MONITORING REPORT

Jincheng Sihe Coal Mine CMM Generation Project

UNFCCC Project Reference Number: 1896

Monitoring Period

Start Date: 22/04/09 - End Date: 31/08/09

Jincheng Anthracite Mining Group Co., Ltd.

LIST OF ACRONYMS

CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMM	Coalmine methane
NMHC	Non-methane hydrocarbons
PDD	Project Design Document
JMC	Jincheng Anthracite Mining Group Co., Ltd.

DOCUMENT STATUS

Approval of this monitoring report:

Date:

Signed by (name and position):

Signature:

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1. Introduction

The purpose of this Monitoring Report for the Jincheng Sihe Coal Mine CMM Generation Project (UNFCCC reference number 1896) is to calculate the emission reductions achieved by the project activity in the period covered by this report, and to serve as the basis for the verification of these emission reductions and issuance of the CERs.

2. Project description

2.1 Title of the project activity

Jincheng Sihe Coal Mine CMM Generation Project

UNFCCC reference number: 1896

2.2. Project category

The categories of the project activity are as follows:

Category 8: Mining/Mineral Production

Category 10: Fugitive Emissions from Fuels (solid, oil and gas)

2.3 Project summary

Jincheng Sihe Coal Mine CMM Generation Project is to utilize the coal mine methane (CMM) which would have been vented to the atmosphere for grid-connected power generation with an installed capacity of 120 MW. The power plant consists of four power houses, installing altogether 60 gas engines, 1.8MW for each, 12 sets waste heat boilers and 4 sets of steam turbines, 3MW for each. The electricity generated by the project activity is exported to the North China Grid.

2.4 Methodology for emission reductions calculation

2.4.1 Methodology

The PDD is based on the approved consolidated methodology ACM0008 (Version 03): "Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring".

Meanwhile, according to ACM0008, version 06 of approved consolidated methodology ACM0002 "consolidated methodology for grid connected power generation from renewable

energy" is adopted to calculate the emission factor of the North China Grid.

2.4.2 Formulae used to calculate emission reductions

The project and baseline emissions and emission reductions are calculated based on the following steps.

Step 1: Calculation of the project emissions

Project emissions are calculated with formulae 1, 2, 3, and 6 below[1]. The values of some parameters are fixed for the crediting period (see Table 1 and PDD for details).

$$PE = PE_{ME} + PE_{MD} + PE_{UM} \quad (1)$$

Where:

PE is the project emissions (tCO2e)

PE_{ME} is the project emissions from energy use to capture and use methane (tCO2e)

PE_{MD} is the project emissions from methane destroyed (tCO2e)

PE_{UM} is the project emissions from un-combusted methane (tCO2e)

And:

$$PE_{ME}=CONS_{ELEC,PJ}\times CEF_{ELEC} = 0^{2} \quad (2)$$

$$PE_{MD}= MD_{ELEC}\times (CEF_{CH4} + r\times CEF_{NMHC}) \quad (3)$$

As the NMHC concentration is less than 1% of the coalmine gas throughout the monitoring period, thus the combustion emissions from non-methane hydrocarbons can be ignored[3] (r=0).

Therefore, $PE_{MD}=MD_{ELEC}\times CEF_{CH4}=(MM_{ELEC}\times Eff_{ELEC})\times CEF_{CH4}=(MM_{ELEC}\times 0.995)\times 2.75$

$$PE_{UM} =GWP_{CH4} \times MM_{ELEC}\times (1-Eff_{ELEC})= 21\times MM_{ELEC}\times(1-0.995) \quad (6)$$

Where:

$CONS_{ELEC}$ is the additional electricity consumption for use of methane (MWh)

MD_{ELEC} is the methane destroyed through power generation (tCH_4)

MM_{ELEC} is the methane measured delivered to power plant (tCH_4)

[1] For easy reference, the numbers for formulae are in consistence with the ones used in the PDD.

[2] When calculating the ER, the net electricity delivered to the grid is used (as per PDD, page 22).

[3] The NMHC concentration will continue being monitored annually to check whether its concentration is below or above 1% to determine if the NMHC combustion be included in the project emissions.

