indicator is the equity IRR. It is on the equity basis which is after tax. The financial indicator is in correspondence with the benchmark		OK
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	The underlying assumptions are appropriate. The waste heat is considered to be zero.		OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/	DR	The income tax calculation takes depreciation into account. The depreciation year 15 years is in accordance with normal accounting practice in the host country		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/	DR	The project participant would need to clarify that 15 years of depreciation cost is reasonable.	~~CL 5~~	OK
B.5.19	When feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/	DR	The FSR of Waste Heat Recovery for Power Generation Project in SGIS Songshan Co., Ltd.,was issued by Zhongye Changtian International Engineering Co., Ltd on September 2008. The FSR approval of the project was issued by Guangdong Economic and Trade committee on 1 January 2009. All of the input parameters are from the FSR. The investment decision was on 29 January 2010 which is 1 year later than FSR approved date.		OK
B.5.20	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/	DR	☐ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☒ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☐ Other approach. *Provide details on how the load factor was validated::* The project participant would need to state the plant load factor in the PDD	~~CL 6~~	OK
B.5.21	How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the	/1/ /5/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.			announcements and annual financial reports related to the project and the project participants *Provide details on how the output price was validated:* The tariff of 0.5694 RMB/kWh is from FSR and is cross checked by the document from Guangdong Provincial Price Bureau.		
B.5.22	How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the investment costs were validated:* The investment costs were cross-checked by the approved FSR The data were available and valid at the time of decision.		OK
B.5.23	How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* The O&M costs were cross-checked by the approved FSR The data were available and valid at the time of decision.		OK
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports		

