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

CONTENTS

Annexes

SECTION A. General description of the project

A.1. Title of the project:

CMM utilisation on the Pniowek Coal Mine in Upper Silesian Basin, Poland

Project acronym: Pniowek

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

Sectoral scopes 8, 10

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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 Pniowek 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 Pniowek has 5 shafts, four of them are for venting. 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 Pniowek was one of first Polish coal mines with a CMM utilisation by means of CHP unit installed 2000. Furthermore there were 3 methane burning systems for the heat generation installed. The heat used by the coal mine facilities was generated by old coal 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 2006 installed and fired with CMM.

After the Marrakesh Accords projects implemented since 2000 can be presented for the JI registration claiming the ERUs generated after 01.01.2008. The additionality of the project implemented in 2000 was proven by the developer. Because of lacking other legal requirements the first request for an LoE for the CHP project from 2000 was in June 2006 together with the project activity presented in this PDD. A re-

request only for the first activity was in March 2008. That project claiming emission reduction through methane combustion was rejected because of the law from 2009.

The Letter of Endorsement for the project activity was requested first in July 2006 and re-requested in August the same year. The positive opinion of NFOSiGW, as of the supporting institution for the Ministry of Environment was stated in September 2006. The positive opinion was issued 2008 once again. The Letter of Endorsement was issued in 2009 after the now current law was finally discussed.

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%. Due to avoid double counting, only the part of emission reduction generated through combustion of methane will be claimed by the project.

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
- Spolka Energetyczna "Jastrzebie" SA (SEJ)
  Project developer, owner of the plant, 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 Pniowek.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located at the coal mine Pniowek in Pawlowice 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.:

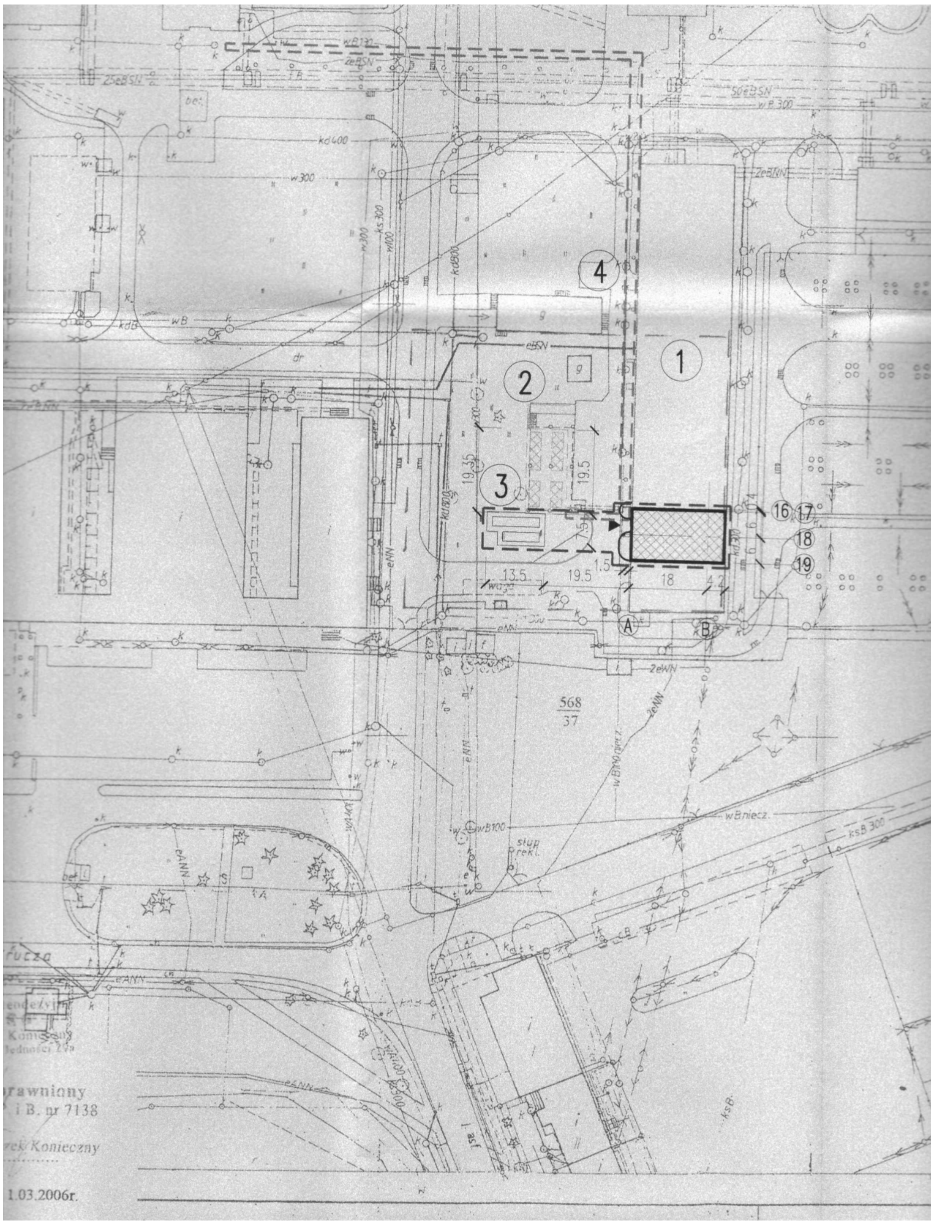
Location of project: the project is located in the Upper Silesia Basin, on the working coal mine Pniowek, EEG "Pniówek" ul. Krucza 18, PL-43-251 Pawłowice Śląskie
Boundary: Pawłowice, Poland.

Land parcel: 568 / 37
Geographical coordinates: 49° 57'58.28''N 18°41'28,55''O

Figure A-3: Location of the Project in Pawlowice

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 "Pniowek" in Upper Silesia.



LEGEND

1. building with the CHP unit inside
2. old infrastructure
3. fan cooler
4. pipeline

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

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 Pniowek used a part of the sucked CMM in old CHP-Units and in boiler systems for heat generation.

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, but a future use for a smaller CHP unit or a flare in current in discussion.

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	12.2006	9,336 kWth 3,966 kWel	power and heat	Electrical efficiency 41.9 % Thermal efficiency 44% Total efficiency 85.9%
1-3 cogeneration units	Not earlier as 2011	3,025-8,300 kWth 1,350 -4,100 kWel	power and heat	Electrical efficiency 40.2-42.8 % Thermal efficiency 45.6-43% Total efficiency 85.5-85.9%

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 were installed. The cogeneration units generate 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 completely build in a container, 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	1,02 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.