CEF_{CH4} is the carbon emission factor for combusted methane (tCO_2e/tCH_4)

Eff_{ELEC} is the efficiency of methane destruction /oxidation in power plant

Step 2: Calculation of the baseline emissions

$$BE = BE_{MD} + BE_{MR} + BE_{Use} \quad (7)$$

Where:

BE is the baseline emissions (tCO_2e)

BE_{MD} is the baseline emissions from destruction of methane in the baseline scenario (tCO_2e)

BE_{MR} is the baseline emissions from release of methane into the atmosphere that is avoided by the project activity (tCO_2e)

BE is the baseline emissions from power generation replaced by this project (tCO_2e)

And:

$BE_{MD} = 0$[4]

$$BE_{MR} = 21 \times MM_{ELEC} \quad (10)$$

$$BE_{Use} = (GEN_1 - GEN_2) \times EF_{ELEC} = (GEN_1 - GEN_2) \times 0.98255 \quad (11)$$

Where:

GEN_1 is the Electricity supplied by project activity to North China Grid (MWh);

GEN_2 is the Electricity consumed by project activity which is supplied by North China Grid in case of emergency (MWh)

The values used in the formulae above are given in Table 1 below.

Table 1: Parameter Values (ex-ante) from the PDD

Parameter	Value	Unit	Description
CEF_{ELEC}	0.98255	tCO_2e/MWh	Carbon emissions factor of electricity used by coal mine (=EF_{ELEC})
Eff_{ELEC}	99.5	%	Efficiency of methane destruction/oxidation in power plant

[4] See PDD page 24.

CEF_{CH4}	2.75	tCO_2e/tCH_4	Carbon emission factor for combusted methane
GWP_{CH4}	21	$tCO2e/tCH_4$	Global warming potential of methane
EF_{ELEC}	0.98255	tCO_2/MWh	Emissions factor of North China Grid

Step 3: Calculation of the project leakage

As described in the PDD, the leakage of this project is 0.

Step 4: Emission Reductions Calculation

$$ER = BE - PE \quad (16)$$

where:

ER emissions reductions of the project activity (tCO_2e)

BE baseline emissions (tCO_2e)

PE project emissions (tCO_2e)

2.5 Data to be monitored

The data to be monitored and needed for the calculation of the project and baseline emissions are listed in Table 2 below.

Table 2: Main Data Monitored

Parameter	Unit	Description
MM_{ELEC}	tCH4	Methane measured delivered to power plant
GEN_1	MWh	Electricity supplied by project activity to North China Grid
GEN_2	MWh	Electricity consumed by project activity which is supplied by North China Grid in case of emergency

In addition, the following parameters are to be monitored:

- PC_{CH4}: concentration of methane in extracted gas (%). The methane concentration is required to calculate MM_{ELEC} and MM_{BL}(the methane consumed by the 15MW power plant);
- $PC_{NMHC:}$ NMHC concentration in coal mine gas (%);
- CEF_{NMHC}: carbon emission factor for combusted non methane hydrocarbons if NMHC concentration is >1%, which has not been the case during this monitoring period;
- MM_{total}: total methane extracted in Sihe Coal Mine;
- $MM_{release}$: total methane still released to the atmosphere;
- MM_{BL}: methane consumed by the 15MW power plant; and
- GEN_{BL}: electricity supplied by the 15MW power plant to JMC Internal Grid.

The following figure represents the generic diagram of flows and monitoring points.

