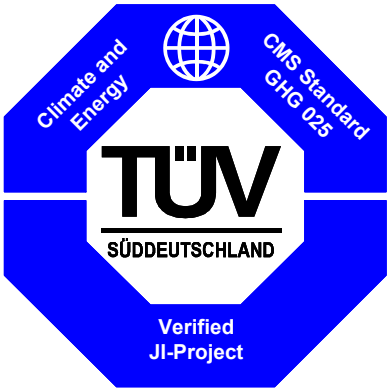
# First Verification Report

# First Verification of "Biomass Energy Portfolio for Czech Republic"

## Report No. 306533

## 2004, August 31st



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| Subject: | First Verification of a JI Project |
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Summary:

TÜV Industrie Service GmbH TÜV SÜD Gruppe (former TÜV Süddeutschland Bau und Betrieb GmbH) has performed a First Verification of the JI project: "Biomass Energy Portfolio for Czech Republic". The verification is based on requirements of ERUPT 1 set as part of the MVP for this specific project. Additionally this First Verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

TÜV Industrie Service GmbH TÜV SÜD Gruppe (TÜV SÜD) has verified that all implemented monitoring methodologies for determining emission reductions conform to the project design documents and have been applied correctly and their documentation is complete and transparent. This verification engagement was carried out during the period of 2003-07-22 to 2004-08-31.

All issues indicated as "Forward Action Request" in chapter 3 have to be submitted as indispensable information to the verification team of the next Periodic Verification. All such issues should receive a special focus during the following verification.

Despite of indicated issues the verifier can confirm that the GHG emission reduction is calculated without material misstatements. Based on the information we have seen and evaluated, we confirm the submitted amount of **33.454 ton** $CO_2$ -equivalents in the period of 2003-01-01 to 2003-12-31.

| | | |
|---|---|---|
| Work carried out by: | Markus Knödlseder (project manager)<br>Werner Betzenbichler<br>Josef Konradl<br>Luděk Maryška<br>Miloš Berka | Internal Quality Control by:<br>Michael Rumberg |

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## Abbreviations

| | |
|---|---|
| AOE | Applicant Operational Entity |
| BLS | Baseline Study |
| BTG | BTG CZECH REPUBLIC S.R.O. |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CDM-EB | CDM Executive Board |
| CER | Certified Emission Reduction |
| CO2 | Carbon Dioxide |
| CO2e | Carbon Dioxide equivalent |
| CP7 | Conference of Parties No. 7 (held in Marrakech) |
| DNA | Designated National Authority |
| ER | Emission Reduction |
| FAR | Forward Action Request |
| GHG | Greenhouse gas |
| JI | Joint Implementation |
| KP | Kyoto Protocol |
| PP | Project Participants |
| TÜV SÜD | TÜV Industrie Service GmbH TÜV SÜD Gruppe |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VP | Verification Protocol |
| VVM | Validation & Verification Manual |

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# 1 INTRODUCTION

BTG Central Europe s.r.o. has commissioned an independent verification by TÜV Industrie Service GmbH TÜV SÜD Gruppe (TÜV SÜD) of its project, called Biomass Energy Portfolio for Czech Republic. That project has been submitted within the climate change project tender ERUPT I, launched by Senter.

Senter buys carbon credits through its procurement program, the ER-UPT program. For investments in Central and Eastern Europe one can benefit from this program under Joint Implementation (JI). Through the procurement program Senter buys carbon credits from investments in a/o renewable energy, energy efficiency, fuel switch and waste management. The program is implemented on a tender basis

The program requires that „a verification body regularly reviews the project performance records and achievements that ER-UPT I, Kyoto Protocol and relevant national and international requirements and standards have been met by the project". The monitoring plan in use within the project is the basis for this verification. The verification report will identify whether the project as implemented meets the relevant requirements, and verify and report the quantum of achieved emissions reductions to ERUPT and the host country.

## 1.1 GHG Project Description

The whole project consists of 28 biomass energy sub-projects. Most of the sub-projects are municipal heating systems, which include a small-capacity electricity production in some cases. Apart from that, there are also a heating source for a senior people's house and a co-generation heat and power system for a hospital. The aim is to substitute the old central coal boilers or individual stoves with new biomass boilers, being fired by wood and straw.

The sub-projects of the portfolio are in different stages of development. Some have been implemented already and have started with operation; others are still under construction. For these reasons the concept of the project is of a step-by-step character.

Six of the 28 sub-projects were completed and have started with operation in January 2003. Those sub-projects are subject to this verification. They are listed as follows:

- Bystrice n. P.
- Driten
- Horni Plana
- N. Cerekev
- Rostin
- Zlutice

Their current status is described in chapter 4.3 "Project Implementation".

## 1.2 Scope

This verification is a First Verification. According to the terms of the Validation & Verification Manual (VVM), a First Verification is in fact a first Periodic Verification without a preceding Initial Verification. Thus, a First Verification includes the objectives of the Initial and Periodic Verification.

According to the VVM, the objective of an Initial Verification is:

- Ensure that the project has been implemented as planned, that the monitoring system is in place and that the project is ready to generate and record GHG emission reductions.
- Approve adjustments and amendments to the MVP that may have become necessary during the detailed design and construction of the project.
- Assist meeting Senter/ERU-PT supervision obligations and clear the way for project commissioning and generation of high quality ERs.

The objective of the Periodic Verifications is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring system and procedures described in the monitoring plan,
- the eligibility of monitoring processes and equipment
- the consistency of data acquisition, data processing and reporting
- all weaknesses and strengths of the applied management procedures
- Evaluation of the GHG emission reduction data and express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emission reduction is “free” of material misstatements,
- Confirming the adequate application of required procedures is reducing the risk of inconsistencies that may endanger the issuance of ERUs for the first year of operation.
- The reported GHG emission data is sufficiently reported by evidence, i.e. monitoring records.

This report refers to the initial and first periodic verification, which was conducted from September 2003 to August 2004.

