**JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM**
**Version 01 – in effect as of 15 June 2006**

## CONTENTS

## SECTION A. General description of the project

### A.1. Title of the project:

**Power and heat displacement by means of CMM utilisation on the Krupinski Coal Mine in Upper Silesian Basin, Poland. Project acronym: Krupinski -power**

(Polish name of the mine is Krupiński. The English notation "Krupinski" is applied for this PDD)

Sectoral scopes 8, 10

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Prepared by: Carbon-TF B.V., Alina Mroz

### A.2. Description of the project:

The Upper Silesian Basin is the largest industrial region of Poland with coal, metallurgic and chemical industries. After the long term industrial use Upper Silesia is one of the most hazardous regions of Poland in terms of environmental pollution. The main contributor of methane emissions to the atmosphere is the coal industry.

Degassing of Coal Mine Gas (CMM) is an unavoidable occurrence of hard coal mining. CMM mainly consists of the harmful greenhouse gas methane (GWP 21), so that using of CMM becomes more important particularly with regard to the world-wide consensus of reducing green-house-gas emissions.

In this project CMM from the suction systems of the coal mine Krupinski should be utilised for heat and power generation. The project constellation is similar as other contracting solutions. The Project developer (Spolka Energetyczna Jastrzebie, SEJ) buys the CMM from its parent company Jastrzebska Spolka Weglowa (JSW) and sells then the produced power to JSW.

The coal mine Krupinski has 3 shafts, one of them is venting shaft. The degassing of the mine is operated by a specialised Polish company ZOK, which has no relationships regarding capital shares with SEJ or JSW.

The coal mine Krupinski was the first Polish coal mine with a CMM utilisation by means of CHP unit installed 1998. Furthermore there was a simply methane burning system for the coal drying installed. The heat used by the coal mine facilities was generated by old coal fired and one CMM fired boilers. In exception of the power produced in the old CHP unit, all power was purchased from the Polish grid. In this project one new cogeneration unit is 2005 installed and fired with CMM. The CMM unit displaces a part of the heat generated by coal boilers and a part of the power purchased from the grid.

The combustion of methane in the CHP unit results in a significant emissions reduction. The conversion of the harmful greenhouse gas methane with a GWP of 21 into less harmful $CO_2$ with a GWP of 1 reduces the global warming potential of the emissions by 87%. Although the biggest emission reduction is achieved by the burning of methane to less harmful carbon dioxide only the emission reduction through avoidance of power and heat production in plants fuelled with fossil fuels is claimed.

After the Marrakesh Accords projects implemented since 2000 can be presented for the JI registration claiming the ERUs generated after 01.01.2008. Furthermore after the law from 28.04.2011 projects causing emission reduction in power stations can be presented as JI after first track in Poland, if there is no double counting. Double counting is not in place if there is a set-aside established in the national allocation plan of the host country for such projects.

**A.3. Project participants:**

*Table A- 1 – Project participants*

| Party involved (*) | Legal entity project participant (as applicable) | Please indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Poland (host) | ▪ Spolka Energetyczna “Jastrzebie” (SEJ) | No |
| Netherlands | ▪ Carbon-TF B.V. | No |
| **((host) indicates a host Party)** | | |

- Carbon-TF B.V.
  Consultant and investor, buyer of the emission reduction certificates; dutch company trading emissions reduction certificates. Authorised to participate in the project.
- Spolka Energetyczna “Jastrzebie” SA (SEJ)
  Project developer, subsidiary of the coal mining company Jastrzebska Spolka Weglowa SA. SEJ buys the CMM from its parent company with a view to utilise the gas and sells the produced power to the mine Krupinski. Owner of the project and of the plant.

**A.4. Technical description of the project:**

**A.4.1. Location of the project:**

The project is located at the coal mine Krupinski in Suszec in south Poland (Silesian Voivodship). The locations of the Upper Silesian basin as well as location of the coal mine are shown on the maps below.

**A.4.1.1. Host Party(ies):**

Host Party: Poland

**A.4.1.2. Region/State/Province etc.:**


*Figure A- 1: Location of the Upper Silesian Basin in Poland*

**A.4.1.3. City/Town/Community etc.:**

The project is located in the Upper Silesia Basin, on the working coal mine Krupinski,
ul. Piaskowa 35, PL - 43 - 267 Suszec
boundary: Suszec,
land parcel: 1525/78
Geographical coordinates: 50° 2'52.57"N
18°46'29.81"O

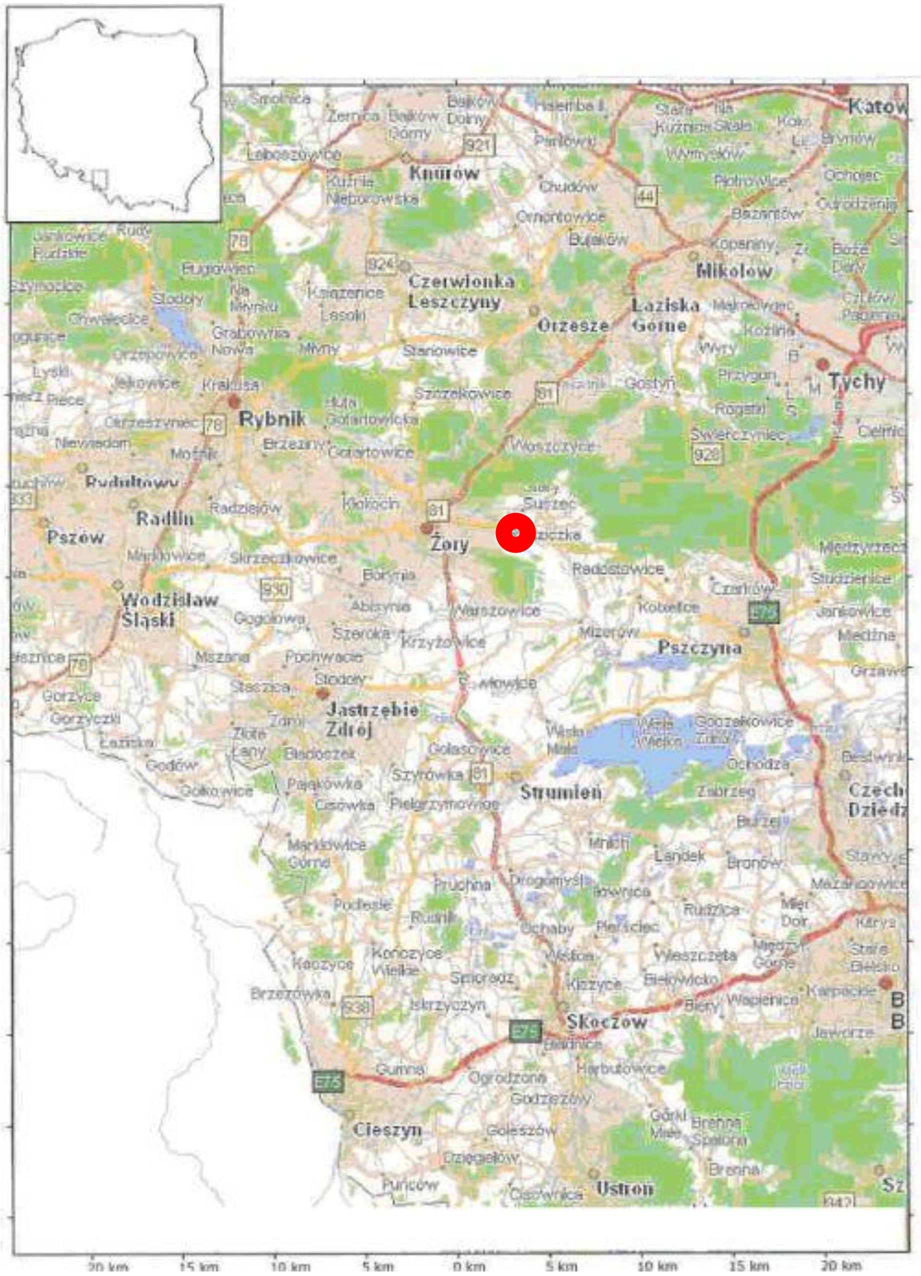


*Figure A-3: Location of the Project in Suszec*

**A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):**

The project is located at the coal mine "Krupinski" in Upper Silesia.

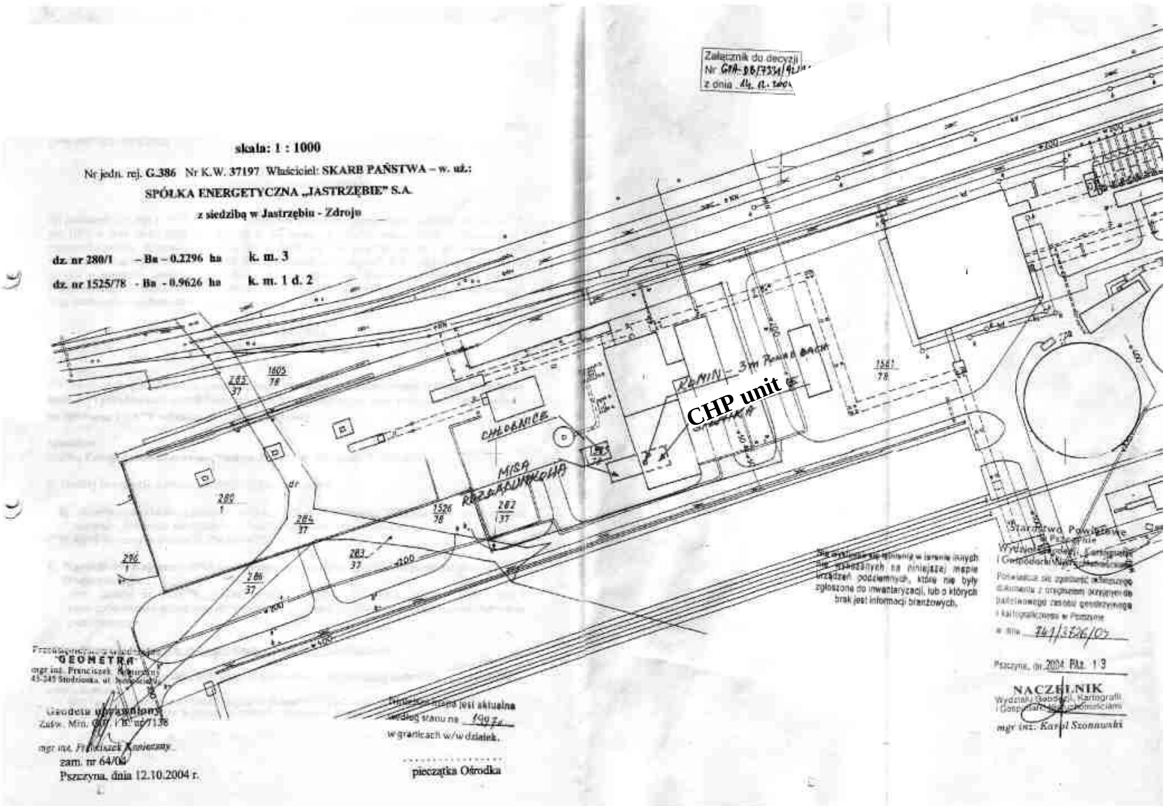


*Figure A-4: Unit location plan at the coal mine Krupinski*

**A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:**

**Degasification activities**

The mine has an active degasification system. A part of the CMM is sucked out of underground boreholes in the longwall and the mining area and is collected in a central suction system, which ends on the surface of the venting shaft.

The suction system was primarily designed for operational safety in the underground and not for CMM utilisation and there are no national regulations or legal requirements for treatment and utilisation of the captured CMM. However it is common practice at Polish coal mines to release the CMM into the atmosphere, the coal mine Krupinski used a part of the sucked CMM in an old CHP-Unit and in a coal drying system.

**Project activities - Utilisation of CMM**

In the case of this additional project a part of the CMM from the suction system is utilised for heat and power generation. This additional part of methane is destroyed by burning. The remaining amount of the CMM should be further on released to the atmosphere unused.

**Utilisation of the methane captured (the project)**

The utilisation of the CMM is provided through:

1. installation of one cogeneration unit for power and heat production

The methane flow from the suction system is about 1000-1700 m³/h. pure methane. The installed plant cannot use whole amount of the gas, a part of it is still unused blown in the atmosphere. The utilisation plan is shown in table A-2.