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 and partly by CMM boilers. After the project realization a part of this energy was displaced by the heat generation of the project. A part of CMM is co-fired with coal in old boilers. This amount of conventionally generated heat displaced by the project generates additional emissions reductions, will not be taken into account due to avoid of double counting.

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 systems regulate automatically the amount of gas that is combusted in the CHP unit. Despite that a minimum concentration of 30% CH4 is required.

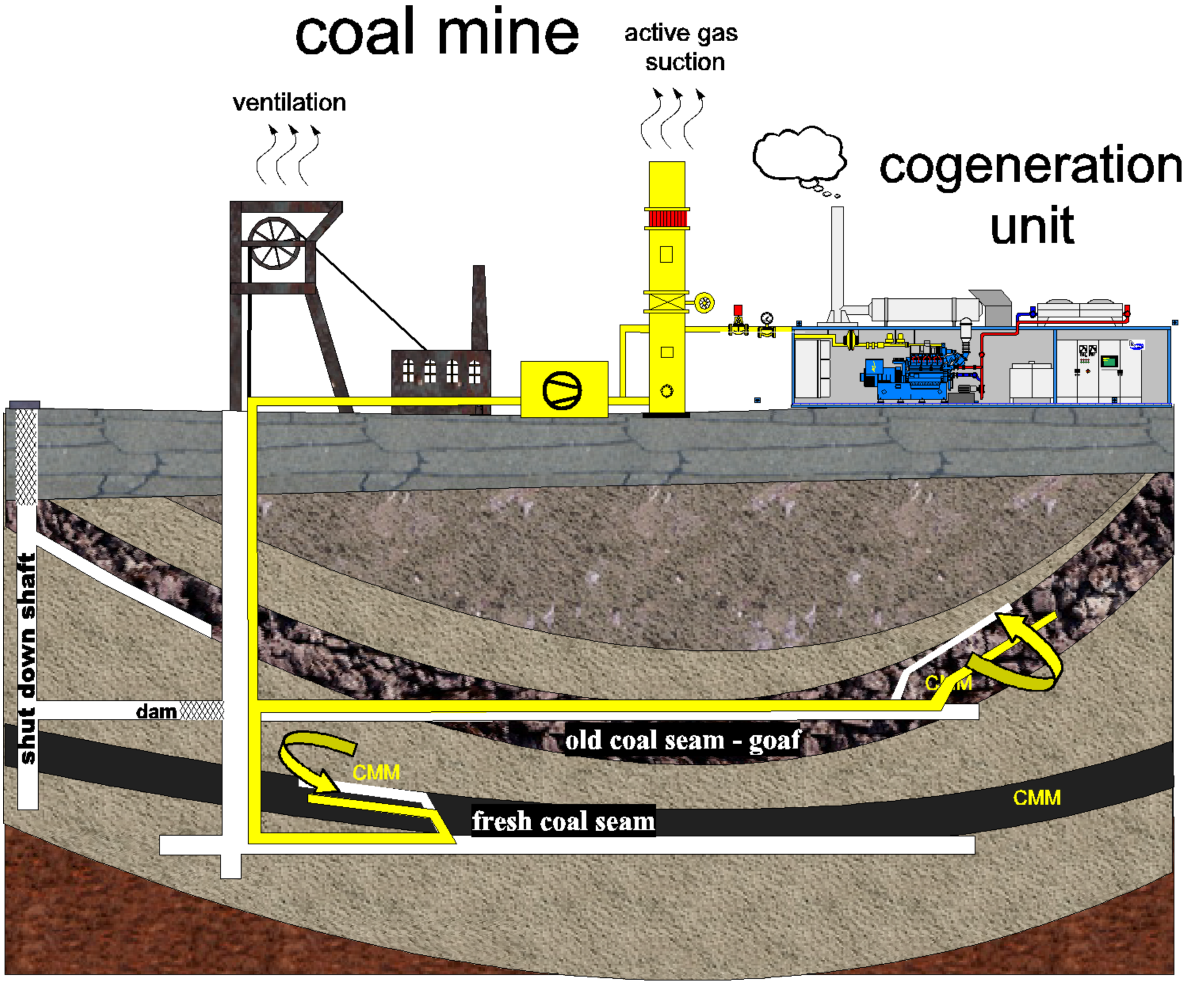


Figure A- 6: Scheme of the installation with main project components

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 conversion of CMM with its main component methane (GWP 21) into CO_2 (GWP 1) in combustion processes. In absence of the project the whole CMM amount, which should be converted into CO_2 in the heat and power generation unit would otherwise be released unused to the atmosphere as more harmful methane.

The power generated by the project displaces conventionally generated power and reduces the greenhouse gas emissions of the Polish grid. This amount emission reduction is not included in this PDD

The heat generated by the project displaces conventionally generated heat by coal combustion and reduces the greenhouse gas emissions of the coal mine. This amount emission reduction is also not included in this PDD.

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 and second crediting period (2008-2012, and 2013-2017)*

1st Crediting Period 2008- 2012	
	Years
Length of the crediting period	5
Start date of the project 01/12/2006	
2008	112,476
2009	112,476
2010	112,476
2011	140,594
2012	224,951
Total estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	702,972
Annual average of estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	140,594

2nd Crediting Period 2013-2017	
	Year
Length of crediting Period	5
2013	224,951
2014	224,951
2015	224,951
2016	224,951
2017	224,951
Total estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	1,124,756
Annual average of estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	224,951

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 Project Idea Note was submitted in August 2006 due to obtain the Letter of Endorsement before the project implementation. The Letter of Endorsement was issued in August 2009.

The PDD is a part of a request for the Letter of Approval by Poland within the first track according to the current Polish law. The Letter of Approval of the Netherlands, as of the investor country, was issued in September 2010, amended in January 2012.

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.

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].

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 to capture and to destroy

- 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 /CMM-Reg/. 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.

A 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 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 fired and partly 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 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 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. A flaring of CMM is in discussion to destroy of the remaining CMM of the mine and a part of the project scenario.

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

2 cogeneration units are working at the mine since 2000.

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 or co-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. If the amounts of remaining CMM are big enough, they will be burned in a flare with a suitable firing capacity.

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

Power is produced by the cogeneration unit. The remaining required 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 beeing exhausted now. A future utilisation in a flare is in the discussion.

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 at the present time, 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.

