Wayang Windu Phase 2 Geothermal Power Project

Clean Development Mechanism (CDM)

CER Monitoring Report

Certified Emission Reductions

Monitoring Period: 23 May 2011 – 31 October 2011 (inclusive of both days)

Reference No: 3193

Date: 6 Dec 2011
Version 02

A project designed to meet the baseline and monitoring requirements of UNFCCC CDM Approved Methodology

"Consolidated methodology for grid-connected electricity generation from renewable sources"
Version 9 (ACM0002)

MONITORING REPORT FORM (CDM-MR)*
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 02–06/12/2011

Wayang Windu Phase 2 Geothermal Power Project
Reference Number 3193
Monitoring Period 2: 23/05/2011 – 31/10/2011 (inclusive of both days)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The project activity, Wayang Windu Phase 2 Geothermal Power Project, involves the installation of the additional main 117 MW steam turbine and peripheral equipment to enable the turbine to be driven by the steam produced by the Wayang Windu geothermal fields. The turbine is connected to a generator which would produce the electricity to the JAMALI grid, and hence adding the electricity capacity of the existing Wayang Windu Phase 1.

Wayang Windu Phase 1 has been producing power since June 2000, delivering 110 MW of electricity into the national grid through a single buyer, PLN.

The baseline scenario for this project is the generation of electricity by the operation of grid-connected power plants and by the addition of new generation sources. In the absence of the project activity electricity will continue to be generated by the existing generation units in the JAMALI grid.

The purpose of the Project activity is the generation of power using a reliable and renewable resource in place of power generation by a more greenhouse gas intensive fuel/source. The project will reduce greenhouse gas emissions through the displacement of fossil fuel electricity generation with a clean, renewable energy source.

The date when the EPC contract was signed was considered as the starting date of the project acitivty, i.e. on 30 J an 2007. The commercial operation of the project started in March 2009. The project activity has been registered with the United Nations Framework Convention on Climate Change (UNFCCC) as a CDM project activity (Reference No. 3193) on 2 December 2010. The details can be viewed on http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view

This Monitoring Report 2 covers the monitoring period of 23 May 2011 – 31 October 2011 (inclusive of both days). The total emission reductions achieved in this monitoring period is 327,693 tCO_2e.

A.2. Project Participants

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Star Energy Geothermal (Wayang Windu) Limited, a private geothermal company which operates in Indonesia and having its office at Jl. Let. Jend. S. Parman Kav 62-63, 8th - 11th floor, Jakarta 12710, Indonesia (hereinafter referred to as "SEG(WW)L").

Sindicatum Carbon Capital Ltd, a company incorporated under the laws of England and having its office at 33 Duke Street, London, W1U 1JY, United Kingdom (hereinafter referred to as "SCC").

A.3. Location of the project activity:

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Republic of Indonesia, 40km south of Bandung Kecamatan Pangalengan, West Java
7° 12′ 26.79″ S, 107° 37′ 44.12″ E

Figure 1 Location of Bandung

Figure 2 Location of Wayang Windu

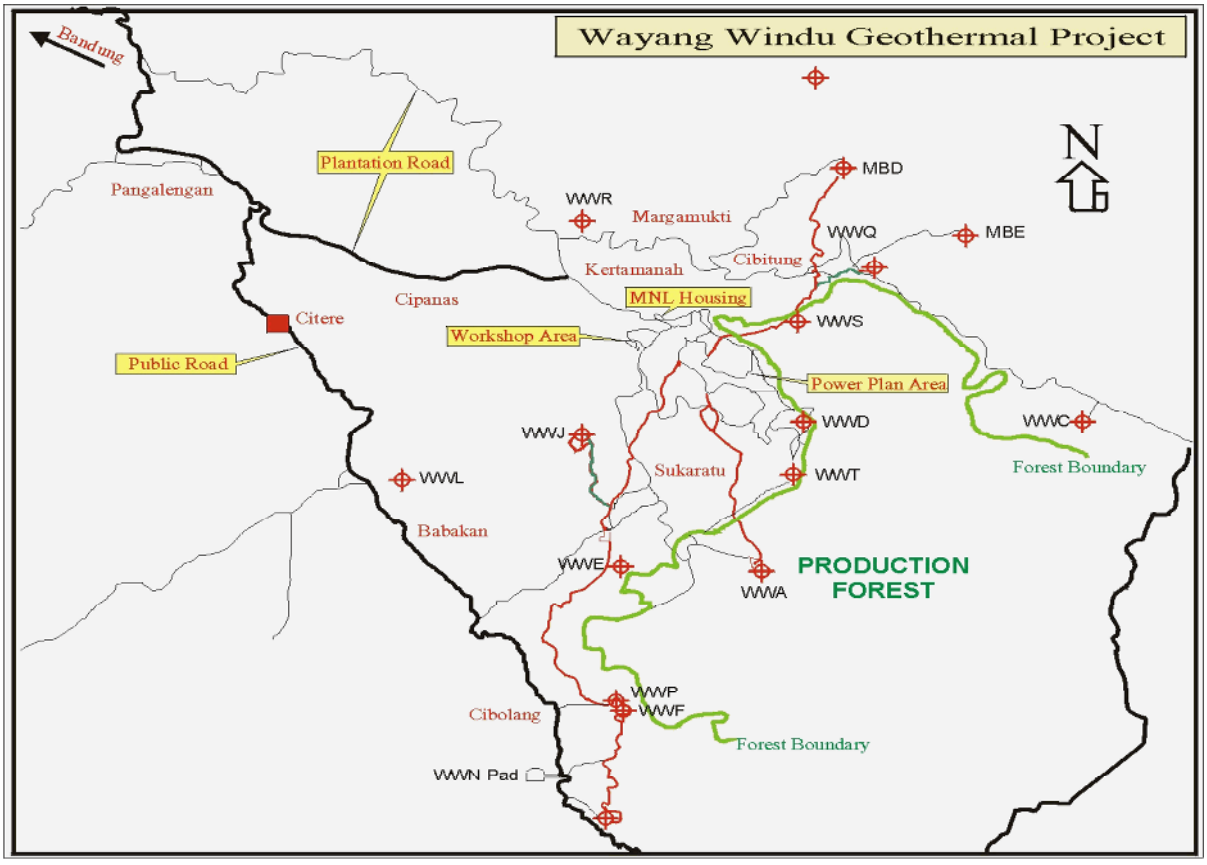

Figure 3 Location of the Wayang Windu Wells and Plant

A.4. Technical description of the project

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The proposed project activity, Wayang Windu Phase 2 Geothermal Power Project, is the construction and operation of a 117 MW geothermal power station, which is an additional power unit to an existing grid-connected renewable power plant. Wayang Windu Phase 1 has been producing power since June 2000, delivering 110 MW of electricity into the national grid through a single buyer, PLN.

Geothermal energy in Wayang Windu is stored in a steam reservoir within the earth's crust. Dry saturated steam at high pressure is produced at the surface from wells drilled into this reservoir. The steam is delivered to the power generation facilities through a steam gathering system, to move the turbine blades and drive a generator hence generating electricity. Exhaust steam from the turbine is condensed in a direct contact condenser and part of the condensed exhaust steam is re-injected into the geothermal reservoir, with the remaining being evaporated in the cooling towers. The electricity produced is transferred by the load dispatcher at the adjacent power switchyard to the transmission lines located outside the power plant.

The power plant will consist of a conventional geothermal condensing steam turbine generator with a capacity of 117 MW. Energy of condensation will be transferred to the circulating cooling water system in the steam exhaust condenser and will subsequently be rejected to atmosphere in a conventional mechanical draught cooling tower.

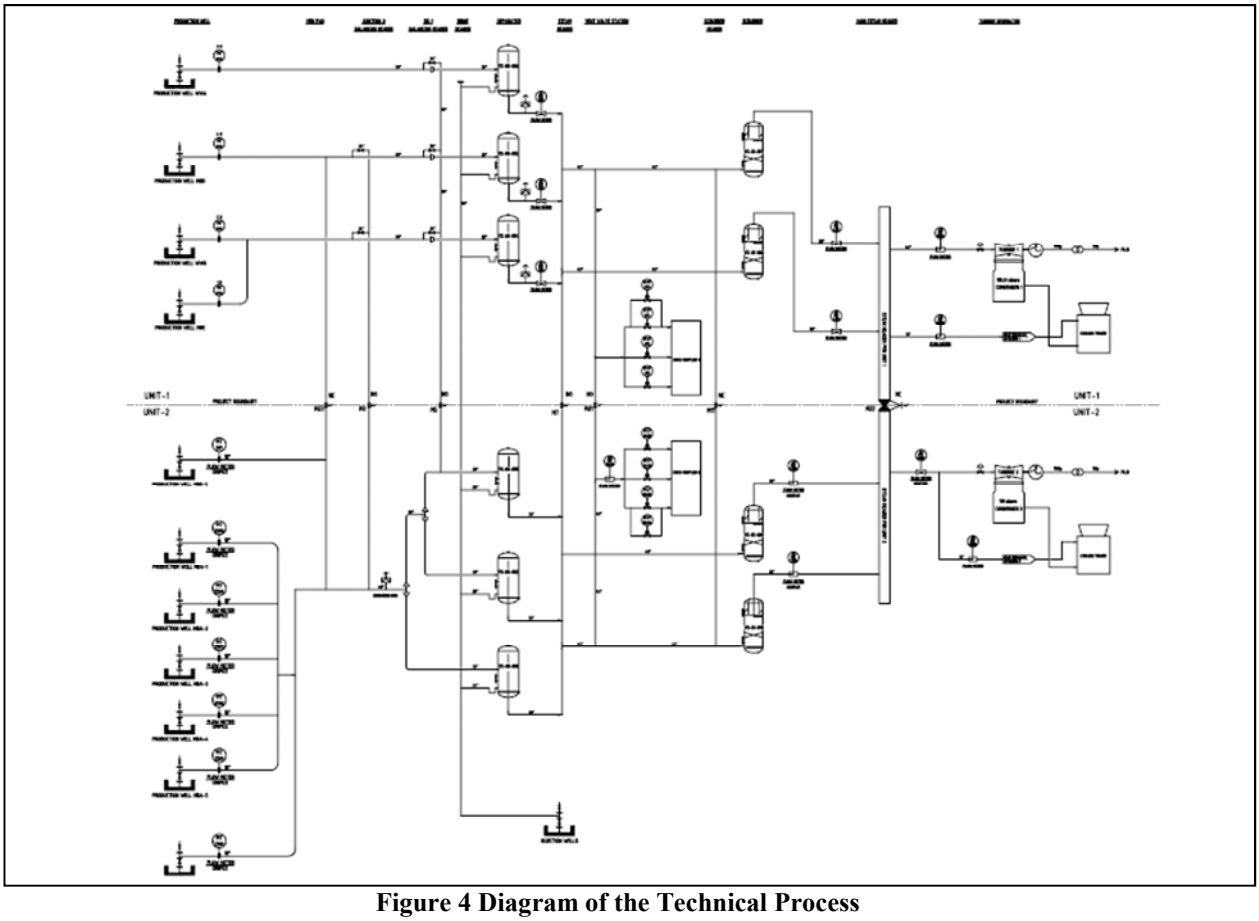

Figure 4 Diagram of the Technical Process

List of Main Equipment and Systems:

- One unit of 117 MW steam turbine
- 17,900 m^3/hour condenser
- Cooling tower
- One unit of 137.5 MVA Main Generator
- One unit of 150kV/13.8kV Generator Transformer
- Scrubbers
- Separator
- Plant DCS (Distributed Control System)
- SAGS (Steamfield Above Ground System)

This technology is technically sound and environmentally safe as is demonstrated by hundreds of similar installations around the world, including Indonesia. Sumitomo Corporation, a Japanese corporation, which was selected to provide technical equipment, and to perform all engineering, procurement and construction services of the Project. Knowledge transfer is ensured through a comprehensive training for SEG(WW)L, the Owner's operation and maintenance personnel. The training covered the configuration and maintenance of all Equipment and systems of the Project designed and supplied by the Contractor.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Methodology : Consolidated methodology for grid-connected electricity generation from renewable sources – Version 9 (ACM0002). This methodology also uses the build margin (BM) and operating margin (OM) approach as specified in "Tool to calculate the emission factor for an electricity system" (Version 01.1) and also references the "Tool for the demonstration of additionality" (Version 5.2), "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02)

A.6. Registration date of the project activity:

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Registration Date: 02 December 2010.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Crediting Period: 02 December 2010 – 01 December 2017 (Renewable)

A.8. Name of responsible person(s)/entity(ies):

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Mr. Gareth Phillips
Chief Climate Change Officer
Sindicatum Carbon Capital (SCC)
3918 B Orchard Road
#15-02 Tower B Ngee AnnCity
Tel. +656732 8897

Sven JP Starckx
Senior Technical Advisor – Monitoring & Issuance
Sindicatum Carbon Capital (SCC)
33 Duke Street
London, UK
Tel. +44(0)207 224 7555

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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Wayang Windu Phase 2 Geothermal Power Project Plant started operation on 1 Mar 2009 and the project activity was registered as a CDM activity on 2 Dec 2010.

