

# Boiler efficiency improvement at Holboca CET Iasi II

## Monitoring Plan Guidelines and Procedures

Version 3 – 2008-09-24



GRUE & HORNSTRUP

## 1. Monitoring Requirements

### 1.1. Objective of the Monitoring Plan

The objective of the Monitoring Plan (MP) is 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, "Boiler efficiency improvement at Holboca CET Iasi II". The project is based on the injection of the liquid chemical named Therma Chem FS 12 into the combustion process of the existing boiler installations in order to increase the thermal efficiency of the boilers and thereby reduce greenhouse gas emissions. Moreover the project encompasses the erection of a new ash handling system for continuous ash removal at the power plant. The MP shall after its validation act as an integrated part of the contractual agreement for CO<sub>2</sub> trading between the Romanian government and the Danish government.

This MP provides for a monitoring methodology for monitoring and estimating GHG emission reduction referring to the baseline approach used. The monitoring methodology comprises the calculation of annual CO<sub>2</sub> emission reductions associated with the reduced fuel consumption at the CET. The methodology shall be used for the entire monitoring period, which is 7 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 the SCADA system and respective measurement devices installed at the CET facility in Holboca.
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 7 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 a Independent Entity to accredit the AAUs and ERUs generated by the project according to requirements of the Joint Implementation Supervisory Board.
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 seven (7) 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	Oct. 2006 – Dec. 2012	May 2007 – Feb. 2013
First period of monitoring	Oct. 2006 – Apr. 2007	May 2007
Last period of monitoring	Oct. – 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 methodology is based on the following stepwise approach:

- Step I: Selection of the time duration with the most applicable emission factors per produced ton of steam for the baseline and project
- Step II: Calculation of the total baseline and project emissions by multiplying the corresponding emission factors per produced ton of steam with the total annual steam production
- Step III: The difference between total baseline and total project emissions represent the total emission reductions

The following values are used for developing the baseline:

- Coal consumption [t/day]
- Fuel oil consumption [t/day]
- Steam production [t/day]
- Net calorific value of coal used [kcal/kg]
- Net calorific value of fuel oil used [kcal/kg]
- Crediting period of 7 years [2006-2012]

## 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<sub>2</sub> emission reductions

#### 2.1.1. Basic assumptions

The MP is based on the basic assumption that the direct CO<sub>2</sub> emission reductions generated by the project activity are equal to the business-as-usual scenario and that this scenario will prevail in the monitoring period.

#### 2.1.2. Methodology

The steps presented below describe the methodology used for calculating the CO<sub>2</sub> emission reductions generated by the project activity:

- Step I:** The specific type of fossil fuel, the calorific value of the coal (kcal/kg) and fuel oil (kcal/kg) used shall be described. The utility shall conduct on-site analysis



or contact the relevant supplier of coal and fuel oil to obtain precise and reliable data.

**Step II:** The CO<sub>2</sub> emission factor for coal (kg CO<sub>2</sub>/GJ) and fuel oil (kg CO<sub>2</sub>/GJ) shall be estimated in accordance with the “Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual”.

**Step III:** Estimate the fuel consumption based on the applicable respective procedure on a daily basis based on the recorded hourly average value.

**Step IV:** Estimate the heat production on a daily basis based on the recorded hourly average value from the SCADA system.

## **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 introduction of Therma Chem FS 12 into the combustion process, will lead to a reduced fuel consumption at the CET 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 coal 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 EPAs and described in EPA inspection reports and forms, following the guidelines presented in paragraph 3.1.2 and 3.1.4.

## **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 the CET.

The CET shall take all reasonable actions to optimise the operation of the project activity.

1. The CET shall ensure the delivery of coal and fuel oil to the CET in order to guarantee its operation.
2. The CET shall as a minimum fulfil the obligations concerning monitoring- and data management which are described in this document, this shall act as an integrated element in the day-to-day management system for the CET facility.
3. The CET shall notify the Romanian Government and the Danish Government if the power plant is stopped, or if combustion of fuel and heat production have dropped significantly.
4. The CET 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 “Boiler efficiency improvement at Holboca CET Iasi II”.

