Energy Efficiency Improvement of the District Heating System in Drobeta Turnu-Severin

Monitoring Plan

Guidelines and Procedures

Version 4 – 2009-11-07

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1. Monitoring Requirements

1.1 Objective of the Monitoring Plan

The objective of the Monitoring Plan (MP) as outlined in the Project Design Document (PDD) and Guidelines and Procedures as outlined in this document are to provide a practical framework for the collection and management of performance data in order to monitor and verify the GHG emission reduction generated by the Joint Implementation project, "Energy Efficiency Improvement of the District Heating System in Drobeta Turnu-Severin". The proposed project activity focuses on the heat conversion part of the heat conversion substations and the secondary district heating network, namely the heat and hot portable water distribution network. In this context the project includes the redesign of the secondary district heating network and a subsequent replacement of approximately 190 km of heat and hot portable water pipes by new pre-insulated district heating pipes. Moreover the project comprises the installation of 114 new heat exchangers in 38 heat conversion substations located within the secondary district heating network. In connection with the rehabilitation work, heat metering devices will be installed at the heat conversion substation outlets as well as on the heat and hot portable water consumption side.

The proposed district heating network rehabilitation project will reduce heat and water losses both within the secondary district heating network and the heat conversion substations. This will simultaneously lead to reduced fuel consumption and hence a reduction of the annual greenhouse gas emissions at the ROMAG – TERMO power plant. The MP shall after its validation act as an integrated part of the contractual agreement for CO_2 trading between the Romanian government and the Danish government. This Monitoring Plan Guidelines and Procedures provides for a monitoring methodology for monitoring and estimating GHG emission reductions referring to the baseline and monitoring plan and approach used in the PDD. The monitoring plan in the PDD comprises the calculation of annual CO_2 emission reductions associated with the reduced fuel consumption at the CET. The methodology shall be used for the entire monitoring period, which is 6 years.

1.2 Requirements for the Monitoring activities

1. Monitoring of the GHG emission reductions generated by the project activity shall be performed by data collection based on respective procedures and the SCADA system installed at the ROMAG – TERMO power plant and district heating system in Drobeta Turnu-Severin.

2. Records shall be kept electronically and on paper, until 2014.

3. Monitoring reports including the actual GHG emission reductions shall be issued on annual basis in the entire crediting period of approximately 6 years.

4. Persons trained in the monitoring procedures shall carry out monitoring of the GHG emission reductions associated with the project activity.

5. Based on the monitoring results, the GHG emission reductions shall be calculated and submitted for verification as:

    - AAUs for the period until the end of 2007
    - ERUs for the period between 2008-2012

6. A Quality Assurance (QA) system shall be implemented to secure accurate and transparent monitoring of GHG emission reductions.

7. The governing language for monitoring records and reports is English.

8. The outcome of the MP shall make it possible for an Independent Entity to accredit the AAUs and ERUs generated by the project according to requirements of the Joint Implementation Supervisory Committee.

9. The monitoring procedures shall follow the guidelines as established by the projects determined Project Design Document and requirements of the Joint Implementation Supervisory Board.

10. A draft version of the annual monitoring report shall be submitted to the Romanian government and Danish government or their representatives before issuing the final version. For a time period of six (6) years the Romanian Government, the Danish Government and the verifier shall annually received the reports presented below.

Receiver of annual reports	Draft version monitoring report	Final version monitoring report
Romanian Government	Two (2) copies	Two (2) copies
Danish Government	Two (2) copies	Two (2) copies
Verifier		Two (2) copies

Table 1: Monitoring report

11. The monitoring plan may be adjusted during the crediting period, to be in accordance/in compliance with Romanian legislation when and if such legislation will change.

1.3 Frequency of Monitoring and Verification Procedures

The table below illustrates the time schedule for monitoring- and verification procedures.

Time period and frequency	Monitoring	Verification
MP time period	Jan 2007 – Dec. 2012	May 2008 – Feb 2013
First period of monitoring	Jan 2007 – Dec. 2007	Feb 2008
Last period of monitoring	Jan – Dec 2012	Feb 2013

Table 2: Time Period for monitoring- and verification procedures

1.4 Baseline Reference

1.4.1 Key elements of the baseline

The baseline approach for the proposed project activity is derived by using data of existing, actual or historical, greenhouse gas emissions as applicable under paragraph 48 of the CDM modalities and procedures. This choice is suitable since it is reasonable to expect that fuel consumption and greenhouse gas emissions would follow historical trends in the absence of the project activity. This approach assumes that the business-as-usual scenario (baseline) would have continued into the future without any intervention changing the historical trend.