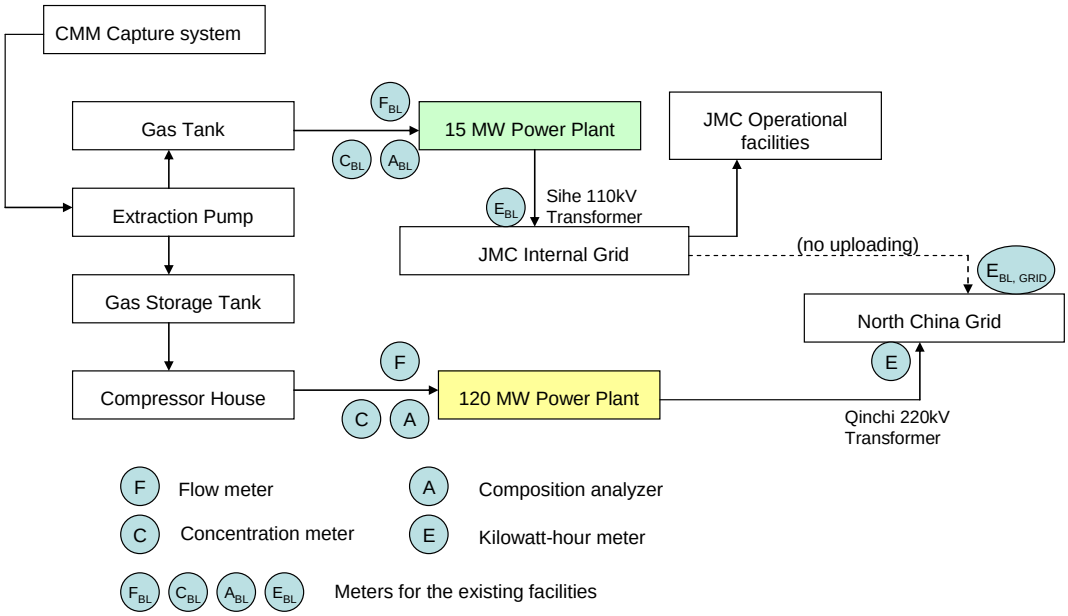

Figure 1: Diagram of gas flow and monitoring points

2.6 Quality assurance and quality control measures

2.6.1 Organization structure and roles and responsibilities

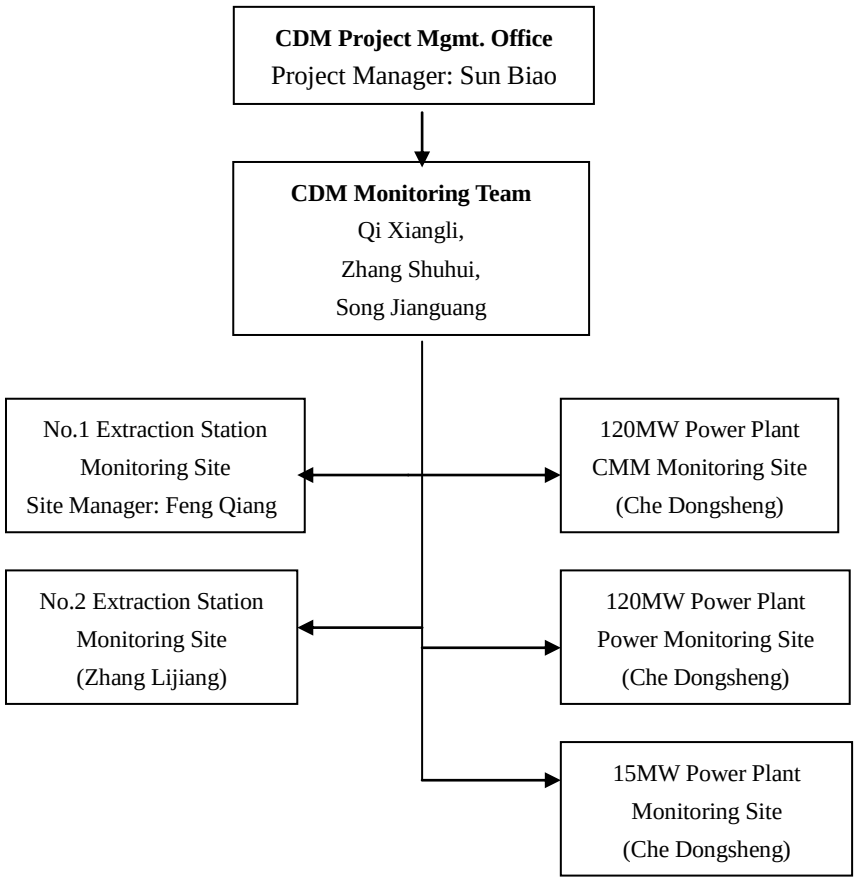

Figure 2: Organizational Structure

The JMC has established a CDM Project Management Office and appointed Ms. Sun Biao as the project manager, who oversees the Office and is responsible for the overall CDM monitoring activities at JMC, supervising the implementation of the Monitoring Plan, checking and reviewing related data, reviewing and issuing the monitoring report.

Under the CDM Project Management Office, a Monitoring Team, consisting of Qi Xiangli, Zhang Shuhui and Song Jianguang has been established and is responsible for coordinating the monitoring issues of each monitoring site, supervising the regular checking and maintenance of the related meters, data recording, data handling and report preparations. The monitoring staffs have all received specific technical training before assuming their responsibilities.