Flaring is now in discussion as an extension of the present project scenario, due to reduce the exhausting of unused or unusable CMM to the maximum (see alternative vii)

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, be economically 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 valid at the time of investment decision and the sale price realisable at the beginning was too low. There is since autumn 2010 a possibility to get tradable certificates for power generated in cogeneration which could be also taken into account for the project activity. Besides the fact, that it happened some years after the project implementation, the additional income is only possible in case of a suitable heat production which faces prohibitive barriers (see Alternative vi).

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 2 CHP unit were 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 low investment possibilities as upgrade of the existing systems for utilisation of CMM for heat generation are exhausted[1]. The heat demand is to be met before all other users and in the case of Polish mines, and so at the project site.

The project operator operates three boiler systems co-fired with CMM, with a suitable heat production for the needs of the regarding facilities. The heaters work are mainly fired with coal due to meet the heat requirements of the mine. Furthermore they work on seasonal demand. The use of CMM for co-firing is quite problematic and meets not the environmental requirements. Due to handling problems the boilers co-fired with CMM would be decommissioned in the future. The heat demand of the facilities decreases furthermore. The installed systems cover the heat needs, so that an additional heater is not necessary.

[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

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. 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 gas 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.

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.

Incentives from the selling of emission reduction were seriously considered in the decision to proceed with the project activity. Before the start of project works an analysis was made, if the project can be approved by the host party. The positive opinion of a focal points´supporting institution cleared in September 2006, that the project can get the approval. The according Letter of Endorsement was issued in August 2009.

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

There is only one realistic option for the baseline scenario, which is the continuation of the current situation: venting of the CMM into the atmosphere.

The heat demand will be met by production from the existing coal fired boilers, the power demand by the two existing CHP. The remaining electricity will be purchased 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 methodology, additionality has to be proven by applying the "Tool for demonstration and assessment of additionality", (version 6), EB65.

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 and each of existing projects has another constellation; 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 an appropriate NPV at least be equal zero supposed, similar as for another Polish energy companies /URE/.

The Government bond rates for 2006, as the investment decision was made, were 7% constant for 5 years bond. New 10 years bond had variable rates of of 4,5% +% of inflation in the first year and than 2,5% + % inflation in the following years. As the assumed rate for 10 years bonds were 6.5 % taken, which is conservative. The present bond rates are variable for 10 years bonds, with 6.75% in the first year.

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 without JI revenue has been calculated under the following assumptions:

Supposed prices for electricity and heat were taken as of 2006, 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	-5.01	%
NPV (0 %)	-626,515	EUR
NPV (6,5 %)	-1,057,359	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 2006 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	3.48	-	%
NPV (0 %)	480,686	-1,950,530	EUR
NPV (6,5 %)	-302,215	-1,930,253	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.

With expected revenues from emission trading the project becomes financially attractive. Detailed information about the finance indicators and structure of the project finance is given in the Annex 6

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.

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 Pniowek 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 2 engines at the coal mine Pniowek installed 2000 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

Venting the captured CMM into the atmosphere is the common practice in the coal sector of Poland. There were no other major examples of using the CMM for heat or power generation that have been implemented without a precognition of additional emission trade revenues.

Even the investment decision for a similar former project of the project operator was taken under assumption of revenues from selling of ERUS /EBM//GATNAR-2005/. An analysis, if the proposed project would be approved as a JI project was made and a Letter of Endorsement was requested. The first opinion for the project was positive. So it can be additional evidenced, that the incentive from the selling of emission reduction was seriously considered in the decision to proceed with the project activity.

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:

Baseline

The baseline shall be established in accordance with the appendix B of the Guidance on criteria for baseline setting and monitoring.

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

Source	**Gas**		**Justification / Explanation**
Emissions of methane as a result of venting	CH4	Included	The main emission source. 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.
Emissions from destruction of methane in the baseline	CO_2	Excluded	There are no systems for heat and power in the applicable baseline scenario. The existing systems use methane for heat generation which is to meet before other uses. The existing power production plant is connected to the mine cooling. The amounts of methane used in these systems cannot be used for the project activity and not reasonably significant for the project.
	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.
Grid electricity generation (electricity provided to the grid)	CO_2	Excluded	CO2 emissions associated to the same quantity of electricity than electricity generated, as a result of the use of methane are excluded, due to avoid of double counting of emissions.
	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	Excluded	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 excluded, due to avoid of

			double counting of emissions.
	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	Only the change in CMM emissions release will be taken into account, by monitoring the methane used or destroyed by the project activity.
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.[2]
	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	From the combustion of methane in the heat and power generation.
Emissions from NMHC destruction	CO_2	Included	Actually NMHC accounts less than 1% by volume of the extracted coal mine gas, so NMHC has been excluded for estimating the emission reductions. However the NMHC amount will be monitored on a regular basis and the emissions will be included if the NMHC concentration will exceed 1%.
Fugitive emissions of unburned methane	CH_4	Included	In accordance with ACM0008, a small amount of uncombusted methane, 0.5% for each unit, will be

[2] 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".

			accounted to keep conservative.
Fugitive methane emissions from on-site equipment	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
Fugitive methane emissions from gas supply pipeline or in relation to use in vehicles	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. (Besides it is not applicable to the project.)
Accidental methane release	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.