The baseline methodology is based on the following stepwise approach:

Step 1: Calculation of baseline emissions

Step 2: Calculation of project emissions

Step 3: Calculation of emissions reductions

2. Verification and basic assumptions

The MP provides a practical approach and describes the methodology of how to quantify the project performance in terms of the GHG emission reductions. The monitoring of the GHG emission reductions shall be based on transparent data management and calculation methods.

2.1 CO_2 emission reductions

2.1.1 Basic assumptions

The MP is based on the assumption that the proposed project activity will reduce the emissions of greenhouse gases by increasing the thermal distribution efficiency within the secondary district heating system (heat conversion substation and secondary heat and hot portable water network) and reducing the water losses within the secondary district heating network.

The thermal efficiencies will increase by replacing old heat exchangers on the district heating site at the heat conversion substations and by the replacement and re-design of the old heat and hot portable water pipes in the secondary district heating network by new pre- insulated pipes.

The increase of the thermal efficiency as well as the reduction of water losses results in a decrease of the overall lignite and fuel oil consumption at ROMAG – TERMO and a corresponding reduction in annual greenhouse gas emissions.

2.1.2 Methodology

The steps presented below describe the methodology used for calculating the CO_2 emission reductions generated by the project activity:

Step 1: Calculation of baseline emissions

The baseline efficiencies for HCS and the secondary district heating network are calculated based on heat measurements carried out at a number of selected heat conversion substations (HCS) and corresponding building connections in January 2005.

The baseline fuel energy input and respective emissions are calculated by means of baseline efficiencies and the quantity of district heat delivered to the consumers under the project activity.

The quantity of heat delivered to new connections in the district heating system (secondary and primary network connections from the time of project start) is deducted from the overall quantity of heat delivered to consumers during the project activity. .

For the reason of conservativeness possible disconnections of consumers to the primary and secondary network will not be considered throughout the crediting period of the project activity.

Step 2: Calculation of project emissions

Project emissions are calculated based on real district heat supplied to consumers by means of back calculating the corresponding fuel energy input and respective emissions.

New connections to the secondary district heating network are deducted from the quantity of heat delivered to the consumers under the project activity.

For the reason of conservativeness possible disconnections of consumers to the secondary network will not be considered throughout the crediting period of the project activity.

The following values are used for calculating the project emissions:

- District heat supply to primary network (Gcal)
- Process steam production (Gcal)
- District heat supply to consumers connected to primary network (Gcal)
- District heat supply to HCS (Gcal)
- District heat supply to secondary network (Gcal)
- District heat supply to consumers connected to secondary network (Gcal)
- Lignite and fuel oil consumption (t)
- Net calorific value of lignite and fuel oil (kcal/kg)
- Carbon factor of lignite and fuel oil (tC/TJ)
- Oxidation factor of lignite and fuel oil (%)
- Molar mass of CO2 and C (g/mol)

In order to account for new consumer connections to both the primary and secondary district heating network the following parameters are also monitored:

- District heat supply to new consumers connected to primary network (Gcal)
- District heat supply to new consumers connected to secondary network (Gcal)

Step 3: Calculation of emission reductions

The difference between baseline and project emissions represents the overall emission reductions associated with the project activity.

2.2 Environmental and social impacts

2.2.1 Basic assumptions

The MP and the corresponding baseline approach is based on the assumption that the rehabilitation of the secondary network side of the district heating system will lead to reduced fuel consumption at the ROMAG – TERMO power plant and thereby reduce greenhouse gas emissions.

Another basic assumption is that the project will lead to a decrease of local dust and particle pollution from lignite transportation and combustion, improving the health condition for inhabitants of the city and its surroundings.

Local stakeholders can at any time submit comments to the project's environmental- or social impact and important comments and its solution will be included in the annual monitoring report.

2.2.2 Methodology

Any environmental and social impacts caused by the project will be recorded by local EPIs and described in EPI inspection reports and forms, following the guidelines presented in paragraph 3.1.2 and 3.1.5.

2.3 Operation- and monitoring obligation

This paragraph describes requirements for the collection of key performance parameters necessary to achieve verifiable emission reduction data. This will call for certain operational obligations and data collection obligations to be fulfilled by ROMAG TPP.