At each monitoring site, a monitoring group has been established, including a site manager and several monitoring staffs:

- For the No.1 CMM Extraction Station, the site manager is Feng Qiang;

- For No.2 CMM Extraction Station, the site manager is Zhang Lijiang; and
- For the 120MW CMM Power Plant and the experimental 15MW CMM Power Plant, the site manager is Che Dongsheng.

The monitoring group is responsible for operations, maintenance and calibration of the monitoring meters and timely and accurately recording the data in accordance with the "CDM Project Management and Operating Manual" for this project. The site manager and monitoring staffs have all received necessary training.

2.6.2 Monitoring equipment

Monitoring equipments have been installed on all monitoring sites, including at No.1 and No.2 CMM Extraction Station, Compressor House (for MM_{ELEC}) and central controlling room (for GEN_1 and GEN_2) of 120MW CMM Power Plant and 15MW CMM Power Plant. The setup of the equipments is in accordance with the monitoring plan of the PDD (see Figure 1).

All instruments installed are in compliance with relevant national/sectoral standards and are calibrated and maintained in accordance with the manufacturers' instructions and relevant national/sectoral standards (see details in the meter list below). All relevant records have been archived (see section 2.6.4) and will be kept for at least 2 year after the end of the crediting period.

Table 3: Jincheng Sihe 120MW CMM Power Plant Meter List

Type of Meter	Range	Accuracy Level	Calibration Frequency	Number of installed meters
Gas Flow Meter	0～6.0KPa	0.20%	Annual	7
Pressure Transmitter	0～100KPa	0.20%	Annual	6
Temperature Transmitter	-200-500℃	±(0.30+0.005|t|)	Annual	9
Methane Analyzer	0-100%	±2.0%*	Annual	5
Power Meter	0-99999.999	0.2S	Annual	2

*Note: the best available methane analyzer is used for monitoring.

The maintenance of monitoring equipment is performed by the trained monitoring staff at each site, supervised by the site manager. Regular maintenance and repair of equipment are carried out by the manufacturers national/sectoral standards and manufacturers' requirements.

2.6.3 Training

The monitoring staffs have all received specific technical training before assuming their responsibilities. The site manager and monitoring staffs have all received necessary training.

There are three kinds of training and professional education provided to the staffs:

1) The monitoring equipment suppliers provide training to the site managers and staff on

how to operate the equipment and read meters so that the staff can undertake the tasks of data recording and equipment maintenance required by the monitoring plan;

2) The CDM experts provide specific CDM training to all personnel involved in the monitoring tasks;

3) Internal trainings are conducted periodically on how to comply with the rules and requirements in the "CDM Project Management and Operating Manual" for this project.

2.6.4 Data collection and storage

The data are monitored, recorded, and archived according to the monitoring methodology and monitoring plan described in the PDD. At each monitoring site, all data recorded must be stored in a spreadsheet format on the hard disk.

Paper backup of monitored data

The data is printed in the form of daily report and the site manager keeps the paper hard copy and forwards a copy to the CDM Monitoring Team periodically.

Electronic backup of monitored data

At least once a month, electronic copies of the daily reports must be stored into an electronic storage device (mobile hard drive or memory stick), and sent to the CDM Project Management Office. The data are properly kept in the CDM Project Management Office.

Both paper back up and electronic back up will be kept for at least 2 years after the end of the crediting period.

2.6.5 Calibration

The metering instruments are calibrated by the accredited third party once a year in accordance with the monitoring plan and the relevant national/sectoral standard; the electricity meters are calibrated by authorized entities and inspected by the local grid company.

2.6.6 Data quality management

JMC follows the procedures described in the "CDM Project Management and Operating Manual" for this project in order to ensure proper monitoring and timely recording and reporting of the data.

It is the responsibility of each site manager to check regularly the data recorded in order to verify if the values are accurate and complete. The CDM Project Management Office also checks and verifies the data values when reviewing and consolidating the data collected from each site. In case there is a potential data issue, the site manager should inform the CDM Project Manager and attempt to solve the problem. If the issue relates to the equipment, the site manager should

immediately contact the supplier and inform the CDM Project Manager.