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	accordance with VVM version 1 paragraph 95.			related to the project and the project participants *Provide details on how other input parameters were validated:* a) The project participant would need to clarify that the benchmark is equity; however the IRR is the project one. b) This benchmark is post tax, so the loan interests should be considered for income tax calculation.	~~CL 7~~	OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	a) The project participant would need to clarify that the benchmark is equity; however the IRR is the project one. b) This benchmark is post tax, so the loan interests should be considered for income tax calculation.	~~CL 7~~	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR	The key parameters contributing to more than 20% of the revenue/costs during operating or implementation have been identified. The possible correlation between the parameters has been considered		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	In the sensitivity analysis, the key parameters should be elaborated not only in the PDD, but also in the spread sheet.	~~CL 8~~	OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	In the sensitivity analysis, the key parameters should be elaborated not only in the PDD, but also in the spread sheet.	~~CL 8~~	OK
	Barrier analysis					
B.5.29	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an	/1/	DR	N/A		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	investment analysis? Each barrier is discussed separately.					
B.5.30	How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	N/A		OK
B.5.32	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
B.5.33	How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	N/A		OK
B.5.35	Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
B.5.36	How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	N/A		OK
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.39	How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	N/A		OK
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
	Common practice analysis					
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'	~~CL 9~~	OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/	DR	The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'	~~CL 9~~	OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/	DR	The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'	~~CL 9~~	OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'	~~CL 9~~	OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'	~~CL 9~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	It will be conducted when the CL 9 is closed.	~~CL 9~~	OK
	Conclusion					
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	It will be conducted when the CL 5 CL 6 CL 7 CL 8 CL 9 are closed.	~~CL 5~~ ~~CL 6~~ ~~CL 7~~ ~~CL 8~~ ~~CL 9~~	OK
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored					
B.6.1	How was the insert parameter available at validation verified?	/1/	DR	The data available at validation are from and verified by DNV to be in line with *2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual*, China Electric Power Yearbook 2006~2008, China Energy Statistical Yearbook 2006~2008, and the emission factor calculation for each power grid of China published on 2 July 2009. Further the EF is cross-checked by the values issued by NDRC on 2 July 2009. All these data used in the PDD are verified and confirmed by DNV. $Q_{OE,BL}$ is defined as 140 417 MWh which is in line with the FSR. ---		OK
	Baseline emissions					
B.6.2	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The emission reduction calculation process are documented in a transparent manner and it is cross-checked by the published data from NDRC.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				f_{cap} and f_{wcm} are documented in a transparent manner and it is cross-checked by ACM0012. DNV can conclude that all the data and calculation in the provided calculation spreadsheet is correct and appropriate.		
B.6.3	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Yes. All the used assumptions are in line with the "Tool to calculate the emission factor for an electricity system" version 2 and Guidance for request for deviation titled "*Application of AM0005 and AMS-I.D in China*" from EB.		OK
B.6.4	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	N/A		OK
	Project emissions					
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The project participant would need to state how to measure and record the electricity consumption of the auxiliary.	~~CAR 3~~	OK
B.6.6	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	The project participant would need to state how to measure and record the electricity consumption of the auxiliary.	~~CAR 3~~	OK
B.6.7	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	N/A	~~CAR 3~~	OK
	Leakage					
B.6.8	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	There is no need to consider leakage according to the approved methodology ACM 0012 Consolidated Baseline Methodology for GHG Emission Reductions from Waste Energy Recovery Projects (version 3.2).		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.9	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	N/A		OK
B.6.10	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	N/A		OK
	Emission Reductions					
B.6.11	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	/1/	DR	It will be conducted after CAR 3 is closed	~~CAR 3~~	OK
B.7	**Monitoring plan**					
	Data and parameters monitored					
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	The project participant would need to state how to measure and record the electricity consumption of the auxiliary.	~~CAR 3~~	OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	The project participant would need to state how to measure and record the electricity consumption of the auxiliary.	~~CAR 3~~	OK
B.7.3	In case parameters are measured, is the measurement	/1/	DR	The project participant would need to state how	~~CAR 3~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	equipment described? Describe each relevant parameter.			to measure and record the electricity consumption of the auxiliary.		
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	a) The project participant would need to state the accuracy of meter in the PDD. b) The project participant would need to state the location of the meters. c) The project participant would need to state the equipment and measurement frequency for $Q_{OE,y}$	~~CAR 4~~	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	Measuring equipment will be calibrated on regular equipment annually.		OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	a) The project participant would need to state the accuracy of meter in the PDD. b) The project participant would need to state the location of the meters. c) The project participant would need to state the equipment and measurement frequency for $Q_{OE,y}$	~~CAR 4~~	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	a) The project participant would need to state the accuracy of meter in the PDD. b) The project participant would need to state the location of the meters. c) The project participant would need to state the equipment and measurement frequency for $Q_{OE,y}$	~~CAR 4~~	OK