The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). The following sections govern JI projects:

- KYOTO PROTOCOL – Article 6
- THE MARRAKESH ACCORDS: Principles, nature and scope of the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto protocol
- Validation and Verification Manual (VVM)
- ERUPT-Guidelines 2000

## 1.3 Objective

The developer of this project is BTG Biomass Technology Group B.V. with its subsidiary BTG Czech Republic s.r.o. (BTG). BTG carries out the project development and negotiations with the host country government and other project partners.

BTG selected the certification body “Climate and Energy” of TÜV SÜD to perform a First Verification of implemented subprojects. The local subsidiary of the TÜV Süddeutschland Group, ITI TÜV s.r.o., assisted TÜV during that verification. The two experts integrated in the project team have a long track record in environmental auditing according to ISO14001. Both are currently running an internal qualification procedure, which should finally result in the appointment as ghg-auditors by the upper-mentioned certification body.

Hence, the verification team consisted of five auditors:

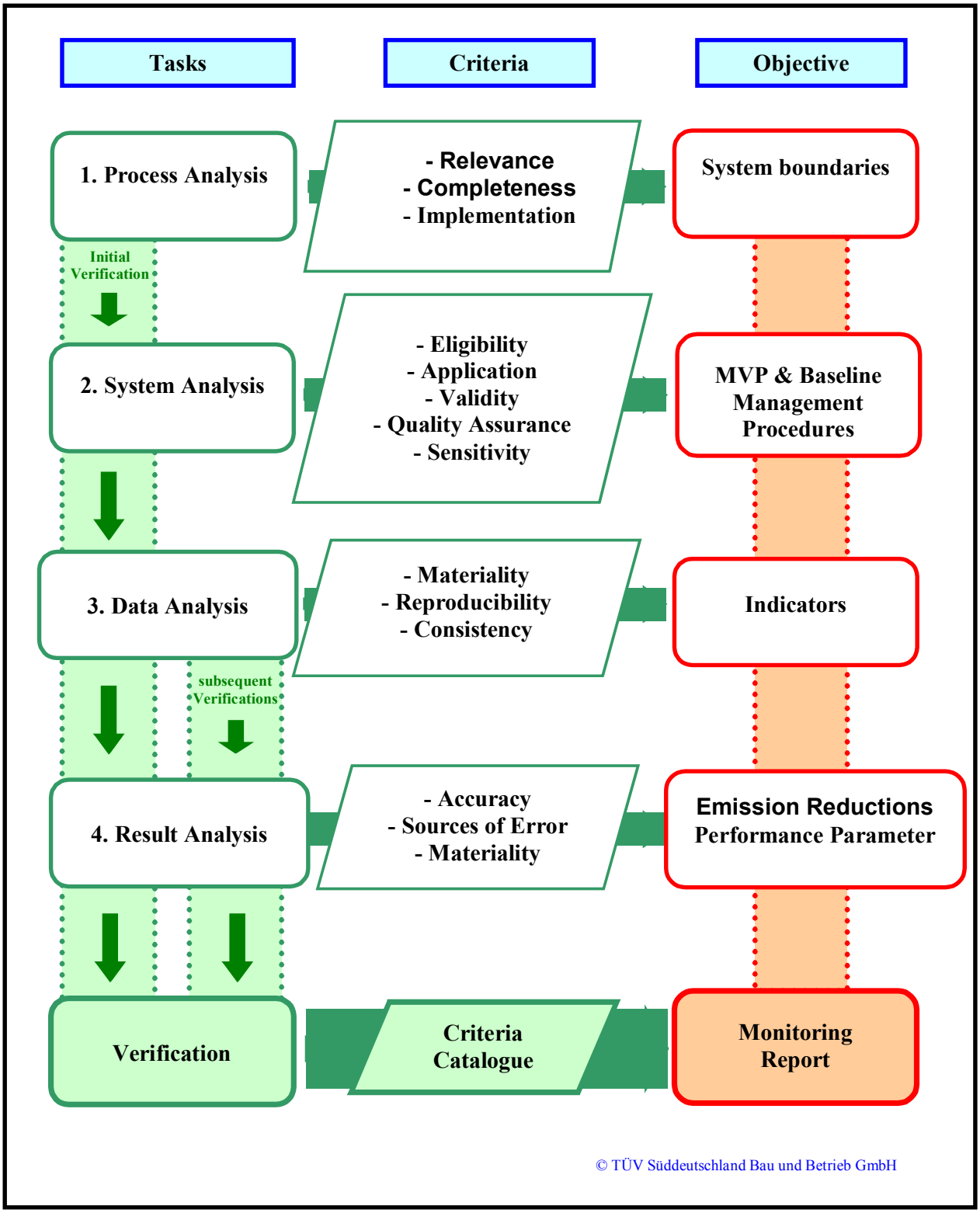
- Markus Knödlseder, TUV SÜD — ghg-auditor (lead), project manager
- Werner Betzenbichler, TÜV SÜD — ghg-auditor
- Josef Konradl, ZREU — technical expert, ghg-auditor (trainee)
- Luděk Maryška, ITI TÜV — ghg-auditor (trainee), ISO 14.001 auditor
- Miloš Berka, ITI TÜV — ghg-auditor (trainee), ISO 14.001 auditor

During verification the team was expected to:

- familiarize themselves with the project and project circumstances,
- introduce the project staff to the audit and verification process,
- check whether the project has been implemented as planned,
- check whether assumptions that have an impact on the monitoring and verification processes and its outcomes are still reasonable, in particular baseline assumptions,
- confirm system readiness: that the MVP has been implemented in the project's management and operational procedures and that all necessary monitoring elements are in place to ensure generation of verifiable emission reductions; and
- verify emission reduction stated by the monitoring report.

## 2 METHODOLOGY

The graph is indicating the different main criteria relevant at each step of verification.



Starting the First Verification process the verifier's first task has been to familiarize with the project. Based on the received documents (see Annex 1) two checklists, the Verification Protocols (VPs) have been prepared according to the VVM. It supported BTG to prepare for the audits and inspections on site.

VPs serve the following purposes:

- it organizes details of the audit procedure and clarifies the requirements the project is expected to meet; and
- it documents how a particular requirement has been validated and the result of the verification.