*Table A-2 – Installation plan of the project /DS/*

| **unit** | **installation date** | **firing capacity** | **product** | **efficiency** |
|---|---|---|---|---|
| 1 cogeneration unit, Deutz TCG 2032 V16 | 07.2005 | 9,336 kWth<br>3,966 kWel | power and heat | Electrical efficiency41.9 %<br>Thermal efficiency 44%<br>Total efficiency 85.9% |

**CMM Supply**

The utilisation unit is connected to the central suction system. The pressure generated by the vacuum pumps of the coal mine is sufficient to supply the utilisation unit, so that no further compression is needed. The total amount of CMM sent to the utilisation unit is measured by flow meters. The unit is provided with a deflagration flame arrester which prevents backfiring from the utilisation unit into the suction system of the coal mine.

**Cogeneration unit**

The cogeneration unit with a firing capacity of approx. 9,336 kW was installed. The cogeneration unit generates power with an output of approx. 3,966 kW per unit, and hot water for the central heating system of the coal mine with an output of max. 4,107 kW per unit.

The CMM is fed into the gas engine, where the methane will be burned completely with low exhaust emissions. The cogeneration unit is operated fully automatically and all essential measured data are gathered and recorded.

Cogeneration units like this have been tested at various sites in Western Europe and are now approved. Especially in the Ruhr District in Germany a large amount of units (approx. 150) is installed on active and abandoned coal mines.

Proved safety-related equipment is used to minimize the risks of the plant.

| | |
|---|---|
| Technical data per unit | cogeneration unit for combined heat and power generation, including all necessary equipment, control and data collection system |
| Installed firing capacity | 9,336 kWth * |
| Power output | max. 3,966 kWel * |
| Heat output | max. 4,107 kWth * |
| Efficiency (electricity) | approx. 36 % |
| Maximum methane amount required | 1,084 m³/h $CH_4$ |
| Average operation time /R-2008/ | 7,800 h/a |
| Average heat generation | 17,108 MWh/a |
| Average power generation /R-2208/ | 29,682 MWh/a |
| Average methane destruction | 7,890,000 $m^3$ $CH_4$ per year = 5,657 t $CH_4$ per year |
| Average power own consumption | 1,020 MWh/a |

*) firing capacity, efficiency and power and heat output depend on the gas quality, methane concentration and load.

**Electricity utilisation**

The electricity for the coal mine facilities was purchased from the grid. The electricity generated by the power generator of the CHP installed in the project is now used for the own consumption of the coal mine. The power will be fed into the grid of the coal mine, which is connected to the Polish grid. In this way the power amount which was purchased from the grid was reduced. This amount of conventionally generated power displaced by the project generates additional emissions reductions which will be taken into account aiming the issuance of ERU.

The cogeneration unit is actually not economically viable. The installation of the cogeneration units is based on an environmentally conscious management decision.

**Heat utilisation**

The heat supply of the coal mine was provided by coal boilers. After the project realization a part of this energy was displaced by the heat generation of the project. This amount of conventionally generated heat displaced by the project generates additional emissions reductions which will be taken into account aiming the issuance of ERU.

**Maintenance program**

The maintenance and operation of the project equipment is provided by the personnel of the plant operator (SEJ). The maintenance of the CHP modules has been carried out by the service division of the engine manufacturer.

**Risks of the project**

The following risk could be identified:

Table A- 3: Risk and mitigation to the project

| Risk | Mitigation |
|---|---|
| Lower CMM utilisation than expected | The amount of extracted CMM is normally higher than the amount of utilised CMM. The amount of CMM is expected to increase in the future, due to the extension of the coal mining activities. |
| Malfunctioning of the CHP plant. | Training of the staff and regular maintenance of equipment. |
| Lower concentration of methane in extracted gas | The supporting system automatically regulates the amount of gas that is combusted in the CHP unit. Despite that a minimum concentration of 30% CH4 is required. |

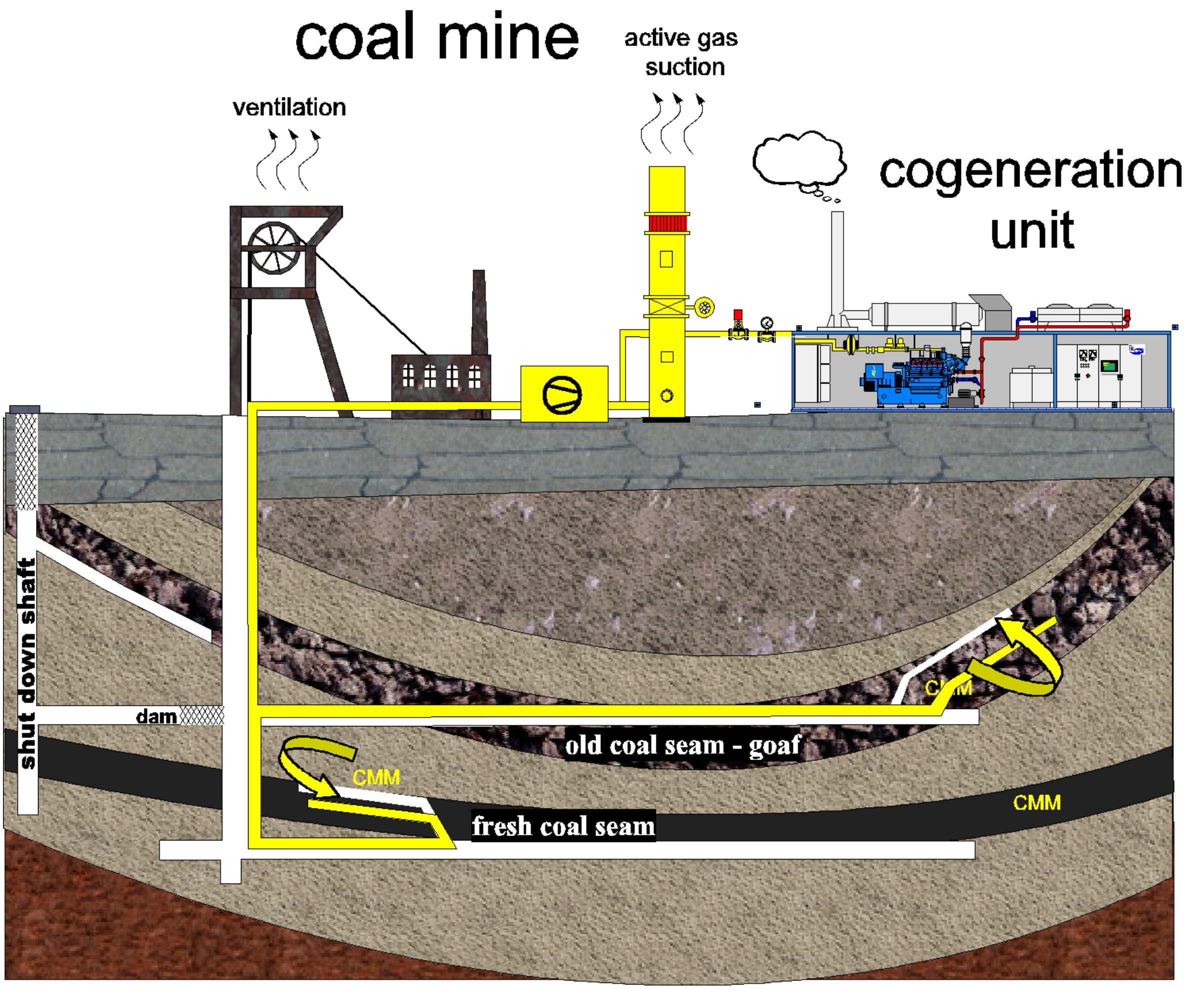


*Figure A- 6: Scheme of the installation with main project components*

**A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:**

The emissions reduction is based on the displacement of power and heat production by means of using CMM in combustion processes of a gas engine. In absence of the project the whole heat and power amount generated, unit would otherwise be produced from fossil fuels causing much higher CO2 emissions.

The power generated by the project displaces conventionally generated power and reduces the greenhouse gas emissions of the Polish grid.

The heat generated by the project displaces conventionally generated heat by coal combustion and reduces the greenhouse gas emissions of the coal mine.

The project is not "business-as-usual" and faces several barriers, both in terms of prevailing practice and the economic attractiveness of the project. In section B of this PDD, it is shown that the emission reductions would not occur in absence of the project.

**A.4.3.1. Estimated amount of emission reductions over the crediting period:**

Table A- 4 —*Emission reductions during the first crediting period (2008-2012)*

| 1st Crediting Period 2008- 2012 | |
|---|---|
| | Years |
| Length of the crediting period | 5 |
| Start date of the project 01/07/2005 | |
| 2008 | 24,512 |
| 2009 | 24,512 |
| 2010 | 24,512 |
| 2011 | 24,512 |
| 2012 | 24,512 |
| Total estimated emission reductions over the crediting period (tonnes of CO2 equivalent) | 122,560 |
| Annual average of estimated emission reductions over the crediting period (tonnes of CO2 equivalent) | 24,512 |

There are no special conditions for small scale projects defined by the host party. The following information is given for the purpose of the project registration.

According to the data given above the project falls under:

Type III of JI SSC projects (Other projects that result in emission reductions of less than or equal to 60 kilotonnes (kt) of carbon dioxide (CO2) equivalent annually) as defined in “Provisions for joint implementation small-scale projects” developed by the JISC

The proposed JI SSC project is not a debundled component of a large project as there is no a JI (SSC) project with a publicly available determination in accordance with paragraph 34 of the JI guidelines:

(a) Which has the same project participants; and

(b) Which applies the same technology/measure and pertains to the same project category; and

(c) Whose determination has been made publicly available in accordance with paragraph 34 of the JI guidelines within the previous 2 years; and

(d) Whose project boundary is within 1 km of the project boundary of the proposed JI SSC project at the closest point.

The emission reduction for the period beyond 2012 is not possible according the regulations valid at the time of determination. But the crediting period can extend beyond 2012 subject to the approval by the host party. The information on the possible emission reductions for this period is given on completion.

Table A- 5 —*Emission reductions during the second crediting period (2013-2017)*

| Crediting Period 2013- 2017 | |
|---|---|
| | Years |
| Length of the crediting period | 5 |
| Start date of the project 01/07/2005 | |
| 2013 | 24,512 |
| 2014 | 24,512 |
| 2015 | 24,512 |
| 2016 | 24,512 |
| 2017 | 24,512 |
| Total estimated emission reductions over the crediting period (tonnes of CO2 equivalent) | 122,560 |
| Annual average of estimated emission reductions over the crediting period (tonnes of CO2 equivalent) | 24,512 |
| Total estimated emission reductions over the expected project life-time 2005-2020 (please refer to C.2 (tonnes of CO2 equivalent) | 367,679 |

## A.5. Project approval by the Parties involved:

The parties involved will support the project. The great impact for reduction of green house gas is one motivation to drive the system.

The Letter of Approval of the Netherlands, as of the investor country, was issued 30th March 2012.

The PDD is a part of a request for the Letter of Approval by Poland within the first track according to the current Polish Act of 17 July 2009 on the System to Manage the Emissions of Greenhouse Gases and Other Substances.

The project aims only the emission reduction units from the power and heat displacement which is now possible after the most recent Polish law adopted on 28th April 2011 which results also in changes of the abovementioned act.

After the Law from 28.04.2011 it is not mandatory to request for a Letter of Endorsement for projects aiming emission reduction through displacement of energy production from fossil fuels. The project presented for approval

- must be additional
- must not cause deterioration of the environmental quality;
- must ensure the limitation of adverse environmental impacts;

- must implement the criteria on BAT
- and be a project belonging to types of projects which can be carried out as Joint Implementation projects in the territory of the Republic of Poland according to the most recent regulation.

The Polish regulation from 26 August 2010 (Dz.U. 2010, nr 167 poz. 1132) about the kind of projects eligible to be approved as JI in Poland specifies projects aiming the emission reduction or avoidance within the energy generation by means of change of fuels used or change of technology applied. The project uses methane as a waste gas which would be otherwise released into the atmosphere instead of fossil fuels in the Polish energy production. There was also a technology applied which allows the use of this fuel instead of the coal fired steam boiler and turbine sets applied widely in the Polish sector. The changes allow to displace the energy produced by conventional methods using fossil fuels and to avoid emissions caused in the conventional processes.

Furthermore, even if not claiming the emission reduction from methane destruction the project leads to significant reduction of methane emission from mining.

In addition to that it must be implemented before 28th February 2012.

The project meets all these requirements for approval by the host party.

According to the most recent JI guidance of the unfccc projects starting as of the year 2000 may be eligible as Article 6 projects if they meet the requirements of the guidelines for the implementation of Article 6 of the Kyoto Protocol as set out in the annex below and that emission reduction units shall only be issued for a crediting period starting after the beginning of the year 2008.