## **3. Management of the Monitoring Plan**

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
$fP_{a,B1}$	Quantity of coal consumed in boiler 1	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$fP_{a,B2}$	Quantity of coal consumed in boiler 2	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$fP_{b,B1}$	Quantity of fuel oil consumed in boiler 1	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$fP_{b,B2}$	Quantity of fuel oil consumed in boiler 2	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$qP_{B1}$	Quantity of steam produced in boiler 1	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$qP_{B2}$	Quantity of steam produced in boiler 2	-	tones	c	per day	100%	electronic and paper	Data calculated in accordance with specific procedures and logged for the day
$CV_a$	Calorific value of coal	-	kcal/kg	m	per day	100%	electronic and paper	Based on onsite analysis and billing records
$CV_b$	Calorific value of fuel oil	-	kcal/kg	m	per day	100%	electronic and paper	Based on onsite analysis and billing records

The 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 Board.

**3.1.**

**Responsibilities**

The management and operation of the CET facility is as mentioned earlier the responsibility of the company operating the CET plant, S.C. CET Iasi S.A.. The CET shall ensure environmental credibility through systematic and accurate performance of monitoring procedures during the entire crediting lifetime of the MP.



The CET is responsible for implementation of the management system according to the guidelines in this MP. The management system shall be based on the guidelines as mentioned in this monitoring plan 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 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, 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 CET and the verifier shall be notified about this, and if necessary monitoring procedures shall be modified according to agreement with the verifier.

**Data recorded in the first three (3) months of the first year of the monitoring period shall be forwarded to the contracted verifier 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. 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 EPAs will be responsible for this third party activity, but no formal agreement has been made so far. The EPAs are operating as branch offices under the Ministry of Waters and Environment in Bucharest.

The QA-system at the CET 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
<b>1.0</b>	<b>Calibration of SCADA system</b>		CET
<b>2.0</b>	<b>Identification of calorific value of fossil fuels used</b>		
2.1	Description of heat value and if possible chemical composition. - coal - fuel oil	Daily	CET
2.2	Suppliers (name, official company registration number, address phone and fax number).		
<b>3.0</b>	<b>Reading of fuel consumption</b>	Hourly	CET
<b>4.0</b>	<b>Reading of steam production meter</b>	Hourly	CET
<b>5.0</b>	<b>Calculation of CO2 and equivalent CO2 emission</b>		
5.1	Calculate the quantity of CO2 emissions using the forms in the annexes.	One (1) time per year.	Local EPA
<b>6.0</b>	<b>Environmental and social impact</b>		
6.1	Environment impacts (degree of improvements, air quality, sustainability of impact, etc.)	One (1) time per year.	CET and local EPA
6.2	Social impact (comfort level in buildings, number of jobs created, new business areas)		
QA – Procedure		Time for inspection	Inspection
<b>7.0</b>	<b>Training of staff members</b>		
7.1	Monitoring procedures	Before commissioning of the project and hereafter one (1) time per year.	CET



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

### 3.1.3. Training of operational staff

Training of operational staff members shall be conducted before commissioning of the project. Training shall be replicated when the boiler installations are entering into operation to secure full understanding of the monitoring procedures and to secure the highest possible reliability of the monitoring results.

It is the responsibility of the utilities 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 verifier, the Romanian Government or the Danish Government.

#### Training Procedures (Guidelines)

Training Procedures		Time for training and responsibility
<b>1.0</b> 1.1	<b>Review of MP (before commissioning of the project)</b> 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 EPA and Verifier	Timing: Before the JI project is commissioned. Responsibility: The CET and technology supplier will be responsible for training
<b>2.0</b> 2.1	<b>Characteristics of fossil fuels used</b> Characteristics of existing fossil fuels used	Timing: Before the JI project is commissioned. Responsibility: The CET will be responsible for training
<b>3.0</b> 3.1 3.3	<b>Monitoring CO<sub>2</sub> emission reduction</b> Quantity of fuel combusted Filling in forms and calculating CO <sub>2</sub> emission reduction	Timing Before the JI project is commissioned. Responsibility: The CET will be responsible for training

### 3.1.4. Instruction of EPAs

As part of the QA – system the local EPA will frequently visit Holboca CET Iasi II to carry out inspection of the monitoring procedures described in this MP. The local EPA 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 EPA shall act as a third party to secure that monitoring procedures are respected as detailed in the MP. Also the EPA as branch offices for the Ministry are in direct contact with Romanian DNA in this project when speaking about emission reduction trading. S.C. CET Iasi S.A. (operator of Holboca CET Iasi II) and other project participants (fx. Romanian Ministry of Waters and Environment) will instruct the EPA in the procedures to be conducted by them.