2.6.7 Corrective actions

In case of instrument malfunction which affects data output, the emissions reductions that are generated during the period from the moment when the key instrument is not functioning would not be counted to ensure integrity and quality of the emission reductions.

3. Project status

3.1. Implementation status during the monitoring period

The project has been registered by the CDM Executive Board since 22/04/09 and the crediting period started on 22/04/09. The start date of the first monitoring period is 22/04/09 and the end date is 31/8/09. All the facilities in the Jincheng Sihe 120MW power plant have been installed and the project started commissioning and received the inspection approval on February 16, 2009.

The power plant is operated normally and complies with the project design. The Monitoring Plan and the "CDM Project Management and Operations Manual" for this project have been developed based on which the monitoring activities are carried out. The on-site assessment of the initial verification was conducted on August 5-7, 2009 and received positive outcome.

3.2. Information on calibration of monitoring instruments

The metering instruments are calibrated by the accredited third party once a year in accordance with the monitoring plan and the relevant national/sectoral standard; the electricity meters are calibrated by authorized entities and inspected by the local grid company.

All the calibration reports covering this monitoring period will be submitted to and verified by the DOE.

3.3. Measurement results during the monitoring period

3.3.1 Main Data Measurement Results

Table 4A: Main Data Measurement Results

Monitoring Period			MM_{ELEC} (tCH_4)	GEN_1 (MWh)	GEN_2 (MWh)
Month	Start Date	End Date			
Apr. 2009	22/04/09	30/04/09	2982.84	17142.65	0
May 2009	01/05/09	31/05/09	9687.06	55856.06	50.16
June 2009	01/06/09	30/06/09	10966.92	61767.55	42.24
July 2009	01/07/09	31/07/09	13100.78	68547.07	0
Aug. 2009	01/08/09	31/08/09	13646.22	68208.10	0
Total			**50383.82**	**271521.43**	**92.40**

3.3.2 Additional Data Measurement Results

Table 4B: Additional Data Measurement Results

Monitoring Period			MM_{total} (tCH4)	$MM_{release}$ (tCH4)	MM_{BL} (tCH4)	GEN_{BL} (MWh)
Month	Start Date	End Date				
Apr. 2009	22/04/09	30/04/09	6921.57	853.63	617.10	2382.82
May 2009	01/05/09	31/05/09	23449.32	3874.58	2267.76	8588.34
June 2009	01/06/09	30/06/09	23315.57	3495.92	1780.85	7744.34
July 2009	01/07/09	31/07/09	21330.88	2727.14	1790.95	8409.03
Aug. 2009	01/08/09	31/08/09	23159.85	2334.36	2540.59	8819.91
Total			**98177.19**	**13285.63**	**8997.24**	**35944.44**

Methane concentration (PC_{CH4}) results are recorded and used for calculation of the methane volume (tCH_4).

NMHC concentration (PC_{NMHC}) value is below 1% throughout the monitoring period, as proven by the latest sample test results. Therefore, based on the methodology, the combustion emissions from non-methane hydrocarbons are ignored.

For the experimental 15MW power plant, GEN_{BL}, the electricity supplied to the internal power grid has been monitored and the volume during this monitoring period is 35944.44 MWh. The monthly average is 8390.41 MWh. MM_{BL}, the volume of methane sent to the 15MW power plant has been monitored and the value for this monitoring period is 8997.24 tCH_4. The monthly average is 2044.82 tCH_4.

Table 5 shows that the monthly average values of both the electricity and methane for this monitoring period are slightly higher than the monthly average in year 2008. Therefore, it can be concluded that the experimental 15MW power plant continues to be operational and maintain similar levels of CMM gas consumption and electricity supply to the internal grid as historically. There no emission reduction leakage in this regard.

Table 5: Experimental 15MW power plant data comparison

Parameter *Period*	MM_{BL} (tCH_4) *22/04/09-31/08/09*	MM_{BL} (tCH_4) *01/01/08-31/12/08*	GEN_{BL} (MWh) *22/04/09-31/08/09*	GEN_{BL} (MWh) *01/01/08-31/12/08*
Total	8997.24	24139.73	35944.44	80605.35
Monthly Average	2044.82	2011.64	8169.19	6717.11

All the monitored data mentioned above have been presented to and verified by the DOE.