A special focus was given to:

- the correct implementation of the project
  (installations, monitoring equipment and procedures, quality assurance procedures)
- the correctness of assumptions with impacts on the monitoring and verification process
  (e.g. baseline assumptions)
- sustainable development and environmental performance parameters relevant for the construction phase
- training programs
- allocation of responsibilities
- the readiness of the system

After the document review the audit team conducted

- inspections at the locations of the sub-projects,
- interviews with operational personnel from the sub-projects, mentioned in chapter 2.3,
- an interview with responsible municipalities and
- interviews with BTG Czech Republic s.r.o..

The findings are the essential part of this verification report, which is based on the Verification Protocols of the VVM (Annex 2).

The VP consists of the following columns:

| | |
|---|---|
| Item | Indicator of task or objective to be assessed during the verification; each new topic is starting with a line indicating time of audits and persons interviewed |
| Objective | Worded objective to be scrutinized |
| Comments / Forward Action Request / Corrective Actions Request | Description of identified situation concerning the objective, Conclusions of the assessment process |
| Reference | Reference to the source setting the requirement |
| Conclusion | Result of the evaluation giving a symbol for<br>☑: in compliance with requirement or task resolved to item x: further discussion shifted to item x<br>FAR: Forward action request, i.e. this issue has to be integrated into the next consecutive verification<br>CAR: Corrective Action Request |

The verification team distinguishes between two different types of findings identified during the verification process. A "**Corrective Action Request**" (CAR) in the verification context would be where:

- There are clear deviations concerning the implementation of the project as defined by the PDD
- Requirements set by the objectives of the VPs have not been met; or
- There is a risk that the project would not be able to deliver high quality CERs

Before awarding a positive verification opinion it is necessary to resolve all findings indicated with a CAR.

The verification team has also used the term "**Forward Action Request**" (FAR), whenever

- the current status requires a special focus on this item for the next consecutive verification, or
- an adjustment of the MVP is recommended.

In the context of FARs no risks have been identified, which may endanger the delivery of high quality ERUs, but it is a hint that there could be deviations from standard procedures as defined by the MVP. As a consequence such aspects should receive a special focus during the next consecutive verification.

All FARs have to be reported to the verification team of the next Periodic Verification, which have to take into account all such findings.

# 3 VERIFICATION FINDINGS

## 3.1 Remaining issues, CARs, FARs from previous validation

### 3.1.1 Discussion

A main task of First Verification is to check the remaining issues from the previous validation or issues which are clearly defined for assessment in the PDD. The validation report, prepared by Société Générale de Surveillance (SGS) in February 2001, notes three open issues. One Minor Corrective Action Requests and two Observations were mentioned:

| CAR No | Type of Corrective Action | Evidence of non compliance |
|---|---|---|
| 001 | Minor* | No data presented on emissions related to transport of biomass or on the construction of the new distribution systems. |
| Observation 1 | | Monitoring of land-use may be considered in order to detect any changes in land-use practices that may arise as a result of the projects |
| Observation 2 | | Monitoring of environmental impacts relating to the removal of agricultural residues from soils may be required |

* Using the terms of Observation, Minor and Major CAR is a system of character applied by SGS and differs from the system defined in the VVM.

SGS assessed that these issues are not expected to affect the success of the project, materially. Nevertheless, due to the up coming EU-emission trading scheme, the demand for biomass will increase. That increasing demand is detectable in its beginning already now. Therefore the project developer should take action to ensure that no negative impacts on land use change or sustainable forest use will take place. Regular updated information about the biomass supplier, the origin of the biomass and its situation production process should be available.

### 3.1.2 Findings

The open issues mentioned in the validation report have not been fulfilled yet.

### 3.1.3 Conclusion

TÜV SÜD agrees with this opinion that issues of Observation 1 & 2 are not crucial for the success of the project, but a system should be elaborated, which monitors the land-use and the environmental impacts related to the removal of agricultural residues from soils. That information has to be addressed in the monitoring report

In our opinion the emissions related to transport of biomass or on the construction of new distribution systems are negligible. The minor CAR can be closed out.

## 3.2 Project Implementation

### 3.2.1 Discussion

The scrutiny of a proper implementation of a project is a key issue of a First Verification. To have a climate change project ready for successful operation, it requires:

- the completion of all installation works concerning the core activity of the project (e.g. power generation equipment),
- the completion of all preparations (equipment, contracts etc.) concerning a sustainable supply by resources required to run the project (in this case biomass boilers),
- in case of emission reduction projects: The completion of all preparations securing the replacement of ghg emissions from baselines sources,
- the completion of all installation works concerning metering systems as required by the MVP,
- the completion of the development of data processing procedures (software applications, hardware) necessary to acquire, process and store all relevant data,
- the completion of initial quality assurance measures (e.g. calibrations),
- the completion of measures to engage and qualify employees in a sufficient amount to maintain the operations and the monitoring process,
- the familiarity of all persons involved concerning the application of routines and procedures guaranteeing a permanent data quality,
- the existence of troubleshooting routines to be applied in order to safeguard data acquisition in case of any problems and
- a clear designation of responsibilities to persons communicating the project to external interested parties by publishing reports or by direct contacts

### 3.2.2 Findings I

During this First Verification we identified that the original project approach could not be realized as described in the PDD. Following changes have been detected during the visit on site. The changes are partly mentioned in the monitoring report, too:

**Location: Nova Cerekev**

"In the original Project Description there were two subprojects planned: the subproject A with a 4.6 $MW_{th}$ biomass boiler and the subproject B with a 1.7 $MW_{th}$ biomass boiler. Currently, a 2 MW biomass boiler has been installed within the subproject A."[1]

**Location: Bystrice nad Pernstejnem**

"In the original Project Description there were two subprojects planned. In the project A, a 9 $MW_{th}$ biomass boiler-house was to substitute coal boiler-house. In the project B, a 5 $MW_{th}$ biomass boiler-house was to substitute gas boiler-house. Eventually, the two subprojects have been combined and a 9 $MW_{th}$ biomass boiler-house has been built. The heat from biomass substitutes heat from coal by 75% and heat from gas by 25%. (…). The subproject operator reports the amount of biomass fuel in cubic meters. To recalculate it, the following densities were used: woodchips and bark (50% moisture content) 0.27 t/m3, sawdust (50% moisture content) 0.60 t/m3, straw (20% moisture content)

[1] Quotation from the original monitoring report

0.20 t/m3. The densities were taken from R.E.H. Sims: The Brilliance of Bioenergy, James&James, London 2002."[1]

Not mentioned in the monitoring report:

The project boundary has been extended to an additional heat district. Several individual households are now also connected to the biomass boiler. This was not planned originally.