This Monitoring Report covers the monitoring period of 23 May 2011 – 31 October 2011 (inclusive of both days). The total emission reductions achieved in this monitoring period is 327,693 tCO_2e.

During this monitoring period, no planned and unplanned outages occurred to Wayang Windu Phase 2.

B.2. Revision of the monitoring plan

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Not applicable

B.3. Deviation applied to this monitoring period

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There is no deviation in this project activity for this monitoring period.

B.4. Notification or request of approval of changes

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Not applicable

SECTION C. Description of the monitoring system

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The location of measurement devices installed is presented in figures 5,6,7,8 below:

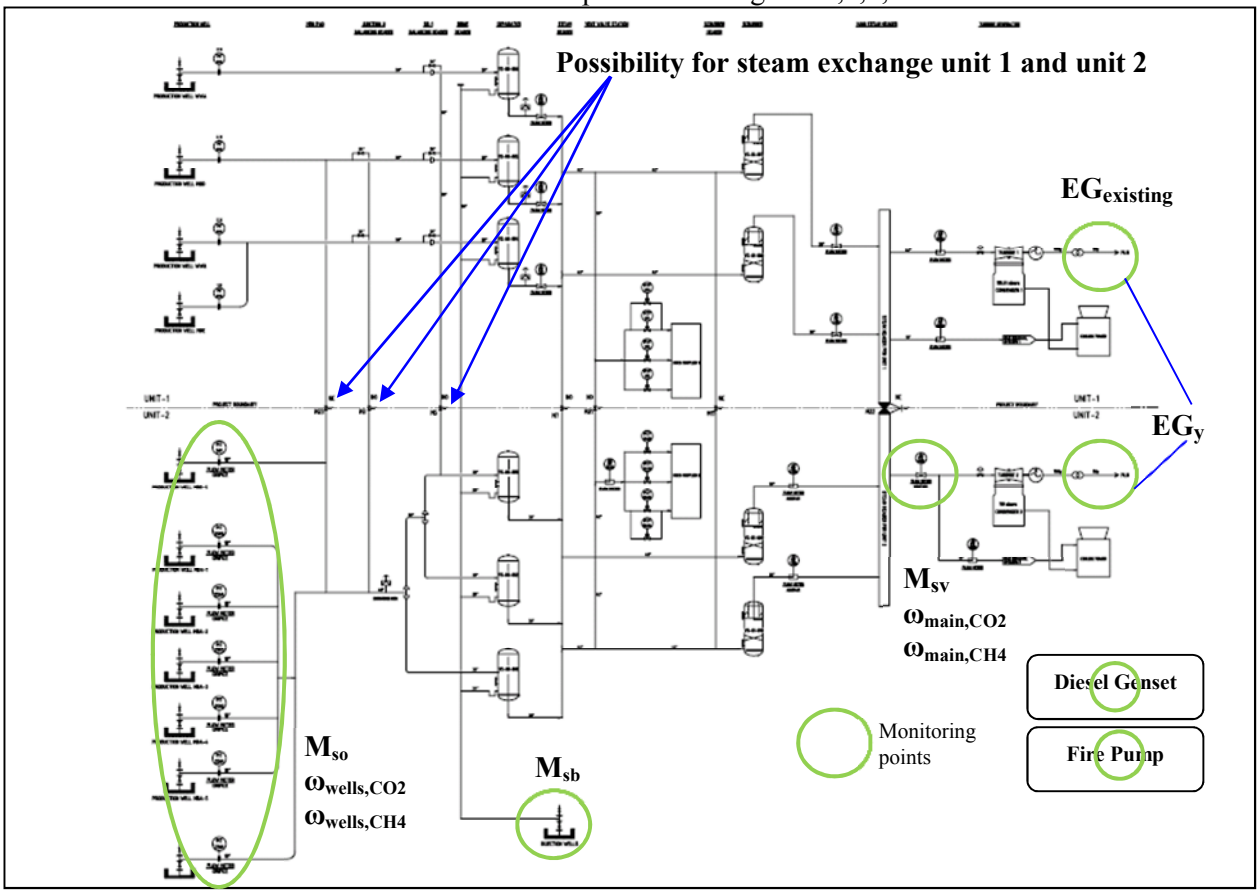


Figure 5 Simplified Process Flow Diagram for Monitoring

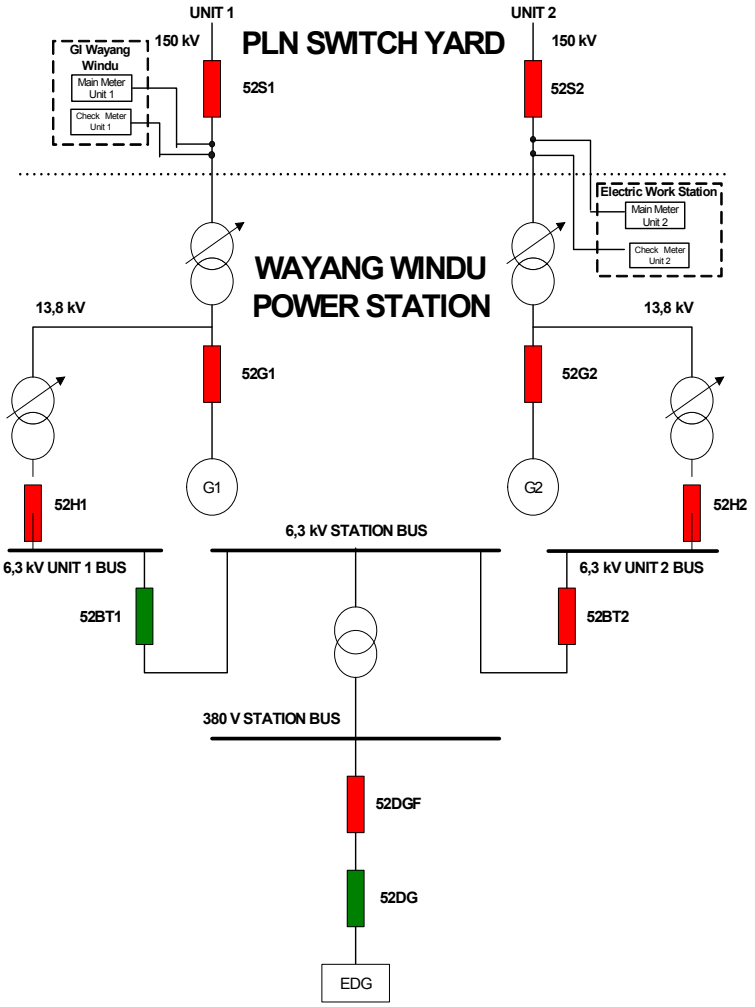


Figure 6 Electrical Layout Drawing

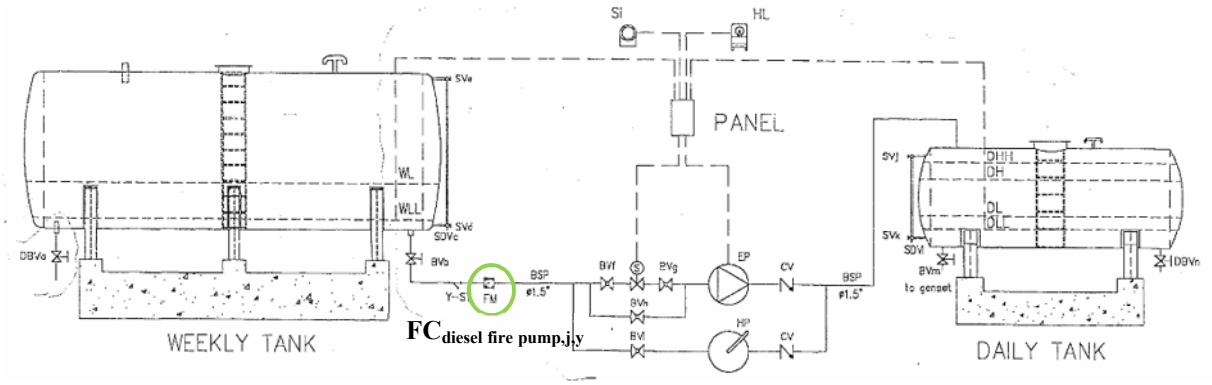


Figure 7 Fire Pump Fuel System

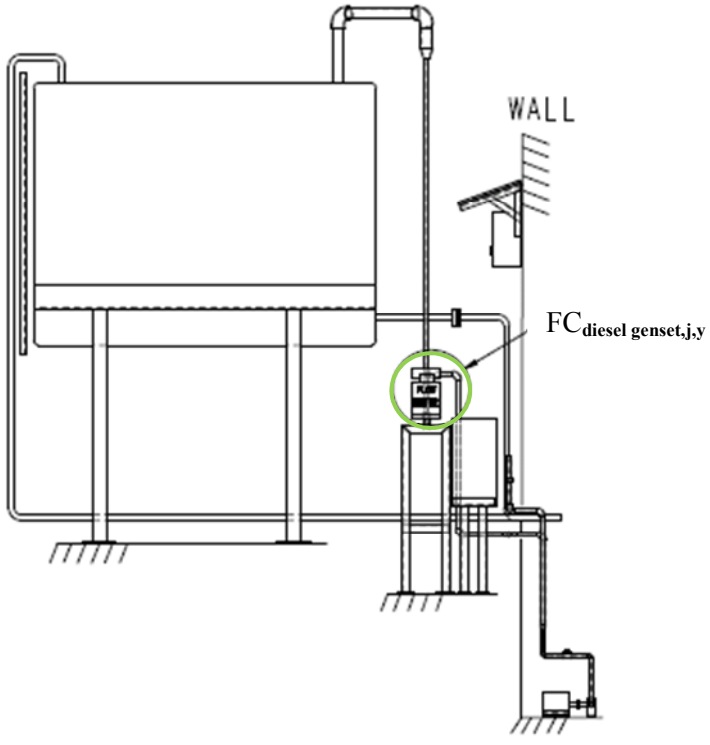


Figure 8 Diesel Generator Set Fuel System

In order to guarantee the quality of the data and data collection system, a detailed monitoring manual has been developed and implemented. This quality manual or monitoring plan (available for verification by a designated operational entity (DOE)) is based upon the requirements set in the registered PDD and addresses as a minimum the items listed below.

Other operation and maintenance procedures developed for the project activity that are related to the monitoring system will be available during verification. Refer to Annex 2 for the list of the procedures.

An overview of the data collection process is provided in table 1 underneath. Detailed formulas for the calculation of emissions are presented in Section E below.

Table 1 Data collection process

Parameter	Reference	Procedure / Frequency	Registration	Check and correct primary measurements
Baseline Emissions	The baseline emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet.	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at the start of each month	CDM spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with SEG(WW)L and if needed corrected

Leakage	= 0			
Project Emissions	The project emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data are entered by the SCC officer in the CDM spreadsheet at the start of each month	CDM spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with SEG(WW)L and if needed corrected
Emissions Reductions	The emission reductions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at start of each month	CDM spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with SEG(WW)L and if needed corrected

Calculation of emissions reduction:
The data required to calculate baseline emissions and project emissions are fed into a protected spreadsheet which calculates the emission reductions according to the formulae described in section E. Access to the spreadsheet is controlled. The spreadsheet is regularly audited to ensure it is operating correctly.

Quality control
Data is compared from month to month using trend analysis to show where parameters have deviated significantly from preceding or following values. Any values identified as being unusual in this manner is rechecked. Where preceding or following values are not available, references values may be taken from published data as appropriate such as 2006 IPCC guideline.

Preparation of monitoring report
The data is used to prepare a periodic monitoring report to be submitted to the CDM EB for verification and issuance of CERs. A standard format for the monitoring report is prepared. Prior to the submission of the first monitoring report, an internal technical review process was conducted and documented before the report was submitted for verification.

Accuracy and calibration of instruments
All meters purchased are maintained to ensure a high level of accuracy. The exact specifications of each meter were determined during the detailed design of the project. Thereafter the meter accuracies are included in this procedure and steps taken to maintain those levels of accuracy.