	Ability of project participants to implement monitoring plan					
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	Yes. the monitoring plan is in line with the Methodology ACM 0012		OK
B.7.9	Are procedures identified for day-to-day records handling	/1/	DR	The project participant would need to state how	~~CAR 3~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	(including what records to keep, storage area of records and how to process performance documentation)?			to record the electricity consumption of the auxiliary		
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Yes. QA/QC procedures are included in monitoring plan.		OK
B.7.11	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Yes. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.		OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	Monitoring of sustainable development indicators is not required by the Chinese DNA.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Chinese DNA does not require collection and archiving of data related to environmental, social and economic impacts. The environmental impacts will be monitored by local environmental authority.		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	Yes. The sustainable development indicators are in line with stated national priorities in the host country.		OK
C	**Duration of the project activity / crediting period**					
C.1.1	**Start date of project activity**					
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/	DR	The starting date was determined to be 29 January 2010, which was the earliest date among the purchase contract, construction permission and construction contract.		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				In order to verify the starting date of the project activity, the project participant would need to provide the evidence when was the first construction activity.	~~CL 10~~	OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The lifetime of the project activity is 15 years which is in line with the approved FSR.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The starting date of the crediting period is on 1 May 2011. The length of the crediting period is 10 years.		OK
D Environmental Impacts						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/	DR	Yes. The EIA was approved by Shaoguan Environmental Protection Agency on 10 Feb 2009, and there are no conditions that need monitoring.		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/	DR	Yes. DNV check the EIA that the project complies with environmental legislation in the host country.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/	DR	As per the results of EIA and the reply from the approval of the local Environmental Protection Bureau, the impacts on the environment are not significant.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes. The environmental impacts have been properly described, which covers air impact, waste water and solid waste, noise and ecological environment.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E Stakeholder Comments						
E.1.1	Have relevant stakeholders been consulted?	/1/	DR	A stakeholder meeting was held on 10 March 2010 in SGIS Hotel. The meeting participants include the staff of SGIS, consultants, official government and residents in the neighbor area. The announcements of stakeholder consultation were published in Shaoguan Daliy and www.tqcdmchina.com . The project participants have also carried out a public survey on the project in the format of questionnaires; 35 questionnaires were sent. DNV have checked the stakeholder meeting records submitted by the project owner.		OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	A stakeholder meeting was held on 10 March 2010 in SGIS Hotel. The announcements of stakeholder consultation were published in Shaoguan Daliy and www.tqcdmchina.com .		OK
E.1.3	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	The stakeholder consultation process is not required by regulations or laws in China.		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/	DR	Yes. 35 copies of questionnaires were provided, which were verified by DNV to be consistent with the summary in the PDD.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/	DR	No negative comments were received from the stakeholder representatives.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 1 The LoA from Denmark has not been provided.	A.3.1-A.3.3	The Letter of Approval (LoA) from Denmark will be obtained after the Denmark DNA receives the Draft Final Validation Report of the project.	OK The LoA from Denmark has been provided. Therefore, the CAR 1 is closed.
CAR 2 The project participant would need to define the project's system boundaries in Figure B.1 in accordance with the methodology. The CO_2 from supplementary electricity consumption should be included in the project boundary.	B.3.1 B.3.2	The CO_2 from supplementary electricity consumption has been added in Figure B.1. Please find it in the revised PDD.	OK The project's system boundaries has been defined in Figure B.1 in accordance with the methodology. The CO_2 from supplementary electricity consumption has been included in the project boundary. Therefore, the CAR 2 is closed.
CAR 3 The project participant would need to state how to measure and record the electricity consumption of the auxiliary.	B.6.5 B.6.6 B.6.7 B.7.2 B.7.3 B.7.9	The total auxiliary electricity consumption will be monitored and calculated as: $M_{4b}+M_{5b}$, further more, M_4, M_5 will be recorded on a monthly basis. See details in the section B.7 in the PDD.	OK The auxiliary electricity consumption will be monitored and calculated as: $M_{4b}+M_{5b.}$ Therefore, the CAR 3 is closed.
CAR 4 a) The project participant would need to state the accuracy of meter in the PDD. b) The project participant would need to state the location of the meters. c) The project participant would need to state the equipment and measurement frequency for $Q_{OE,y}$	B.7.4	a) The accuracy of M_1, M_2, M_3, M_4 and M_5 is 0.5 or more accuracy, which has been added in the PDD. b) M_1 (0.5 or more accuracy, main meter) located at the exit of the generator will be employed to monitor the electricity generated by the project activity (M_1). M_4, M_5 (0.5 or more accuracy, main meters, bi-directional) located at the entrance of the SGIS Internal electricity system are used to measure electricity supplied to the SGIS	OK a) the accuracy of meter in the PDD is 0.5 or more accuracy b) see section B.7 in the PDD c) $Q_{OE,y}$ will be monitored by M1 Therefore, the CAR 4 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		internal electricity system (M_{4a}+M_{5a}) and auxiliary electricity consumption from the SGIS internal electricity system (M_{4b}+M_{5b}). M_2, M_3 (0.5 or more accuracy, back-up meters, bi- directional) located at the exit of the 10kV bus line of the project, which are back-up meter of M_4, M_5 respectively. c) A meter M_1 will be employed to measure the quantity of $Q_{OE, y}$, the frequency for $Q_{OE,y}$ is measured continuously and recorded on a monthly basis. This has been added in the PDD.	