**Location: Driten**

"In the original Project Description there were two subprojects planned. In the subproject A, a 1.2 $MW_{th}$ biomass boiler-house was to substitute coal boiler-house. In the subproject B, a 3 $MW_{th}$ biomass boiler-house was to substitute a mixture of individual stoves. Currently, the project A has been realized with a 2 MW biomass boiler-house." [1]

**Location: Horni Plana**

"In the original Project Description biomass boilers with the total thermal output of 0.6 $MW_{th}$ were planned. Eventually, biomass boilers with the total thermal output of 0.5 $MW_{th}$ have been installed.

Within this subproject, heat is supplied to the Old people's home in Horni Plana, which is also an owner of the project, and to a local Elementary school. The heat consumption in the Elementary school is metered and invoiced. The heat consumption in the Old people's home is currently not metered, but the meter of heat supplied has been ordered and will be installed in near future. As direct measurements of the total heat supplied are not temporarily available, the heat production is calculated using the fuel consumption (75 t of woodchips) multiplied by wood heating value from the Baseline study (10 GJ/t wet basis) multiplied by biomass boiler efficiency (70%) from the Baseline study of the original Project Description. Both values are very conservative.

In this subproject, the heat produced is considered to be equal to the heat supplied and metered, as the biomass boilers are situated in the building of the Old people's home, and the elementary school is only about 20m away from the home." [1]

**Location: Zlutice**

"In the original Project Description biomass boilers with the total thermal output of 10 $MW_{th}$ were planned. Eventually, biomass boilers with the total thermal output of 7.9 $MW_{th}$ have been installed."

**Location: Rostin**

"In the original Project Description biomass boilers with the total thermal output of 5.7 $MW_{th}$ were planned. Eventually, biomass boilers with the total thermal output of 5.5 $MW_{th}$ have been installed.

The heat sold for Jan. and Feb. 2003 was not individually monitored. The subproject operator monitored the heat sold for several months in 2002 since the boiler implementation, and for Jan. and Feb. 2003 in total. The heat sold was again monitored for Mar., Apr. and May 2003 in total. As data on heat sold for Jan. and Feb. 2003 are missing, they are estimated from the data on heat production for Jan. and Feb. 2003. The heat production data are multiplied by heat distribution efficiency for the period Mar-May 2003, i.e. 67.0%. The efficiency value is obtained as the ratio of the heat sold and the heat produced over Mar-May 2003. The value of 67.0% is a conservative estimate. The heat produced monthly over this period was less than in Jan. and Feb.

For an emergency heat supply there is also an LFO boiler in the heating plant. The boiler has not been operated during the period Jan-Jun 2003 for more than few minutes of a test. However, currently there is no meter that would measure the heat production of this boiler only. It will be added in the near future to ensure a proper monitoring in case the LFO boiler is used." [1]

### 3.2.3 Findings II

Additional to those findings which have been mentioned already in the monitoring report, the verifier identified following findings related to the Initial Verification Checklist V.3.0 of the VVM, see annex.

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| Project boundaries | The subproject in Bystrice nad Pernstejnem changes its project boundary. In this subproject additional single households were connected to the existing biomass boiler. | FAR#1 |
| Monitoring and metering systems | The monitoring and metering systems are in place, apart from Driften. In that municipality after its installation, the heat production meter has been taken out. The measurement equipment effected supply problems due to pressure loss.<br>In following municipalities missing ID-numbers could be identified: Driften, Zludice. | FAR#2 |
| Calibration and quality assurance | Verifiable documents to calibration of the measurement equipment could not be submitted. | FAR#3 |
| Data acquisition and data processing systems | The individual municipalities have high interest in their purchased energy. Therefore the data acquisition is well done. Concrete documented procedures, however are missing. | FAR#4 |
| Reporting procedures | Reporting procedures are in place.<br>During the verification, however, the verifier identified a need for procedures which ensure the delivering of all necessary information from the municipalities to BTG. | FAR#5 |
| Documented instructions | Instructions to the municipalities are given by BTG within the contract, but additional instructions according to above issues of this checklist have to be included. | FAR#6 |
| Qualification and training | Sufficient information about qualification and training about all involved and responsible people and service companies is not submitted.<br>An appropriate information system to BTG is not in place. During the verification the verifier identified a need for better qualification. Especially in municipalities which bill the sold heat for their customers on their own by using appropriate software. | FAR#7 |
| Troubleshooting procedures | Troubleshooting procedures do not exist | FAR#8 |

### 3.2.4 Conclusion

To Finding I: The mentioned changes and differences between the project design document (PDD) and implemented sub-projects have been checked by the verifier. Given the background of the portfolio project and its baseline which includes a variety of sub-projects,

those changes are not material. The project changes can be reflected in a changed monitoring concept.

To Finding II: In order to reduce any efforts in verification and to raise reliability in the accounted emission reductions a quality assurance system shall be established.

Following conclusions have to be mentioned:

FAR#1: The PDD includes a portfolio of possible subproject types, given that, this extension is not against the approved project in general. The project boundaries may vary in future; therefore it is necessary that those changes are mentioned especially in the monitoring report. Especially in case of new buildings in the municipalities which are not covered by the baseline, an appropriate monitoring scheme and handling has to be established

FAR#2: The removed metering equipment has to be installed again. Therefore any changes there are not addressable. Missing ID-numbers have to be added.

FAR#3: Given that these are new measurement equipments, there is no significant risk that they fail, but a better documentation has to be established

FAR#4: During the verification process the verifier identified a need for procedures which rule the data acquisition in the municipality and the data transfer between the municipalities and BTG.
Additionally it is advisable to rule and to document how the data is collected in each municipality.