All key meters are subjected to a quality control regime that includes regular maintenance and calibration. A record is maintained showing the location and unique identification number of each meter, the calibration status of that meter (when last calibrated, when next due for calibration) and who performs the calibration service. Calibration certificates are retained for all meters until two years after the end of the crediting period.

Archiving of data

The monitoring team periodically archives data to a secure and retrievable storage format on a periodic e.g. weekly basis. Calibration records are archived by scanning and storage in an accessible electronic format. These data are stored until 2 years after the end of the crediting period.

Document Control
The Project Manager implements a document control system that ensures that the current versions of necessary documents are available at the point of use. All documents are maintained in English (with local translations if necessary).

Manual data recording system
The monitoring team implements a manual data recording system to act as a back-up for the online system. This involves completion of a daily log sheet that records electricity meter readings at the start of the day (which is also the end of the previous day).

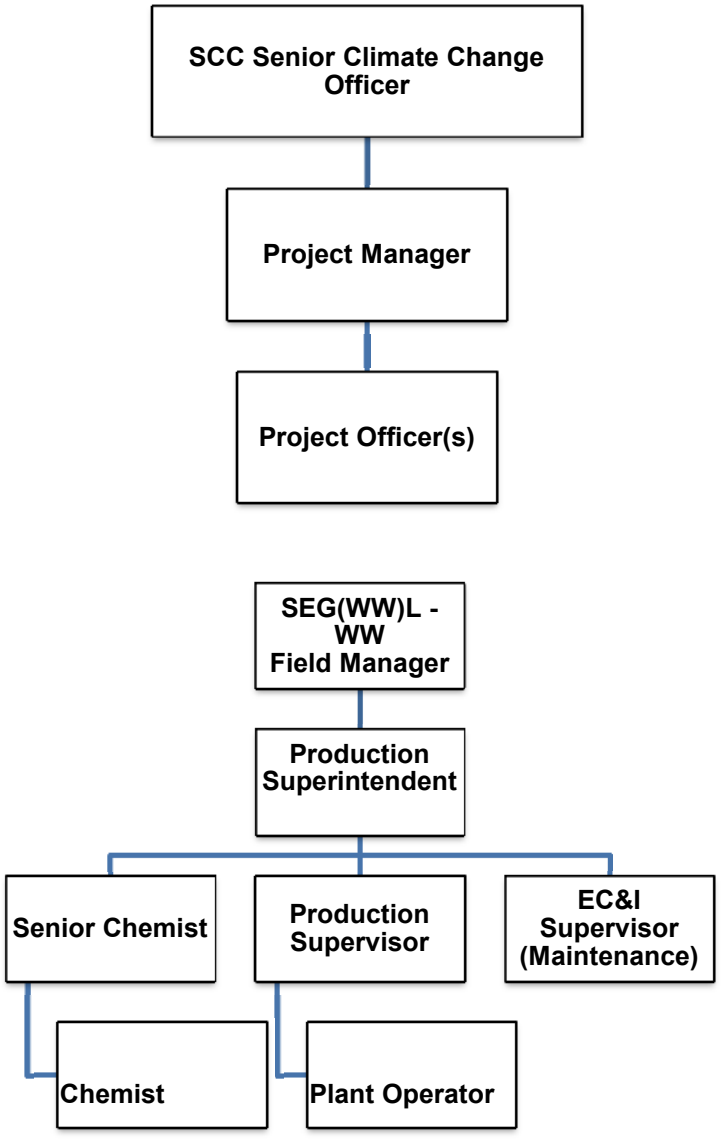
Treatment of missing or corrupted data
Where data are corrupted or missing whilst the plant is operating, the missing data can be estimated by taking the lower of the average value for the parameter before the error arose.

Audit function and management review
The Project Manager arranges for an audit of the management system periodically and at least once per year. The auditor is not involved in the daily operation of the project and if necessary, may be sourced from a third party. The auditor assesses the implementation of the monitoring procedure and the preparation of the monitoring report. Audit findings, and steps taken to address findings are recorded and reviewed by the management, which also reviews the effectiveness of these procedures and necessary changes implemented.

Organisation & Responsibilities
SEG(WW)L
- Wayang Windu Field Manager is responsible for supervision of overall plant operations and management responsibilities
- Production Superintendent is responsible for the preparation of monthly CDM report and supervision of plant productions
- EC&I Supervisor is responsible for maintaining the measurement devices and ensuring calibration of the measurement devices
- Senior Chemist is responsible for checking steam quality information for CDM and submission to SCC
- Chemist is responsible for steam sampling and analysis, checking and recording of steam quality
- Production Supervisor is responsible for external data collection, checking CDM information (excluding steam quality data) and weekly spreadsheet and submission to SCC
- Plant Operators are responsible for meter readings, data recording and other roles as specified by the supervisors

SCC
- Senior Climate Change Officer is responsible for the supervision of overall climate change monitoring of the project, initiate verification with DOE, and conducts internal audit on correct implementation MP
- Project Manager is responsible for management and checking of CDM information and reporting
- Project Officer is responsible for project coordination, implementation and liaison, data gathering and retention, completion of the CDM spreadsheet, calculation of emission reductions, preparation of monitoring report

The organizational structure will be as follows:



SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2/tCH_4
Description:	Global warming potential of methane valid for the relevant commitment period
Source of data used:	IPCC
Value(s) :	Default value for the first commitment period = 21 tCO_2/tCH_4

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Additional comment:	--

Data / Parameter:	$EG_{historical}$
Data unit:	MWh
Description:	Average of historical electricity delivered by the existing facility to the grid
Source of data used:	Project activity site.
Value applied:	912,476
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Any comment:	The average of historical electricity delivered by the existing facility (Wayang Windu Phase 1) to the grid, spanning all data from the most recent available month (February 2009) to the time at which the facility was operated (June 2000) expressed in MWh per year. Data is based on invoices from net electricity sales to the grid operator.

Data / Parameter:	$DATE_{BaselineRetrofit}$
Data unit:	Date
Description:	Point in time when the existing equipment would need to be replaced in the absence of the project activity
Source of data used:	Project activity site
Value applied:	01 June 2030
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations The technical lifetime of the existing facility, i.e. Wayang Windu Phase 1, in the absence of the project activity is taken to be 30 years. This is a conservative number, considering many of the power plants in Indonesia are operated even after its technical lifetime. Wayang Windu 1 started operation in June 2000, hence the $DATE_{BaselineRetrofit}$ is 01 June 2030.
Any comment:	--

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Grid emission factor for JAMALI
Source of data used:	Grid calculation published by Department of Energy and Mineral Resources of Indonesia - Directorate General of Electricity and Energy Utilization and endorsed by Indonesia DNA on 19 January 2009.
Value applied:	0.891
Indicate what the data are used for (Baseline/ Project/	Baseline emission calculations

Leakage emission calculations)	
Any comment:	Calculated with "tool to calculate the emission factor for an electricity system version 01.1". Calculated once ex-ante at the start of the crediting period, using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

D.2. Data and parameters monitored

Data / Parameter:	$\omega_{main,CO2}$
Data unit:	tCO_2/t steam
Description:	Average mass fraction of CO_2 in the produced steam
Measured /Calculated /Default:	Measured
Source of data:	The mass fraction of CO_2 in the produced steam at the production wells and at the steam field-power plant interface by the external laboratory.
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The CO_2 monitoring equipment consists of gas flasks, filled with sodium hydroxide solution and additional chemicals to prevent oxidation. The gas sampling is carried out using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling single phase steam only). The analysis is carried out by an external laboratory accredited under ISO 17025 by the National Accreditation Committee (KAN - Komite Akreditasi Nasional).
Measuring/ Reading/ Recording frequency:	Sampling, analysis, and recording are performed every 3 months.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

CO_2 (t_{CO2} /t_{steam})	Wells	Main Steam
14-Jun-11	0.00701	0.00951
14-Sep-11	0.00706	0.01311

Data / Parameter:	$\omega_{main,CH4}$
Data unit:	$t\ CH_4/t$ steam
Description:	Average mass fraction of CH_4 in the produced steam
Measured /Calculated /Default:	Measured
Source of data:	The mass fraction of CH_4 in the produced steam at the production wells and at the steam field-power plant interface by the external laboratory.
Value(s) of monitored parameter:	

CH_4 (t_{CH4} / t_{steam})	Wells	Main Steam
14-Jun-11	4.30E-07	5.52E-07
14-Sep-11	4.18E-07	9.35E-07

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The C_xH_y monitoring equipment consists of gas flasks, filled with sodium hydroxide solution and additional chemicals to prevent oxidation. The as sampling is carried out using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling single phase steam only). The analysis is carried out by an external laboratory accredited under ISO 17025 by the National Accreditation Committee (KAN - Komite Akreditasi Nasional).
Measuring/ Reading/ Recording frequency:	Sampling, analysis, and recording are performed every 3 months.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

Data / Parameter:	**$M_{S,y}$**
Data unit:	Tonnes
Description:	Quantity of steam produced during the year y
Measured /Calculated /Default:	Measured
Source of data:	Continuous measurement by a Venturi flow meter ($M_{sv,y}$) located at the upstream of the Wayang Windu Unit 2 turbine and which is adjusted for losses of brine at the steam separator ($M_{sb,y}$) as well as Orifice Plates ($M_{so,i,y}$) located at the Wayang Windu Unit 2 well heads.
Value(s) of monitored parameter:	Refer to Annex 3 Daily Steam Data Wayang Windu Phase 2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Venturi Flow Meter Serial Number: A2-FIT-0106-DP (S/N 91L410293), A2-FIT-0106-SP (S/N 91L410293) Calibration Frequency : biannually Date of last Calibration: 26 May 2011 Validity: 26 Nov 2011 Orifice Flow Meter for MBB-1 well steam flow Serial Number: FIT-2301 (S/N 01830354), PIT-2302 (S/N 01830135) Calibration Frequency : biannually Date of last Calibration: 10 Sep 2011 for FIT, 14 Jun 2011 for PIT Validity: 10 Mar 2012 for FIT, 14 Dec 2011 for PIT Orifice Flow Meter for MBA-1 well steam flow Serial Number: FIT-2501 (S/N 01830374), PIT-2502 (S/N 01830130) Calibration Frequency : biannually Date of last Calibration: 13 June 2011 for FIT, 6 June 2011 for PIT Validity: 13 Dec 2011 for FIT, 6 Dec 2011 for PIT

	Orifice Flow Meter for MBA-2 well steam flow Serial Number: FIT-2502 (S/N 02065517), PIT-2504 (S/N 01830131) Calibration Frequency : biannually Date of last Calibration: 8 July 2011 for FIT, 6 June 2011 for PIT Validity: 8 Jan 2012 for FIT, 6 Dec 2011 for PIT Orifice Flow Meter for MBA-3 well steam flow Serial Number: FIT-2503 (S/N 01830360), PIT-2506 (S/N 01830132) Calibration Frequency : biannually Date of last Calibration: 13 June 2011 for FIT, 7 June 2010 for PIT Validity: 13 Dec 2011 for FIT, 7 Dec 2011 for PIT Orifice Flow Meter for MBA-4 well steam flow Serial Number: FIT-2504 (S/N 01830361), PIT-2508 (S/N 01830133) Calibration Frequency : biannually Date of last Calibration: 10 Jun 2011 for FIT, 7 June 2011 for PIT Validity: 10 Dec 2011 for FIT, 7 Dec 2011 for PIT Orifice Flow Meter for MBA-5 well steam flow Serial Number: FIT-2505 (S/N 01830359), PIT-2510 (S/N 01830134) Calibration Frequency : biannually Date of last Calibration: 9 June 2011 for FIT, 7 June 2011 for PIT Validity: 9 Dec 2011 for FIT, 7 Dec 2011 for PIT Orifice Flow Meter for MBD-5 well steam flow Serial Number: FIT-501 (S/N 01845811), PIT-506 (S/N 01593780) Calibration Frequency : biannually Date of last Calibration: 16 June 2011 for FIT, 13 June 2011 for PIT Validity: 16 Dec 2011 for FIT, 13 Dec 2011 for PIT Orifice Flow Meter for WWW-1 brine injection flow Serial Number: FIT-984 (S/N 02061116), PIT-918 (S/N 8F196683) Calibration Frequency : biannually Date of last Calibration: 22 Aug 2011 for FIT, 31 May 2011 for PIT Validity: 22 Feb 2012 for FIT, 30 Nov 2011 for PIT Flow meters are calibrated using internal calibrator. The internal calibrator is calibrated every 2 years by accredited laboratory. Refer to Annex 4 Monitoring Equipments for further details
Measuring/ Reading/ Recording frequency:	Data is monitored continuously (polling of at least every second) and condensed to half hour values. Daily figures will be built according to the methodology by accumulation of data.
Calculation method (if applicable):	In order to be conservative, the primary data will be taken from the higher values from either the upstream metering points or the downstream metering. In case steam is transferred from unit 1 steam fields for power generation at unit 2 the upstream figure will higher. In case steam from the new steamfields at unit 2 will be transferred to the power generator of unit 1 the downfield figure will be higher. Using the higher one of the two

