MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	24MW Power Generation from Coking Waste Heat Generated in the Clean-type Heat-recovery Coke Ovens at Shanxi Sinochem Wonder Industries Co. Ltd.
Reference number of the project activity	1717
Version number of the monitoring report	1.0
Completion date of the monitoring report	14 March 2012
Registration date of the project activity	18 July 2008
Monitoring period number and duration of this monitoring period	Monitoring period number: 1st Duration: 18 Jul 2008 – 25 December 2009
Project participant(s)	Shanxi Sinochem Wonder Industries Co. Ltd China; Trading Emissions PLC.
Host Party(ies)	People's Republic of China
Sectoral scope(s) and applied methodology(ies)	Applied methodology: ACM0004 Sectoral scope: Energy Industries
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	199,255 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	116,092 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project involves the utilisation of waste heat from coke production at Sinochem Wonder Industries Coking Facility in Shanxi Province to generate electricity. The purpose of the project is to generate electricity using waste heat and to sell the electricity to the North China Power Grid (NCPG).

The project installed four waste heat boilers (1*25t/h, 2*35t/h, 1*46t/h) and four steam turbines coupled to four generators (4*6MW), provides a total installed electricity generation capacity of 24MW and an estimated annual gross electricity production of 144GWh. The total net electricity generated was estimated as 134.2GWh per annum. All of the net electricity produced by the project has supplied to the Shanxi Power Grid which is a constituent of the North China Power Grid.

A.2. Location of project activity

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The proposed project is sited in northeast of Houma City, southwest of Shanxi Province. It is 10km away from the centre of Houma City. The geographical coordinates are east longitude 111 °21′ and north latitude 35 °37′.

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Shanxi Sinochem Wonder Industries Co. Ltd China	No
UK	Trading Emissions PLC	No

A.4. Reference of applied methodology

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The following approved methodologies have been applied to the proposed project activity:

- ACM0004: Consolidated baseline/monitoring methodology for waste gas and/or heat and/or pressure for power generation (version 02)
- ACM0002: Consolidated baseline/monitoring methodology for grid-connected electricity generation from renewable sources (version 06)
- Tools for the Demonstration and Assessment of Additionality (version 04)

More information about the methodologies and the tool can be found on the website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

A.5. Crediting period of project activity

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18/07/2008 – 17/07/2015

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity employs waste heat recovery boilers and steam cycle power generation technology to produce electricity. The project activity located at a clean type non-chemical recovery type coke production facility.

Coke is produced by the pyrolysis of coal in coking ovens. This involves the heating of prepared coal at high temperatures in the absence of oxygen. Most coke is produced in by-product coke ovens. As the coal is heated volatiles are driven off forming coke oven gas. In a traditional by-product coke oven this gas is used to produce a range of chemicals. In a clean type non-chemical-recovery system such as at the site of the project activity, the coke oven gas and other volatiles driven off the coal are combusted inside the coke ovens.

The coking plant consists of a battery of coke ovens. Each oven has two doors, one for charging the coal and the other for removing the coke. The ovens themselves remain hot between batches and this heat is sufficient to commence the coking process. No external heat energy source is required. As the gases come off the coal they are combusted in the air space above the coal and in downcomers down the side of the ovens and also under the floor of the ovens. This combustion ensures even spread of thermal energy around the coal. The hot combustion gases leave the ovens and are carried along a pipe running the length of the battery to the stack where they are currently emitted directly to the atmosphere.

The waste heat boilers were installed at the point where the combustion gases reach the stack. At this point the gases are still at a high temperature but are no longer contributing thermal energy to the process. As the waste heat boiler is being installed at the end of the coking process and as the process requires no additional thermal energy input it is clear that the waste heat is not of use on the site without the installation of the project activity. As the combustion gases pass through the waste heat boiler they will produce steam which will be used to power a steam turbine and generator.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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Not applicable.