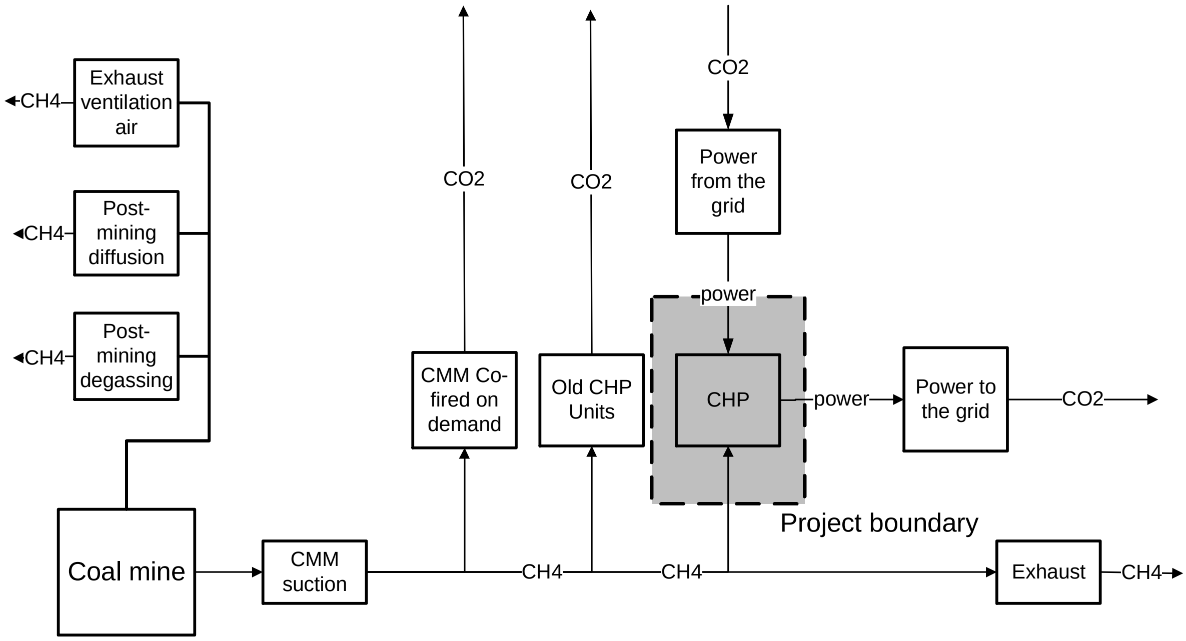


Figure B-3: Project boundary

Overlap of the project activity and the baseline

The amount of captured methane is between ca. 40 up to ca. 58 millions m³ CH4 per year, as estimated 2006 before the project implementation. The newest forecasts estimated the amount of methane captured in the mine as ca. 55 millions in the years 2008-2012. The systems installed yet can use average 35 millions m³ CH4 per year.

According to the ACM0008, the CMM use in the baseline was determined for the last 5 years prior to the start of the project activity. Only the amount of CMM extending the baseline use should be taken into account for determination of emission reduction by the project activity. Overlaps between the project activity should be concerned as a leakage. In the case of the proposed project activity leakage is not likely as analysed in the next steps of the baseline section and D.1.3. and can be ignored.

Baseline Emissions

Baseline emissions are given by the following equation

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

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})

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.

There is CMM utilisation at the coal mine, but there is no impact on the project activity.

The project operator is responsible for the heat supply of the mine. The heat demand of the mine is to be met before the extern uses, as it is essential for the mine processes. There is no opportunity to meet the heat demand from extern suppliers. The heat demand has varied in the past and depended among others on the coal production of the mine. As proven in the following (see: Leakage) the CMM supply of the existing boilers depends only on the real heat demand which vary.

$$BE_{MDy} = (CEF_{CH4} + r \times CEF_{NMHC}) \, x \sum_i \left(CMM_{BL,i,y}\right) \quad (2)$$

Where

BE_{MDy} = Baseline emissions from destruction of methane in the baseline scenario in year y of the project activity (tCO_2e)

i = Use of methane (flaring, power generation, heat generation, supply to gas grid to various combustion end uses)

$CMM_{BL,i,y}$ = Pre-mining CMM captured, sent to the baseline scenario in year *y* of the project activity (expressed in t CH_4)

CEF_{CH4} = Carbon emission factor for combusted methane (2.75 t CO_2/t CH_4)

CEF_{NMHC}) = Carbon emission factor for combusted non methane hydrocarbons. should be obtained through periodical analysis of captured (tCO_2 eq/tNMHC)

r = Relative proportion of NMHC compared to methane

with
$r = PC_{NMHC} / PC_{CH4}$ (3)

PC_{NMHC} = Concentration (in mass) of NMHC in extracted gas (%), to be measured on wet basis

PC_{CH4} = CH4 concentration (in mass) in extracted gas (%)

Methane released in the atmosphere

The baseline emissions from release of methane into the atmosphere in the year y (BEMR,y) is obtained by the following equation:

$BE_{MR,y} = (CMM_{PJ,y})x\ GWP_{CH4}$ (4)

where
$CMM_{PJ,}$ CMM captured, sent to and destroyed by use *i* in the project activity in year *y* (expressed in tCH_4)
GWP_{CH4} Global warming potential of methane (21 tCO_2e/tCH_4)

The total emissions reductions from displacement of power/heat generation are not taken under account due to avoid of double-counting

Leakage

The formula for leakage is given as follows:
$LE_y = LE_{d,y} + LE_{o,y}$ (5)

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 boilers two of them co-fired with CMM and a gas fuelled one are the main heat supply for the regarding mine. The project operator 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.

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 operational 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 heat produced by the engines is used on demand in the absorption mine air conditioning. The amounts are too small to be taken under account as the replacement of the heat production by means of boilers.

The leakage could 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 economical circumstances at the project location makes leakage emissions due to displacement of other baseline thermal energy uses of methane very unlikely

Emission Reduction

ERy = BEy - PEy -LEy **(6)**
where

ERy	=	Emission reductions of the project activity during the year y(t CO2)
BEy	=	Baseline emissions during the year y (t CO2)
PEy	=	Project emissions during the year y (t CO2)
LEy	=	leakage emissions in year y (t CO2) =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	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	The amount of methane will be calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity. The GWP for methane is determined after the IPCCC
QA/QC procedures:	Monthly recorded
Any comment:	Calculated using formulae in section B3 $BE_{MR,y} = (CMM_{PJ,y})$x GWP_{CH4}

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 applied	There are no systems for heat and power in the applicable baseline scenario. The existing systems use methane for heat generation which is to meet before other uses. The existing power production plant is connected to the mine cooling. The amounts of methane used in these systems cannot be used for the project activity and are so not reasonably significant for the project.
QA/QC procedures:	
Any comment:	

Data / Parameter:	PC_{NMHC}
Data unit:	%
Description:	Concentration (in mass) of NMHC in extracted gas (%), to be measured on wet basis
Time of determination/ monitoring	yearly
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	Actually NMHC accounts less than 1% by volume of the extracted coal mine gas, so NMHC has been excluded for estimating the emission reductions. However the NMHC amount will be monitored on a regular basis and the emissions will be included if the NMHC concentration will exceed 1%.
QA/QC procedures:	The determination will be provided by an accredited laboratory.
Any comment:	

Data / Parameter:	$BE_{Use,y}$
Data unit:	t CO_{2Eq}
Description:	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (t_{CO2e})
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 total emissions reductions from displacement of power/heat generation are not taken under account due to avoid of double-counting
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{PJ,}$
Data unit:	tCH_4
Description:	CMM captured, sent to and destroyed by use *i* in the project activity in year *y*
Time of determination/ monitoring	During the project implementation, monthly
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 amount of methane will be calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity.
QA/QC procedures:	See Section D.2
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_{2Eq} /tCH_4
Description:	Global warming potential of methane
Time of determination/ monitoring	Ex ante
Source of data:	IPCC
Value of data applied	21 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_{2Eq} /tCH_4
Description:	Carbon emission factor for combusted methane
Time of determination/ monitoring	Ex ante
Source of data:	IPCC
Value of data applied	2.75 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{BL,y}$
Data unit:	t CH4
Description:	Pre-mining CMM that would have been captured , sent to and destroyed by use *i* in the baseline scenario in year *y*
Time of determination/ monitoring	Ex ante at the start of the project
Source of data:	Project site
Value of data applied	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	There are no systems for heat and power in the applicable baseline scenario. The existing systems use methane for heat generation which is to meet before other uses. The existing power production plant is connected to the mine cooling. The amounts of methane used in these systems cannot be used for the project activity and are so not reasonably significant for the project.
QA/QC procedures:	
Any comment:	