ROMAG TPP shall take all reasonable actions to optimise the operation of the project activity.

1. ROMAG TPP shall ensure the delivery of lignite and fuel oil to the power plant in order to guarantee its operation, and the proper maintenance and implementation schedule to guarantee proper operation of the district heating system.

2. ROMAG TPP shall as a minimum fulfil the obligations concerning monitoring- and data management which are described in this document and the PDD, this shall act as an integrated element in the day-to-day management system for the power plant facility and the district heating system.

3. ROMAG TPP shall notify the Romanian Government and the Danish Government if the power plant is stopped, or if combustion of fuel and heat production has dropped significantly, as well as any signification consumer disconnections from the district heating network.

4. ROMAG TPP shall notify the Romanian Government and the Danish Government if implementation of new directives or legislation will affect the operation and the corresponding GHG emission reduction generated by the project.

3. Management of the Monitoring Plan

Management of the MP shall ensure the registration of performance data for verification of the GHG emissions, which verification shall be executed by an Independent Entity as certified by the Joint Implementation Supervisory Committee.

The table below outlines the data to be collected in order to monitor emissions from the project and how these data will be archived (The table was taken from the Monitoring Plan of the PDD D.1.1.)

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
$V_{P,lignite}$	Quantity of lignite consumed	-	T	c	per month	100%	electronic and paper	Data calculated in accordance with specific procedures and logged on a monthly basis
$V_{P,oil}$	Quantity of oil consumed	-	T	c	per month	100%	electronic and paper	Data calculated in accordance with specific procedures and logged on a monthly basis
$cv_{P,lignite}$	Net calorific value of lignite	-	kcal/kg	m	per month	100%	electronic and paper	Based on onsite analysis and billing records
$cv_{P,oil}$	Net calorific value of oil	-	kcal/kg	m	per month	100%	electronic and paper	Based on onsite analysis and billing records
$Q_{P,DH,primary}$	District heat supplied to primary network	Heat meter	Gcal	m	per month	100%	electronic and paper	Data collected manually every 8 hours and logged for the day.
$Q_{P,ps}$	Process steam produced for heavy water producers	Dedicated Computer	Gcal	m	per month	100%	electronic and paper	Data collected manually and automatically every hour and logged for the day
$Q_{P,DH,HCS}$	District heat supplied to heat conversion substations	SCADA	Gcal	m	per month	100%	electronic and paper	Data collected manually and automatically every hour and logged for the day
$Q_{P,DH,pr.con}$	District heat supplied to consumers connected to the primary network	Individual Heat Meter	Gcal	m	per month	100%	electronic and paper	Data collected manually on a monthly basis
$Q_{P,DH,secondary}$	District heat supplied to secondary network	SCADA	Gcal	m	per month	100%	electronic and paper	Data collected manually and automatically every hour and logged for the day
$Q_{P,DH,consumers}$	District heat supplied to consumers connected to the secondary network	SCADA (after completing the connections of local Heat Meters to the new installed M Bus cable) **At Present:** Heat Meters	Gcal	m	per month	100%	electronic and paper	Data collected manually and automatically every hour and logged for the day **At Present:** Data collected manually on a monthly basis
$Q_{P,DH,pr.new\_con}$	District heat supplied		Gcal	m	per month	100%	electronic and	Data collected manually on a

	to new consumers connected to the primary network	Individual Heat Meter					paper	monthly basis
$Q_{P,DH,\text{sec}.new\_con}$	District heat supplied to new consumers connected to the secondary network	SCADA	Gcal	m	per month	100%	electronic and paper	Data collected on a monthly basis

3.1 Responsibilities

The management and operation of the power plant facility and district heating network is as mentioned earlier the responsibility of the company operating the plant, ROMAG TPP.

ROMAG TPP shall ensure environmental credibility through systematic and accurate performance of monitoring procedures during the entire crediting lifetime of the MP.

ROMAG TPP is responsible for implementation of the management system according to the guidelines and procedures of the MP. The management system shall be based on the guidelines and procedures as mentioned in this MP and standard recording forms.

3.1.1 Data and records handling

Data handling shall be conducted in a transparent way to secure high quality data recording and data filing. The forms included in the MP and its guidelines and procedures shall be used as a protocol for data handling, which as a minimum comprise written recording of all monitoring data and electronic recording and backup. In addition, all reports (monitoring reports, QA reports, and verification reports etc.) shall be kept in both written and electronic form (with backup).