B.2.2. Corrections

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Not applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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It was presented in PDD “The project owner and the grid company will get and record the readings of electricity meters at the grid-connection point within the 24 hours of the last day of every month and check the reading”;

The actual situation is that “The project owner and the grid company will get and record the readings of electricity meters at the grid-connection point at 20:00 on the 25th of every month and check the reading

B.2.4. Changes to project design of registered project activity

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The PDD was written based on the FSR. The FSR was conducted by Guanghua Electric Power Survey Design Institute in 2002. In the FSR the proposed engineering design was 24MW (4*6 MW turbines and generators with five 30 t/h boilers, i.e. a total capacity of 150t/h).

In June 2005 while implementing the project, Shanxi Metallurgical Design Institute, a third party organization which was contracted to provide detailed boiler design, proposed an optimized solution:

Instead of 5 boilers with 150t/h total capacity, 4 boilers with 141t/h capacity were suggested to be installed, however, the power generation capacity is remained to be 24MW. This proposal was finally accepted by the project owner, because such improvement was optimized to match:

a) actual waste heat volume from the four different coke ovens;
b) the steam demand by the 4*6 MW turbines and generators; and
c) the physical layout of the waste heat utilization power plant.

2. These boilers are 1*25t/h, 2*35t/h, 1*46t/h. These 4 boilers could reach the same purpose of capturing the waste heat and supply sufficient steam for the same capacity (4*6MW) of power generation sets.

B.2.5. Changes to start date of crediting period

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Not applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not applicable

SECTION C. Description of monitoring system

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Data collection procedure

Data generation: As shown in the figure C-1below, six meters (M_1, M_2, M_3, M_4, M_5, M_6) are installed, M_1, M_2, M_3, M_4 are installed at the exit of the generators to measure EG_{GEN}, M_5, M_6 are installed at the inlet of transformers to measure EG_{AUX}.

Data recording: The readings of the electricity meters are recorded by DCS system and written down in paper and also can be converted into an excel sheet.

Data aggregation: The calculated net electricity supplied to the grid per month is summed over the monitoring period.

Calculation: See section D.2 and section E. The electricity exported and consumed by the project activity per month is measured simultaneously by the meters. Net power supplied to the grid is electricity exported minus consumed by the project activity. Emission reduction is calculated as net electricity supplied to the grid multiplied by the emission factor of the grid.

Reporting: The calculated values are included in an Excel sheet and reported in the CDM-MR. The meters were installed by qualified personnel from the accredited authorization. When replacing the meters, the project owner makes detailed records.

Organizational structure, roles and responsibilities

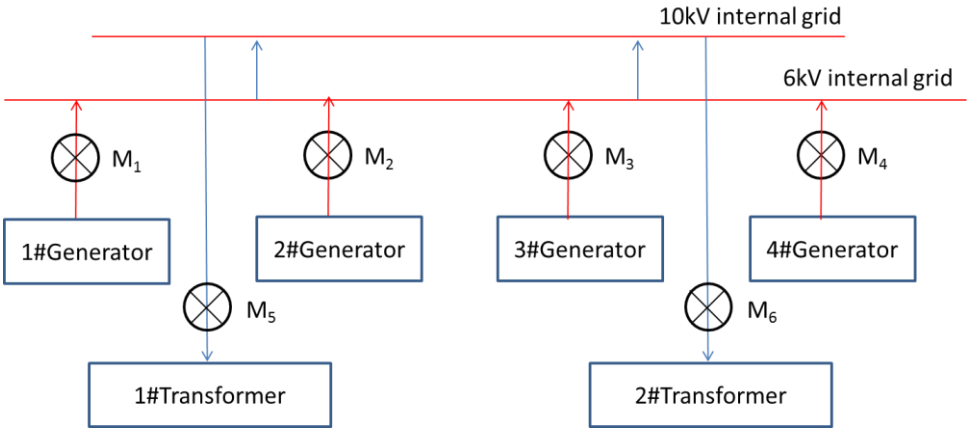
Overall responsibility for daily monitoring and reporting lies with the project owner. A CDM group is established to carry out the monitoring work, which includes data recording, reporting, archiving and etc. Its staffs are trained by the experts of the project consultancy.