CL 1 a) The project participant would need to provide the energy balance or any other relative evidence because of TRT and CDQ were operated prior to the implementation of the project activity. b) The project participant would need to provide evidence that 'SGIS receives about 66% of its electricity demand from captive plants' stated in the PDD	B.2.2	a) According to the 2009 Shaogang Power Generation Report, with the electricity generated by the cogeneration plant, TRT and CDQ, the electricity supplied by the captive plants is only 66% of its electricity demand, even with the electricity generated by the project, the electricity supplied by all the captive plants is only 72.7% of its electricity demand, still can not satisfy the electricity demand of Shaogang. b) According to the 2009 Shaogang Power Generation Report, the total electricity demand of shaogang is 2 001 964 045kWh, electricity generated by the captive plants is 1 327 951 365kWh, and others were sourced from the South China Power Grid. Therefore, it can be concluded that, SGIS receives about 66% of its electricity demand from captive plants. The relevant evidence will be submitted to	OK a) The energy balance or any other relative evidence because of TRT and CDQ were operated prior to the implementation of the project activity has been provided. DNV can confirm that it is transparent and can be demonstrated that the waste heat utilized in the project activity was released into the atmosphere in the absence of the project activity. b) DNV check the 2009 Shaogang Power Generation Report. DNV can confirm that 'SGIS receives about 66% of its electricity demand from captive plants'.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		DOE.	Therefore, the CL 1 is closed.
CL 2 The project participant would need to provide the evidence when the existing facilities were operated.	B.2.6	According to the Completion Acceptance Report of No.5 sinter machine compiled by Zhongye Changtian International Engineering Co., Ltd (hereafter referred as "ZCIE") on July 8, 2005, the No.5 sinter machine completed construction on January 31, 2005. The Completion Acceptance Report of No.6 sinter machine has not been compiled yet. However, according to the Engineering, Procurement and Construction (EPC) of No.6 sinter machine signed between the project owner and the ZCIE on March 3 2007, the No.6 sinter machine completed construction on July 7, 2008.	OK DNV check the Completion Acceptance Report. DNV can confirm that No.5 sinter machine completed construction on 31 January 2005. No.6 sinter machine completed construction on 7 July 2008. Therefore, the CL 2 is closed.
CL 3 The project participant would need to state that the remaining lifetime of equipments currently being used; and Credit period	B.2.9	According to the Completion Acceptance Report of No.5 sinter machine compiled by ZCIE on July 8, 2005, the operation date of No.5 sinter machine is January 31, 2005, and according to the FSR of No.5 sinter machine compiled by ZCIE on September 2003, the operation period is 20years. Therefore, the remaining lifetime of No.5 sinter machine is 15years from now on (July 2010). According to the Engineering, Procurement and Construction (EPC) of No.6 sinter machine signed between the project owner and the ZCIE on March 3, 2007, the starting date of No.6 sinter machine is July 7, 2008, and according to the FSR of No.6	OK DNV check the Completion Acceptance Report. The credit period of 10 years in PDD is reasonable. Therefore, the CL 3 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		sinter machine compiled by ZCIE on January 2007, the operation period is 20 years. Therefore, the remaining lifetime of No.6 sinter machine is 18 years from now on (July 2010). Therefore, the credit period of 10 years in PDD is reasonable. The relevant evidences will be submitted to DOE with this table.	
CL 4 a) For P 4: The project participant would need to clarify that the on-site or off-site existing/new fossil fuel based existing captive or identified plant was excluded. b) For P 5: The project participant would need to clarify that the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) For P 7: The exclusion of this alternative should be clarified further.	B.4.1-B.4.8	a) According to DOE on-site visit, there is no exiting fossil fuel based existing captive power plant in SGIS. Furthermore, according to the China Electric Yearbook 2008, the average operation hours of fossil fuel power plants in 2007 reached 5,344 hours, in order to supply the equivalent electricity, the installed capacity of the plant should be 26.28MW. According to regulation of electricity regulation, it is prohibited to construct a fossil fuel power plant under 135MW. Therefore, this scenario is not in compliance with the regulations and law of China. Therefore, P4 is excluded from the baseline scenario. b) There are two cogeneration plants, TRT and two CDQ power plants implemented in SGIS, however all the captive power plants can only supply 66% of the power demand of SGIS, and SGIS have to purchase power from the South China Power Grid, and therefore, the project is impossible to	OK a) No fossil fuel based existing captive power plant in SGIS. b) There are two cogeneration plants, TRT and two CDQ power plants implemented in SGIS, however all the captive power plants can only supply 66% of the power demand of SGIS. c) No addtional waste heat can be utilized by the project activity. It is impossible to generate the same power with lower efficiency than the project. Therefore, the CL 4 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		replace the output of the six existing power plants. Furthermore, in case of two cogeneration plants and two CDQ power plants, the products of the cogeneration plants and CDQ power plants are electricity and heat, however, the project can only supply electricity to the internal electricity system of SGIS. Therefore, these two cogeneration plants, two TRT projects and two CDQ power plants can not become the baseline scenario. In conclusion, the onsite or offsite other waste energy-based existing captive or identified plant was excluded. c) If constructing new captive electricity generation plants with lower efficiency than the project to generate equivalent electricity, in order to supply the equivalent electricity, it will need more waste heat than the project. However, the proposed project will recover all the waste heat to generate electricity, further more, for the other sinter machine, No. 1,2,3 sinter machine had been eliminated, No. 4 sinter machine will be eliminated at the end of year 2010. Hence, there is no addtional waste heat can be utilized by the project activity. Therefore, it is impossible to generate the same power with lower efficiency than the project. Therefore, P7 is excluded from the baseline scenario.	
CL 5	B.5.18	The operating lifetime of 15 years was sourced from the approved FSR which is	OK