FAR#5: BTG should elaborate a documented procedure about its reporting which rules responsibilities, required information from the subprojects and the handling respectively the calculation of the emission reduction.

FAR#7: Depending on to the advised description how the data has to be collected, the need for qualification and training varies. For example some subproject owners do everything on their own, others use specialized service companies. Therefore, general documentations about all involved staff and companies have to be adjusted. BTG should take care that data collection will be done in best practice.

FAR#8: Due to the inhomogeneous kind of subprojects and their different handling troubleshooting procedures have to be elaborated.

Despite of the missing quality assurance procedures and the above FARs, the verifier sees no misstatement in the figures of the submitted monitoring report, due to the scrutinized onsite verification.

## 3.3 Project changes

During the time of project implementation and its operation it became clear that the original envisaged and documented approaches for the determination of baseline emissions and the methodology of monitoring are not practicable. Due to that lack of practicability and the project changes (see chapter 3.2), the methodologies of baseline determination and monitoring have changed.

### 3.3.1 Changes in Baseline Methodology / Assumptions

#### 3.3.1.1 Discussion

To determine the emission reductions it is necessary to estimate the ghg emissions, which would have occurred in the absence of the project. This theoretical case is called baseline scenario, which is defined for each project by the baseline study (BLS). The validation confirms the eligibility of the

applied baseline approach. This approach consists of the methodology, the assumptions and determination of parameters and key factors.

For this particular project the baseline emissions are defined case by case, but in principal there is a fuel switch from fossil fuel energy to biomass. The fossil powered energy is for example a central coal boiler, individual stoves or electricity, which comes from fossil fired plants. The use of biomass for combustion has the positive side effect that it avoids the emission of methane. Methane occurs by rotting biomass in anaerobic conditions.

Thus there are two baselines:

- Avoided methane emissions caused by the use of rotting biomass and
- Avoided CO2 emissions caused by the fuel switch and replacement of single stoves.

The project engineering was in 2000 and the validation, which confirms the two baseline approaches was done in early 2001. During the time when the first sub-project has been started, in January 2003, the approaches had changed.

#### 3.3.1.2 Findings

The baseline methodology has not changed in principal. After the assessment it became clear that the original baseline approach can not always be realized as described in the PDD.

FAR#9: The old baseline approach calculates just on the basis of the installed boiler capacity. In case of replaced single stoves this approach is not correct. In that case the energy supply is the relevant figure. This new approach has to be added to the existing one.

#### 3.3.1.3 Conclusion

From the verifiers point of view the implementation and use of the described baseline is correct. The submitted baseline figures in the monitoring report of 2003 can be confirmed.

Like mentioned in FAR#9 the baseline is only for existing buildings. Cases of new buildings in the municipalities which shall be connected to the district heating are not covered sufficiently by the current baseline. Therefore new connected buildings have to be monitored and addressed separately. The project developer has to clarify how such building will be considered.

### 3.3.2 Changes in Monitoring Methodology / Assumptions

The discussion, findings and conclusion regarding the conformity of the actual project activity with the registered project design document are summarized in this section.

#### 3.3.2.1 Discussion

As mentioned before, there are two basic changes in the methodologies to determine the baseline emissions. Obviously, the monitoring has to be changed, too.

#### 3.3.2.2 Findings

FAR#10: Avoided methane emissions caused by the use of rotting biomass.
The calculation methodology is based on the weight of the wet biomass. Most of the operators do not have any balances and they do not measure the moisture content of the biomass, because an installation of it ex post is not economical feasible. In practice most operators buy the humid biomass by volume. Due to that situation, it is not feasible to account the amount in the original envisaged way.

V(wood wet) x density (wood dry) = m(wood dry)
m(wood dry) x factors = m (Methane)

This would mean an exchange of the moisture content against the density of dry wood. The value of density is referenced. This methodology can be used for the existing data and for the future. The monitoring report has to address clearly which methodology is used.

FAR#11: Determination of avoided CO2 emissions caused by the fuel switch and replacement of single stoves has been changed. The calculation basis for the new calculation is the real heat production in the implemented biomass boiler and the real heat demand.

With respect to the Key Principals of the ERUPT 1 guidelines the following cases can be identified, which need their individual monitoring and calculation methodology:

Case 1: A biomass boiler substitutes an old central boiler with an existing distribution system, and subsequently the "bio produced heat" substitutes the amount of "coal produced heat".
This value is easily measurable annually. If there was a refurbishment of the existing distribution system, this environmental positive effect should be neglected, because it is neither in the project boundary nor any key parameters of the old distribution system are defined.

Case 2: Individual stoves are substituted; then the newly installed biomass boiler substitutes just the individual heat demand. The individual heat demand being generated by the new biomass boiler is measured annually in the households. This value is measurable easily. This procedure is conservative, because it set also "heat supply" equal to heat production. It does not take into account the new distribution system, which did not exist before the biomass boiler.

Case 3: In the case of combination of both situations, the emission can be calculated according to the weighted percentages.

#### 3.3.2.3 Conclusion

The „Operational Guidelines for Baseline Studies, Validation, Monitoring and Verification of Joint Implementation Projects Version 1.0"from ERU-PT 1 requires in chapter 2 "Key Principals" among others accuracy and practicability. In consideration of these principals mentioned changes result in following conclusions:

To FAR#10: In cases where operators have only the volume of biomass, the methodology of determining the weight of biomass should be extended. The new formula, mentioned above has been adopted by the project owner and approved by Senter, because the small gap of V (wet wood) and V (dry wood) is covered by the 25% deduction. As mentioned, this approach can be confirmed.

To FAR#11: The calculation basis for the new calculation is the real heat production in the implemented biomass boiler and the real heat demand.
Basis for the original baseline methodology is the installed capacity of the biomass boiler and the capacity assumptions of the substituted heat sources (central boilers, stoves, etc.). This methodology does not reflect the real produced heat in the new biomass boiler. It does not reflect the real heat demand in individual households, too. In every year the according to the old baseline would be almost the same amount of CO2-reduction, because the installed capacity does not change.