3.4. Emission reduction calculations

Based on the data measurement results specified in Section 3.3, the project emissions, baseline emissions and emission reductions for this monitoring period are calculated as follows according to the methodology of ER calculation specified in Section 2.4.

3.4.1 Project emissions

Monitoring Period			A	B	C	D
			PE_{ME} (tCO_2e)	PE_{MD} (tCO_2e)	PE_{UM} (tCO_2e)	PE (tCO_2e)
Month	Start Date	End Date				D=A+B+C
Apr. 2009	22/04/09	30/04/09	0	8,161.80	313.20	8,475.00
May 2009	01/05/09	31/05/09	0	26,506.22	1,017.14	27,523.36
June 2009	01/06/09	30/06/09	0	30,008.23	1,151.53	31,159.76
July 2009	01/07/09	31/07/09	0	35,847.01	1,375.58	37,222.59
Aug. 2009	01/08/09	31/08/09	0	37,339.47	1,432.85	38,772.32
Total			**0**	**137,862.73**	**5,290.30**	**143,153.03**

3.4.2. Baseline emissions

Monitoring Period			A	B	C	D
			BE_{MD} (tCO_2e)	BE_{MR} (tCO_2e)	BE_{Use} (tCO_2e)	BE (tCO_2e)
Month	Start Date	End Date				D=A+B+C
Apr. 2009	22/04/09	30/04/09	0	62,639.64	16,843.51	79,483.15
May 2009	01/05/09	31/05/09	0	203,428.26	54,832.09	258,260.35
June 2009	01/06/09	30/06/09	0	230,305.32	60,648.21	290,953.53
July 2009	01/07/09	31/07/09	0	275,116.38	67,350.93	342,467.31
Aug. 2009	01/08/09	31/08/09	0	286,570.62	67,017.86	353,588.48
Total			**0**	**1,058,060.22**	**266,692.60**	**1,324,752.82**

3.4.3. Leakage emissions

As described in the PDD and indicated in section 3.3.2, the leakage from the project is zero.

3.4.4. Emission reductions

Monitoring Period			A	B	C	D
			PE (tCO2e)	BE (tCO2e)	Leakage	ER*
Month	Start Date	End Date				D=B-A-C
Apr. 2009	22/04/09	30/04/09	8,475.00	79,483.15	0	71,008
May 2009	01/05/09	31/05/09	27,523.36	258,260.35	0	230,736
June 2009	01/06/09	30/06/09	31,159.76	290,953.53	0	259,793
July 2009	01/07/09	31/07/09	37,222.59	342,467.31	0	305,244
Aug. 2009	01/08/09	31/08/09	38,772.32	353,588.48	0	314,816
Total			**143,153.03**	**1,324,752.82**	**0**	**1,181,597**

*Note: The decimals of the ER values are rounded down for conservativeness.

Therefore, the total emission reductions for the monitoring period 22/04/09 - 31/08/09 are 1,181,597 tCO_2e.

3.5. Comparison of actual ER volume with PDD estimate

As described in the PDD, the annual emission reductions are estimated to be 3,016,714 tCO2e. The total number of days in this monitoring period (22/04/09-31/08/09) is 132, so the estimated ER volume for this monitoring period according to the PDD is 1,090,976 tCO_2e[5]. The actual ER volume as calculated in Section 3.4 is 1,181,597 tCO_2e, 90,621 tCO_2e or 7.7% higher than the estimate according to the PDD.

The increase in ER volume is insignificant. The main reason for this increase is that high temperature in July and August prevented the gas generators from reaching the desired operational efficiency level and the gas consumption ratio (gas consumption per electricity generation) was higher than normal. It is demonstrated in Table 6 that the actual power generation is slightly less than the designed volume; at the same time, both the gas consumption volume and the gas consumption ratio are higher than the designed level.

Table 6: Comparison of actual result with PDD estimate

	ER Volume (for 132 days)	Power Generation (daily average)	Gas Consumption (daily average)	Gas Consumption Ratio (m^3/ kWh)
Actual	1,181,597 tCO2e	2,056,981 kWh	569,694.93 m^3	0.2770
PDD Estimate	1,090,976 tCO2e	2,255,342 kWh	497,189.04 m^3	0.2205

[5] The number is calculated as 3,016,714 * 132 / 356.