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: 16.01.2012

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 was made in March 2006. The first operation of the project was 2006-12-01

C.2. Expected operational lifetime of the project:

At least 15 years, equal to 180 months

C.3. Length of the crediting period:

5 years (2008 – 2012), equal 60 months

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:

A monitoring plan according to the JI approach after JISC and the Guidance on criteria for baselien setting and monitoring is applied for the project. Supporting elements of the "Approved consolidated baseline methodology ACM0008", Version 07, Sectoral Scope: 8 and 10, EB28 are used.

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 an annual basis;
- IPCC default factors have been taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. [IPCC-2]
- In accordance with ACM0008 only methane that is being destroyed by the project should be taken into account.

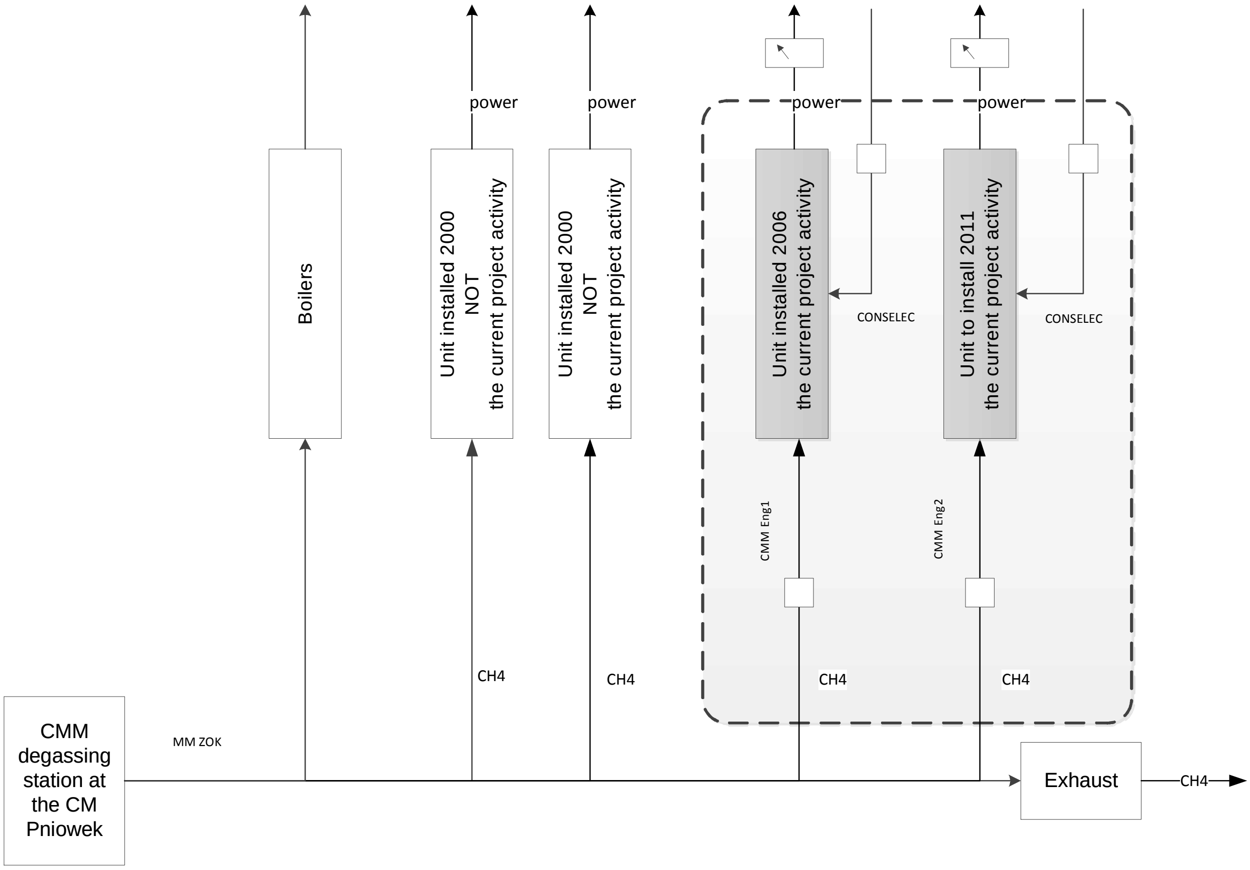


Figure D-1: Data collected for the monitoring

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 since July 2008.

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:	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 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 since July 2008.
Any comment:	

Data / Parameter:	η_{power}
Data unit:	%
Time of determination/ monitoring	in dependence from load of the plant and according to the manufacturer data of the plant
Description:	Energy efficiency of the 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 efficiency in dependence from load of the plant is provided by the manufacturer
QA/QC procedures:	
Any comment:	The energy efficiency of the plant depends on the achieved load of the plant and will be calculated for the given operational case as monthly average. The calculation of achieved efficiency in dependence of the load will be interpolated and based on the values given by the manufacturer

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: 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 ρ_{CH4}=0.717 kg/m^3 NCV_M=9.96 kWh/m^3

Data / Parameter:	Ti
Data unit:	hours
Time of determination/ monitoring	During the project implementation
Description:	Operating hours of the plant
Source of data:	measured
Value of data applied	
Justification of the choice of data or description of measurement methods	The amount of the operating hours is necessary for the determination of the load factor of the plants

and procedures (to be) applied	
QA/QC procedures:	Operating hours are daily and monthly reported by the staff
Any comment:	

Data / Parameter:	LF_{Engi}
Data unit:	%
Time of determination/ monitoring	During the project implementation
Description:	The load factor of the 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 achieved capacity is to calculate as a monthly average from of the operating hours and generated power versus the theoretical capacity of the plant. The load factor is necessary for the final efficiency of power production in the plant. The calculation of achieved efficiency in dependence of the load will be interpolated and based on the values given by the manufacturer.
QA/QC procedures:	Operating hours are daily and monthly reported by the staff.
Any comment:	$LF_{Engi} = EG_{Eng1}/Ti/P_i$

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 each engine installed within the project capacity. The theoretical capacity can change subject to technical improvement and innovation made in cooperation with the engine manufacturer.