Emergency procedures for the monitoring system

The site manager will notify the grid company in case there is doubt about the correct functioning of the meter mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meter. If the problem can be solved quickly, no CERs are claimed for the

period during which the meter was not functioning correctly. If the problem cannot be solved quickly, the CERs generated in the downtime are invalid. See section B.1 for information on downtime of equipment.

Line Diagram C-1



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

(Copy this table for each piece of data and parameter.)

Data/Parameter	EF_y
Unit	tCO_2e/MWh
Description	Combined emission factor of the grid
Source of data	China Electric Power Yearbook
Value(s) applied	1.0303
Purpose of data	For baseline emission calculation
Additional comment	-

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data/Parameter	EG_{GEN}	
Unit	MWh	
Description	Electricity delivered to grid in year y	
Measured/Calculated /Default	Measured	
Source of data	Measured based on four installed meters (M_1, M_2, M_3, M_4)	
Value(s) of monitored parameter	Details showed in Table E-1	
Monitoring equipment	Type: Main meter (M_1) Accuracy class: 0.5S Serial number: B906000031 Dates of calibration: 20/03/2009, 19/03/2010	Type: Main meter (M_2) Accuracy class: 0.5S Serial number: B906000040 Dates of calibration: 20/03/2009, 19/03/2010
	Type: Main meter (M_3) Accuracy class: 0.5S Serial number: B906000010 Dates of calibration: 20/03/2009, 19/03/2010	Type: Main meter (M_4) Accuracy class: 0.5S Serial number: B906000033 Dates of calibration: 20/03/2009, 19/03/2010
Measuring/Reading/ Recording frequency	Measuring: Continued Recording frequency: monthly The electricity measured by the meters is aggregated once on 25th in every month.	
Calculation method (if applicable)	-	
QA/QC procedures	According to national standard, the meter will be calibrated yearly. Data measured by the meter will be cross checked by the electricity sales documents or invoice, the conservative data between the measured data and data from Electricity Transaction Notes (ETN) documents or invoice will be used to calculate CERs during the verification.	
Purpose of data	For net electricity generation calculation.	
Additional comment	-	

Data/Parameter	EG_{AUX}	
Unit	MWh	
Description	The auxiliary electricity consumed by the proposed project	
Measured/Calculated /Default	Measured	
Source of data	Measured by four install meters (M_5, M_6)	
Value(s) of monitored parameter	Details showed in Table E-1	
Monitoring equipment	Type: Main meter (M_5) Accuracy class: 0.5S Serial number: D0159415 Dates of calibration: 20/03/2009, 19/03/2010	Type: Main meter (M_6) Accuracy class: 0.5S Serial number: D0159440 Dates of calibration: 20/03/2009, 19/03/2010
Measuring/Reading/ Recording frequency	Measuring: Continued Recording frequency: monthly The electricity measured by the meters is aggregated once on 25th in every month.	
Calculation method (if applicable)	-	
QA/QC procedures	According to national standard, the meter will be calibrated yearly. Data measured by the meter will be cross checked by the electricity sales documents or invoice, the conservative data between the measured data and data from Electricity Transaction Notes (ETN) documents or invoice will be used to calculate CERs during the verification.	
Purpose of data	For net electricity generation calculation.	
Additional comment	-	

D.3. Implementation of sampling plan
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Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks
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The formula of baseline emission calculation is as follow:

$BE_{electricity,y} = EG_y * EF_{electricity,y}$

where:

$BE_{electricity,y}$ is the baseline emissions during the year y in tCO_2,
EG_y is net quantity of electricity supply by the project during the year y in MWh,
$EF_{elelctricity,y}$ is CO_2 baseline emission factor for the electricity displaced due to the project activity during the year y in tCO_2/MWh.

Calculation of EG_y

According to the monitoring methodology of ACM0004, the net electricity supply of the project activity, EG_y equals to the electricity generation EG_{GEN} minus the auxiliary electricity consumption EG_{AUX} in the project boundary:

$EG_y = EG_{GEN} - EG_{AUX}$

Where:

EG_y is net quantity of electricity supply by the project during the year y in MWh,

EG_{GEN} is total electricity generation by the project during the year y in MWh,

EG_{AUX} is auxiliary electricity consumption in the project boundary during the year y in MWh.