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The project participant would need to clarify that 15 years of depreciation cost is reasonable.		compiled by an authoritative and independent third party ZCIE in September 2008. Therefore, the operating lifetime in FSR is convincible. Moreover, according to paragraph 3, Annex 58 "Guidelines On The Assessment Of Investment Analysis" issued at EB 51 meeting, the minimum period of the lifetime is 10 years, and the maximum period of the lifetime is 20 years. Therefore, for this project, the lifetime of 15 years is reasonable, and 15 years of depreciation cost is reasonable either. Furthermore, even with the application of 20 years depreciation, the equity IRR is 10.67%, still lower than benchmark.	DNV check the FSR. DNV can confirm that 15 years of depreciation cost is reasonable. Therefore, the CL 5 is closed.
CL 6 The project participant would need to state the plant load factor in the PDD	B.5.20	The plant load factor of this project is 64.1%, which has been added in the PDD.	OK The plant load factor has been updated to the PDD. Therefore, the CL 6 is closed.
CL 7 a) The project participant would need to clarify that the benchmark is equity, however the IRR is the project one. b) This benchmark is post tax, so the loan interests should be considered for the income tax calculation.	B.5.24 B.5.25	a) The benchmark of this project was chose though the following two steps: Step 1: chose EIRR. As per the investment Analysis Guideline (EB 51, Annex 58), the purpose of EIRR and PIRR is different. The purpose of EIRR calculation is to determine the final return on the initial equity investment and the PIRR calculation is to determine the viability of the project to service debt. As the project has been entirely financed by Equity capital, the	OK a) DNV check Economic Evaluation Method and Parameters for Construction Projects, DNV can confirm that the bench mark is reasonable. b) No loan in this project. Therefore, the CL 7 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		project owner concerned more about the final return on the initial equity investment. Therefore, The EIRR was chose firstly. Step 2: chose post-tax EIRR. The Economic Evaluation Method and Parameters for Construction Projects does not define the post-tax project IRR benchmark, and it just has post-tax EIRR and pre-tax PIRR.As mentioned above, the EIRR should be chose for this project, therefore, the post-tax EIRR benchmark was chose finally. b) According to FSR and on site validation, all the investment of this project is sourced from equity, and there is no loan from the bank, therefore, the loan interests should not be considered for the income tax calculation.	
CL 8 In the sensitivity analysis, the key parameters should be elaborated not only in the PDD, but also in the spread sheet.	B.5.27 B.5.28	The key parameters have been elaborated in the IRR spreadsheet. The revised IRR spreadsheet will be submitted to DOE.	OK The IRR spread sheet has been updated. Therefore, the CL 8 is closed.
CL 9 The project participant would need to clarify that 'the project activity is first-of-kind in Guangdong Province'.	B.5.42-B.5.47	According to the China Steel Yearbook 2001-2007, which is the only official and authoritative public source regarding Iron and Steel industry in China, there is no similar project activities have been in operation in Guangdong Province; And through research of internet website, no similar project has been noticed in Guangdong Province. Therefore, it can be concluded that the proposed project is first-of-kind in Guangdong Province.	OK DNV check the China Steel Yearbook 2001-2007. DNV can confirm that the project activity is first-of-kind in Guangdong Province. Therefore, the CL 9 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 10 In order to verify the starting date of the project activity, the project participant would need to provide the evidence when was the first construction activity.	C.1.2 C.1.3 C.1.4	According to the Project Starting Permission issued by the Supervisor Company and the Equipment Contractors on May 25, 2010, the first construction activity date of the project is May 26, 2010. The starting date (January 29, 2010) of this project in PDD is later than the first construction activity date in the Project Starting Permission; therefore, the starting date in PDD is reasonable. The Project Starting Permission will be submitted to DOE.	OK DNV can firm that the starting date of this project was on 29 January 2010 which the date of Engineering Procurement Construction. Therefore, the CL 10 is closed.