Data and information obtained from third parties shall be in writing and confirmed with the stamps and signatures necessary.

Uncertainty related to data handling shall be recorded by the ROMAG TPP and the Independent Entity shall be notified about this, and if necessary monitoring procedures shall be modified according to agreement with the Independent Entity.

Data recorded in the first three (3) months of the first year of the monitoring period shall be forwarded to the contracted Independent Entity immediately after this three-month period has passed for identification of possible mistakes or irregularities.

3.1.2 Quality Assurance System

The quality assurance system shall secure that monitoring procedures and requirements are followed in accordance with the MP and guidelines and procedures. The QA system will not be according to any ISO 9000 or similar standards.

The QA system comprises inspection of the monitoring procedure by an independent third party. It is recommended that the local EPIs will be responsible for this third party activity, but no formal agreement has been made so far. The EPIs are operating as branch offices under the Ministry of Waters and Environment in Bucharest.

The QA-system at the ROMAG TPP will in general focus on the procedures presented below and the QA system shall be in force during the entire crediting and monitoring period.

QA – Procedure		Time for inspection	Inspection
1.0	**Calibration of SCADA system**	As recommended by manufacturer	ROMAG
2.0	**Identification of calorific value of fossil fuels used**	Daily	ROMAG
2.1	Description of heat value and if possible chemical composition. - lignite - fuel oil		
2.2	Suppliers (name, official company registration number, address phone and fax number).		
3.0	**Estimation of fuel quantities consumed**	Daily	ROMAG
4.0	**Reading of district heat supplied to primary network**	Daily	ROMAG
5.0	**Reading of process steam produced**	Daily	ROMAG
6.0	**Reading of district heat supplied to heat conversion substations**	Daily	ROMAG
7.0	**Reading of district heat supplied to consumers connected to primary network**	Monthly	
8.0	**Reading of district heat supplied to secondary network**	Daily	ROMAG
9.0	**Reading of district heat supplied to consumers connected to secondary network**	Monthly	
10.0	**Reading of district heat supplied to new consumers connected to secondary network**	Monthly	ROMAG
11.0	**Reading of district heat supplied to new consumers connected to primary network**	Monthly	ROMAG
12.0	**Calculation of CO2 emission**	One (1) time per month.	ROMAG Local EPI (every year)
12.1	Calculate the quantity of CO2 emissions using the forms in the annexes.		
13.0	**Determination of new consumer connections**	One (1) time per year.	ROMAG and local EPI
14.0	**Environmental and social impact**	One (1) time per year.	local EPI
14.1	Environment impacts (degree of improvements, air quality, sustainability of impact, etc.)		
14.2	Social impact (comfort level in buildings, number of jobs created, new business areas)		
15.0	**Training of staff members**	Before commissioning of the project and hereafter one (1) time per year.	ROMAG
15.1	Monitoring procedures and guidelines		

Note that as part of the QA system items 2 through 11 shall be recorded at least daily based on general conditions at the power plant, however general operation of the power plant and district heating network may require more frequent recording. While total monthly values derived from the daily record will be recorded directly into the MP records.

The QA system can be changed according to request from the Independent Entity and the Romanian or Danish Governments.

3.1.3 Determination of Disconnection of Consumers

It is important that possible changes in the demand structure (e.g. consumer re/disconnections to secondary and primary network is monitored by both ROMAG TPP

and the EPA, as a change in the demand structure will lead to a false recording of emission reductions.

In this context all consumers connected to the secondary network shall be monitored during the entire crediting period.

Where new connections occur, the annual heat delivered to these consumers will be removed from the heat quantity delivered and subsequent emissions.

For conservative reasons possible disconnections of consumers to the primary and secondary network are not considered throughout the crediting period of the project activity and will be neglected.

3.1.4 Training of operational staff

Training of applicable operational staff members shall be conducted before commissioning of the project and before the beginning of each heating season to secure the highest possible quality of monitoring activities.

It is the responsibility of the ROMAG TPP to ensure that the operational staff members receive the necessary training enabling them to fulfil the requirements as specified in the MP. The training described in this MP may be changed according to request from the Independent Entity, the Romanian Government or the Danish Government.