	values ensures that project emissions which are attributable to the capacity addition by unit 2 are clearly identified and accounted. Thus, the quantity of steam ($M_{S,y}$) is given by: $M_{S,y} = \max((M_{sv,y} + M_{sb,y}), \sum_i M_{so,y})$
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid (total of net electricity generated by Wayang Windu Unit 1 and Unit 2)
Measured /Calculated /Default:	Measured
Source of data:	The reading of the electricity from the transaction meters from Wayang Windu Unit 1 and Unit 2. Primary data is sourced from the check kWh meters.
Value(s) of monitored parameter:	Refer to Annex 5 Daily Data Wayang Windu Unit 1 and Unit 2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Wayang Windu 1 main kWh meter which is owned by PLN: Accuracy Class: 0.2% Serial Number: MT-0809A063-01 Calibration Frequency : every 5 years Date of last Calibration: 10 Oct 2008 Validity: 10 Oct 2013 Wayang Windu 1 check kWh meter which is owned by SEG(WW)L (primary data): Accuracy Class: 0.2% Serial Number: PT-0807A249-01 Calibration Frequency : every 2 years Date of last Calibration: 6 Jan 2011 Validity: 6 Jan 2013 Wayang Windu 2 main kWh meter which is owned by PLN: Accuracy Class: 0.2% Serial Number: MT 0806 A 388 - 01 Calibration Frequency : every 5 years Date of last Calibration: 10 Oct 2008 Validity: 10 Oct 2013 Wayang Windu 2 check kWh meter which is owned by SEG(WW)L (primary data): Accuracy Class: 0.2% Serial Number: PT-0802A194-01 Calibration Frequency : every 2 years

	Date of last Calibration: 6 Jan 2011 Validity: 6 Jan 2013 Refer to Annex 4 Monitoring Equipments for further details
Measuring/ Reading/ Recording frequency:	The meter reading is recorded every half hourly and recorded automatically at load profile at the transaction kWh meters.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Based on the Standard Operating Procedure of Metering System of PT PLN (Persero) P3B – Jawa Bali revision A, the data from the main meter and the check meter are compared on the monthly basis and any differences greater than 0.4% (the maximum difference of the main meter of 0.2 class and check meter of 0.2 class) will be investigated further. During this monitoring period, the difference between the data from main meter and check meter has never achieved a difference exceeding 0.4% and therefore is considered acceptable. Primary data (data applied to the CERs calculation) is sourced from the check meter. Refer to Annex 6 Main Meter and Check Meter Measurement. The data is double-checked with the records of the electricity transaction. Detailed procedures are described in the CDM Monitoring Manual.

Data / Parameter:	**$EG_{existing,y}$**
Data unit:	MWh
Description:	Electricity supplied by the existing power generation unit to the grid (net electricity generated by Wayang Windu Unit 1). Primary data is sourced from the check kWh meter.
Measured /Calculated /Default:	Measured
Source of data:	The reading of the electricity from the transaction meters from Wayang Windu Unit 1
Value(s) of monitored parameter:	Refer to Annex 5 Daily Data Wayang Windu Unit 1 and Unit 2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Wayang Windu 1 main kWh meter which is owned by PLN: Accuracy Class: 0.2% Serial Number: MT-0809A063-01 Calibration Frequency : every 5 years Date of last Calibration: 10 Oct 2008 Validity: 10 Oct 2013 Wayang Windu 1 check kWh meter which is owned by SEG(WW)L (primary data): Accuracy Class: 0.2% Serial Number: PT-0807A249-01 Calibration Frequency : every 2 years Date of last Calibration: 6 Jan 2011 Validity: 6 Jan 2013

	Refer to Annex 4 Monitoring Equipments for further details
Measuring/ Reading/ Recording frequency:	The meter reading is recorded every half hourly and recorded automatically at load profile at the transaction kWh meter.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Based on the Standard Operating Procedure of Metering System of PT PLN (Persero) P3B – Jawa Bali revision A, the data from the main meter and the check meter are compared on the monthly basis and any differences greater than 0.4% (the maximum difference of the main meter of 0.2 class and check meter of 0.2 class) will be investigated further. During this monitoring period, the difference between the data from main meter and check meter has never achieved a difference exceeding 0.4% and therefore is considered acceptable. Primary data (data applied to the CERs calculation) is sourced from the check meter. Refer to Annex 6 Main Meter and Check Meter Measurement. The data is double-checked with the records of the electricity transaction. Detailed procedures are described in the CDM Monitoring Manual.

Data / Parameter:	**$PE_{FC,j,y}$**
Data unit:	tCO_2/yr
Description:	CO_2 emissions from fossil fuel combustion in the operation of the power plant (diesel genset and fire pump) in year y
Measured /Calculated /Default:	Calculated
Source of data:	Calculated according to procedure outlined in the 'Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion'
Value(s) of monitored parameter:	5.97
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Calculated on the monthly basis
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

Data / Parameter:	**$FC_{i,j,y}$**
Data unit:	ton/yr
Description:	Quantity of diesel fuel combusted in power plant operation during the year y
Measured /Calculated	Measurement

/Default:	
Source of data:	Measurement of diesel fuel consumption for emergency genset and fire pump multiplied with the national data of the diesel fuel density. Readings from the flowmeter at the inlet of the daily tank for emergency genset and readings from the flowmeter at the inlet diesel tank for the fire pump are recorded during the first week of the month.
Value(s) of monitored parameter:	1.87
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Flowmeter at the inlet of the daily tank for the diesel fuel consumption for emergency genset Serial Number: AO-FQ-2033 Calibration Frequency : annually Date of last Calibration: 31 Jan 2011 Validity: 31 Jan 2012 Flowmeter at the inlet diesel tank for the fire pump Serial Number: AO-FQ-2032 Calibration Frequency : annually Date of last Calibration: 31 Jan 2011 Validity: 31 Jan 2012 Refer to Annex 4 Monitoring Equipments for further details
Measuring/ Reading/ Recording frequency:	The data is collected monthly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	The consistency of measured diesel fuel consumption quantities was cross-checked by an annual energy balance that was based on engine specification fuel consumption (emergency genset and fire pump) and the working hour

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/ton
Description:	Weighted average net calorific value of diesel fuel in year y
Measured /Calculated /Default:	Default
Source of data:	National value (Pertamina handbook – Bahan Bakar Minyak Elpiji dan BBG)
Value(s) of monitored parameter:	42.73
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial	N/A

number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	The value is recorded annually
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor of diesel fuel in year y
Measured /Calculated /Default:	Default
Source of data:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) of monitored parameter:	0.0748
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	The value is recorded annually
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Detailed procedures are described in the CDM Monitoring Manual

TEG_y (Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y)* is not monitored for the project activity. Based on ACM0002 ver 9, TEG_y is only applicable to be monitored for hydro power plants and is not a requirement for geothermal power plants.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

The formula used for determination of the baseline emissions are described in section B.6.1 of the Project Design Document v3 dated 2 December 2010, and available upon the UNFCCC website (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view).

Baseline emissions are calculated as follows:

$$BE_y = (EG_y - EG_{baseline}) \cdot EF_{grid,CM,y}$$

Where:

BE_y = Baseline emission in year y (tCO_2/yr)
EG_y = Electricity supplied by the project activity to the grid (MWh)
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y (calculated by using "tool to calculate the emission factor for an electricity system version 01.1")

The project activity is the installation of additional power units at an existing grid-connected renewable power plant:

$EG_{baseline} = MAX\ (EG_{historical}\ ,\ EG_{existing,y}),\ until\ DATE_{BaselineRetrofit}$

$EG_{baseline} = EG_y,\ on/after\ DATE_{BaselineRetrofit}$

Where:

$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh)
$EG_{historical}$ = Average of historical electricity delivered by the existing facility to the grid (MWh)
$EG_{existing,y}$ = Electricity supplied by the existing grid-connected power plant (MWh)
$DATE_{BaselineRetrofit}$ = Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

Calculation of $EG_{historical}$

$EG_{historical}$ was calculated based on the historical electricity delivered by Wayang Windu Phase 1 from the start of its operation in June 2000 up to February 2009, i.e. 912,476 MWh/year

Calculation of $DATE_{BaselineRetrofit}$

The technical lifetime of the existing facility, i.e. Wayang Windu Phase 1, in the absence of the project activity is taken to be 30 years. This is a conservative number, considering many of the power plants in Indonesia are operated even after its technical lifetime.

Wayang Windu 1 started operation in June 2000, hence the $DATE_{BaselineRetrofit}$ is 01 June 2030.

$EF_{grid,CM,y}$

The value applied is 0.891 tCO_2/yr based on ex-ante calculation in the registered PDD.

Monitored Baseline Emission Calculation

EG[1]	Electricity supplied by the project activity to the grid	820,707	MWh

[1] Refer to Annex 5 for daily generation data from Wayang Windu Phase 1 and Wayang Windu Phase 2 geothermal power project

$EG_{existing}$ [2]	Monitored	404,785	MWh
Duration Monitoring Period	23 May 2011 – 31Oct 2011	162	Days
$EG_{historical,y}$	Yearly average of historical electricity delivered by the existing facility to the grid	912,476	MWh
$EG_{historical,MP}$	162/365*912,476	404,989	MWh
$EG_{baseline}$	MAX ($EG_{historical,MP}$, $EG_{existing,MP}$)	404,989	MWh
$EG - EG_{baseline}$		415,718	MWh
BE	$(EG - EG_{baseline}) . EF_{grid,CM,y}$	**370,196**	**t CO2e**

E.2. Project emissions calculation

>>

The formula used for determination of the project emissions are described in section B.6.1 of the Project Design Document v3 dated 2 December 2010, and available upon the UNFCCC website (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view).

Project emissions are calculated as follows:

$$PE_y = PES_y + PEFF_y$$

Where:

PE_y 1 = Project emission in year y (tCO_2/yr)

PES_y = Project emission of CH_4 and CO_2 due to the release of non-condensable gases from the stream produced in geothermal power plant in year y (tCO_2/yr)

$PEFF_y$ = Project emission from combustion of fossil fuels related to the operation of the geothermal power plant in year y (tCO_2/yr)

Project emission of CO_2 and CH_4 due to the release of non-condensable gases from the steam produced in the geothermal power plant is calculated as:

$$PES_y = (\omega_{main,CO2} + \omega_{main,CH4} . GWP_{CH4}) . M_{S,y}$$

Where:

PES_y = Project emission of CH_4 and CO_2 due to the release of non-condensable gases from the stream produced in geothermal power plant in year y (tCO_2/yr)

$\omega_{main,CO2}$ = average mass fraction of CO_2 in the produced steam (non-dimensional)

$\omega_{main,CH4}$ = average mass fraction of CH_4 in the produced steam (non-dimensional)

[2] Refer to Annex 5 for daily generation data from Wayang Windu Phase 1 geothermal power project

GWP_{CH4} = global warming potential of CH_4 valid for the relevant commitment period (tCO_2/tCH_4)

$M_{S,y}$ = Quantity of steam produced during the year y (tonnes)

Project emissions from combustion of fossil fuel related to the operation of geothermal power plant is calculated as:

$$PEFF_y = PE_{FC,j,y}$$

Where:

$PEFF_y$ = Project emission from combustion of fossil fuels related to the operation of the geothermal power plant in year y (tCO_2/yr)

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr). This parameter will be calculated by the "tool to calculate project or leakage CO_2 emissions from fossil fuel combustion version 02"

$$PE_{FC,j,y} = \sum FC_{diesel,j,y} \cdot COEF_{i,y}$$

Where:

$FC_{diesel,j,y}$ = quantity of diesel combusted in emergency genset and fire pump multiplied with the national data of the diesel fuel density (ton)

$COEF_{i,y}$ = CO_2 emission coefficient of diesel fuel (tCO_2/ton)

$COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of diesel fuel, as follows:

$$COEF_{i,y} = NCV_{diesel,y} \cdot EF_{CO2,diesel,y}$$

Where:

$NCV_{diesel,y}$ = weighted average net calorific value of diesel fuel in year y (Values provided by the fuel supplier, or regional or national average default values, or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories) (GJ/ton)

$EF_{CO2,diesel,y}$ = weighted average CO_2 emission factor of diesel fuel in year y (Values provided by the fuel supplier, or regional or national average default values, or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories) (tCO_2/GJ)

Monitored Project Emission

Month	Diesel Consumption [litres]
May-11	296
June-11	433
July-11	351
Aug-11	338
Sept-11	398

Oct-11	331

ΣFC_{diesel}	$\Sigma FC_{diesel,j} \cdot \rho_{diesel,j}$[3]	1.87	T
PEFF	$\Sigma FC_{diesel,j,y} \cdot NCV_{diesel,y} \cdot EF_{CO2,diesel,y}$[4]	6	t CO2e
PES_y	$(\omega_{main,CO2} + \omega_{main,CH4} \cdot GWP_{CH4}) \cdot M_{S,y}$[5]	42,496	t CO2e
PE	$PES_y + PEFF_y$	**42,503**[6]	**t CO2e**

E.3. Leakage calculation

>>

Since ACM0002 version 9 does not consider the emission due to power plant construction and fuel handlings, no leakage is considered ($L_y = 0$).