Data / Parameter:	Eff_{ELEC}
Data unit:	%
Time of determination/ monitoring	Ex ante
Description:	Efficiency of methane destruction/oxidation in power plant
Source of data:	IPCC
Value of data applied	99.5%
Justification of the	

choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	Set at 99.5%(IPCC)

Data / Parameter:	CEF_{NMHC}
Data unit:	t CO_{2eq} / t $_{NMHC}$
Time of determination/ monitoring	Once a year
Description:	Carbon emission factor for combusted non methane hydrocarbons (various)
Source of data:	Estimated
Value of data applied	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	The determination of the gas composition will be provided by an accredited laboratory. The emission factors will be estimated for the particular gas component from appropriate sources
Any comment:	To be obtained through periodical analysis of the fractional composition of gas captured.

Data / Parameter:	PC_{NMHC}
Data unit:	%
Time of determination/ monitoring	Annually
Description:	NMHC concentration (in mass) in extracted gas
Source of data:	Concentration meters, optical and calorific
Value of data applied	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	Measured by an accredited laboratory
Any comment:	

Data / Parameter:	Eff_i
Data unit:	-
Time of determination/ monitoring	*Ex ante*
Description:	Efficiency of methane destruction/oxidation through use *i* (power generation, heat generation, supply to gas grid to various combustion end

	uses)
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:	Set at 99.5%(IPCC) for gas engines

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/ tCH_4
Time of determination/ monitoring	*Ex ante*
Description:	Global warming potential of methane
Source of data:	
Value of data applied	21 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_2e/tCH_4
Time of determination/ monitoring	*Ex ante*
Description:	Carbon emission factor for combusted methane
Source of data:	
Value of data applied	44/16 = 2.75 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
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

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$ (7)

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

$PE_{ME} = CONS_{ELEC,PJ} \times EF_{elec}$

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 $CONS_{ELEC,PJ}$.

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

$PE_{MD} = MM_{ELEC} \times (CEF_{CH4} + r \times CEF_{NMHC})$ (8)

with:

$r = PC_{NMHC} / PC_{CH4}$ (3)

where:

PE_{MD}	Project emissions from CMM destroyed (t CO_2eq)
CEF_{CH4}	Carbon emission factor for combusted methane (2.75 t CO_2eq/t CH4)
CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons (various) (t CO_2eq/tNMHC)
r	Relative proportion of NMHC compared to methane
Pc_{CH4}	Concentration (in mass) of methane in extracted gas (%)
PC_{NMHC}	NMHC concentration (in mass) in extracted gas (%)

Uncombusted methane from flaring and end uses (PE_{UM}) can be obtained through the equation:

$PE_{UM} = GWP_{CH4} \times [MM_{ELEC} \times (1 - Eff_{ELEC})]$ (9)

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:	BE_y
Data unit:	t CO_{2eq}
Description:	Baseline emissions in year y
Time of determination/ monitoring	monthly
Source of data:	monitored data
Value of data applied	Calculated
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	calculated using formulae in Section D.1.1.4, see below

Data / Parameter:	$BE_{MR,y}$
Data unit:	t CO_{2eq}
Description:	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity
Time of determination/ monitoring	monthly
Source of data:	
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 calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity. The GWP for methane is determined after the IPCCC
QA/QC procedures:	Monthly recorded
Any comment:	Calculated using formulae in section B3 $BE_{MR,y} = (CMM_{PJ,y})x\ \ GWP_{CH4}$

Data / Parameter:	$CMM_{PJ,y}$
Data unit:	t CH_4
Description:	CMM captured and destroyed in the project activity in year y
Time of determination/ monitoring	Monthly
Source of data:	Calculated, monitored data
Value of data applied	
Justification of the choice of data or description of measurement methods andprocedures (to be) applied	The amount of methane will be calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity.
QA/QC procedures:	See Section D.2
Any comment:	pre-mining + during mining + post-mining methane is collected as a cumulative value, see section B.1, Step 1a for explanation

Data / Parameter:	GWP_{CH4}
Data unit:	t CO_{2eq} / t CH_4
Description:	Global warming potential of methane
Time of determination/ monitoring	Ex ante
Source of data:	IPCC
Value of data applied	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	t CO_{2eq} / t CH_4
Description:	Carbon emission factor for combusted methane
Time of determination/ monitoring	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
Description:	continuous
Time of determination/ monitoring	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 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 since July 2008.
Any comment:	Cumulative value

Data / Parameter:	EF_{elec}
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:	

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

$BE_y = BE_{MR,y} + BE_{Use,y}$ (10)

The baseline emissions from release of methane into the atmosphere in the year y (BEMR,y) is obtained by the following equation:

$BE_{MR,y} = CMM_{PJ,y} \times GWP_{CH4}$ (11)

The total emissions reductions from displacement of power/heat generation are not taken under account due to avoid of double-counting

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:	
Source of data:	
Measurement procedures (if	
Monitorin g	
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:

$$ER_y = BE_y - PE_y \quad (12)$$

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.
NMHC Concentration	low	The determination will be provided by an accredited laboratory.
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. 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 methane amount destroyed in the cogeneration units are estimated from the produced power. The operator of the plant is responsible for the operation and maintenance of all measurement equipment. Calibration procedures are in accordance 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 since July 2008.

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 relevant process data collected by the project operator are: methane input, methane concentration, CHP-worked hours, power production. The power plant and all relevant process data are to be observed daily by the staff. The process data are to be collected and archived monthly. The monthly report has to be printed for archiving and the plant manager´s validation (sign and stamp).

The data concerning the methane extraction and use for the heat demand of the mine are reported monthly by the operator of the degasification, even if they are not a part of the project monitoring. They are saved in the lean systems and stored electronically for a year. They are relevant for mine´s invoices for the CMM used by the project operator.

The power production is measured by measuring devices maintained by the grid operator, as they are relevant for invoicing. The readout of the measurement is to be made in the presence of the plant operator, who double checks it. The quality of the measurement is thereafter high.

All printed and validated reports and invoices are to be stored for at least two years after the last transfer of ERUs for the project. A 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 producer instructions, legal and operation requirements.

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.

Based on the procedure described above a detailed annual report should be prepared by SEJ and confirmed by the verifier.