Training Procedures		**Time for training and responsibility**
1.0	**Review of MP (before commissioning of the project)**	
1.1	Objectives of MP Requirements of MP Monitoring methods to be used Data handling and elaboration of annual emission reduction report QA – system The role of local EPI and Verifier	Timing: Before the JI project is commissioned. Responsibility: ROMAG
2.0	**Characteristics of fossil fuels used**	Timing: Before the JI project is commissioned. Responsibility: ROMAG
2.1	Characteristics of existing fossil fuels used	
3.0	**Monitoring CO_2 emission reduction**	
3.1	Quantity of district heat delivered to primary network	
3.2	Quantity of process steam produced	
3.3	Quantity of district heat delivered to heat conversion substations	
3.4	Quantity of district heat delivered to consumers connected to primary network	Timing Before the JI project is commissioned. Responsibility: ROMAG
3.5	Quantity of district heat delivered to secondary network	
3.6	Quantity of district heat delivered to consumers connected to secondary network	
3.7	Quantity of district heat delivered to new consumers connected to primary network	
3.8	Quantity of district heat delivered to new consumers connected to secondary network	
3.9	Procedure in case of disconnection of consumers	
3.10	Filling in forms and calculating CO_2 emission reduction	

3.1.5 Instruction of EPIs

As part of the QA – system the local EPI will frequently visit ROMAG TERMO and the district heating network to carry out inspection of the monitoring procedures described in

this MP. The local EPI is a public authority under the Romanian Ministry of Waters and Environment responsible for environmental issues related to the local society (county level) like inspection of the wood processing industry, forestry, air quality and wastewater quality.

In this context the EPI shall act as a third party to secure that monitoring procedures are respected as detailed in the MP. Also the EPI as branch offices for the Ministry are in direct contact with Romanian DNA in this project when speaking about emission reduction trading. ROMAG TPP and other project participants (e.g. Romanian Ministry of Waters and Environment) will instruct the EPI in the procedures to be conducted by them.

The EPI will conduct inspections two (2) times every year during the crediting period, and in this way secure that the monitoring procedures at ROMAG TERMO and the district heating network are being correctly implemented based on the monitoring forms and the guidelines. Inspection guideline items for an EPI inspection report are listed below.

EPI Inspection Report (guidelines)		**Language**
1.0	**Basic Information**	Romanian/English
1.1	Name of Inspection Report	
	Name of EPI elaborating the inspection report	
	Contact name/address/phone/fax	
	Name of JI project owner	
	Contact name/address/phone/fax	
	Time of inspection	
2.0	**Fuel Consumption**	
2.1	Quantities of fuels used	
	Net calorific value of fuels used	
	Record keeping of data	
	Calibration of measuring equipment	
3.0	**Process steam Production**	
3.1	Quantities of process steam produced	
	Record keeping of data	
	Calibration of measuring equipment	
4.0	**District Heat delivered to Primary Network**	
4.1	Quantities of district heat delivered to primary network	
	Record keeping of data	
	Calibration of measuring equipment	
5.0	**District Heat delivered to HCS**	
5.1	Quantities of district heat delivered to HCS	
	Record keeping of data	
	Calibration of measuring equipment	
6.0	**District Heat delivered to Consumers Connected to Primary Network**	
6.1	Quantities of district heat delivered to consumers connected to primary network	
	Record keeping of data	
	Calibration of measuring equipment	
7.0	**District Heat Delivered to Secondary Network**	
7.1	Quantities of district heat delivered to secondary network	
	Record keeping of data	
	Calibration of measuring equipment	
8.0	**District Heat Delivered to Consumers Connected to Secondary Network**	

8.1	Quantities of district heat delivered to consumers connected to secondary network Record keeping of data Calibration of measuring equipment	
9.0	**District Heat Delivered to New Consumers Connected to Secondary Network**	
9.1	Quantities of district heat delivered to new consumers connected to secondary network Record keeping of data Calibration of measuring equipment	
10.0	**District Heat Delivered to New Consumers Connected to Primary Network**	
10.1	Quantities of district heat delivered to new consumers connected to primary network Record keeping of data Calibration of measuring equipment	
11.0	**Calculation of CO2 Emission Reductions**	
11.1	Project specific emissions CO2 emissions Record keeping of data	
11.2	Emission reductions	
12.0	**Training**	
13.0	**Environmental and Social Impacts**	
13.1	Negative impacts	
13.2	Positive impacts	
14.0	**Observations and comments**	

3.1.6 Monitoring Report

ROMAG TPP shall every year during the entire crediting period elaborate the monitoring reports mentioned in paragraph 1.2 (Table 1) with the content following the guidelines presented below. The number of monitoring reports per year can be changed according to request the Romanian Government or the Danish Government.