## SECTION B. Baseline

### B.1. Description and justification of the baseline chosen:

The JI specific approach for baseline setting and monitoring has been used to identify the baseline scenario of the proposed JI project. According to the most recent guidelines for baseline setting and monitoring (JISC18) elements of approved CDM baseline and monitoring methodologies or approved CDM methodological tools can be used, as appropriate.

Furthermore some elements of the approved consolidated methodology ACM0008 / Version 07 "Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring") has been used to identify the baseline scenario of the proposed JI project [ACM0008] was used.

**Applicability of ACM0008**

The project involves the extraction of CMM from

- underground boreholes in the mine to capture pre mining CMM
- underground boreholes, gas drainage galleries and other goaf capture techniques, including gas from sealed areas to capture post mining CMM.

The extraction activities mentioned above are listed as applicable project activities.

The methane is captured and destroyed

- through utilisation to produce electricity and thermal energy. Emission reductions for displacing energy from other sources (mainly coal for heat and power generation) are not claimed.

Ex-ante projections have been made for methane extraction and utilisation. The CMM is captured through existing mining activities. The following steps apply to an active coal mine.

The project activity has none of the following features:

- The mine is not an open cast mine
- The mine is not an abandoned/decommissioned coal mine
- There is no capture of virgin coal-bed methane
- There is no usage of $CO_2$ or any other fluid/gas to enhance CMM drainage. In step 1 below the method of extraction is described in more detail

Hence ACM0008 is fully applicable to this project.

**Step 1. Identification of technically feasible options for capturing and/or using CBM or CMM**

**Step la. Options for extraction**

According to the ACM0008 methodology, all technically feasible options to extract CMM have to be listed. In Polish coal mines CMM has to be captured from seams with high methane content. The classification is given in the according Polish Regulation. The pre mining CMM captured can be collected in the CMM gas system or diluted into the ventilation shaft.

The post mining CMM can also be captured according to the regulation. The design of the possibly post mining CMM capture is each time adapted to the given situation in the mine.

CMM deliberating to the working area of the mine has to be vented in an adequate way. The maximal concentration of the methane in the ventilation shaft should not become higher as 0,75% at every time.

An utilisation of CMM is not required by the Polish law.

A.1 Pre mining CMM captured by underground boreholes

A.2 Pre mining CMM captured by surface drainage wells

B.1 Post mining CMM captured by underground boreholes

B.2 Post mining CMM captured by surface drainage wells

C Possible combinations of options A, B, and C, with the relative shares of gas specified.

A big amount of the methane on the project site is currently released to the atmosphere together with the ventilation air – option A. In this case it is not the methane captured, but only this part which deliberates from the coal seam directly in the venting air. Due to the low concentration of methane in the ventilation air (usually less then 0,75%), this methane cannot be utilised. So that the ventilation air methane is not considered in the PDD.

In the case of the project there are no existing surface drainage wells and no wells are planned, so that the options A2 and B2 are not technically feasible.

In the case of the project pre mining CMM and post mining CMM from underground boreholes is collected together in one central suction system and transported to the surface with vacuum pumps. There is no dilution of the captured CMM into the venting shaft. It is impossible to determine the shares of the sources, because numerous drainage branches are connected to the central system and every branch collects CMM as long as it is in operation. So that in the case of the project the option C is the only option that is technically feasible for utilisation purposes. Usually the concentration of methane in the extracted gas ranges from 30-70%.

A big amount of the methane on the project site is currently released to the atmosphere together with the ventilation air. In this case it is not the methane captured, but only this part which deliberates from the coal seam directly in the venting air. Due to the low concentration of methane in the ventilation air (usually less then 0,75%), due to lacking of technical possibilities, this methane is not utilised or planned to be utilised at the project location. The ventilation air methane is hence not considered in the PDD.

The degassing system was implemented for safety reasons, due to fulfil the according regulations. It would have been also implemented without the proposed project activity.

**Step lb. Options for extracted CBM and CMM treatment**

Several approaches can be taken to treat the captured CMM of the project:

i. Venting
ii. Using/destroying ventilation air methane rather than venting it
iii. Flaring of CMM
iv. Use for additional grid power generation
v. Use for additional captive power generation
vi. Use for additional heat generation
vii. Feed into gas pipeline (to be used as fuel for vehicles or heat/power generation)
viii. Possible combinations of options i to vii with the relative shares of gas treated under each option specified

All of these options are considered as possible alternatives for the baseline scenario. In step 3 of this section some of these options will be further developed into baseline scenario alternatives. The project activity is covered by the option viii. – the combination of option vi. heat generation, and option v. captive power production.

**Step lc. Options for energy production**

The options for energy production are included in the options iv. to viii. listed in step 1b.

The project activity is covered by the option viii. – the combination of option vi. heat generation, option iv Use for additional grid power generation and option v. captive power production.

**Step 2. Eliminate baseline options that do not comply with legal or regulatory requirements**

According to the national safety regulations, the coal mine methane has to be extracted. There is no regulation in place that would require any specific utilisation of the extracted methane. On the other hand, there is no national regulation in place that would prohibit any use of CMM, e.g. for heat and/or electricity generation. Therefore, all the alternatives listed in step lb are in compliance with the existing regulations.

**Step 3. Formulation of the baseline scenario alternatives**

The following alternatives can be considered for implementation at the project site and are in compliance with the options listed in step lb and step lc. In any case the coal mine has to extract the CMM from the mine for safety reasons. Therefore the alternatives below assume extraction as described in step la and describe in detail the alternatives for treatment and utilisation.

*Alternative i. - Venting of CMM*

Since there are no legal requirements for treatment and utilisation of the captured CMM, it is common practice at Polish coal mines to release the CMM into the atmosphere. This alternative is the actual situation before project implementation – the part of the CMM extracted by the project was released into the atmosphere. The mentioned amount of CMM vented is not understood as VAM, but the CMM with higher methane content, captured for safety reasons in the underground, exhausted in the atmosphere without utilisation independent from VAM.

The energy demand and supply of the coal mine in this scenario would continue in the following way:

- Electricity would be supplied by the national/regional grid
- On-site heat demand would be supplied by the coal/CMM fired on-site boilers

*Alternative ii. Using/destroying ventilation air methane rather than venting it*

This alternative is not technical feasible, neither the use nor the destruction, due to the low concentration of the methane in the ventilation air.

The energy needs of the mine will be supplied in the same way as described in alternative i.

*Alternative iii. Flaring of CMM*

The flaring of the captured methane is not required by any existing national regulations. The infrastructure for methane flaring does not exist at the coal mine, so that additional investment would be required. Without revenues from emissions trading this alternative would only generate costs and is economically not viable.

The energy needs of the mine would be supplied in the same way as described in alternative i.

*Alternative iv. – use for additional grid power generation*

The captured methane could be utilised in a power plant for power generation. Possible power plant alternatives are:

a) conventional steam power plant, CMM fired

b) combined gas-steam power plant, CMM fired

c) gas turbine, CMM fired

d) gas engine, CMM fired

e) fuel cell, CMM fired

The energy needs of the mine would be supplied in the same way as described in alternative i.

*Alternative v. – use for additional captive power generation*

The captured methane could be utilised for captive power generation. A combined heat and power generation is possible and eligible:

a) cogeneration unit, CMM fired

A cogeneration unit is working at the mine since 1998.

The captive power generation with a new unit is part of the project scenario. See alternative viii.

*Alternative vi. – use for additional heat generation*

The coal mine operates a heater for coal drying, with a suitable heat production for the needs of the mine.

The captured methane could be utilised for additional heat generation, that means heat, which should be used outside the coal mine facilities. The existing boilers of the coal mine are supposed to supply only the coal mine facilities, the existing heating system is not connected to any other heating system outside the coal mine. So in this case a new heat generation plant should be constructed and connected to a heating system outside the coal mine, e.g. a district heating system. Possible heat generation plant alternatives are:

a) conventional steam boiler, CMM fired
b) conventional hot water boiler, CMM fired
c) heat generation in the cogeneration untit

The energy needs of the mine would be supplied in the same way as described in alternative i.

*Alternative vii. – feed into a gas pipeline (to be used as fuel vehicles or heat /power generation)*

There are three possible ways to utilise the captured methane:

a) feeding into a gas pipeline – in this case a new connection to an existing pipeline has to be made. Depending on the quality specification of the pipeline operator, most likely an additionally methane enrichment plant could be required
b) compression of the gas and usage as fuel for vehicles
c) liquefaction of the gas and transportation in tanks for utilisation by external users

The energy needs of the mine would be supplied in the same way as described in alternative i.

*Alternative viii. – possible combinations of alternatives i. to vii.*

There are numerous possible combinations of the alternatives i. to vii. described above, so that only the project scenario should be described in the following.

The CMM should be utilised for heat and captive power generation. All produced heat and power should be consummated by the coal mine. The remaining amount of the CMM which cannot be utilised for heat and power generation (especially in the summer) should be exhausted in the first step.

There is a CHP system for power production implemented as a project activity.

Power is produced by the cogeneration unit. The remaining power amount required by the mine should further be delivered from the grid.

The remaining available CMM amount, which cannot be utilised for heat and power production is exhausted.

**Step 4. Elimination of baseline scenario alternatives that face prohibitive barriers**

In this section the possible alternatives formulated above will be checked against the existing economic and other barriers for their implementation. Non-realistic alternatives will be eliminated.

*Alternative i. Venting*

The existing national regulations require that captured CMM has to be vented for safety reasons. There are no legal requirements that prohibit venting or require mines to utilise CMM. This alternative represents the current situation in the absence of the proposed project activity. There are no barriers or external factors that prevent this alternative to be continued. Therefore, this scenario can be considered to be a realistic alternative.

*Alternative ii. Using/destroying ventilation air methane rather than venting it*

As already mentioned under step 3, this alternative is not technical feasible, neither the use nor the destruction, due to the low concentration of the methane in the ventilation air. The VAM cannot be burned stand alone. A use of VAM as support for the combustion air requires an existing appropriate technological process at the project site, which does not exist. Other technological solutions were only implemented as demonstration, if at all.

Therefore this alternative faces a prohibitive barrier.

*Alternative iii. Flaring of CMM*

Flaring of CMM is not required by the existing national regulation. Additional investment has to be made by the project owners to install the flare. The operation would generate additional costs Without revenues from emissions trading no income but only costs are generated, this alternative is therefore economically not viable.

So this scenario is facing a strong prohibitive barrier, because the investment will not generate any revenues.

*Alternative iv. Use for additional grid power generation*

Generally CMM can be used for electricity generation that is delivered to the grid.

a) conventional steam power plant, CMM fired

The mine cannot guarantee a stable minimum amount of CMM needed for a conventional steam power plant. It could be only possible by means of additional amounts of captured CMM . /Gat-1994/ Usually power generation in conventional steam power plants is economically viable for middle and large scale plants (more than 20 MWel), so in case of the project the alternatives b) to e), which are listed below, could be economically more attractive.

Therefore this alternative faces a prohibitive barrier and is eliminated.

b) combined gas-steam power plant, CMM fired

A combined gas-steam power plant is a rather new technology. At present the technology is only available for natural gas, so that the CMM, which has an appreciable lower methane concentration and lower calorific value, should be first conditioned to an adequate quality. The additionally required conditioning plant makes this alternative economically not viable.

Also a stable minimum amount of CMM needed for combined gas-steam power plant cannot be guaranteed. There is also no need for a additional heat amount produced by the plant /Gat-1994/

Therefore this alternative faces multiple prohibitive barriers and is eliminated.

c) gas turbine, CMM fired

At present this technology is only available for gases with high caloric values, so that the CMM, which has a low calorific value, should be first conditioned to an adequate quality. The additionally required conditioning plant makes this alternative economically not viable. There is also no experience in Poland with such technologies for CMM utilisation, it would be therefore a solution first in its kind, which is a clear barrier according to ACM008

Therefore this alternative faces some prohibitive barriers and is eliminated.

d) gas engine, CMM fired

This alternative is the most suitable technology for power generation in the prospected range of performance. In this alternative only power generation for the grid and no heat generation is regarded.

This alternative is not economically viable, because the required revenues for the power feed-in into the grid are not marketable due to the business competition of the grid owners. The actually realisable sale price of power is too low. There are no privileges for power produced from CMM according to the Polish Energy Law and the actually realisable sale price of power is too low. /PL-EnLaw/ /URE-2004/

Therefore this alternative faces a prohibitive barrier and is eliminated.