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: 16.01.2012

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:

The following calculations are based on the baseline determined in section B. All CMM which is burned in the cogeneration unit is concurrently avoided CMM, which would otherwise escape to the atmosphere in absence of the project.

The project emissions PE are calculated presuming that NMHC has not to be regarded (r = 0).

For detailed calculation see Annex 4.

Table E-1 – Estimated project emissions

Estimated project emissions [t CO_{2Eq}]						
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013-2017**
Methane destruction						
power generation	17,082	17,082	17,082	21,352	34,163	170,817
additional power consumption						
power generation	884	884	884	1,106	1,769	1,769
sum	**17,966**	**17,966**	**17,966**	**22,458**	**35,932**	**172,585**

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 CO_{2Eq}]						
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013-2017**
Methane destruction						
power generation	17,082	17,082	17,082	21,352	34,163	170,817
additional power consumption						
power generation	884	884	884	1,106	1,769	1,769
sum	**17,966**	**17,966**	**17,966**	**22,458**	**35,932**	**172,585**

E.4. Estimated baseline emissions:

Table E-4 – Estimated baseline emissions

Estimated baseline emissions [t CO_{2Eq}]						
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013-2017**
Methane destruction						
power generation	130,442	130,442	130,442	163,052	260,883	1,304,417
sum	**130,442**	**130,442**	**130,442**	**163,052**	**260,883**	**1,304,417**

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	17,966	-	130,442	112,476
2009	17,966	-	130,442	112,476
2010	17,966	-	130,442	112,476
2011	22,458	-	163,052	140,594
2012	35,932	-	260,883	224,951
Total (tonnes of CO2 equivalent)	**112,288**	**-**	**815,261**	**702,972**

prospected emissions for the years 2013-2017				
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)
2013	35,932	-	260,883	224,951
2014	35,932	-	260,883	224,951
2015	35,932	-	260,883	224,951
2016	35,932	-	260,883	224,951
2017	35,932	-	260,883	224,951
Total (tonnes of CO2 equivalent)	**179,661**	**-**	**1,304,417**	**1,124,756**

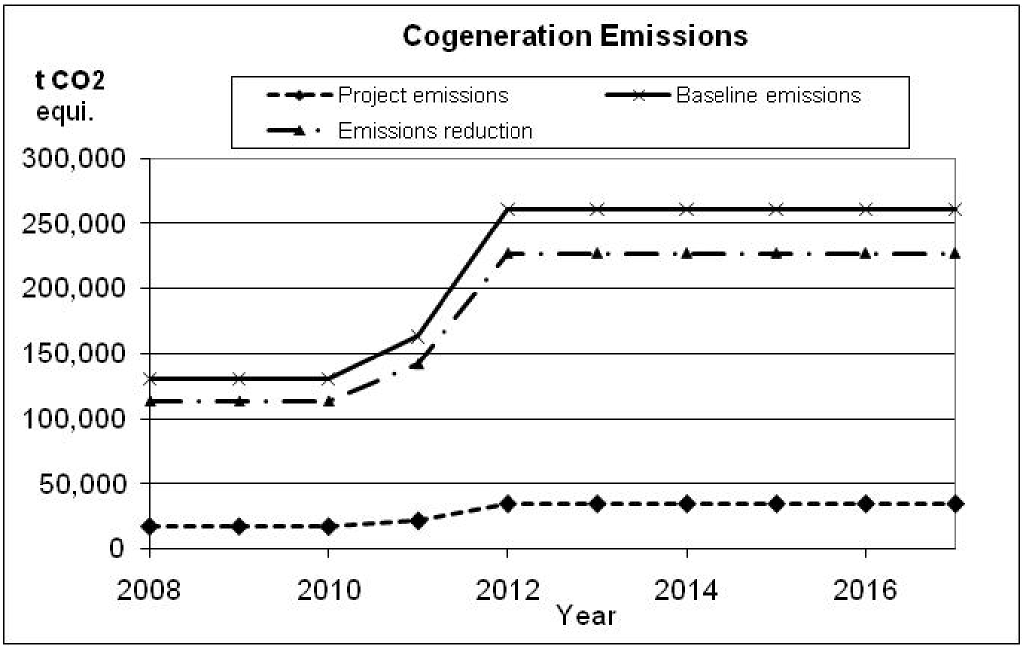


Figure E-1 Baseline emissions, project emissions and emissions reduction; total project

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. No environmental impact assessment is needed. The plant has to fulfil the requirements of the Polish regulations.

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.

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

Parties involved in the procedure were: Municipality Pawlowice, 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 Pawlowice 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.

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

No objection were raised neither during the administrative procedure nor during the construction and operational time of the plant.

Furthermore, a Project Idea Note was presented to the Polish Ministry of Environment and a state Environmental Funding Institution (NFOSiGW) due to obtain a Letter of Endorsement for the project. The opinion of NFOSiGW in September 2006 was positive. The Letter of Endorsement was issued in August 2009.

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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E-mail:	
URL:	
Represented by:	Jaroslaw Parma
Title:	CEO
Salutation:	Mr.
Last Name:	Parma
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First Name:	Jaroslaw
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Phone(direct):	+ 48 32 471 69 79
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Consultant and investor, buyer of the emission reduction certificates

Organization:	Carbon-TF B.V.
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E-mail:	info@carbon-tf.com
URL:	www.carbon-tf.com
Represented by:	Clemens Backhaus
Title:	Managing Director
Salutation:	
Last Name:	Backhaus
Middle Name:	
First Name:	Clemens
Department:	
Phone(direct):	
Fax (direct):	
Mobile:	
Personal e-mail:	ba@carbon-tf.com

Contact person for the purpose of the project:

Organization:	Carbon-TF B.V.
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Contact person:	Alina Mroz
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Salutation:	
Last Name:	Mroz
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Annex 2

BASELINE INFORMATION

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 firing capacity, efficiency, power and heat output of the cogeneration units depend mainly on the gas quality, especially the methane concentration. Average values, based on the experience made on comparable units in Germany have been taken into account.