E.4. Emission reductions calculation / table

>>

The emission reduction $ER_y(tCO_2/yr)$ by the project activity during a given year y is the difference between the baseline emission (BE_y), project emission (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y$$

Baseline Emissions	370,196	t CO2e
Project Emissions	42,503	t CO2e
Leakage	-	t CO2e
Total Emission Reduction in MP	**327,693**	**t CO2e**

Total CERs: 22 May 2011 – 31 October 2011 (inclusive of both days) = 327,693 tCO_2eq

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

[3] Diesel density, Source: national value of 0.87 kg/Litre (Pertamina handbook – Bahan Bakar Minyak Elpiji dan BBG). Fossil fuel consumption is recorded on the monthly basis.

[4] Diesel net calorific value, Source: Source: Bahan Bakar Minyak ELPIJI dan BBG of 42.73 GJ/ton. Diesel effective CO_2 emission factor, Source: IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories of 0.0748 tCO_2/GJ

[5] Refer to Annex 5 for daily steam data from Wayang Windu Phase 2 geothermal power project. PES is recorded on the daily basis

[6] 42,502.3 being rounded up to 42,503

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	352,775	**327,693**

* The value applied in the *ex ante* calculation of the PDD provided here is calculated by pro-rating the annual estimated emission reductions: Values Applied in the Ex-ante Calculation of the PDD for the Monitoring Period = Annual Estimation of Emission reductions in the PDD × Number of Days in the Monitoring Period / Number of Days per Year = 794,832 tCO_2e/year × 162 Days in the Monitoring Period / 365 days per year = 352,775 tCO_2e.

E.6. Remarks on difference from estimated value in the PDD

>>

The maximum emission reduction generated by this project activity within the proposed Monitoring period is 352,775 ton of CO_2 and the actual emission reduction is 327,693 ton of CO_2. The actual CER generation is -7.11 % lower than the values applied in ex-ante estimation of the registered PDD. This is because of the wells performance which was subjected to depletion.

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Annex 1

Downtime and Shutdown Records

No Downtime and Shutdown in both Units Wayang Windu Unit 1 and Unit 2 during this period of 23 May 2011 – 31 October 2011

Annex 2

List of Relevant Operation and Maintenance Procedures

FIT Routine & Venture Inspection Procedures
Routine Operation Procedures
Metering System Operation, Maintenance and Calibration
QA/QC Laboratory Analysis & Utilities Procedures
Gas Sampling Procedures

Annex 3

Daily steam production data from Wayang Windu Phase 2 geothermal power project (M_s), Daily steam generation data measured by Venturi flowmeter ($M_{sv,y}$), Daily losses of brine at the steam separator ($M_{sb,y}$), Daily steam generation data measured by Orifice plates ($M_{so,y}$) during Monitoring Period

Date	$M_{so,i,y}$ Wells	$M_{sb,y}$ Brine	$M_{sv,y}$ Main Steam	$M_{sb,y} + M_{sv,y}$ Brine+Main Steam	$M_{s,conservative}$ Wells/Brine+Main Steam	M_s Tons
23 May 2011	20,379.76	2,288.29	19,519.00	21807.29	Brine+Main Steam	21,807.29
24 May 2011	20,289.76	3,044.37	19,519.00	22563.37	Brine+Main Steam	22,563.37
25 May 2011	20,378.32	3,802.46	19,519.00	23321.46	Brine+Main Steam	23,321.46
26 May 2011	20,475.24	3,943.66	19,519.00	23462.66	Brine+Main Steam	23,462.66
27 May 2011	20,479.24	3,860.54	19,517.00	23377.54	Brine+Main Steam	23,377.54
28 May 2011	20,439.24	3,851.53	19,519.00	23370.53	Brine+Main Steam	23,370.53
29 May 2011	20,419.24	3,899.60	19,480.00	23379.60	Brine+Main Steam	23,379.60
30 May 2011	20,380.60	4,187.01	19,481.00	23668.01	Brine+Main Steam	23,668.01
31 May 2011	20,347.48	4,110.90	18,402.00	22512.90	Brine+Main Steam	22,512.90
01 June 2011	20,329.29	4,120.00	19,434.00	23554.00	Brine+Main Steam	23,554.00
02 June 2011	20,274.71	4,122.00	19,385.00	23507.00	Brine+Main Steam	23,507.00
03 June 2011	20,284.26	4,126.00	19,493.00	23619.00	Brine+Main Steam	23,619.00
04 June 2011	20,299.01	4,112.00	19,493.00	23605.00	Brine+Main Steam	23,605.00
05 June 2011	20,282.18	4,100.00	19,455.00	23555.00	Brine+Main Steam	23,555.00
06 June 2011	19,610.66	4,093.00	19,485.00	23578.00	Brine+Main Steam	23,578.00
07 June 2011	20,264.60	3,921.00	18,841.00	22762.00	Brine+Main Steam	22,762.00
08 June 2011	20,226.96	4,365.00	18,681.00	23046.00	Brine+Main Steam	23,046.00
09 June 2011	20,241.60	3,834.00	19,435.00	23269.00	Brine+Main Steam	23,269.00
10 June 2011	20,252.60	4,306.00	19,453.00	23759.00	Brine+Main Steam	23,759.00
11 June 2011	20,253.24	3,673.00	19,446.00	23119.00	Brine+Main Steam	23,119.00
12 June 2011	20,048.24	4,077.00	19,419.00	23496.00	Brine+Main Steam	23,496.00
13 June 2011	19,367.85	3,974.00	19,490.00	23464.00	Brine+Main Steam	23,464.00
14 June 2011	19,898.20	3,917.00	19,501.00	23418.00	Brine+Main Steam	23,418.00
15 June 2011	19,576.79	3,881.00	19,508.00	23389.00	Brine+Main Steam	23,389.00
16 June 2011	15,344.09	3,908.00	19,519.00	23427.00	Brine+Main Steam	23,427.00
17 June 2011	19,959.84	3,802.00	19,493.00	23295.00	Brine+Main Steam	23,295.00
18 June 2011	19,773.99	3,812.00	19,514.00	23326.00	Brine+Main Steam	23,326.00
19 June 2011	19,630.87	3,826.00	19,466.00	23292.00	Brine+Main Steam	23,292.00
20 June 2011	19,778.68	3,837.00	19,517.00	23354.00	Brine+Main Steam	23,354.00
21 June 2011	19,915.76	3,831.00	19,518.00	23349.00	Brine+Main Steam	23,349.00
22 June 2011	19,950.55	3,843.00	19,487.00	23330.00	Brine+Main Steam	23,330.00
23 June 2011	20,064.33	3,817.00	19,478.00	23295.00	Brine+Main Steam	23,295.00
24 June 2011	20,066.52	4,100.00	19,509.00	23609.00	Brine+Main Steam	23,609.00
25 June 2011	20,055.69	3,791.00	19,172.00	22963.00	Brine+Main Steam	22,963.00
26 June 2011	20,052.89	3,921.00	19,509.00	23430.00	Brine+Main Steam	23,430.00
27 June 2011	19,958.14	4,092.00	19,511.00	23603.00	Brine+Main Steam	23,603.00
28 June 2011	19,914.83	3,854.00	19,492.00	23346.00	Brine+Main Steam	23,346.00
29 June 2011	18,344.77	4,008.00	19,508.00	23516.00	Brine+Main Steam	23,516.00
30 June 2011	18,330.74	3,970.00	19,499.00	23469.00	Brine+Main Steam	23,469.00
01 July 2011	18,314.08	3,957.00	19,507.00	23464.00	Brine+Main Steam	23,464.00
02 July 2011	18,316.22	3,893.00	19,517.00	23410.00	Brine+Main Steam	23,410.00
03 July 2011	18,323.30	3,534.00	19,463.00	22997.00	Brine+Main Steam	22,997.00
04 July 2011	18,706.66	3,825.00	19,518.00	23343.00	Brine+Main Steam	23,343.00
05 July 2011	18,697.72	3,608.00	19,518.00	23126.00	Brine+Main Steam	23,126.00
06 July 2011	18,718.38	3,909.00	19,518.00	23427.00	Brine+Main Steam	23,427.00
07 July 2011	18,654.80	3,780.00	19,515.00	23295.00	Brine+Main Steam	23,295.00
08 July 2011	18,514.72	3,506.00	19,519.00	23025.00	Brine+Main Steam	23,025.00
09 July 2011	18,496.29	3,714.00	19,519.00	23233.00	Brine+Main Steam	23,233.00
10 July 2011	18,509.47	3,776.00	19,477.00	23253.00	Brine+Main Steam	23,253.00
11 July 2011	18,973.89	3,393.00	19,396.00	22789.00	Brine+Main Steam	22,789.00
12 July 2011	19,014.50	3,650.00	17,903.00	21553.00	Brine+Main Steam	21,553.00
13 July 2011	18,993.91	3,651.00	17,687.00	21338.00	Brine+Main Steam	21,338.00
14 July 2011	19,032.03	3,647.00	18,152.00	21799.00	Brine+Main Steam	21,799.00
15 July 2011	19,029.74	3,619.00	18,165.00	21784.00	Brine+Main Steam	21,784.00
16 July 2011	19,012.81	3,613.00	18,163.00	21776.00	Brine+Main Steam	21,776.00
17 July 2011	18,970.22	3,636.00	18,151.00	21787.00	Brine+Main Steam	21,787.00
18 July 2011	18,996.33	3,677.00	18,066.00	21743.00	Brine+Main Steam	21,743.00
19 July 2011	19,002.84	3,708.00	18,107.00	21815.00	Brine+Main Steam	21,815.00
20 July 2011	18,904.48	3,763.00	18,173.00	21936.00	Brine+Main Steam	21,936.00
21 July 2011	18,849.48	3,419.00	18,171.00	21590.00	Brine+Main Steam	21,590.00
22 July 2011	18,696.84	3,755.00	18,318.00	22073.00	Brine+Main Steam	22,073.00
23 July 2011	18,682.48	3,813.00	18,224.00	22037.00	Brine+Main Steam	22,037.00
24 July 2011	18,662.84	3,731.00	18,285.00	22016.00	Brine+Main Steam	22,016.00
25 July 2011	18,634.20	3,875.00	18,558.00	22433.00	Brine+Main Steam	22,433.00
26 July 2011	18,613.20	3,552.00	18,558.00	22110.00	Brine+Main Steam	22,110.00
27 July 2011	18,562.32	3,759.00	19,265.00	23024.00	Brine+Main Steam	23,024.00
28 July 2011	18,394.52	3,639.00	18,326.00	21965.00	Brine+Main Steam	21,965.00
29 July 2011	18,330.24	3,800.00	18,172.00	21972.00	Brine+Main Steam	21,972.00
30 July 2011	18,310.88	3,724.00	18,188.00	21912.00	Brine+Main Steam	21,912.00
31 July 2011	18,279.96	3,687.00	18,158.00	21845.00	Brine+Main Steam	21,845.00