However this alternative is more suitable for captive energy generation in the project scenario, especially by the combined heat and power generation in cogeneration units, see alternatives v. and viii.

e) fuel cell, CMM fired

At present this technology is only available for gases with high caloric values, so that the CMM, which has a low calorific value due to low methane concentration, should be first conditioned to an adequate quality. The additionally required conditioning plant makes this alternative economically not viable. Further on this would be the first fuel cell fired with CMM in Poland and there are no skilled and properly trained personnel for the operation and maintenance of this kind of technology.

Therefore this alternative faces multiple prohibitive barriers and is eliminated.

*Alternative v. Use for additional captive power generation*

The captive power generation is part of the project scenario.

Although this technology is the most suitable technology for power generation for captive energy generation in the project scenario, especially by the combined heat and power generation in cogeneration units, this alternative requires high investment. Also the operating and the maintenance costs of the new technology are high. On the other hand the specific energy costs of the coal mine and the electricity price in Poland are at the time too low for economically justifiable power generation in cogeneration units.

Although one CHP unit was already installed at the mine and its operational results were quite satisfying, the very high investment made it not economical viable[1]. All incentives from the heat and power production were the first 3-5 years spent for repayment of the bank loan and other services.

It makes visibly, that the alternative faces prohibitive barriers and is eliminated as a baseline scenario. See alternative viii.

*Alternative vi. Use for additional heat generation*

The coal mine operates a heater for coal drying, with a suitable heat production for the needs of the mine. There are three heaters fired with coal and one fired with CMM. The heaters work on demand with priority on the coal dryers. The CMM fired one works not regularly. The installed heaters cover the heat needs of the coal drying section, so that an additional heater is not necessary.

A conventional steam boiler produces steam, so that a steam grid is required for the transportation of the generated heat to the users. Because no such a grid is available and the investment and maintenance cost for such a grid are too high the alternative is not implementable.

A conventional hot water boiler produces hot water, which is supposed for use on the mine. This alternative requires a redesign of the conventional boiler for the possible operating with CMM, with coal and for co-firing. There is already one boiler redesigned for co-firing. All boilers work on demand and the installed capacity covers the present heat needs of the mine. On the other hand the specific energy costs of the coal mine are low and cannot ensure a economically justifiable heat system based only on CMM

A conventional hot water boiler produces hot water, which is supposed for the feed-in in a heating grid, e.g. a district heating system. As the district heating is not the common solution for the sparsely populated region where the mine is located and the next really available district heating system is too far away, the connection would cause very too high investment costs to make this alternative economically viable.

The alternatives face prohibitive barriers and are eliminated.

*Alternative vii. feed into a gas pipeline (to be used as fuel vehicles or heat /power generation)*

There are three possible ways to utilise the captured methane:

a) feeding into a gas pipeline

In this case a new connection to an existing pipeline has to be made. Also an additionally methane enrichment plant is required to fulfil the quality specification of the pipeline operator. The costs of the enrichment plant and the lacking piping infrastructure make this alternative economically not viable. Further on the alternative faces a barrier due to the absence of prevailing practises to feeding into a gas pipeline of natural gas.

Therefore this alternative faces a prohibitive barrier and is eliminated.

[1] Tor, Gatnar, DRAINAGE AND ECONOMICAL UTILIZATION OF METHANE-GAS FROM COAL SEAMS IN THE MINING FIELD JASTRZÊBIE COAL COMPANY IN COGENERATION POWER SYSTEM, Proceedings of International Scientific Conference "Geothermal Energy in Underground Mines" November 21-23, 2001, Ustroñ, Poland

b) compression of the gas and usage as fuel for vehicles

This alternative requires a suitable large fleet of vehicles, which are upgraded with CMM compatible engines. But there are not enough such consumers available. Further on the alternative faces a barrier due to the absence of prevailing practises to utilise CMM as vehicle fuel.

Therefore this alternative faces prohibitive barriers and is eliminated.

c) liquefaction of the gas and transportation in tanks for utilisation by external users

This alternative requires a liquefaction plant. The required investment for the plant is high. There is significant uncertainty in Poland on the domestic price of natural gas, and as a consequence, on the economic feasibility of such a project. There are no personnel available, which is skilled and properly trained for the operation and maintenance of such a plant. Further on the alternative faces a barrier due to the absence of prevailing practises to utilise CMM for liquefaction purposes.

Therefore this alternative faces prohibitive barriers and is eliminated.

*Alternative viii.* *Possible combinations of options i to vii with the relative shares of gas treated under each option specified.*
*This alternative describes the project scenario not registered as JI-Project*

A combination of the alternatives described above faces similar barriers as the alternatives as standalone solutions. The most probably combination would be the project scenario not registered as JI, where 100% of treated methane would be used for.

The project scenario alternative as described in step 3. requires a high investment, the operating and the maintenance costs of the new technology are relatively high, on the other hand the specific energy costs of the coal mine are relatively low. The electricity price in Poland is at the time too low for economically justifiable power generation in cogeneration units. As shown in the calculation of profitability, the project scenario is financially not attractive. This is proven in section B.2 of this PDD.

It can be additional evidenced, based on the corporate documentation and proceedings[2] , that the incentive from the selling of emission reduction was seriously considered in the decision to proceed with the project activity.

In addition there is significant uncertainty in Poland on the domestic price of natural gas, and as a consequence, on the economic feasibility of such a project. Project finance in Poland is absent as is shown in section B.2 and therefore the investment would have to be paid from the cash flow of the project operator.

Thus this alternative is a realistic alternative but faces economical barriers and is eliminated.

**Conclusion**

[2] Tor, Gatnar, Commercial methane utilisation for energetically purposes, Górnictwo i Geoinzynieria, nr 4 /2005

There is only one realistic option for the baseline scenario, which is the continuation of the current situation: venting of the captured CMM into the atmosphere, heat generation with the existing coal fired boilers, coal drying in the present configuration, the one existing CHP and the purchase of the remaining electricity from the grid.

The low investment possibilities for use of methane are not possible to implement anymore, due to lacking heat demand on site. As mentioned by the operator solutions requiring high investment were not economical viable for the company. Only with incentives from emission trading this project seems to be economical viable, which was considered in the management decision concerning the investment.

Without additional income from emission trading, the project is economically not viable and faces prohibitive barriers.

**B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:**

In accordance with the chosen methodology, additionality has to be proven by applying the "Tool for demonstration and assessment of additionality", (version 6.1.0), EB69.

The result is given below.

**Step 1. Alternatives**

In accordance with the methodology ACM0008, this step is ignored.

**Step 2. Investment analysis**

In this step is to determine whether the proposed project activity is not

a) the most economically or financially attractive

or

b) economically or financially feasible, without the revenues from the sale of ERUs

**Sub-step 2a. Determination of the analysis method**

The proposed project activity generates also other revenues than only those from JI. Therefore, simple cost analysis (Option I) is not applicable.

Obtaining financial indicators for similar projects in Poland is problematic as this project is one of the first in its kind; therefore the investment comparison analysis (Option II) cannot be performed for the identified alternatives and the benchmark analysis (Option III) will be used to test the additionality of the proposed emission reduction project activity.

**Sub-step 2b. Application of the benchmark analysis**

The project operator (SEJ) can only sell the produced energy, if it is cheaper than that from the grid. The project operator buys the CMM and sales the electricity and heat under that given conditions. The project operating company must evaluate a project, which is economically viable. As the benchmark of new projects used for evaluation is the IRR>12% and NPV(12%) at least be equal zero supposed, similar as for another Polish energy companies /URE/.

The Government bond rates for 2004, as the investment decision was made, were 7% constant for 5 years bond. New 10 years bond had rates of 7% variable in 2005. As the assumed rate for 10 years bonds were 6.5 % taken, which is conservative. The present bond rates are 6.75% variable for 10 years bonds.

The NPV (6.5%) shows the comparison of the project activity with the financial investments by means of government bonds. If its value is positive, the project activity would be economical more attractive than the bond investment.

**Sub-step 2c. Calculation and comparison of the indicators**

The economic indicators for the proposed project (alternative viii) without JI revenue has been calculated under the following assumptions:

Supposed prices for electricity and heat were taken as of 2004, after the decision to implement the project was taken.

The project has the following economic indicators:

*Table B-1: Economic indicators of the project, without revenues from emissions trading*

| Economic Parameters without ERUs | | |
|---|---|---|
| IRR | 4.20 | % |
| NPV (0 %) | 1,093,697 | EUR |
| NPV (6.5 %) | -391,283 | EUR |

**Sub-step 2d. Sensitivity analysis**

A sensitivity analysis of the proposed project was made based on the market data available at the moment of making the financial analysis of the proposed project. The price for the electricity sold to the mine should be approximately 5-10% lower, than the electricity from the grid. According to the "Tool for the demonstration and assessment of additionality", the revenues from electricity and heat sale in 2004 was supposed changed 10% downwards and 10% upwards as they are the source of revenue. The operational costs are those for CMM purchase and maintenance, which are nearly stable, so a variation for the sensitive analysis is not realistic

*Table B-2: Sensitivity analysis of economic indicators of the project, without ERU*

| Economic Parameters without ERUs | power+heat up 10% | power+heat down 10% | |
|---|---|---|---|
| IRR | 4.88 | 3.50 | % |
| NPV (0 %) | 1,287,877 | 899,518 | EUR |
| NPV (6.5 %) | -278,193 | -504,591 | EUR |

Thus, even in the case of a significant change in the power and heat revenues, the IRR of the proposed project would be lower as the benchmark of 12%, as for projects of Polish energy providers and NPV(6.5%) has not became positive, which makes a bond investment more attractive.

Outcome of the step 2 :

Even in the case of a significant change in the power and heat revenues, the IRR of the proposed project would be lower as the benchmark of 12% and NPV(6.5%) has not became positive. The proposed project is unlikely to be financially attractive.

**Step 3. Barrier analysis**

**Sub-step 3a. Barrier identification**

The proposed JI activity faces the following barriers:

*Barriers to prevailing practices*

According to publicly available information from Polish Ministry of Environment and Polish State Institute of Geology about 442 million cubic meters of CMM were 2005 extracted through degasification systems by Polish coal mines. Confidential statistics are not available. The CHP unit put into operation till 2005 caused technical problems and due to high service costs were not economically viable without revenues from sale of emission reductions.

It can be evidenced, based on the corporate documentation and proceedings, that the incentive from the selling of emission reduction was seriously considered in the decision to proceed with the project activity.

There were about 50 % of the CMM at the Coal Mine Krupinski vented in the atmosphere. Existing legislation is primary orientated on increasing safety of coal mine operations thus facilitating and enforcing development of degasification and ventilation systems at coal mines. Therefore current practices and economical conditions prevent the project from being implemented and clearly prevent the development of CMM utilisation activities.

*Technology barrier*

According to official information the project was one of the first CMM utilisation projects by means of CHP units Poland. CMM has varying quality and its combustion is not that simple as this of natural gas, it is reflected in the high service demand of the engines. The first engine at the coal mine Krupinski installed 1998 caused some technical problems. Also the experiences done in another European countries show, that the maintenance of this technology is very cost intensive. Therefore there is a clear technology barrier for the realisation of the proposed project.

*Financial barrier*

See step 2c.

**Sub-step 3b. Influence of the barriers identified on the alternative baseline scenario**

The only viable alternative to the proposed activity was the continuation of the former situation. Since this scenario does not require any additional investment or changes in the technology, it is not affected by the barriers described above.

**Step 4. Common practice analysis**

The investment decision for this project was taken under assumption of revenues from selling of ERUS /EBM/. It can be additional evidenced, based on the corporate documentation and proceedings /GATNAR-2005/, that the incentive from the selling of emission reduction was seriously considered in the decision to proceed with the project activity.

The further common practice analysis was made after the most recent Methodological “Tool for the demonstration and assessment of additionality” (Version 06.0.0) EB 65. The proposed project activity is a „common practice“ within a sector in the applicable geographical area if both the following conditions described in the tool are fulfilled:

(a) the factor $F=1- N_{diff} / N_{all}$ is greater than 0.2, and
(b) $N_{all}-N_{diff}$ is greater than 3.

Step 1

The applicable output range as +/-50% of the design output or capacity of the proposed project activity was calculated. Energy output of the proposed activity: 9,336 kW.

Calculated output range : 4,668 kW -14,004 kW

Step 2:

All plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project should be identified within the applicable geographical area. Registered CDM project activities and projects activities undergoing validation shall not be included in this step. The applicable geographical area is Poland. The first two conditions of step 3 (same energy/fuel and same feed stock) are included in step 2 for the purpose of the analysis in order to stay concise.