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

The baseline study was made by analysis of historical data of CMM use during the past 5 years prior to the project start. As daily amounts were not available monthly records were used.
All data in m³CH4

CMM Consumption m³ Methane	2002	2003	2004	2005	2006
January	2,597,600	2,272,400	3,843,500	3,632,800	2,463,900
February	2,341,100	2,157,800	3,519,400	3,515,000	2,860,200
March	2,662,100	3,087,200	4,195,300	3,808,600	3,056,100
April	2,689,300	3,284,800	3,832,500	3,527,100	3,604,800
May	2,515,100	2,937,300	4,039,600	3,119,000	3,258,400
June	2,315,300	2,745,500	3,665,000	3,176,500	3,276,800
July	2,379,600	2,448,000	3,863,100	2,873,100	2,863,500
August	2,241,600	2,766,100	3,655,400	2,513,400	3,455,400
September	2,154,200	2,575,500	3,200,300	2,807,900	2,867,800
October	2,466,500	3,281,700	3,695,400	3,142,200	2,960,800
November	2,612,700	3,551,100	3,223,800	2,945,100	2,749,300
December	2,230,300	3,624,300	3,547,100	2,881,200	2,462,700
Average per month	**2,433,783**	**2,894,308**	**3,690,033**	**3,161,825**	**2,989,975**
sum in the year y of baseline	29,205,400	34,731,700	44,280,400	37,941,900	35,879,700

As the leakages according to the ACM008 are not to be considered, the above table shows only the variable amounts of used CMM

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:	$BE_{MR}y$
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	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	The amount of methane will be calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity. The GWP for methane is determined after the IPCCC
QA/QC procedures:	Monthly recorded
Any comment:	Calculated using formulae in section B3 $BE_{MR,y} = (CMM_{PJ,y})x\ \ GWP_{CH4}$

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	There are no systems for heat and power in the applicable baseline scenario. The existing systems use methane for heat generation which is to meet before other uses. The existing power production plant is connected to the mine cooling. The amounts of methane used in these systems cannot be used for the project activity and are so not reasonably significant for the project.
QA/QC procedures:	
Any comment:	

Data / Parameter:	PC_{NMHC}
Data unit:	%
Description:	Concentration (in mass) of NMHC in extracted gas (%), to be measured on wet basis
Time of determination/ monitoring	yearly
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	Actually NMHC accounts less than 1% by volume of the extracted coal mine gas, so NMHC has been excluded for estimating the emission reductions. However the NMHC amount will be monitored on a regular basis and the emissions will be included if the NMHC concentration will exceed 1%.
QA/QC procedures:	The determination will be provided by an accredited laboratory.
Any comment:	

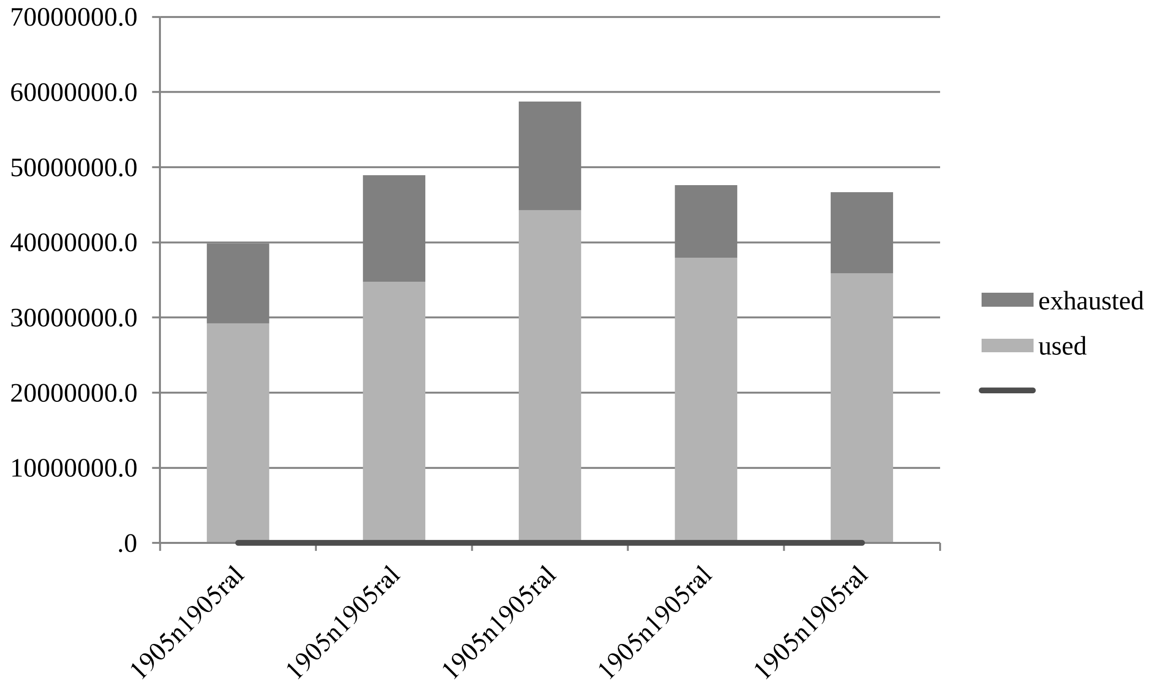
Data / Parameter:	$BE_{Use,y}$
Data unit:	t CO_{2Eq}
Description:	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (tCO2e)
Time of determination/ monitoring	Ex ante
Source of data:	Monitored data
Value of data applied	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The total emissions reductions from displacement of power/heat generation are not taken under account due to avoid of double-counting
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{PJ,}$
Data unit:	tCH_4
Description:	CMM captured, sent to and destroyed by use *i* in the project activity in year *y*
Time of determination/ monitoring	During the project implementation, monthly
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 amount of methane will be calculated from in dependence from the load of the CHP installed in the project activity and the efficiency of the power production. The load is determined from the measurement of the operating time of the system and staff reporting. The operating hours are a part of the monthly reporting of the project activity.
QA/QC procedures:	See Section D.2
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_{2Eq} /tCH_4
Description:	Global warming potential of methane
Time of determination/ monitoring	Ex ante
Source of data:	IPCC
Value of data applied	21 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_{2Eq} /tCH_4
Description:	Carbon emission factor for combusted methane
Time of determination/ monitoring	Ex ante
Source of data:	IPCC
Value of data applied	2.75 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures (to be) applied	
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{BL,y}$
Data unit:	t CH4
Description:	Pre-mining CMM that would have been captured , sent to and destroyed by use *i* in the baseline scenario in year *y*
Time of determination/ monitoring	Ex ante at the start of the project
Source of data:	Project site
Value of data applied	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	There are no systems for heat and power in the applicable baseline scenario. The existing systems use methane for heat generation which is to meet before other uses. The existing power production plant is connected to the mine cooling. The amounts of methane used in these systems cannot be used for the project activity and are so not reasonably significant for the project.
QA/QC procedures:	
Any comment:	



The yearly amounts of exhausted and used CMM on the project site are shown above

Annex 3

MONITORING PLAN

The monitoring plan is listed in section D.