In our opinion, the new approach can be confirmed as being in line with ERUPT 1 key principles. The new methodology is more realistic and can be adapted easier to new situations in the municipalities. In this way it can be calculated every year, what emissions would occur, if the biomass boiler would

not have been installed. The second advantage is the use of real measured values, which makes it more accurate. The monitoring report has to address this new method.

## 3.4 External and internal data

This chapter discuses findings and conclusion regarding accessibility, quality and accuracy of external and internal data required for calculating emission reductions.

### 3.4.1 Discussion

Internal GHG data sources and ways, in which the data has been collected, calculated, processed, aggregated and stored should be part of verification. Accuracy and reliability of the internal GHG data has to be identified.

External data sources might be necessary for baseline emissions. The access to such data and a proof of data quality is part of this verification. If it is deemed to be necessary, an entity delivering such data should be audited.

### 3.4.2 Findings

Findings an internal data could be identified as follows:

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| Type and sources of internal data | It is the nature of a portfolio project to have need for various types of internal data. They are determined in the PDD. Because of the changes mentioned above additional data for plausibility check or for more realistic calculations have to be included. Specific information about the data acquisition is not mentioned in the PDD.<br>Therefore the verifier recommends addressing such information in the monitoring report. | FAR#12 |
| | The biomass utilization factor is necessary for determining the avoided methane emission. In sub-projects where this factor is used for calculating the emission reduction, the verifier shall take care to check and to interview the biomass supplier in future verifications. | FAR#13 |
| Quality assurance | The quality assurance for internal data has to be improved. According to chapter C in this checklist, procedures have to be elaborated and established. The project owner, BTG, has not a sufficient control about all available information. | FAR#5 |
| Significance and reporting risks | In this First Verification no significant risks were identified. However, if there will be more subprojects involved and the quality assurance and monitoring control will not be improved like mentioned above it is likely that reporting risks increase. That issue affects also subsequent efforts. | FAR#5 |

### 3.4.3 Conclusion

The listed findings have to be seen in the context of missing quality assurance procedures in the monitoring and in the context of the methodology changes. In order to ensure the use of reliable data such a quality system has to be elaborated. Even more problematic is the weak evidence of the bio-

mass utilization factor applied. In projects where that factor is used the verifier has to check its reliability very carefully. Through the scrutinized verification the addressed data can be confirmed.

External data are well addressed by sources.

## 3.5 Environmental and Social Indicators

This section summarizes findings and conclusion regarding the implementation of environmentally additional components and the monitoring equipment and procedures of environmental and social indicators.

### 3.5.1 Discussion

The use of decentralized energy supply has always positive social effects. It creates new or protects existing jobs in the region and makes more independent from the macroeconomic situation.

Environmental effects are usually positive. On the one hand the use of biomass is very environmental friendly. Due to the use of regional wood the owner are more interested taking care of their forests. From the point of view of $CO_2$-emission reduction, it should be assured that the used wood come from sustainable and renewable sources.

### 3.5.2 Findings

Following finding can be identified:

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| External data<br>. | Like mentioned in the validation report and in chapter 3.1, the only environmental impact that this project could generate, is the increasing demand and consumption of non sustainable wood. The noted recommendation in the validation report is not fulfilled; therefore a system has to be elaborated, that the wood does not stem from non sustainable forests. | FAR#14 |

### 3.5.3 Conclusion

It is not likely that those six subprojects have a negative environmental effect to the constancy of the forests. Nevertheless such a system, as it has been stated in the validation report already, has to be estabilshed.

Recommendation:
An annual revised list of wood suppliers and their delivered wood to every subproject should be developed.

## 3.6 Completeness of Monitoring

The discussion, findings and conclusion regarding correct application of the monitoring methodologies and the completeness of the monitoring should be summarised in this section.

### 3.6.1 Discussion

The correct application of the monitoring methodologies and their necessary changes are sufficiently discussed in above chapters.

### 3.6.2 Findings

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| **Monitoring report** | The completeness of the monitoring includes the complete printed monitoring report which addresses all changes; all used factors, collected data and finally the total emission reduction. As far as the monitoring plan in the PDD does not include all processes in detail which are used for collecting necessary data and factors, those statements shall be included additionally. | FAR#15 |
| | The submitted monitoring report is made up of a printed report and an Excel file which includes the single aggregated figures.<br>A hardcopy of the Excel-sheet should be added in future. | FAR#16 |
| **Sufficient description of data collecting** | The determination of the avoided methane the *biomass utilization DW* factor is important, as mentioned in the PDD. Neither the monitoring plan in the PDD nor the current monitoring report addresses the procedure how to determine this figure. | FAR#17 |

### 3.6.3 Conclusion

The format of the monitoring report does not affect the performance of the emission reduction itself.

The determination of the *biomass utilization DW* factor is not transparent, according to the PDD and monitoring report. Just the individual interview and statement of the owner closed that credibility gap. Therefore the verifier has to check each sub project very carefully, where such a factor is used.

## 3.7 Accuracy of Emission Reductions Calculations

The discussion, findings and conclusion regarding spreadsheet formulas and connections, conversions, aggregations, consistent use of factors in line with the monitoring plan, possible manual transposition errors between data sets, uncertainty of technology (e.g. metering) and appropriateness of default data where specific source data is lacking should be summarised in this section.

### 3.7.1 Discussion

The main tool for calculation the emission reduction is an Excel sheet (called emission_calculation_2003.xls). That sheet covers all sub-projects. It collects data from the subprojects and calculates the complete emission reductions. Many values, fixed factors, calculated intermediate results, plausibility values and finally emission reduction are hereby summerized.