Following projects within the calculated output range were identified:

| Plant at the mine... | Installation | Output [kW] | N |
|---|---|---|---|
| Krupinski (1998) | 1998 | 5,800 | 1 |
| Budryk (2003) | 2003 | 7,200 | 1 |
| **Presented project (2005)** | **2005** | **9,336** | **Nall=2** |

$N_{all} = 2$

$N_{all}-N_{diff}$ cannot become greater than 3, so that further analysis is not necessary anymore.

According to the conditions given by the tool the proposed activity is **not a common practice**.

**Conclusion**

The impact of approval of the proposed project activity will allow the crossing of the financial hurdles and other barriers that otherwise would prevent the project from being implemented. The project is additional.

**B.3. Description of how the definition of the project boundary is applied to the project:**

*Table B-4: Overview on emissions sources included in or excluded from the project boundary*

**Baseline**

| **Source** | **Gas** | | **Justification / Explanation** |
|---|---|---|---|
| Emissions of methane as a result of venting | $CH_4$ | Exluded | The amount of methane to be released depends on the amount of coal produced. The baseline scenario for the project activity not implemented as a JI project is taken into account. The emissions associated with methane are not taken under account for the purpose of the project. |
| Emissions from destruction of methane in the baseline | $CO_2$ | Excluded | There are systems for heat and power in the applicable baseline scenario. The emissions associated with methane are not taken under account for the purpose of the project. |
| | $CH_4$ | Excluded | The emissions associated with methane are not taken under account for the purpose of the project. |
| | $N_2O$ | Excluded | Excluded for simplification. This is conservative and in accordance with ACM0008. |
| Grid electricity generation (electricity provided to the grid) | $CO_2$ | Included | CO2 emissions associated to the same quantity of electricity than electricity generated. |
| | $CH_4$ | Excluded | Excluded for simplification. This is conservative and in accordance with ACM0008. |
| | $N_2O$ | Excluded | Excluded for simplification. This is conservative and in accordance with ACM0008. |
| Captive power and/or heat, and vehicle fuel use | $CO_2$ | Included | In the baseline scenario heat would be generated by the on-site coal boilers. CO2 emissions associated to the same quantity of heat than heat generated, as a result of the use of methane are included. |
| | $CH_4$ | Excluded | Excluded for simplification. This is conservative and in accordance with ACM0008. |
| | $N_2O$ | Excluded | Excluded for simplification. This is conservative and in accordance with ACM0008. |

*Table B-5: Overview on emissions sources included in or excluded from the project boundary*

**Project activity**

| **Source** | **Gas** | | **Justification / Explanation** |
|---|---|---|---|
| Emissions of methane as a result of continued venting | $CH_4$ | Excluded | According to ACM0008 only the change in CMM emissions release would be taken into account, by monitoring the methane used or destroyed by the project activity. The amounts associated with methane are generally not taken under account for the purpose of the project. |
| On-site fuel consumption due to the project activity, including transport of the gas | $CO_2$ | Included | The own electricity consumption of the cogeneration units (cooling fans) is included. |
| | $CO_2$ | Excluded | The electricity consumption of the vacuum pumps is not included in the project boundary as they are necessary for the extraction itself and is performed both in the baseline and project scenario. |
| | $CO_2$ | Excluded | The electricity consumption of the CHP unit during the down time is not included in the project boundary as it is not significant.[3] |
| | $CH_4$ | Excluded | Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small. |
| | $N_2O$ | Excluded | Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small. |
| Emissions from methane destruction | $CO_2$ | Included | Emissions from the combustion of methane in the heat and power generation are included. |
| Emissions from NMHC destruction | $CO_2$ | Exluded | The emission amounts associated with methane are generally not taken under account for the purpose of the project. Only CO2 emissions associated to the same quantity of electricity than electricity generated, as a result of the use of methane are taken under account. |

[3] The average per year over the crediting period is less than 1% of the annual average and does not exceed the amount of 2,000 t $CO_{2eq}$. Reference JISC "Guidance on Criteria for Baseline Setting and Monitoring".

| | | | |
|---|---|---|---|
| Fugitive emissions of unburned methane | $CH_4$ | Excluded | The amounts associated with methane are generally not taken under account for the purpose of the project. |
| Fugitive methane emissions from on-site equipment | $CH_4$ | Excluded | The amounts associated with methane are generally not taken under account for the purpose of the project. |
| Fugitive methane emissions from gas supply pipeline or in relation to use in vehicles | $CH_4$ | Excluded | The amounts associated with methane are generally not taken under account for the purpose of the project. |
| Accidental methane release | $CH_4$ | Excluded | The amounts associated with methane are generally not taken under account for the purpose of the project. |

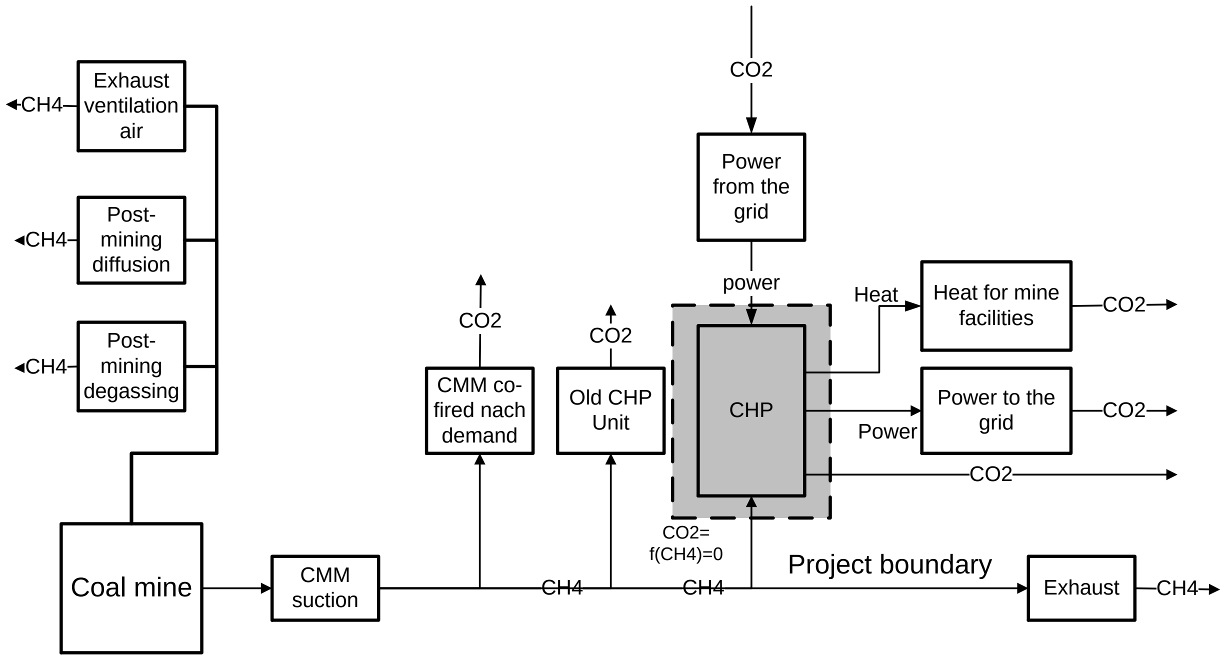


*Figure B-3: Project boundary*

**Overlap of the project activity and the baseline**

The amount of captured methane is minimum 26,3 millions m³ CH4 per year, as estimated 2005 before the project implementation. The newest forecasts estimated the amount of methane captured in the mine as 37-41 millions the years 2008-2012. The systems installed in the 90s and being a part of the baseline can use average 12 millions m³ CH4 per year in the CHP with firing capacity of 3.2 MW, boiler and for the coal drying system, depending of the demand of the mine.

Even, if the new CHP unit implemented as a project activity works, there is a big amount of methane exhausted. Overlaps between the project activity and the baseline are very unlikely.

**Baseline Emissions**

Baseline emissions are given by the following equation

$$BE_y=BE_{MDy}+BE_{MRy}+BE_{Use,y} \qquad (1)$$

where
$BE_y$ = baseline emissions in year y ($t_{CO2e}$)
$BE_{MDy}$ = Baseline emissions from destruction of methane in the baseline in year y ($t_{CO2e}$)
$BE_{MRy}$ = Baseline emissions from release of methane into atmosphere in year y ($t_{CO2e}$) that is avoided by the project activity
$BE_{Use,y}$ = Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y ($t_{CO2e}$)

$$BE_{Use,y} = BE_{power,y} + BE_{Heat,,y} \qquad (2)$$

**Methane destruction in the baseline**

The project activity uses methane which otherwise would be exhausted into the atmosphere. There is no use of this part of methane in the baseline.

**Methane released in the atmosphere**

The baseline emissions from release of methane into the atmosphere in the year y (BEMR,y) are not taken into account for the project.

**Leakage**

The formula for leakage is given as follows:

$$LE_y = LE_{d,y} + LE_{o,y} \qquad (3)$$

Where:
$LE_y$ = Leakage emissions in year *y* ($tCO_2e$)
$LE_{d,y}$ = Leakage emissions due to displacement of other baseline thermal energy uses of methane in year *y* ($tCO_2e$)
$LE_{o,y}$ = Leakage emissions due to other uncertainties in year *y* ($tCO_2e$)

***Displacement of baseline thermal energy uses***

Leakage may occur if the project activity prevents CMM/CBM from being used to meet baseline thermal energy demand, whether as a result of physical constraints on delivery, or price changes. Where regulations require that local thermal demand is met before all other uses, which is common in many jurisdictions, then this leakage could be ignored.

The coal drying is owned by the mine and is the first demand, which is met before transporting CMM to the project operator. The project operator has no priority to purchase the gas, before the direct demand of the mine is met. The project operator has to meet heat demand of the mine alone, as he is the only heat supplier. The heat demand has to be met before other uses, as it is essential for the mine operation. The heat demand is changing and depends on the mine operation. Even in cases, as the CMM amount send to the heat production decreased, there were still big amounts of CMM exhausted. The project activity produces power, which is one of several power sources for the mine. The production is parallel to the grid and ensured by the local power supplier.

Furthermore, the price of heat produced in boilers depends on the kind of fuel and is lower if the boilers use more gas. The situation where CMM would be sent to the project activity instead to the boilers is very unlikely because of increasing heat prices.

The project activity produces power, which is one of several power sources for the mine. The production is parallel to the grid. The power demand is ensured by the local power supplier.

The leakage can be ignored as:

- as the heat demand of the mine is met before the extern uses, as it is essential for the mine processes
- the other technological and economic circumstances at the project location makes leakage emissions due to displacement of other baseline thermal energy uses of methane very unlikely.

Furthermore according to "Provisions for Joint Implementation small-scale project", Version 03, leakage only has to be considered within the boundaries of non-Annex I Parties.