01 August 2011	18,283.96	3,575.00	18,425.00	22000.00	Brine+Main Steam	22,000.00
02 August 2011	18,280.32	3,626.00	18,223.00	21849.00	Brine+Main Steam	21,849.00
03 August 2011	18,296.32	3,616.00	18,191.00	21807.00	Brine+Main Steam	21,807.00
04 August 2011	18,271.68	3,566.00	18,320.00	21886.00	Brine+Main Steam	21,886.00
05 August 2011	18,251.04	3,737.00	18,645.00	22382.00	Brine+Main Steam	22,382.00
06 August 2011	18,238.04	3,355.00	18,482.00	21837.00	Brine+Main Steam	21,837.00
07 August 2011	18,225.04	3,768.00	18,290.00	22058.00	Brine+Main Steam	22,058.00
08 August 2011	18,202.40	3,505.00	17,395.00	20900.00	Brine+Main Steam	20,900.00
09 August 2011	18,165.76	3,527.00	15,352.00	18879.00	Brine+Main Steam	18,879.00
10 August 2011	18,150.76	3,551.00	18,374.00	21925.00	Brine+Main Steam	21,925.00
11 August 2011	18,134.12	3,554.00	18,215.00	21769.00	Brine+Main Steam	21,769.00
12 August 2011	18,124.12	3,525.00	18,216.00	21741.00	Brine+Main Steam	21,741.00
13 August 2011	18,106.12	3,534.00	18,380.00	21914.00	Brine+Main Steam	21,914.00
14 August 2011	18,102.76	3,519.00	18,301.00	21820.00	Brine+Main Steam	21,820.00
15 August 2011	18,083.12	3,506.00	18,225.00	21731.00	Brine+Main Steam	21,731.00
16 August 2011	18,031.48	3,521.00	18,231.00	21752.00	Brine+Main Steam	21,752.00
17 August 2011	18,008.48	3,506.00	18,543.00	22049.00	Brine+Main Steam	22,049.00
18 August 2011	17,972.48	3,503.00	18,523.00	22026.00	Brine+Main Steam	22,026.00
19 August 2011	17,526.48	3,485.00	17,862.00	21347.00	Brine+Main Steam	21,347.00
20 August 2011	16,921.20	3,533.00	17,503.00	21036.00	Brine+Main Steam	21,036.00
21 August 2011	18,074.48	3,555.00	17,499.00	21054.00	Brine+Main Steam	21,054.00
22 August 2011	18,265.04	3,340.00	17,500.00	20840.00	Brine+Main Steam	20,840.00
23 August 2011	18,299.04	2,508.00	17,500.00	20008.00	Brine+Main Steam	20,008.00
24 August 2011	18,278.04	2,724.00	17,499.00	20223.00	Brine+Main Steam	20,223.00
25 August 2011	18,269.04	2,893.00	17,499.00	20392.00	Brine+Main Steam	20,392.00
26 August 2011	18,237.76	1,218.00	16,933.00	18151.00	Wells	18,237.76
27 August 2011	17,720.00	687.00	16,902.00	17589.00	Wells	17,720.00
28 August 2011	18,232.76	663.00	16,767.00	17430.00	Wells	18,232.76
29 August 2011	18,232.76	666.00	17,361.00	18027.00	Wells	18,232.76
30 August 2011	18,239.76	653.00	17,285.00	17938.00	Wells	18,239.76
31 August 2011	18,255.04	652.00	17,174.00	17826.00	Wells	18,255.04
01 September 2011	18,246.76	653.00	17,147.00	17800.00	Wells	18,246.76
02 September 2011	18,241.76	654.00	17,069.00	17723.00	Wells	18,241.76
03 September 2011	18,246.76	655.00	16,803.00	17458.00	Wells	18,246.76
04 September 2011	18,265.04	653.00	17,307.00	17960.00	Wells	18,265.04
05 September 2011	18,239.76	668.00	17,113.00	17781.00	Wells	18,239.76
06 September 2011	18,224.12	672.00	17,099.00	17771.00	Wells	18,224.12
07 September 2011	18,234.12	665.00	17,123.00	17788.00	Wells	18,234.12
08 September 2011	18,234.12	651.00	17,179.00	17830.00	Wells	18,234.12
09 September 2011	17,598.48	669.00	16,888.00	17557.00	Wells	17,598.48
10 September 2011	16,560.60	664.00	16,760.00	17424.00	Brine+Main Steam	17,424.00
11 September 2011	16,808.00	642.00	17,135.00	17777.00	Brine+Main Steam	17,777.00
12 September 2011	16,754.80	638.00	16,468.00	17106.00	Brine+Main Steam	17,106.00
13 September 2011	16,721.16	631.00	16,435.00	17066.00	Brine+Main Steam	17,066.00
14 September 2011	17,690.88	638.00	17,180.00	17818.00	Brine+Main Steam	17,818.00
15 September 2011	17,211.16	639.00	17,221.00	17860.00	Brine+Main Steam	17,860.00
16 September 2011	17,162.88	652.00	17,229.00	17881.00	Brine+Main Steam	17,881.00
17 September 2011	17,127.88	654.00	17,337.00	17991.00	Brine+Main Steam	17,991.00
18 September 2011	17,067.12	643.00	17,069.00	17712.00	Brine+Main Steam	17,712.00
19 September 2011	17,044.12	646.00	16,556.00	17202.00	Brine+Main Steam	17,202.00
20 September 2011	17,105.88	649.00	16,606.00	17255.00	Brine+Main Steam	17,255.00
21 September 2011	17,097.88	631.00	16,223.00	16854.00	Wells	17,097.88
22 September 2011	16,973.56	632.00	16,403.00	17035.00	Brine+Main Steam	17,035.00
23 September 2011	19,783.88	662.00	18,156.00	18818.00	Wells	19,783.88
24 September 2011	19,596.88	685.00	18,846.00	19531.00	Wells	19,596.88
25 September 2011	19,405.80	666.00	18,609.00	19275.00	Wells	19,405.80
26 September 2011	19,374.16	666.00	17,195.00	17861.00	Wells	19,374.16
27 September 2011	19,362.16	678.00	17,246.00	17924.00	Wells	19,362.16
28 September 2011	19,359.16	676.00	17,152.00	17828.00	Wells	19,359.16
29 September 2011	19,416.52	663.00	18,846.00	19509.00	Brine+Main Steam	19,509.00
30 September 2011	19,380.16	669.00	17,618.00	18287.00	Wells	19,380.16
01 October 2011	19,353.16	656.00	17,520.00	18176.00	Wells	19,353.16
02 October 2011	19,344.52	657.00	17,436.00	18093.00	Wells	19,344.52
03 October 2011	19,369.52	643.00	17,237.00	17880.00	Wells	19,369.52
04 October 2011	18,829.48	654.00	16,925.00	17579.00	Wells	18,829.48
05 October 2011	19,539.88	658.00	17,499.00	18157.00	Wells	19,539.88
06 October 2011	19,546.00	654.00	18,077.00	18731.00	Wells	19,546.00
07 October 2011	19,497.00	661.00	17,899.00	18560.00	Wells	19,497.00
08 October 2011	19,447.00	645.00	17,500.00	18145.00	Wells	19,447.00
09 October 2011	19,399.00	659.00	17,581.00	18240.00	Wells	19,399.00
10 October 2011	19,362.00	665.00	18,766.00	19431.00	Brine+Main Steam	19,431.00
11 October 2011	19,273.00	658.00	18,846.00	19504.00	Brine+Main Steam	19,504.00
12 October 2011	19,257.00	664.00	18,774.00	19438.00	Brine+Main Steam	19,438.00
13 October 2011	19,192.00	670.00	18,846.00	19516.00	Brine+Main Steam	19,516.00
14 October 2011	19,146.00	675.00	18,846.00	19521.00	Brine+Main Steam	19,521.00
15 October 2011	19,146.00	676.00	18,846.00	19522.00	Brine+Main Steam	19,522.00
16 October 2011	19,127.00	687.00	18,846.00	19533.00	Brine+Main Steam	19,533.00
17 October 2011	19,125.00	682.00	17,615.00	18297.00	Wells	19,125.00
18 October 2011	19,127.00	673.00	17,440.00	18113.00	Wells	19,127.00
19 October 2011	19,112.00	677.00	17,500.00	18177.00	Wells	19,112.00
20 October 2011	19,090.00	612.00	17,494.00	18106.00	Wells	19,090.00
21 October 2011	19,068.00	611.00	17,499.00	18110.00	Wells	19,068.00
22 October 2011	19,054.00	610.00	17,507.00	18117.00	Wells	19,054.00
23 October 2011	19,030.00	613.00	17,590.00	18203.00	Wells	19,030.00
24 October 2011	19,014.00	572.00	17,963.00	18535.00	Wells	19,014.00
25 October 2011	18,952.00	550.00	18,846.00	19396.00	Brine+Main Steam	19,396.00
26 October 2011	18,949.00	564.00	18,569.00	19133.00	Brine+Main Steam	19,133.00
27 October 2011	18,922.00	561.00	18,309.00	18870.00	Wells	18,922.00
28 October 2011	18,916.00	563.00	18,572.00	19135.00	Brine+Main Steam	19,135.00
29 October 2011	18,905.00	567.00	18,577.00	19144.00	Brine+Main Steam	19,144.00
30 October 2011	18,867.00	548.00	17,499.00	18047.00	Wells	18,867.00
31 October 2011	18,896.00	557.00	18,843.00	19400.00	Brine+Main Steam	19,400.00

Annex 4

Monitoring Equipments

Parameter	Measurement Device	Tag (serial number)	Calibration - I Date	Calibration - II Date	Calibration - III Date	Calibration - IV Date	Calibration - V Date	Calibration - VI Date	Calibration - VII Date	Next Calibration Sheduled	Remarks
Msv,y (Ms,y in section D.2)	Differential Pressure Transmitter - Venturi Flow Meter	A2-FIT-0106 (S/N 1882270)	6-Oct-08	14-Apr-09	7-Oct-09	8-Mar-10	22-Jul-10	The differential pressure transmitter (Rosemount) and the static pressure transmitter (Rosemount) were replaced with a multi-variable transmitter (Yokogawa S/N 91GA08958738) which measures both differential pressure and static pressure on 23 November 2010			Steam flow to WW-2 turbine
	Pressure Transmitter - Venturi Flow Meter	A2-PIT-0106 (S/N 0350337)	6-Oct-08	7-Apr-09	15-Oct-09	8-Mar-10	22-Jul-10				
	Multi Variable Transmitter	A2-FIT-0106-DP (S/N 91GA08958738)	New installation of a rented multi-variable transmitter (Yokogawa S/N 91GA08958738) to replace the differential pressure transmitter (Rosemount) and the static pressure transmitter (Rosemount) on 23 November 2011					22-Nov-10	The rented multi-variable transmitter (Yokogawa S/N 91GA08958738) was replaced with the new multi-variable transmitter (Yokogawa S/N 91L410293) owned by SEG(WW)L on 31 May 2011		
		A2-FIT-0106-DP (S/N 91L410293)	New installation of a multi-variable transmitter (Yokogawa S/N 91L410293) owned by SEG(WW)L to replace the rented multi-variable transmitter (Yokogawa S/N 91GA08958738) on 31 May 2011						26-May-11	26-Nov-11	
Mso,y (Ms,y in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2301 (S/Nn 8G201612)	29-Aug-08	15-Feb-09	13-Jul-09	13-Jan-10	9-Jul-10	31-Dec-10	Replaced with Rosemount differential pressure-transmitter S/N 01830354 on 4 Jan 2011		MBB-1 Well steam flow
	Differential Pressure Transmitter - Orifice Plate	FIT-2301 (S/N 01830354)	New installation of a Rosemount differential pressure-transmitter S/N 01830354 on 4 Jan 2011					04-Jan-11	10-Sep-11	10-Mar-12	
	Pressure Transmitter - Orifice Plate	PIT-2302 (S/N 01830135)	21-Aug-08	13-Apr-09	14-Oct-09	13-Jan-10	1-Jul-10	06-Jan-11	14-Jun-11	14-Dec-11	
Mso,y (Ms,y in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2501 (S/N 01830374)	28-Aug-08	24-Feb-09	13-Jul-09	5-Jan-10	8-Jul-10	28-Dec-10	13-Jun-11	13-Dec-11	MBA-1 Well steam flow
	Pressure Transmitter - Orifice Plate	PIT-2502 (S/N 01830130)	22-Aug-08	14-Apr-09	16-Nov-09	11-Jan-10	1-Jul-10	6-Dec-10	6-Jun-11	6-Dec-11	
Mso,y (Ms,y in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2502 (S/N 8G201617)	28-Aug-08	14-Feb-09	2-Jul-09	5-Jan-10	9-Jul-10	28-Dec-10	Replaced with Rosemount differential pressure-transmitter S/N 02065517		MBA-2 Well steam flow
	Differential Pressure Transmitter - Orifice Plate	FIT-2502 (S/N 02065517)	New installation of a Rosemount differential pressure-transmitter S/N 02065517						8-Jul-11	8-Jan-12	
	Pressure Transmitter - Orifice Plate	PIT-2504 (S/N 01830131)	21-Aug-08	14-Apr-09	14-Oct-09	7-Jan-10	1-Jul-10	9-Dec-10	6-Jun-11	6-Dec-11	
Mso,y (Ms,y in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2503 (S/N 01830360)	29-Aug-08	14-Feb-09	2-Jul-09	4-Jan-10	9-Jul-10	27-Dec-10	13-Jun-11	13-Dec-11	MBA-3 Well steam flow
	Pressure Transmitter - Orifice Plate	PIT-2506 (S/N 01830132)	22-Aug-08	14-Apr-09	14-Oct-09	7-Jan-10	2-Jul-10	8-Dec-10	7-Jun-10	7-Dec-11	
Mso,y (Ms,y in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2504 (S/N 01830361)	29-Aug-08	14-Feb-09	1-Jul-09	4-Jan-10	8-Jul-10	27-Dec-10	10-Jun-11	10-Dec-11	MBA-4 Well steam flow
	Pressure Transmitter - Orifice Plate	PIT-2508 (S/N 01830133)	21-Aug-08	13-Apr-09	9-Sep-09	7-Jan-10	2-Jul-10	8-Dec-10	7-Jun-11	7-Dec-11	