Contents of annual monitoring reports (guidelines)

Paragraph (issues)		**Language**
1.0	**Basic information**	English
1.1	Name of monitoring report Name of owner of the JI project Contact name/address/phone/fax Name of company elaborating the monitoring report Contact name/address/phone/fax Time period for monitoring Name of verifier Contact name/address/phone/fax	English
2.0	**Description of Project Performance**	English
2.1	Description of lignite consumed	English
2.2	Description of fuel oil consumed	English
2.3	Description of NCV of lignite	English
2.4	Description of NCV of fuel oil	English
2.5	Description of district heat delivered to primary network	English
2.6	Description of process steam production for heavy water producers	English
2.7	Description of district heat delivered to HCS	English
2.8	Description of district heat delivered to consumers connected to primary network	English

2.9	Description of district heat delivered to secondary network	English
2.10	Description of district heat delivered to consumers connected to secondary network	English
2.11	Description of district heat delivered to new consumers connected to primary network	English
2.12	Description of district heat delivered to new consumers connected to secondary network	English
3.0	**Monitoring Procedures**	English
3.1	Description of monitoring methods and equipment	English
3.2	Description of adjustments of monitoring methods and equipment	English
3.3	Description of training and calibrations	English
3.4	Description of errors (including disconnections)	English
3.5	Filled in forms (in Annexes)	English
4.0	**Changes in Monitoring Procedures**	English
4.1	Description of changes in operation of the JI project activity	English
4.2	Description of changes in the supply of fuels	English
4.3	Description of changes conducted according to agreement with verifier, Romanian Government and/or Danish Government	English

3.1.7 Instruction of operational staff

ROMAG TPP is responsible for necessary instruction of the operational staff members enabling them to carry out monitoring procedures according to this MP. The instruction shall be performed before the beginning of each heating season to secure highest possible quality of monitoring activities.

ROMAG TPP conduct an instruction meeting minimum one (1) month before the beginning of each heating season and before the first monitoring period starts.

3.1.8 Confirmation

Confirmation of the management procedures and monitoring procedures for carrying out a satisfactory MP must be approved through the determination of an Independent Entity before the project can start generating AAUs and ERUs, respectively.

In addition, monitoring may not officially begin until all the required management procedures and monitoring procedures are in-place. This shall be confirmed by the local EPIs or upon mutual agreement between ROMAG TPP, Romanian Government, and Danish Government.

Summary - Management of the monitoring plan

The summary aims to highlight the key elements and responsibilities of the management of the MP..

Obligations	ROMAG TPP	Independent Entity
MP	• Review of the MP and comments. • Review management of monitoring plan. • Preparation of monitoring procedures. • Training of staff members performing monitoring procedures. • Updating of MP if necessary. • Preparation for data collection, data handling and data storing.	• Review of MP and comments. • Review of management system.
Data Collection	• Review of methods and system for data collection system including updating of these if necessary.	• Review of methods and system for data collection including comments.

Data Handling	• Appointment of person (s) responsible for data handling.	• Review of data handling systems.
Data storing	• Establishment of data storing system for written- and digital data. • Establishment of backup system for data storing.	• Review of data storing system including backup systems.
Monitoring	• Timetable for monitoring activities.	• Review and provide comments on timetables, monitoring sheets etc.
Reporting	• Establish framework for reporting which fulfil requirements of MP.	• Review of framework for reporting.
Instruction	• Responsible for instruction of staff members to perform the different monitoring procedures.	• provide comments on performance of the training.

4. Fixed Parameters available at the validation

The table below presents those parameters used in the calculations of both baseline and project emissions, which are fixed and available at the validation of the project.

ID number	Data variable	Data	Unit
$C_{lignite}$	carbon factor for lignite	27.6	tC/TJ
$oxid_{lignite}$	oxidation factor of lignite	97	%
M_{CO2}	molar mass of CO2	44.01	g/mol
M_C	molar mass of C	12.01	g/mol
C_{oil}	*carbon factor for oil*	21.1	tC/TJ
$oxid_{oil}$	*oxidation factor of oil*	99.5	%