**Emission Reduction**

$$ER_y = BE_y - PE_y - LE_y \qquad (4)$$

**where**

| | | |
|---|---|---|
| ERy | = | Emission reductions of the project activity during the year y(t $CO_2$) |
| BEy | = | Baseline emissions during the year y (t $CO_2$) |
| PEy | = | Project emissions during the year y (t $CO_2$) |
| LEy | = | leakage emissions in year y (t $CO_2$) =0 |

| **Data / Parameter:** | BEy |
|---|---|
| Data unit: | t $CO_{2Eq}$ |
| Description: | baseline emissions in year y ($t_{CO2e}$) |
| Time of determination/ monitoring | During the project implementation |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | Monthly recorded |
| Any comment: | Calculated using formulae in section B3 |

| **Data / Parameter:** | $BE_{MR}y$ |
|---|---|
| Data unit: | t $CO_{2Eq}$ |
| Description: | Baseline emissions from release of methane into atmosphere in year y ($t_{CO2e}$) that is avoided by the project activity |
| Time of determination/ monitoring | Ex ante |
| Source of data: | Monitored data |
| Value of data applied | 0 |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The emissions from release of methane into atmosphere in year y ($t_{CO2e}$) that is avoided by the project activity are excluded for the project activity. Only CO2 emissions associated to the same quantity of electricity than electricity generated, as a result of the use of methane are included. In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |
| QA/QC procedures: | |
| Any comment: | |

| **Data / Parameter:** | $BE_{MDy}$ |
|---|---|
| Data unit: | t $CO_{2Eq}$ |
| Description: | Baseline emissions from destruction of methane in the baseline in year y ($t_{CO2e}$) |
| Time of determination/ monitoring | Ex ante |
| Source of data: | |
| Value of data applied | 0 |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The emissions from destruction of methane are excluded for the project activity. |
| QA/QC procedures: | |
| Any comment: | |

| **Data / Parameter:** | $EF_{elec\text{-}gen}$ |
|---|---|
| Data unit: | t $CO_2$ / MWh |
| Description: | $CO_2$ emission factor of the grid |
| Time of determination/ monitoring | |
| Source of data: | KOBiZE/Poland |
| Value of data applied | 0.812 $t_{CO2}$/MWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | A standardised carbon emission factor for the Polish Grid as determined by KOBiZE: http://www.kobize.pl/materialy/jicdm/JI-wskaznik_referencyjny_26sie2011_publik.pdf |
| QA/QC procedures: | |
| Any comment: | |

| **Data / Parameter:** | $EF_{Heat\text{-}gen}$ |
|---|---|
| Data unit: | $t_{CO2}$ /GJ $_{Heat}$ |
| Description: | $CO_2$ emission factor of coal fired heating |
| Time of determination/ monitoring | Ex ante |
| Source of data: | IPCC 2006 / Polish legal source: 2008/Dz.Ust 183/1142 |
| Value of data applied | 0.118$t_{CO2}$ /GJ $_{Heat}$ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The standard carbon emission factor from the IPCC guidelines together with a combustion efficiency of 80% has been taken as a conservative approach. The value for “Coking Coal” / “Other Bit. Coal” of 94.5 $t_{CO2}$ /TJ has been chosen. This is the value with the lowest carbon emissions, thus this is conservative for coal displacement. |
| QA/QC procedures: | |
| Any comment: | $EF_{Heat\text{-}gen}$= 0.0945 / 0.8 = 0.118 $t_{CO2}$ /GJ $_{Heat}$ |

| **Data / Parameter:** | $BE_{Use,y}$ |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power, heat or gas supply to grid replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measu-rement methods and procedures to apply | |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. Calculated using formulae in section B3 |

| **Data / Parameter:** | BEpower,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The total emissions reductions from displacement of power generation are CO2 emissions associated to the same quantity of electricity as electricity generated, that otherwise would be produced by combustion of fossil fuels. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

| **Data / Parameter:** | BE heat,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of heat replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The total emissions reductions from displacement of the same quantity of heat as heat generated, that otherwise would be produced in coal boilers. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

**B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:**

Date of completion of the baseline study: 05 November 2012

Name of person / entity setting the baseline: Alina Mroz, / Carbon-TF B.V.

See Annex 1 for detailed contact information.

## SECTION C. Duration of the project / crediting period

### C.1. Starting date of the project:

The management decision considering the presentation of the project as JI was made in July 2004. The first operation of the project was 2005-07-01

### C.2. Expected operational lifetime of the project:

The operational lifetime of the project is planned as 15 years, 180 months. The effective operational lifetime is determined by the planed abandoning of the mine 2014-2020.

### C.3. Length of the crediting period:

5 years (2008 – 2012); this is equal to 60 months.

Start of the crediting period is January 1st, 2008.

The crediting period can extend beyond 2012 subject to the approval by the host party.

## SECTION D. Monitoring plan

### D.1. Description of monitoring plan chosen:

The JI specific approach for baseline setting and monitoring has been used for the monitoring of the proposed JI project. According to the most recent guidelines for baseline setting and monitoring (JISC18) elements of approved CDM baseline and monitoring methodologies or approved CDM methodological tools can be used, as appropriate.

Applicability requirements for the monitoring plan of the ACM0008 methodology are identical to respective requirements of the baseline setting. For a detailed overview of the ACM0008 applicability please refer to section B.I of this PDD.

General remarks to the Monitoring Plan:

- Social indicators such as number of people employed, safety record, training records, etc, will be available to the verifier;
- Environmental indicators such as dust emissions, $NO_x$, or $SO_x$ will be available to the verifier. These indicators are being reported to the Regional Supervisory Authority on demand;
- IPCC default factors have been taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. [IPCC-2]

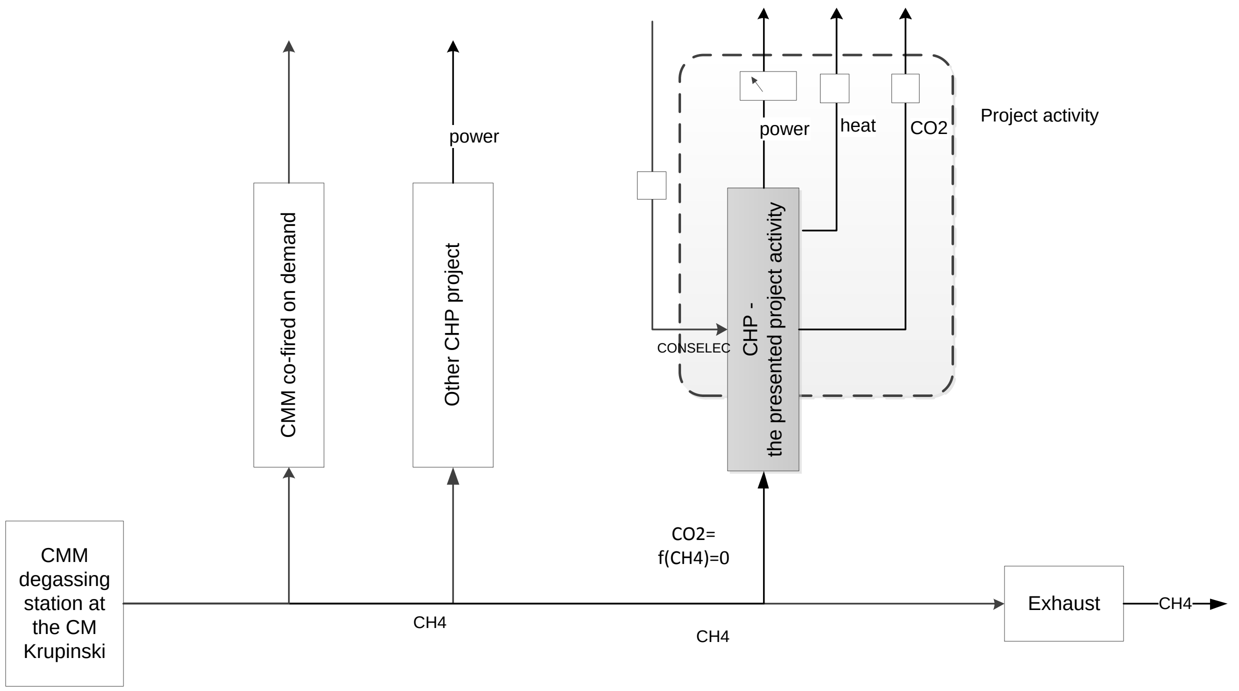


*Figure D-1: Data collected for the monitoring*

**D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:**

| | |
|---|---|
| **Data / Parameter:** | $CONS_{ELEC,PJ}$ |
| Data unit: | MWh |
| Time of determination/ monitoring | Ex post |
| Description: | Additional electricity consumption for use or destruction of methane, if any |
| Source of data: | Research, measurements |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The additional electricity consumption will be determined in dependence from the produced power |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the Vattenfall´s control room. The operator receives additional receipts about the meter reading. |
| Any comment: | The power own consumption of the power generation units was estimated ex ante as of 3.5% of the generated power in other projects. This assumption made to the a JI activity was already finally determined in the Project 0078 |

| | |
|---|---|
| **Data / Parameter:** | $MM_{ELEC\ Eng1}$ |
| Data unit: | $tCH_4$ |
| Time of determination/ monitoring | monthly |
| Description: | Methane destroyed in the power plant |
| Source of data: | calculated |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The amount of methane will be estimated in dependence from the energy generation of the CHP installed in the project activity and the efficiency of the power production. |
| QA/QC procedures: | |
| Any comment: | $MM_{ELEC\ Eng1} = EG_{Eng1} / \eta_{power} / NCV_M \times \rho_{CH4}$ |

| | |
|---|---|
| **Data / Parameter:** | $\eta_{power}$ |
| Data unit: | % |
| Time of determination/ monitoring | Ex ante |
| Description: | Energy efficiency of the plant |
| Source of data: | Manufacturer´s data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The efficiency of the plant is provided by the manufacturer |
| QA/QC procedures: | |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | $NCV_M$ |
| Data unit: | TJ/Gg |
| Time of determination/ monitoring | Ex ante |
| Description: | Net calorific value of methane |
| Source of data: | Polish legal source: Polish legal source: 2008/Dz.Ust 183/1142 |
| Value of data applied | 50 |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | With 1MJ=0.2778 kWh and $\rho_{CH4}$=0.717 kg/$m^3$<br>$NCV_M$=9.96 kWh/$m^3$ |

| | |
|---|---|
| **Data / Parameter:** | $P_i$ |
| Data unit: | kWel |
| Time of determination/ monitoring | Ex ante/ex post |
| Description: | Theoretical electrical capacity of the plant |
| Source of data: | Manufacturer's data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | The theoretical capacity is individual for the engine installed within the project activity. The theoretical capacity can change subject to technical improvement and innovation made in cooperation with the engine manufacturer. |

| | |
|---|---|
| **Data / Parameter:** | $CEF_{CH4}$ |
| Data unit: | t $CO_{2eq}$ / t $CH_4$ |
| Time of determination/ monitoring | Carbon emission factor for combusted methane |
| Description: | Ex ante |
| Source of data: | IPCC |
| Value of data applied | 2.75 |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | $EG_{Engi}$ |
| Data unit: | MWh |
| Time of determination/ monitoring | Continuous monitored and monthly recorded |
| Description: | Electricity generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement with summation, recorded monthly in the plant protocols. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the Vattenfall´s control room. The operator receives additional receipts about the |

| | |
|---|---|
| | meter reading. |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | HG $_{Engi}$ |
| Data unit: | MWh |
| Time of determination/ monitoring | Continuous monitored and monthly recorded |
| Description: | Heat generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement, monthly recorded in the plant protocols. The protocols are parts of yearly SEJ´s cogeneration reports summarised for all engines installed within the project location. The quality of the monitored data for engine installed in the presented project is thus verified in advance by another accredited entity. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The heat meters fulfil the requirements for billing |
| Any comment: | |

**D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

Project emissions are defined by the following equation

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$ ( 5)

Where

$PE_y$ = Project emissions in year *y* ($tCO_2e$)
$PE_{ME}$ = Project emissions from energy use to capture and use methane ($tCO_2e$)
$PE_{MD}$ = Project emissions from methane destroyed ($tCO_2e$)
$PE_{UM}$ = Project emissions from un-combusted methane ($tCO_2e$)

Project emissions from energy use to capture and use methane ($PE_{ME}$), is obtained by the equation:

$PE_{ME} = CONS_{ELEC,PJ}\ x\ EG_{Engi}$ ( 6)

Project emissions from methane destroyed ($PE_{MD}$) can be obtained by the equation

$PE_{MD} = MM_{ELEC}\ x\ CEF_{CH4}$ (7)

$PE_{UM} = 0$ (8)

as only the energy displacement is taken into account within the presented project approach and the emissions associated with methane are not considered in the project.

All utilisation units are supplied with CMM from the CMM suction system of the coal mine. The CMM pressure provided by the suction system is sufficient for the operation of all utilisation units and no further compression is needed. The CMM suction system is always in operation for safety reasons in the underground of the coal mine. The CMM suction system would be also in operation in the absence of the project; in this case the part of methane would be simply blown into the atmosphere. Thus the energy use for capture of the methane is outside the project boundaries and only the part for use methane is regarded.

The power generator and the cogeneration unit need additional power especially for the cooling fans. The power amount consumed by the power generation units is taken into account as $CONS_{ELEC,PJ}$.