Assessing the accuracy of emission reduction calculation means:

- deposited formulas have to be checked,
- the input parameters from the projects have to be identified and checked and
- validated parameters have to be identified and checked

### 3.7.2 Findings

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| 1. Use of *biomass utilization DW* factor | As mentioned above in chapter 3.6. the origin of the *biomass utilization DW* factor is not transparent. | FAR#17 |
| 2. Consistency of biomass and methane calculation | The calculation of avoided methane emissions expressed in $CO_2e$, $EM_{CO2,methane}$, is based on the weight of woodchips, sawdust and bark consumed, $M_{wood}$, expressed in tons of dry matter,[2]<br>$EM_{CO2,methane} = M_{wood} \times DW \times MEF \times GWP \times T$,<br>where *DW* is the fraction of biomass that would be in the baseline scenario anaerobic digested (the biomass utilization factor), *MEF* is the methane forming factor, giving the amount of methane that will evolve from 1 t of dry wooden biomass under anaerobic conditions in 1 year, *GWP* is the global warming potential of methane, 21, and *T* time for which the methane emissions are calculated, i.e., *T* = 0.5 y in this case.<br>In practice this formula has three factors of weakness:<br>$M_{wood}$ , *DW and MEF*<br>Those factors are based on dry wood the right knowledge about DW.<br>Following findings can be addressed regarding to the use of these factors:<br>- MEF and $M_{wood}$ must be based on the same content of moisture. Currently MEF is based on dry wood. Therefore $M_{wood}$ has to be based also on dry wood. The project developer has to ensure to be consistent in the calculation. | FAR#18 |

[2] $M_{wood}$ is currently calculated from the mass of the wet wooden biomass and the moisture content in wood of 50%. The moisture content of straw is conservatively considered to be 20%.

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| | - The use of terms, units and values has to be consistent, except this is clearly defined like in chapter 3.3.2 with the formula:<br>V(wood wet) x density (wood dry) = m(wood dry)<br>The currently given values in monitoring report version 2 for wood densities in t dry/cubic meter are the same like before in version 1 when they were addressed in t wet/cubic meter. The reference however has not changed. That indicates inconsistency.<br>An additional inconsistency is the definition of the different types of wood regarding to the term “15% moisture content% in comparison to the unit “t dry/cubic meter”.<br>Independent from the decision the project developer takes, he has to ensure in a transparent manner that the use of parameters, its definitions and units is consistent. | FAR#19 |

### 3.7.3 Conclusion

The used formulas are applied correctly. Therefore, the verifier can confirm the amount of emission reduction caused by the fuel switch.

In addition the verifier can confirm the emission reduction from the avoided methane without further information and the use of consistent values. That is justified by the fact that the density value is not used. Any other uncertainties are sufficiently covered by a deduction of 25% from the calculated amount. In the future the project developer has to demonstrate in a transparent manner that the use of parameters, its definitions and units is consistent.

## 3.8 Quality of Evidence to Determine Emission Reductions

The discussion, findings and conclusion and the quality of evidence to determine emission reduction are summarised in this section.

### 3.8.1 Discussion

With respect to the multi baseline and the different types of sub-projects many values have to monitored and referenced.

### 3.8.2 Findings

| OBJECTIVE | COMMENTS | Concl |
|---|---|---|
| 1. Use of *biomass utilization DW* factor | See above in chapter 3.7 | FAR#17 |
| 2. Consistency of biomass and methane calculation | See above in chapter 3.7 | FAR#19 |

### 3.8.3 Conclusion

Evidences on heat production and supplies are given by invoices to the customer and measurement records. Those documents have a high reliability because in most cases those values are checked at least twice – once by seller and once by customer. It is not unusual that a professional service company is ordered to manage these issues. In those cases there is a third check. But in those cases were biomass is bought from merchants the situation is the same. In these cases were the amount of biomass comes from own sources there only records are available. After scrutinized verification the submitted evidences are considered to be credible sufficient.

A risk for inconsistency was identified. Inconsistency is caused by using default factors from literature which are related to special conditions. The use of those factors is not convenient, if the conditions will be changed. The annual monitoring report has to address clearly why which factor is applied. The monitoring and calculation must consider the used physical units of and its appropriate consistency. In cases, where an inconsistent approach will result in a more practical determination of emission reduction, the caused range of uncertainty should be mentioned. Any inconsistencies have to be addressed.

Due to the scrutinized verification, the verifier can confirm that all identified inconsistencies are covered by the general uncertainty deduction. The uncertainty deduction is 5%, 15% or 25% according to the monitoring risk.

## 3.9 Management, Operational System and Quality Assurance

In order to ensure a successful operation of a project and the credibility and verifiability of the ERs achieved, the project must have a well defined management and operational system. The discussion, findings and conclusions regarding the suitability of the management system for monitoring and reporting, i.e. organizational structure, responsibilities, competencies, non-conformance handling, internal audits and management review are summarized in this section.

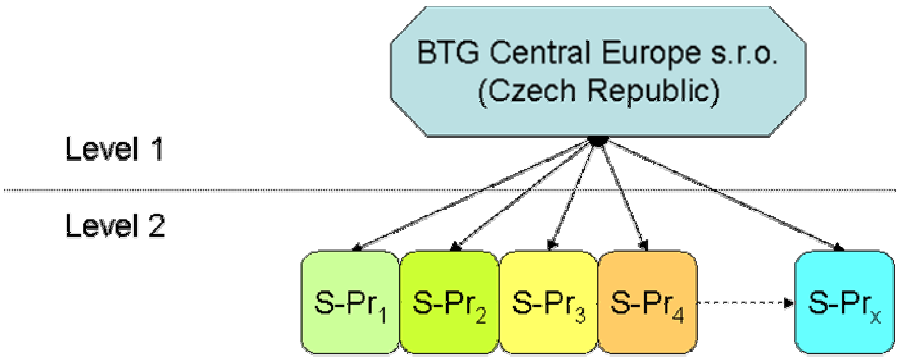
### 3.9.1 Discussion

As mentioned this verification includes at first only six out of the planed 28 sub-projects. In order to ensure a successful operation of a project, the management and operational system has to be properly installed. Due to the characteristic of the portfolio project there are two different management levels, which have to be met by the management system.

The graph illustrates the two levels:

Level 1 is the Level of BTG Central Europe s.r.o., where all data and information come together and be processed.

Level 2 is the level of each sub-project and operator. They operate the plants and measure the necessary data.