The EPA will conduct inspections two (2) times every year during the crediting period, and in this way secure that the monitoring procedures at Holboca CET Iasi II are being correctly implemented based on the monitoring forms and the guidelines. Inspection guideline items for an EPA inspection report are listed below.



**EPA Inspection Report (guidelines)**

Paragraph (issues)		Language
<b>1.0</b>	<b>Basic Information</b>	Romanian/English
1.1	Name of Inspection Report Name of EPA elaborating the inspection report Contact name/address/phone/fax Name of JI project owner Contact name/address/phone/fax Time of inspection	
<b>2.0</b>	<b>Fuel Consumption</b>	
2.1	Quantities of fuels used Net calorific value of fuels used Record keeping of data Calibration of measuring equipment	
<b>3.0</b>	<b>Steam Production</b>	
3.1	Quantities of steam produced Record keeping of data Calibration of measuring equipment	
<b>4.0</b>	<b>Calculation of CO2 Emission Reductions</b>	
4.1	Steam specific emissions CO2 emissions Record keeping of data	
4.2	Emission reductions	
<b>5.0</b>	<b>Training</b>	
<b>6.0</b>	<b>Environmental and Social Impacts</b>	
5.1	Negative impacts	
5.2	Positive impacts	
<b>7.0</b>	<b>Observations and comments</b>	

**3.1.5.****Monitoring Report**

The CET 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 of the verifier, the Romanian Government or the Danish Government.

**Contents of annual monitoring reports (guidelines)**

Paragraph (issues)		Language
<b>1.0</b>	<b>Basic information</b>	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
<b>2.0</b>	<b>Description of Project Performance</b>	English
2.1	Overall description of performance of boiler facilities and operation during the respective period of monitoring.	English
2.2	Description of performance of the JI project	English
2.3	Description of fuels consumption and energy content	English





2.4	Description of steam production	English
2.5	Description of CO2 emissions	English
2.6	Description of CO2 emission reductions	English
<b>3.0</b>	<b>Monitoring Procedures</b>	English
3.1	Description of monitoring methods and equipment	English
3.2	Description of adjustments of monitoring methods and equipment	English
3.2	Description of training and calibrations	English
3.3	Description of errors	English
3.4	Filled in forms (in Annexes)	English
<b>4.0</b>	<b>Changes in Monitoring Procedures</b>	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

### 3.1.6. Instruction of operational staff

The CET 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.

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

### 3.1.7. 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 Project Manager endorsed by the Iasi TPP General Manager stating that all conditions have been fulfilled or upon mutual agreement between the CET, 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	CET	Verifier
MP	<ul style="list-style-type: none"> <li>Review of the MP and comments.</li> <li>Review management of monitoring plan.</li> <li>Preparation of monitoring procedures.</li> <li>Training of staff members performing monitoring procedures.</li> <li>Updating of MP if necessary.</li> <li>Preparation for data collection, data handling and data storing.</li> </ul>	<ul style="list-style-type: none"> <li>Review of MP and comments.</li> <li>Review of management system.</li> </ul>
Data Collection	<ul style="list-style-type: none"> <li>Review of methods and system for data collection system including updating of these if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>Review of methods and system for data collection including <u>comments</u>.</li> </ul>



Data Handling	<ul style="list-style-type: none"><li>• Appointment of person (s) responsible for data handling.</li></ul>	<ul style="list-style-type: none"><li>• Review of data handling systems.</li></ul>
Data storing	<ul style="list-style-type: none"><li>• Establishment of data storing system for written- and digital data.</li><li>• Establishment of backup system for data storing.</li></ul>	<ul style="list-style-type: none"><li>• Review of data storing system including backup systems.</li></ul>
Monitoring	<ul style="list-style-type: none"><li>• Timetable for monitoring activities.</li></ul>	<ul style="list-style-type: none"><li>• Review and provide comments on timetables, monitoring sheets etc.</li></ul>
Reporting	<ul style="list-style-type: none"><li>• Establish framework for reporting which fulfil requirements of MP.</li></ul>	<ul style="list-style-type: none"><li>• Review of framework for reporting.</li></ul>
Instruction	<ul style="list-style-type: none"><li>• Responsible for instruction of staff members to perform the different monitoring procedures.</li></ul>	<ul style="list-style-type: none"><li>• provide comments on performance of the training.</li></ul>