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
FAR N/A		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Deng Cuiping, Lucy

Ms. Deng Cuiping, Lucy holds a Master Degree in Chemical Technology. She has an overall experience of around 21 years. Prior to joining DNV, having 10 years experience in chemical industry covering research and development of acrylic additives used in coating and adhesive industries, new method and technology in anti-counterfeit field such as oil and paper. Also she has more than 7 years of consulting and auditing experiences in environmental management system and safety & health management system.

She has experience of around 3 years in validation and verification of CDM projects and other 3rd party validation/verification services.

Her qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in chemical processes industries, waste handling and disposal, and energy generation from renewable energy sources.

Wang Ning Neil

Mr. Wang Ning, Neil holds a Master Degree in Energy and Environment Technology. He has an overall experience of around 5 years. Prior to joining DNV, he has 3 years experience in cement industry covering analysis of market and technical consultancy services.

He has experience of around 2 years in validation and verification of CDM projects and other 3rd party validation/verification services.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in cement industry.

Zhang Xiaojun, Johnsen

Mr. Zhang Xiaojun, Johnsen holds a Master Degree in Metallurgical Physical Chemistry and obtained his MBA in project management. He has an overall experience of 26 years. Prior to joining DNV, Johnsen had an overall experience of 4 years in glass manufacturing industry covering production, energy efficiency improvement and commissioning. Later on he gained combined experience of more than 15 years in the iron and steel industry, while he worked as researcher and management personnel in Central Iron and Steel Institute, the sector covering the refractory, iron & steel, waste heat recovery, energy efficiency and relevant environmental affairs. His experience also covers the fields of environmental management, resource conservation and cleaner production in various manufacturing and metallurgical industries.