S-Pr: sub-project

BTG Central Europe s.r.o. is the head of the management system. It contracts the sub-projects, is in the responsibility for Senter International and the ERUs, it is preparing the monitoring report and

therefore it is also responsible for collecting the right data from the sub-project operator. Additionally it has to make sure that all sub-project operators implement and operate in the prescribed manner.

### 3.9.2 Findings

FAR#5: A management and operational system is missing. See above listed sections.

### 3.9.3 Conclusion

BTG Central Europe s.r.o. should estabilsh a management system which describes the following tasks:

- procedures and manual, to ensure the control about all sub-projects, including
- the operators, their responsibilities, staffs and their qualification,
- the individual situation and plans for changing the status quo,
- the individual methods of measuring, data collecting and proceedings,
- knowledge about measuring equipment,
- how to identify an abnormal situations, which affect the result of determining of CO2-reductions,
- procedures, how to calculate the CO2-reduction, how to use the excel-spreadsheet, how to report the monitoring results or how to do the documentation and archiving of information and manuals,
- plausibility checks,
- clarification regarding responsibilities:
    - communication,
    - reporting

The management system has to guide the owner of the subprojects how to collect all relevant data and information, e.g. calibration sheets, staff qualification or changes in their subprojects.

The strength of the used monitoring procedure is that all sub-project owners have to submit only a few figures to BTG. The required sheets are easy and clear. The sub-project owners have to submit their figures once a year. On the other hand this procedure works only, if there will be no trouble. The verification indicated a need for a better communication between BTG and the sub-project owner during the year.

For the First Verification with on-site inspections on all sub-projects all open issues could be clarified. To rise reliability in the accounted emission reductions and its verifiability, a quality assurance system shall be established. A proper manual which rules and supports the supervision of BTG Central Europe s.r.o. and its staff has to be elaborated.

Due to the scrutinized onsite verification the verifier sees no doubt in the figures of the submitted monitoring report.

Industrie Service

# 4 VERIFICATION STATEMENT

TÜV Industrie Service GmbH TÜV SÜD Gruppe (former TÜV Süddeutschland Bau und Betrieb GmbH) has performed a First Verification of the prospective JI project: "Biomass Energy Portfolio for Czech Republic". The verification is based on requirements of ER-UPT 1 set as part of the MVP for this specific project. Additionally this verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

This verification engagement was carried out during the period of 2003-07-22 to 2004-08-31.

The verifier identified that the sub-projects are not implemented as planned. Differences in installed capacities and changed project boundaries were detected. Due to the multi project baseline those alternatives are covered by the baseline. Therefore the verifier can not identify any material risk.

The monitoring system is in place and the project is ready to generate GHG emission reductions, but the monitoring system and procedures are not in compliance with the MVP in the PDD. Also, the quality assurance procedures according to the monitoring system as a whole have to be improved.

The adjustments to the monitoring can be approved. They result in a more realistic, correct and practicable determination of GHG emission reductions. The annual monitoring report should address these adjustments and the used methodology for each sub-project separately. From a technical point of view, the verifier can confirm the correctness of the additional procedures. As long as all involved project participants agree with the procedures, which differ from the ones validated, the verifier can confirm the correct application of the new approach.

The procedures outlined in the MVP are not eligible in every sub-project, because necessary equipment for biomass weight determination can not be installed due to high costs. Metering equipments for heat measuring are eligible. The project developer has to ensure that necessary equipment is installed and operates correctly. Troubleshooting procedures have to be defined. Given that the MVP of the PDD does not include any troubleshooting procedures, the annual monitoring report or a monitoring manual has to describe the regular and troubleshooting procedures.

Despite of above indicated issues the verifier can confirm that the GHG emission reduction is calculated without material misstatements.

All issues indicated as "Forward Action Request" in chapter 3 have to be submitted as indispensable information to the verification team of the next Periodic Verification. All such issues should receive a special focus during the following verification.

Based on the information we have seen and evaluated we confirm the submitted amount of **33.454 ton** $CO_2$ -equivalents in the period of 2003-01-01 to 2003-12-31.

Munich, 2004-08-31

Markus Knödlseder

Project Manager
Verification Lead Auditor

Michael Rumberg

## Annex 1 Reference

Category 1 Documents:

List documents provided by the Client that relate directly to the GHG components of the project. These should have been used as direct sources of evidence for the initial verification conclusions, and are usually further checked through interviews with key personnel.

1. Monitoring report 1: Biomass Energy Portfolio for Czech Republic (Monitoring report #1), 31st August, 2003, BioHeat International B.V.
2. Monitoring report 2: Biomass Energy Portfolio for Czech Republic (Monitoring report #1_v2), 16th April, 2004, BioHeat International B.V.
3. Project Design Document: Biomass Energy Portfolio for Czech Republic PROJECT DESCRIPTION, Feb. 2001, BTG Biomass Technology Group B.V.
4. Validation Report: Biomass Energy Portfolio for Czech Republic, 2001, SGS Agrocontrol

Category 2 Documents:

List background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents should have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.

5. Operational Guidelines for Baseline Studies, Validation, Monitoring and Verification of Joint Implementation Projects, *Ver. 1.0,* Ministry of Economic Affairs of the Netherlands, May 2000

Persons interviewed:

List persons interviewed during the initial verification, or persons contributed with other information that are not included in the documents listed above.

6. Mr. Viduna and Mr. Cmiral from BTG Central Europe s.r.o. ,Praha
7. Mr. Ales Sitar, Bystrice n. P,
8. Mr. Karel Lukas, Driten,
9. Mrs. Ruzena Zezulkova, Horni Plana,
10. Mr. Milan Blazek, N. Cerekev,
11. Mr. Plachy and Mr. Silny, Rostin,
12. Mrs. Pavlina Volakova, Zlutice
13. Onsite inspections and interviews at:
    a. BTG Central Europe s.r.o. ,Praha
    b. Bystrice n. P,
    c. Driten,
    d. Horni Plana,
    e. N. Cerekev,
    f. Rostin,
    g. Zlutice

**Annex 2**
**Initial and Periodic Verification Protocol**