Legends

- Historical calibration by Internal Lab
- Historical calibration by External Lab
- Future calibration to be conducted
- Equipment replaced/installed

$M_{so,y}$ ($M_{s,y}$ in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT-2505 (S/N 01830359)	29-Aug-08	14-Feb-09	1-Jul-09	4-Jan-10	9-Jul-10	24-Dec-10	9-Jun-11	9-Dec-11	MBA-5 Well steam flow
	Pressure Transmitter - Orifice Plate	PIT-2510 (S/N 01830134)	21-Aug-08	14-Apr-09	14-Oct-09	5-Jan-10	5-Jul-10	9-Dec-10	7-Jun-11	7-Dec-11	
$M_{so,y}$ ($M_{s,y}$ in section D.2)	Differential Pressure Transmitter - Orifice Plate	FIT501 (S/N 01845811)	4-Aug-08	3-Mar-09	9-Sep-09	12-Jan-10	8-Jul-10	30-Dec-10	16-Jun-11	16-Dec-11	MBD-5 Well steam flow
	Pressure Transmitter - Orifice Plate	PIT506 (S/N 01593780)	4-Aug-08	3-Mar-09	22-Sep-09	11-Jan-10	5-Jul-10	20-Dec-10	13-Jun-11	13-Dec-11	
$M_{sb,y}$ ($M_{s,y}$ in section D.2)	Differential Pressure Transmitter	FIT-984 (S/N 0G238876)		25-Dec-08	22-Jul-09	14-Jan-10	9-Jul-10	10-Jan-11	Replaced with Rosemount differential pressure-transmitter S/N 02061116 on 22 August 2011		WWW-1 Brine Injection Well
	Differential Pressure Transmitter	FIT-984 (S/N 02061116)	New installation of a Rosemount differential pressure-transmitter S/N 02061116 on 22 August 2011						22-Aug-11	22-Feb-12	
	Pressure Transmitter	PIT-918 (S/N 8F196683)		23-Dec-08	29-Jun-09	24-Dec-09	22-Jun-10	18-Nov-10	31-May-11	31/11/2011	
$FC_{diesel,EDG}$ ($FC_{i,j,y}$ in section D.2)	Flow Totalizer	AO-FQ-2033	Emergency Diesel Generator (EDG) Fuel Flowmeter installed on 15 Jan 2010				15-Jan-10	31-Jan-11		31-Jan-12	Emergency diesel generator
$FC_{diesel,fire\ pump}$ ($FC_{i,j,y}$ in section D.2)	Flow Totalizer	AO-FQ-2032	Diesel Fire Pump Fuel Flowmeter installed on 15 Jan 2010				15-Jan-10	31-Jan-11		31-Jan-12	Fire pump
EG_y (Unit-1)	Unit-1, "Meter Utama" kWh meter reading (main meter owned by PLN)	MT-0809A063-01	10-Oct-08							10-Oct-13	WW-1 electricity meter
	Unit-1, "Meter Pembanding" kWh meter reading (check meter owned by SEG)	PT-0807A249-01		12-Jan-09				6-Jan-11		06-Jan-13	
EG_y (Unit-2)	Unit-2, "Meter Utama" kWh meter reading (main meter owned by PLN)	MT-0806A388 - 01	10-Oct-08							10-Oct-13	WW-2 electricity meter
	Unit-2, "Meter Pembanding" kWh meter reading (check meter owned by SEG)	PT-0802A194-01	24-Oct-08		25-Aug-09			6-Jan-11		06-Jan-13	

Annex 5

Daily generation data from Wayang Windu Phase 1 and Wayang Windu Phase 2 geothermal power project (EG), Daily generation data from Wayang Windu Phase 1 ($EG_{existing}$), Quantity of steam produced (M_s), and Project emissions from steam produced (PES) during Monitoring Period

Date	EG	EGexisting	M_s	PES
	MWh	MWh	Tons	tCO_2
23 May 2011	5369.04	2671.41	21,807.29	309.43
24 May 2011	5359.18	2668.30	22,563.37	320.15
25 May 2011	5359.33	2673.20	23,321.46	330.91
26 May 2011	5238.68	2553.80	23,462.66	332.91
27 May 2011	5196.20	2507.20	23,377.54	331.71
28 May 2011	5225.22	2530.09	23,370.53	331.61
29 May 2011	5311.48	2622.20	23,379.60	331.74
30 May 2011	5307.61	2614.30	23,668.01	335.83
31 May 2011	5289.10	2595.41	22,512.90	319.44
01 June 2011	5267.41	2583.19	23,554.00	334.21
02 June 2011	5267.00	2574.81	23,507.00	333.54
03 June 2011	5270.80	2570.80	23,619.00	335.13
04 June 2011	5274.80	2577.30	23,605.00	334.93
05 June 2011	5295.31	2589.50	23,555.00	334.22
06 June 2011	5286.00	2576.00	23,578.00	334.55
07 June 2011	5250.59	2627.00	22,762.00	322.97
08 June 2011	5242.91	2631.91	23,046.00	327.00
09 June 2011	5268.28	2562.50	23,269.00	330.17
10 June 2011	5280.20	2567.89	23,759.00	337.12
11 June 2011	5283.11	2566.20	23,119.00	328.04
12 June 2011	5262.79	2562.70	23,496.00	333.39
13 June 2011	5266.81	2557.50	23,464.00	332.93
14 June 2011	5389.39	2675.20	23,418.00	332.28
15 June 2011	5428.28	2699.28	23,389.00	331.87
16 June 2011	5405.90	2684.31	23,427.00	332.41
17 June 2011	5332.28	2610.19	23,295.00	330.54
18 June 2011	5369.72	2650.31	23,326.00	330.98
19 June 2011	5406.53	2690.31	23,292.00	330.49
20 June 2011	5409.59	2688.59	23,354.00	331.37
21 June 2011	5378.09	2667.09	23,349.00	331.30
22 June 2011	5324.09	2615.00	23,330.00	331.03
23 June 2011	5196.69	2482.91	23,295.00	330.54
24 June 2011	5181.63	2461.00	23,609.00	334.99
25 June 2011	5183.69	2496.91	22,963.00	325.82
26 June 2011	5151.90	2430.09	23,430.00	332.45
27 June 2011	5159.19	2430.91	23,603.00	334.91
28 June 2011	5142.81	2420.00	23,346.00	331.26
29 June 2011	5128.50	2408.19	23,516.00	333.67
30 June 2011	5129.97	2400.59	23,469.00	333.00
01 July 2011	5135.72	2396.50	23,464.00	332.93
02 July 2011	5103.41	2369.22	23,410.00	332.17
03 July 2011	5078.60	2351.38	22,997.00	326.31
04 July 2011	5108.72	2382.13	23,343.00	331.22
05 July 2011	5077.68	2368.09	23,126.00	328.14
06 July 2011	5069.00	2357.00	23,427.00	332.41
07 July 2011	5072.78	2361.09	23,295.00	330.54
08 July 2011	5060.91	2346.91	23,025.00	326.70
09 July 2011	5049.69	2333.69	23,233.00	329.66
10 July 2011	5071.72	2346.50	23,253.00	329.94
11 July 2011	5017.04	2310.63	22,789.00	323.36
12 July 2011	4845.88	2330.19	21,553.00	305.82
13 July 2011	4866.41	2377.50	21,338.00	302.77
14 July 2011	4880.38	2365.19	21,799.00	309.31
15 July 2011	4888.53	2362.31	21,784.00	309.10
16 July 2011	4891.53	2356.81	21,776.00	308.98
17 July 2011	4880.00	2347.50	21,787.00	309.14
18 July 2011	4840.87	2319.59	21,743.00	308.51
19 July 2011	4834.91	2289.69	21,815.00	309.54
20 July 2011	4845.00	2288.50	21,936.00	311.25
21 July 2011	4837.63	2304.22	21,590.00	306.34
22 July 2011	5069.07	2471.69	22,073.00	313.20
23 July 2011	5100.82	2512.41	22,037.00	312.69
24 July 2011	5087.41	2526.91	22,016.00	312.39
25 July 2011	5089.41	2465.00	22,433.00	318.30
26 July 2011	5075.00	2456.69	22,110.00	313.72
27 July 2011	5184.40	2491.31	23,024.00	326.69
28 July 2011	5211.28	2626.69	21,965.00	311.66
29 July 2011	5232.00	2661.19	21,972.00	311.76
30 July 2011	5240.81	2661.72	21,912.00	310.91
31 July 2011	5239.41	2671.50	21,845.00	309.96