He has also gained the experience in Management System Audits such as ISO 9001, ISO 140001 standards in various industrial sectors for more than 3 years for industrial plants.

For financial analysis and investment, he has gained the relevant knowledge through his MBA course; and through the feasibility case study in the iron and steel sector while he worked as management personnel, he gradually gained concerted experience in cost accounting, financial analysis and investment input parameter assessment.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV in China.

His qualification, industrial and investment experience and experience in CDM demonstrate him sufficient sectoral competence in "Glass", "Iron and Steel" and "Energy Generation from Renewable Energy Sources".

Zhang Yongkang, Phillip

Mr. Zhang Yongkang, Phillip holds a dual-Bachelor Degree in Environmental Engineering and Chemical Engineering. Having an overall experience of around eight years. Prior to joining DNV, having around seven years experience in Environmental Engineering at international water company specialized in water and wastewater treatment in pulp and paper and Chemical industry. He has been involved in more than 15 large-scale water and wastewater projects in China since 2002. He is also expert at coarse screen, fine screen, filter, surface aerator and clarifier, sedimental treatment and sludge treatment equipments, process and design principle and also been involved in water quality analysis and monitoring of COD, BOD and SS. In addition, he has also gained substantial experience and involvement in technical support, designing drawings and document review, project management and consultancy with clients and on site technical supervision in both water and wastewater treatment.

He has experience of around half of year in validation CDM projects in DNV Beijing office. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in "Waste Handling and Disposal".

Seshan Ranganathan

Mr. Seshan Ranganathan holds a Bachelor's Degree in Chemical Engineering and has done diploma course in Management and completed the graduate ship course in Industrial Engineering and has an overall working experience of around twenty six years. Prior to joining DNV has around twenty four years experience in Chemical process industry (fertilizer & petrochemical manufacturing) covering production, technical services including energy audits and efficiency studies, waste heat recovery, efficiency studies of boilers ,power plants , safety audits and pollution control activities including waste water treatment, project management, corporate planning, sales, logistics in fertilizer & petrochemical industry . With respect to the thermal power plant the job assignment included the monitoring of flue gas exit temperatures, excess air used, efficacy of fuel additives, condition of boiler refractory, insulation of steam lines etc. The experience also includes 5 years in process design & engineering for chemical process industry.

He has experience of over two years in validation and verification of CDM projects in DNV. He has completed the EMS lead auditor course

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Thermal Energy Generation from fossil fuels.

Ole Andreas Flagstad

Mr. Ole Andreas Flagstad has a technical background in thermodynamics and energy efficiency and holds degrees in refrigeration/energy efficiency (NTNU, Norway) and chemical heat pumps (Univ. de Perpignan, France). He has worked both in public and private sector, including experience from a research institute (IFE), the research council of Norway (NFR) and industry (DNV).

At DNV (2002-) he started in the research unit and is currently working with climate change services. Ole Andreas has 3 years experience in validation and verification of projects within CDM, JI and other carbon credit schemes. His qualifications, and experience in carbon credit schemes (primarily CDM and JI), qualifies him for different roles in a broad group of technical areas

Other experience includes working in European research programmes, administering national research programmes and IEA-annexes.

Luis Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering. He has an overall experience of thirty tree years. Prior to joining DNV having around twenty tree years experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control. He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Yang Xiaoshan

Mr. Yang Xiaoshan holds a Bachelor Degree in Material Science and Engineering. He has an overall experience of around five years. Prior to joining DNV, having around four years experience in cement manufacturing industry covering production, process optimization, quality assurance, waste heat recovery and energy efficiency improvement. His experience also covers the fields of environmental management and resource conservation including alternative fuels, cheap coal, and solid waste disposal in clinker kiln. He has also been actively involved in implementation of Quality Management System, ISO 9001 standard in cement manufacturing industry for more than three years.

He has experience of around 1 year in validation and verification of CDM and VCS projects.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in “Cement Manufacturing”.