**D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:**

| | |
|---|---|
| **Data / Parameter:** | BEy |
| Data unit: | t $CO_{2Eq}$ |
| Description: | baseline emissions in year y ($t_{CO2e}$) |
| Time of determination/ monitoring | During the project implementation, |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | Monthly recorded |
| Any comment: | Calculated using formulae in section B3 |

| | |
|---|---|
| **Data / Parameter:** | $BE_{Use,y}$ |
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power, heat or gas supply to grid replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. Calculated using formulae in section B3 |

| **Data / Parameter:** | BEpower,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The total emissions reductions from displacement of power generation are CO2 emissions associated to the same quantity of electricity as electricity generated, that otherwise would be produced by combustion of fossil fuels and to the same quantity of heat as heat generated, that otherwise would be produced in coal boilers. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

| **Data / Parameter:** | BEheat,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of heat by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The total emissions reductions from displacement of the same quantity of heat as heat generated, that otherwise would be produced in coal boilers. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

| **Data / Parameter:** | $CONS_{ELEC,PJ}$ |
|---|---|
| Data unit: | MWh |
| Time of determination/ monitoring | Ex post |
| Description: | Additional electricity consumption for use or destruction of methane, if any |
| Source of data: | Research, measurements |
| Value of data applied | |
| Justification of the | The additional electricity consumption will be determined in dependence |

| | |
|---|---|
| choice of data or description of measurement methods and procedures (to be) applied | from the produced power |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the Vattenfall´s control room. The operator receives additional receipts about the meter reading. |
| Any comment: | The power own consumption of the power generation units was estimated ex ante as of 3.5% of the generated power in other projects. This assumption made to the a JI activity was already finally determined in the Project 0078 |

| **Data / Parameter:** | $EG_{Engi}$ |
|---|---|
| Data unit: | MWh |
| Time of determination/ monitoring | continuous |
| Description: | Electricity generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement with summation, recorded in the plant dairies. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the Vattenfall´s control room. The operator receives additional receipts about the meter reading. |
| Any comment: | |

| **Data / Parameter:** | $HG_{Engi}$ |
|---|---|
| Data unit: | MWh |
| Time of determination/ monitoring | Continuous monitored and monthly recorded |
| Description: | Heat generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement, monthly recorded in the plant protocols. The protocols are parts of yearly SEJ´s cogeneration reports summarised for all engines installed within the project location. The quality of the monitored data for engine installed in the presented project is thus verified in advance by another accredited entity. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The heat meters fulfil the requirements for billing |
| Any comment: | |

| **Data / Parameter:** | $EF_{elec-gen}$ |
|---|---|
| Data unit: | t $CO_2$ / MWh |
| Description: | $CO_2$ emission factor of the grid |
| Time of determination/ monitoring | Ex ante |
| Source of data: | KOBiZE/Poland |
| Value of data applied | 0.812 $t_{CO2}$/MWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | A standardised carbon emission factor for the Polish Grid as determined by KOBiZE: http://www.kobize.pl/materialy/jicdm/JI-wskaznik_referencyjny_26sie2011_publik.pdf |
| QA/QC procedures: | |
| Any comment: | |

| **Data / Parameter:** | $EF_{Heat-gen}$ |
|---|---|
| Data unit: | $t_{CO2}$ /GJ $_{Heat}$ |
| Description: | $CO_2$ emission factor of coal fired heating |
| Time of determination/ monitoring | Ex ante |
| Source of data: | IPCC 2006 / Polish legal source: 2008/Dz.Ust 183/1142 |
| Value of data applied | 0.118$t_{CO2}$ /GJ $_{Heat}$ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The standard carbon emission factor from the IPCC guidelines together with a combustion efficiency of 80% has been taken as a conservative approach. The value for "Coking Coal" / "Other Bit. Coal" of 94.5 $t_{CO2}$ /TJ has been chosen. This is the value with the lowest carbon emissions, thus this is conservative for coal displacement. |
| QA/QC procedures: | |
| Any comment: | $EF_{Heat-gen}$= 0.0945 / 0.8 = 0.118 $t_{CO2}$ /GJ $_{Heat}$ |

**D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

$BE_y = BE_{MR,y} + BE_{Use,y}$ (9)

The baseline emissions from release of methane into the atmosphere in the year y ($BE_{MR}$,y) are not taken into account for the purposes of the project

$BE_{MR,y}$ = O

The emissions reductions from displacement of power/heat generation are described as follows:
$BE_{Use,y} = EG_{Engi} \times EF_{elec} + HG_{Engi} \times EF_{Heat-gen}$ (10)

**D. 1.2.Option 2 – Direct monitoring of emission reductions from the project (values should**

**be consistent with those in section E.):**

| **Data / Parameter:** | |
|---|---|
| Data unit: | |
| Description: | |
| Time of determination/ monitoring | |
| Source of data: | |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | |

not applicable

**D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of $CO_2$ equivalent):**

not applicable

**D.1.3. Treatment of leakage in the monitoring plan:**

In accordance with ACM0008 the following leakages should be considered:

1. Displacement of baseline thermal energy uses
2. CBM drainage from outside the de-stressed zone
3. Impact of the emission reducing project on coal production
4. Impact of the emission reducing project on coal prices

Leakage in the project is very unlikely as:

1. the heat demand of the mine is met before the extern uses, because it is essential for the mine processes. The amount of captured methane was furthermore every month bigger as the summarised project and baseline demand till now
2. There is no CBM involved hence no leakage occurs from CBM drainage from outside the de-stressed zone
3. There is no impact of the emission reducing project on coal production as degasification activities are independent from the emission reducing project
4. The impact of the emission reducing project on coal prices is difficult to assess. The revenues from carbon trading are for the project operator, not for the mine, and necessary for a economical viability of the presented project. The emission reducing project as such does not influence coal production so it is unlikely that the emission reducing project will impact coal prices.

**D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:**

not applicable

**D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

not applicable

**D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of $CO_2$ equivalent):**

The greenhouse gas emission reduction gained by the project over a period is the difference between the total baseline emissions over the period and the total project emissions over the period. This is given by the equation:

$$ER_y = BE_y - PE_y \qquad (11)$$

where:

$ER_y$ Emissions reductions of the project activity during the year y (t $CO_{2eq}$)
$BE_y$ Baseline emissions during the year y (t $CO_{2eq}$)
$PE_y$ Project emissions during the year y (t $CO_{2eq}$)

**D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:**

To maintain a consistent and reliable performance of the automatic controlling and monitoring system an adequate quality control and assurance procedures will be implemented that is regulated by the calibration standards and quality norms of the national legislation. Under these requirements of quality control system, regular maintenance and testing regime to ensure accuracy of flow meters, gas-analysers, electricity and heat measuring instruments will be provided. All measuring instruments will be calibrated periodically. The calibration protocols will be archived and proved by an independent entity on an annual basis. A consistency check for all measurement data and the calculation of the emission reductions will be carried out and reported monthly.

| **D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:** | | |
|---|---|---|
| Data | Uncertainty level of data (high/medium/low) | Explain QA/QC procedures planned for these data, or why such procedures are not necessary. |
| *Power production* | low | The indication of the measurement instrument should be controlled one-time during the final inspection by the manufacturer. The gauge has usually hardly any fluctuations and no recalibration is needed.<br>The indication of the measurement instrument should be controlled during the regular inspections while the operation time and a gauge which is obviously out of order should be substituted. |
| *Heat production* | low | The indication of the measurement instrument should be controlled one-time during the final inspection by the manufacturer. The heat measuring device has usually hardly any fluctuations and no recalibration is needed.<br>The indication of the measurement instrument should be controlled during the regular inspections while the operation time and a gauge which is obviously out of order should be substituted. |

Irrespective the monitoring plan all installed aggregates and gauges should be controlled during the regular inspections, at least weakly, to assure a proper operation of the facility. Beside the monitored values any other values which are needed for the supervision of the plant should be logged.

Any gauge or apparatus which is detected as obviously out of order should be substituted.

Furthermore emissions measurement for dust, CO, NOx etc. for all combustion units will be carried out and archived as required by the legal requirements of the Polish Authorities.

**D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:**

The plants installed in the project are designed to run fully automatic, so that the operating personnel have only to supervise the correct operation of the plant and the plausibility of the collected and monitored data. In case of disturbances the plant will be shut down automatically and no unintended emissions are caused.

The operator of the degassing station is responsible for the measurement of the whole amount of captured methane, the amount of methane sent to the coal drying station, to the operator of proposed project and the amount of captured methane vented. The amounts are documented monthly and given to the mine´s and project operator´s representatives. The measured amounts are relevant for mine´s invoices for the CMM used by the project operator.

The protocols should be stored as a part of balance of the operating company.

All stored data will be kept during the whole operation period of the plant and furthermore for at least 5 years.

The project operator measures the methane amounts sent to his plants: the proposed project activity, the old CHP plant and the boilers. The two last devices destruct methane in the baseline and the emission reduction achieved by them will not be taken under account.

The relevant process data collected by the project operator are: heat and power production. The power plant and all relevant process data are to be observed daily by the staff. The process data are to collect and archive monthly. The monthly report has to be printed for archiving and the plant manager´s validation..

The power production is measured by measuring devices maintained by the grid operator, as they are relevant for invoicing. In addition they are necessary for requesting of cogeneration certificates. The readout of the measurement is made automatically by the grid operator. The quality of the measurement is thereafter high.

The heat production is measured by measuring devices maintained by the project operator, as they are relevant for invoicing. In addition they are necessary for requesting of cogeneration certificates. The readout of the measurement is made by the project operator and thereafter verified by an accredited entity in accordance with the requirements of Polish Energy Law. The quality of the measurement is thereafter high.

The power and heat monthly reports are parts of yearly SEJ´s cogeneration reports summarised for all engines installed within the project location. The quality of the monitored data for engine installed in the presented project is thus verified in advance by another accredited entity.

All printed and validated reports and invoices are to be stored for at least 5 years. Storage of scanned reports is allowed, due to the internal quality guidelines of the project operator. The quality of management systems of the project operator is certified by ISO procedure.

All measuring equipment is to calibrate according to the legal requirements and manufacturers guidelines.

The plant manager is responsible for the preparation of the standardised monthly report. He is also in charge for the preparation of the summarised monthly and yearly reports, which should be revised by the project manager.

The plant manager is keeping an operational journal which includes the following information:

- compilation and description of all data recorded, required for the calculation of the emission reductions
- description of all records to be kept during the regular inspections, including all corrective action undertaken
- manually logged data collected during the regular inspections
- particular events
- all calibrations carried out, incl. all calibration protocols

All data should be continuously checked for consistency, completeness and integrity by project developer (SEJ). A detailed plausibility check should be carried out at least monthly.

The responsible staff members of the project operator SEJ have been trained on the handling with CMM-utilisation units and the applied monitoring systems by the plant producer. Those trained personnel of the operator is the basis and responsible for operating and monitoring of this project.

**D.4. Name of person(s)/entity(ies) establishing the monitoring plan:**

Date of completion of the monitoring plan: 05 November 2012

Name of person / entity setting the monitoring plan: Alina Mroz / Carbon-TF B.V.

See Annex 1 for detailed contact information.

## SECTION E. Estimation of greenhouse gas emission reductions

### E.1. Estimated project emissions:

*Table E-1 – Estimated project emissions*

| Estimated project emissions [t CO2Eq] | | | | | |
|---|---|---|---|---|---|
| Year | 2008 | 2009 | 2010 | 2011 | 2012 |
| **CO2 Emission from** | | | | | |
| power generation | 15,884 | 15,884 | 15,884 | 15,884 | 15,884 |
| additional power consumption | 935 | 935 | 935 | 935 | 935 |
| **sum** | **16,819** | **16,819** | **16,819** | **16,819** | **16,819** |

### E.2. Estimated leakage:

There is no leakage estimated in this project.

### E.3. The sum of E.1. and E.2.:

*Table E-3 – Estimated project emissions and leakage*

| Estimated project emissions and leakage [t CO2Eq] | | | | | |
|---|---|---|---|---|---|
| **Year** | 2008 | 2009 | 2010 | 2011 | 2012 |
| **CO2 Emission from** | | | | | |
| power generation | 15,884 | 15,884 | 15,884 | 15,884 | 15,884 |
| additional power consumption | 935 | 935 | 935 | 935 | 935 |
| **sum** | **16,819** | **16,819** | **16,819** | **16,819** | **16,819** |

### E.4. Estimated baseline emissions:

*Table E-4 – Estimated baseline emissions*

| Estimated baseline emissions [t CO2Eq] | | | | | |
|---|---|---|---|---|---|
| **Year** | 2008 | 2009 | 2010 | 2011 | 2012 |
| **release of CO2 that is avoided by the project** | | | | | |
| production of heat that is displaced by the project | 14,621 | 14,621 | 14,621 | 14,621 | 14,621 |
| production of power that is displaced by the project | 26,710 | 26,710 | 26,710 | 26,710 | 26,710 |
| **sum** | **41,331** | **41,331** | **41,331** | **41,331** | **41,331** |

## E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

See table E-6 in section E.6.