01 August 2011	5208.78	2611.00	22,000.00	312.16
02 August 2011	5172.81	2577.00	21,849.00	310.02
03 August 2011	5157.19	2573.19	21,807.00	309.42
04 August 2011	5148.50	2570.22	21,886.00	310.54
05 August 2011	5183.09	2590.28	22,382.00	317.58
06 August 2011	5211.40	2610.59	21,837.00	309.85
07 August 2011	5203.09	2605.81	22,058.00	312.98
08 August 2011	5225.68	2609.09	20,900.00	296.55
09 August 2011	5214.13	2609.50	18,879.00	267.88
10 August 2011	5200.50	2600.31	21,925.00	311.10
11 August 2011	5193.00	2600.50	21,769.00	308.88
12 August 2011	5189.10	2594.41	21,741.00	308.49
13 August 2011	5201.00	2592.19	21,914.00	310.94
14 August 2011	5184.40	2585.09	21,820.00	309.61
15 August 2011	5145.78	2564.09	21,731.00	308.34
16 August 2011	5191.90	2591.81	21,752.00	308.64
17 August 2011	5187.81	2587.59	22,049.00	312.86
18 August 2011	5181.81	2582.00	22,026.00	312.53
19 August 2011	5013.56	2500.50	21,347.00	302.90
20 August 2011	4969.81	2475.50	21,036.00	298.48
21 August 2011	5045.85	2519.72	21,054.00	298.74
22 August 2011	5019.25	2511.69	20,840.00	295.70
23 August 2011	4974.44	2484.31	20,008.00	283.90
24 August 2011	5006.56	2506.50	20,223.00	286.95
25 August 2011	4999.50	2498.00	20,392.00	289.34
26 August 2011	4770.94	2396.50	18,237.76	129.10
27 August 2011	4736.07	2378.88	17,720.00	125.43
28 August 2011	4724.50	2371.50	18,232.76	129.06
29 August 2011	4724.00	2358.50	18,232.76	129.06
30 August 2011	4716.06	2354.50	18,239.76	129.11
31 August 2011	4719.26	2362.13	18,255.04	129.22
01 September 2011	4706.81	2349.19	18,246.76	129.16
02 September 2011	4707.50	2347.50	18,241.76	129.13
03 September 2011	4705.38	2354.19	18,246.76	129.16
04 September 2011	4717.50	2360.00	18,265.04	129.29
05 September 2011	4704.00	2354.00	18,239.76	129.11
06 September 2011	4701.41	2353.91	18,224.12	129.00
07 September 2011	4716.78	2361.72	18,234.12	129.07
08 September 2011	4736.72	2369.78	18,234.12	129.07
09 September 2011	4647.00	2328.50	17,598.48	124.57
10 September 2011	4607.91	2318.09	17,424.00	247.23
11 September 2011	4719.31	2362.81	17,777.00	252.24
12 September 2011	4674.84	2342.59	17,106.00	242.72
13 September 2011	4668.50	2340.50	17,066.00	242.15
14 September 2011	4769.94	2379.50	17,818.00	252.82
15 September 2011	4717.28	2359.59	17,860.00	253.42
16 September 2011	4703.03	2347.22	17,881.00	253.72
17 September 2011	4709.91	2355.09	17,991.00	255.28
18 September 2011	4698.06	2355.00	17,712.00	251.32
19 September 2011	4721.31	2387.00	17,202.00	244.08
20 September 2011	4710.00	2355.19	17,255.00	244.83
21 September 2011	4722.31	2367.50	17,097.88	121.03
22 September 2011	4768.50	2393.50	17,035.00	241.71
23 September 2011	5022.78	2408.91	19,783.88	140.04
24 September 2011	5097.03	2381.41	19,596.88	138.72
25 September 2011	5095.75	2415.88	19,405.80	137.37
26 September 2011	5078.69	2648.81	19,374.16	137.14
27 September 2011	5087.75	2669.00	19,362.16	137.06
28 September 2011	5074.81	2658.81	19,359.16	137.04
29 September 2011	5068.56	2362.38	19,509.00	276.82
30 September 2011	5051.75	2562.44	19,380.16	137.18
01 October 2011	5094.25	2625.50	19,353.16	136.99
02 October 2011	5087.25	2671.25	19,344.52	136.93
03 October 2011	5055.94	2639.44	19,369.52	137.11
04 October 2011	4988.00	2629.56	18,829.48	133.29
05 October 2011	5079.00	2627.94	19,539.88	138.31
06 October 2011	5157.13	2617.00	19,546.00	138.36
07 October 2011	5133.50	2599.69	19,497.00	138.01
08 October 2011	5130.44	2614.13	19,447.00	137.66
09 October 2011	5142.38	2611.88	19,399.00	137.32
10 October 2011	5118.88	2444.88	19,431.00	275.71
11 October 2011	5138.19	2453.63	19,504.00	276.74
12 October 2011	5141.94	2459.00	19,438.00	275.81
13 October 2011	5114.50	2389.13	19,516.00	276.92
14 October 2011	5088.88	2359.25	19,521.00	276.99
15 October 2011	5080.38	2354.13	19,522.00	277.00
16 October 2011	5057.31	2344.88	19,533.00	277.16
17 October 2011	5083.50	2644.44	19,125.00	135.38
18 October 2011	5053.25	2649.81	19,127.00	135.39
19 October 2011	5049.06	2642.00	19,112.00	135.29
20 October 2011	5048.44	2636.69	19,090.00	135.13
21 October 2011	5053.75	2640.50	19,068.00	134.97
22 October 2011	5044.31	2630.06	19,054.00	134.88
23 October 2011	5033.19	2614.00	19,030.00	134.71
24 October 2011	5076.31	2518.25	19,014.00	134.59
25 October 2011	5120.00	2442.50	19,396.00	275.21
26 October 2011	5119.00	2551.50	19,133.00	271.48
27 October 2011	5105.75	2527.75	18,922.00	133.94
28 October 2011	5134.81	2514.81	19,135.00	271.51
29 October 2011	5146.50	2569.50	19,144.00	271.64
30 October 2011	5106.81	2657.50	18,867.00	133.55
31 October 2011	5117.63	2477.63	19,400.00	275.27

Annex 6

Check meter and Main meter measurement

Date	Unit 1 Main Meter Downloaded monthly from kWh meter	Unit 1 Check Meter Downloaded monthly from kWh meter	Unit 1 Check Meter Downloaded daily from DCS	Difference between Main meter and Check Meter (Downloaded monthly from kWh meter)	Difference between Main meter and Check Meter (Downloaded daily from DCS)	Difference between Check Meter (downloaded monthly from kWh meter) and Check Meter (downloaded daily from DCS)
	MWh	MWh	MWh			
May-11	23,438.889	23,436.777	23,435.906	-0.009%	-0.013%	-0.004%
Jun-11	77,065.206	77,058.032	77,058.188	-0.009%	-0.009%	0.000%
Jul-11	74,816.133	74,816.133	74,809.813	0.000%	-0.008%	-0.008%
Aug-11	78,382.939	78,375.121	78,372.906	-0.010%	-0.013%	-0.003%
Sep-11	71,955.270	71,949.061	71,950.000	-0.009%	-0.007%	0.001%
Oct-11	79,162.974	79,158.265	79,158.188	-0.006%	-0.006%	0.000%

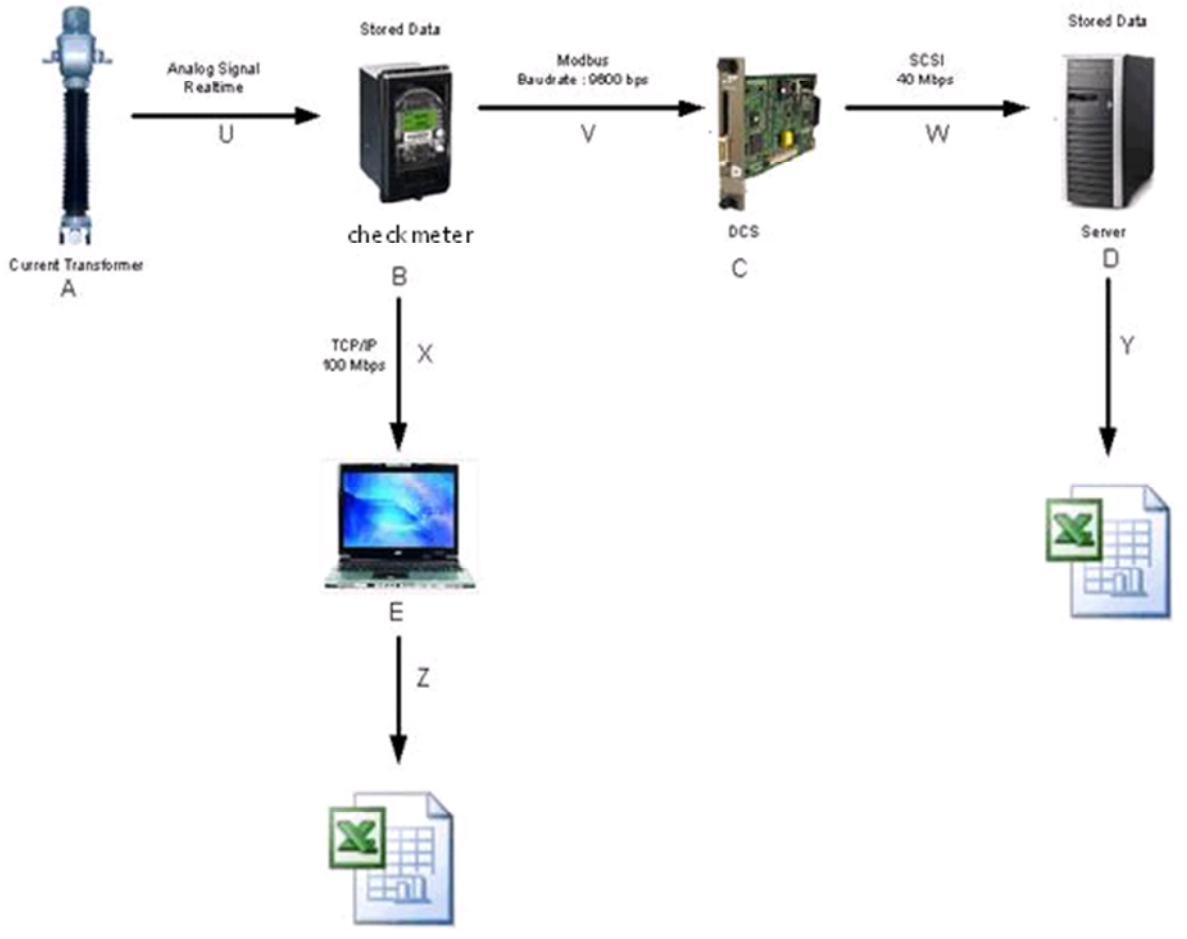
Date	Unit 2 Main Meter Downloaded monthly from kWh meter	Unit 2 Check Meter Downloaded monthly from kWh meter	Unit 2 Check Meter Downloaded daily from DCS	Difference between Main meter and Check Meter (Downloaded monthly from meter)	Difference between Main meter and Check Meter (Downloaded daily from DCS)	Difference between Check Meter (downloaded monthly from kWh meter) and Check Meter (downloaded daily from DCS)
	MWh	MWh	MWh			
May-11	24,222.575	24,221.129	24,219.928	-0.006%	-0.011%	-0.005%
Jun-11	81,184.821	81,180.350	81,176.094	-0.006%	-0.011%	-0.005%
Jul-11	81,181.857	81,177.111	81,176.250	-0.006%	-0.007%	-0.001%
Aug-11	78,454.573	78,449.297	78,446.875	-0.007%	-0.010%	-0.003%
Sep-11	72,164.947	72,160.695	72,161.125	-0.006%	-0.005%	0.001%
Oct-11	78,745.126	78,741.815	78,742.063	-0.004%	-0.004%	0.000%

EG_y	Main meters Downloaded monthly from kWh meter	Check meters Downloaded monthly from kWh meter	Check meters Downloaded daily from DCS	Difference between Main meter and Check Meter (Downloaded monthly from meter)	Difference between Main meter and Check Meter (Downloaded daily from DCS)	Difference between Check Meter (downloaded monthly from kWh meter) and Check Meter (downloaded daily from DCS)
	MWh	MWh	MWh			
May-11	47,661.464	47,657.905	47,655.834	-0.007%	-0.012%	-0.004%
Jun-11	158,250.027	158,238.382	158,234.281	-0.007%	-0.010%	-0.003%
Jul-11	155,997.990	155,993.244	155,986.063	-0.003%	-0.008%	-0.005%
Aug-11	156,837.512	156,824.418	156,819.781	-0.008%	-0.011%	-0.003%
Sep-11	144,120.217	144,109.756	144,111.125	-0.007%	-0.006%	0.001%
Oct-11	157,908.100	157,900.080	157,900.250	-0.005%	-0.005%	0.000%

$EG_{existing}$	Main meters Downloaded monthly from meter	Check meters Downloaded monthly from meter	Check meters Downloaded daily from DCS	Difference between Main meter and Check Meter (Downloaded monthly from meter)	Difference between Main meter and Check Meter (Downloaded daily from DCS)	Difference between Check Meter (downloaded monthly from kWh meter) and Check Meter (downloaded daily from DCS)
MWh	MWh	MWh	MWh			
May-11	23,438.89	23,436.78	23,435.91	-0.009%	-0.013%	-0.004%
Jun-11	77,065.21	77,058.03	77,058.19	-0.009%	-0.009%	0.000%
Jul-11	74,816.13	74,816.13	74,809.81	0.000%	-0.008%	-0.008%
Aug-11	78,382.94	78,375.12	78,372.91	-0.010%	-0.013%	-0.003%
Sep-11	71,955.27	71,949.06	71,950.00	-0.009%	-0.007%	0.001%
Oct-11	79,162.97	79,158.26	79,158.19	-0.006%	-0.006%	0.000%

It is to be noted that there is a slight difference between the check meter reading downloaded from the internal storage of the check kWh meter and the check meter reading from the DCS. However, both the check meter reading downloaded from the internal storage of the check kWh meter and the check meter reading from the DCS are within the tolerable 0.4% difference with the reading from the main kWh meter. Furthermore, the check meter reading from the DCS gives the lowest reading for both EG_y and $EG_{existing}$, and therefore this is considered conservative.

The slight difference between the check meter reading downloaded from the internal storage of the check kWh meter and the check meter reading from the DCS can be explained through the diagram below, i.e. the data from check kWh meter (figure B) is transmitted to DCS Process Control unit (DCS PCU) through serial communication protocol modbus and baudrate 9600 bps (figure V), which is then transmitted to PGP Server (DCS Human Machine Interface – figure D) through SCSI with baudrate 40 Mbps (figure W).


Current Transformer
A
Analog Signal
Realtime
U
Stored Data
checkmeter
B
Modbus
Baudrate : 9600 bps
V
DCS
C
SCSI
40 Mbps
W
Stored Data
Server
D
TCP/IP
100 Mbps
X
Y
E
Z