Calculation of $EF_{electricity,y}$

The result of $EF_{OM,y}$ is1.1208 tCO_2e/MWh.

The result of $EF_{BM,y}$ is 0.9397 tCO_2e/MWh.

$EF_{electricity,y}$ = 0.5*1.1208+0.5*0.9397=1.0303 tCO_2e/MWh

Thus, $BE_{electricity,y} = EG_y * EF_{electricity,y}$ = 112,678.3 * 1.0303 =116,092 tCO_2

Period	EG_{GEN} on MRR	EG_{GEN} on ETN	Verified EG_{GEN}	EG_{AUX} on MRR	EG_{AUX} on ETN	Verified EG_{AUX}	EG_y	EF	BE_y
	MWh	MWh	MWh	MWh	MWh	MWh	MWh	tCO_2e/MWh	tCO_2e
	A	**B**	**C=MIN(A,B)**	**D**	**E**	**F=MAX(D,E)**	**G=C-F**	**H**	**I=G*H**
18/07/2008 ~ 25/08/2008	8971.56	8971.56	8971.56	841.52	841.52	841.52	8130.04	1.0303	8376.38
26/08/2008 ~ 25/09/2008	6334.56	6334.56	6334.56	689.48	689.48	689.48	5645.08		5816.13
26/09/2008 ~ 25/10/2008	6209.16	6209.16	6209.16	665.00	665.00	665.00	5544.16		5712.15
26/10/2008 ~ 25/11/2008	7532.16	7532.16	7532.16	741.32	741.32	741.32	6790.84		6996.60
26/11/2008 ~ 25/12/2008	7127.28	7127.28	7127.28	466.86	466.86	466.86	6660.42		6862.23
26/12/2008 ~ 25/01/2009	7485.48	7485.48	7485.48	689.82	689.82	689.82	6795.66		7001.57
26/01/2009 ~ 25/02/2009	7539.96	7539.96	7539.96	683.36	683.36	683.36	6856.60		7064.35
26/02/2009 ~ 25/03/2009	6727.56	6727.56	6727.56	622.54	622.54	622.54	6105.02		6290.00
26/03/2009 ~ 25/04/2009	7269.48	7269.48	7269.48	689.00	689.00	689.00	6580.48		6779.87
26/04/2009 ~ 25/05/2009	7177.20	7177.20	7177.20	667.82	667.82	667.82	6509.38		6706.61
26/05/2009 ~ 25/06/2009	7335.72	7335.72	7335.72	689.76	689.76	689.76	6645.96		6847.33
26/06/2009 ~ 25/07/2009	7250.16	7250.16	7250.16	666.18	666.18	666.18	6583.98		6783.47
26/07/2009 ~ 25/08/2009	7450.44	7450.44	7450.44	689.60	689.60	689.60	6760.84		6965.69
26/08/2009 ~ 25/09/2009	7479.96	7479.96	7479.96	689.90	689.90	689.90	6790.06		6995.80
26/09/2009 ~ 25/10/2009	7253.76	7253.76	7253.76	629.38	629.38	629.38	6624.38		6825.10
26/10/2009 ~ 25/11/2009	7564.68	7564.68	7564.68	690.92	690.92	690.92	6873.76		7082.03
26/11/2009 ~ 25/12/2009	7471.56	7471.56	7471.56	689.92	689.92	689.92	6781.64		6987.12
Total							112678.30		116092.00

E.2. Calculation of project emissions or actual net GHG removals by sinks
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As prescribed in the registered PDD, the Project Emission is zero according to the applied methodology. Thus, $PE_y = 0\ tCO_2$.

E.3. Calculation of leakage
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As prescribed in the registered PDD, there is no leakage in the proposed project activity.
Thus, $LE_y = 0\ tCO_2$.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	116,092	0	0	116,092

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	199,255	116,092

E.6. Remarks on difference from estimated value in registered PDD
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As per the registered PDD, the annual average estimation of emission reduction was 138,266 tCO_2. The average emission reduction for one year generated in this monitoring period is reported as 80,558 tCO_2 which is lower than the estimated value of PDD.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		