## E.6. Table providing values obtained when applying formulae above:

*Table E-6 – Project emissions and emission reductions during the lifetime of the project (2008-2012)*

| Year | Estimated project emissions (tonnes of CO2 equivalent) | Etimated leakage (tonnes of CO2 equivalent | Estimated baseline emissions (tonnes of CO2 equivalent) | Estimated emissions reductions (tonnes of CO2 equivalent) |
|---|---|---|---|---|
| 2008 | 16,819 | - | 41,331 | 24,512 |
| 2009 | 16,819 | - | 41,331 | 24,512 |
| 2010 | 16,819 | - | 41,331 | 24,512 |
| 2011 | 16,819 | - | 41,331 | 24,512 |
| 2012 | 16,819 | - | 41,331 | 24,512 |
| Total (tonnes of CO2 equivalent) | **84,096** | **-** | **206,656** | **122,560** |

The AIE was provided with the detailed calculation and supporting documents within the determination process.

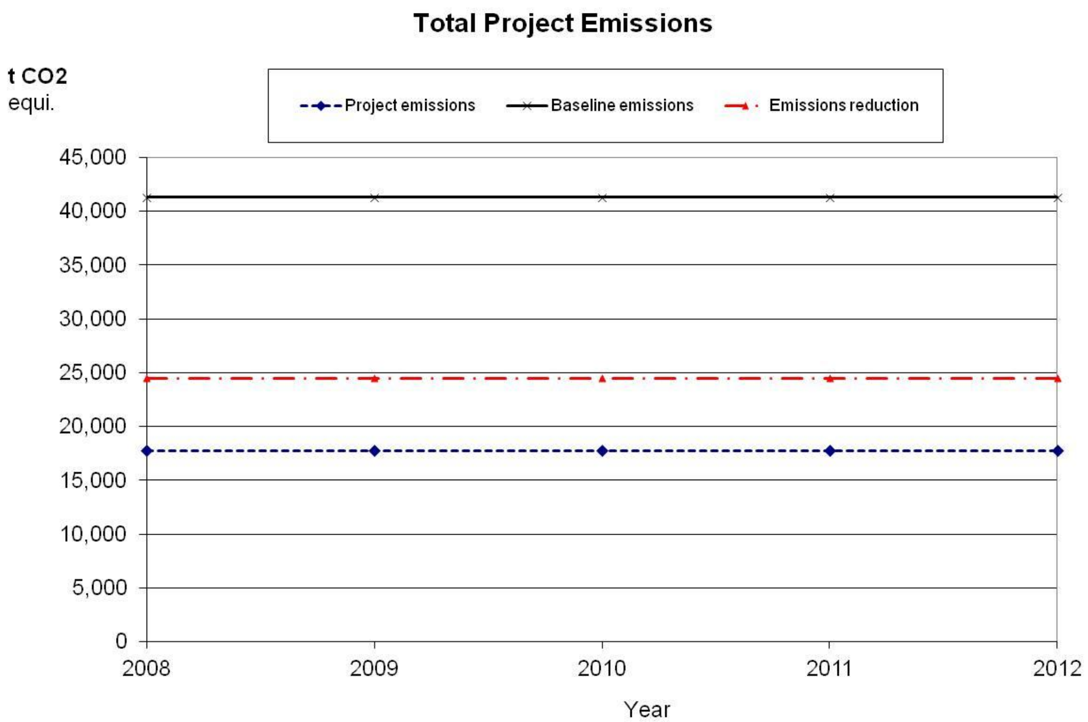


*Figure E-1 - Baseline emissions, project emissions and emissions reduction; total project*

## SECTION F. Environmental impacts

**F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:**

The CHP-unit does not use the natural resources: water, ground and landscape, so that no impairment on nature or landscape is given. The facility does not produce any waste, sewage or condensate. Due to the very high operational safety standards supplied a very low accident hazard is given.

The plant requires an approval by the Polish Environmental Authorities. The combustion processes are designed to comply for the Polish emissions limits.

The facility causes no harmful environmental impacts. In fact the utilisation of otherwise unused CMM reduces in an active manner the amount of CMM which is released to the atmosphere and provides significant benefits for the global climate production by converting the harmful methane into the less harmful carbon dioxide.

Furthermore the operation of the plant creates additional jobs.

Beside the positive effect on the global climate protection, no transboundary impacts occur.

**F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

There are no significant environmental impacts expected (see Section F.1). The plant fulfils Polish administrative and legal requirements, which was proven within the regulatory procedures of the host country prior to the plant start-up and if necessary during the operation. All relevant environmental permissions for the construction and operation of the plant were obtained.

## SECTION G. Stakeholders' comments

### G.1. Information on stakeholders' comments on the project, as appropriate:

A local stakeholder consultation is required during the authorization procedure, by the building law, the law of city and regional planning, environmental law. The stakeholder rights are described in the administrative law. The stakeholders were consulted according to the regulations.

SEJ has applied for the building permit in accordance with the current legislation.

Parties involved in the procedure were: Municipality Suszec, District Building Supervision in Pszczyna, District Mining Authority.

As the necessary preliminary administrative step was the achieving of a decision about the conditions for the building development plan. This decision was given by the Municipality Suszec after examination of the ownership right and other stakeholder´s rights and interests..

According to the Polish legislation every stakeholder can raise objection, if his rights and interests are put at risk. The decision about the conditions for  the building was issued on 14 December 2004. /BC/

The building permit was issued on 31 January 2005./BP/

During the plant building the stakeholders had to be informed about the character of the plant and all risks, that could occur.

No objections were raised whether during the administrative procedure or during the construction and operational time of the plant.

The stakeholders were consulted according to the regulations.

A stakeholder consultation within the JI procedure is not requested by the national regulation. However a project activity was made public at the AIE´s homepage. There were no comments received.

Nevertheless, the strategy of the project developer (SEJ) and its parent company for avoidance of methane emission were made public. The plans for new CMM utilisation plants inclusive the presented project were published both in local and scientific journals. The intention of project implementation as emission reduction generating project was published.

Annex 1

## CONTACT INFORMATION ON PROJECT PARTICIPANTS

### Proposer and project developer


| | |
|---|---|
| Organization: | Spolka Energetyczna Jastrzebie |
| Street/P.O.Box: | ul. Rybnicka |
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| Represented by: | Jaroslaw Parma |
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| Salutation: | Mr. |
| Last Name: | Parma |
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| Personal e-mail: | jparma@sejsa.com.pl |

**Consultant and investor, buyer of the emission reduction certificates**

| | |
|---|---|
| Organization: | Carbon-TF B.V. |
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| Represented by: | Clemens Backhaus |
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| Last Name: | Backhaus |
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Contact person for the purpose of the project:

| | |
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Annex 2

## BASELINE INFORMATION

**Justification of the amounts taken for the baseline estimation**

Evaluation of the energy amount, which is to produce within the project, was based on the size of the utilisation units appropriate for the utilisation of the forecasted CMM amounts. The first operational results of the installed equipment proved the correctness of the assumptions. The supporting documents regarding the assumption were provided to the AIE.

**Power own consumption of the cogeneration units**

The power own consumption of the power generation units is estimated ex ante as of 3.5% of the generated power. This ratio is based on the experience made with over 100 CMM CHP modules in Germany.

**Project emission**

The project emissions during the down times of the plant are not considered in the calculation. As they are very small and not significant, they are not necessary to be encompassed by the project boundaries. This is in accordance with the JISC`s Guidance on criteria for baseline setting and monitoring.

**Efficiency of the cogeneration units**

The power own consumption of the power generation units is estimated ex ante as of 3.5% of the generated power. This ratio is based on the experience made with over 100 CMM CHP modules in Germany.

**Baseline Carbon Emission Factor for Coal**

The standard carbon emission factor from the IPCC 2006 guidelines and Polish legal source: 2008/Dz.Ust 183/1142 together with a combustion efficiency of 80% has been taken as a conservative approach, corresponding to the reference efficiency for the Polish cogeneration reporting according to the Energy Law.

The value for “Coking Coal” / “Other Bit. Coal” of 94.5 tCO2 /TJ has been chosen. This is the value with the lowest carbon emissions, thus this is conservative for coal displacement.

**Baseline Carbon Emission Factor for the Polish power grid**

A standardised carbon emission factor for the Polish Grid as determined by KOBiZE
http://www.kobize.pl/materialy/jicdm/JI-wskaznik_referencyjny_26sie2011_publik.pdf

**Key elements of the baseline:**

| **Data / Parameter:** | BEy |
|---|---|
| Data unit: | t $CO_{2Eq}$ |
| Description: | baseline emissions in year y ($t_{CO2e}$) |
| Time of determination/ monitoring | During the project implementation, |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | Monthly recorded |
| Any comment: | Calculated using formulae in section B3 |

| **Data / Parameter:** | $BE_{Use,y}$ |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power, heat or gas supply to grid replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. Calculated using formulae in section B3 |

| **Data / Parameter:** | BEpower,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of power replaced by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of | The total emissions reductions from displacement of power generation are CO2 emissions associated to the same quantity of electricity as electricity generated, that otherwise would be produced by combustion of fossil fuels and to the |

| | |
|---|---|
| measurement methods and procedures (to be) applied | same quantity of heat as heat generated, that otherwise would be produced in coal boilers. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

| **Data / Parameter:** | BEheat,y |
|---|---|
| Data unit: | t CO2Eq |
| Description: | Baseline emissions from the production of heat by the project activity in year y (tCO2e) |
| Time of determination/ monitoring | During the project duration |
| Source of data: | Monitored data |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The total emissions reductions from displacement of the same quantity of heat as heat generated, that otherwise would be produced in coal boilers. |
| QA/QC procedures: | |
| Any comment: | In order to avoid of double counting of emissions the emission reduction caused by the project activity is to proceed from the appropriate set-aside in the national allocation plan. |

| **Data / Parameter:** | $CONS_{ELEC,PJ}$ |
|---|---|
| Data unit: | MWh |
| Time of determination/ monitoring | Ex post |
| Description: | Additional electricity consumption for use or destruction of methane, if any |
| Source of data: | Research, measurements |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The additional electricity consumption will be determined in dependence from the produced power |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the ´s control room. The operator receives additional receipts about the meter reading. |
| Any comment: | The power own consumption of the power generation units was estimated ex ante as of 3.5% of the generated power in other projects. This assumption made to the a JI activity was already finally determined in the Project 0078 |

| | |
|---|---|
| **Data / Parameter:** | $EG_{Engi}$ |
| Data unit: | MWh |
| Time of determination/ monitoring | Continuous monitored and monthly recorded |
| Description: | Electricity generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement with summation, recorded in the plant dairies. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The power meters fulfill the requirements for billing. They allow an automatic reading from the Vattenfall´s control room. The operator receives additional receipts about the meter reading. |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | $HG_{Engi}$ |
| Data unit: | MWh |
| Time of determination/ monitoring | Continuous monitored and monthly recorded |
| Description: | Heat generation |
| Source of data: | measured |
| Value of data applied | |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Continuous measurement, monthly recorded in the plant protocols. The protocolls are parts of yearly SEJ´s cogeneration reports summarised for all engines installed within the project location. The quality of the monitored data for engine installed in the presented project is thus determinated in advance by another accredited entity. |
| QA/QC procedures: | Calibration according to the producer instructions, legal and operation requirements. The heat meters fulfil the requirements for billing |
| Any comment: | |

| **Data / Parameter:** | $EF_{elec-gen}$ |
|---|---|
| Data unit: | t $CO_2$ / MWh |
| Description: | $CO_2$ emission factor of the grid |
| Time of determination/ monitoring | |
| Source of data: | KOBiZE/Poland |
| Value of data applied | 0.812 $t_{CO2}$/MWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | A standardised carbon emission factor for the Polish Grid as determined by KOBiZE: http://www.kobize.pl/materialy/jicdm/JI-wskaznik_referencyjny_26sie2011_publik.pdf |
| QA/QC procedures: | |
| Any comment: | |

| **Data / Parameter:** | $EF_{Heat-gen}$ |
|---|---|
| Data unit: | $t_{CO2}$ /GJ $_{Heat}$ |
| Description: | $CO_2$ emission factor of coal fired heating |
| Time of determination/ monitoring | Ex ante |
| Source of data: | IPCC 2006 / Polish legal source: 2008/Dz.Ust 183/1142 |
| Value of data applied | 0.118$t_{CO2}$ /GJ $_{Heat}$ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The standard carbon emission factor from the IPCC guidelines together with a combustion efficiency of 80% has been taken as a conservative approach. The value for "Coking Coal" / "Other Bit. Coal" of 94.5 $t_{CO2}$ /TJ has been chosen. This is the value with the lowest carbon emissions, thus this is conservative for coal displacement. |
| QA/QC procedures: | |
| Any comment: | $EF_{Heat-gen}$= 0.0945 / 0.8 = 0.118 $t_{CO2}$ /GJ $_{Heat}$ |

Annex 3

## MONITORING PLAN

The monitoring plan is listed in section D.