



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

**CONTENTS**

- A. General description of the project
- B. Baseline
- C. Duration of the project / crediting period
- D. Monitoring plan
- E. Estimation of greenhouse gas emission reductions
- F. Environmental impacts
- G. Stakeholders' comments

**Annexes**

- Annex 1: Contact information on project participants
- Annex 2: Baseline information
- Annex 3: Monitoring plan

**SECTION A. General description of the project****A.1. Title of the project:****Utilisation of CMM on the coal mine Chertinskaya-Koksovaya**

Document Version: 04

Date: 2008-03-18

Prepared by: Emissions-Trader ET GmbH, Adam Hadulla

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

The Kemerovo Oblast in southwest Siberia is the largest industrial region of Russia. Within the Oblast is the Kuznetsk Coal Basin (Kuzbass). It possesses some of the biggest coal deposits anywhere in the world; coal-bearing seams extend over an area of 10,309 square miles (26,700 km<sup>2</sup>) and reach to a depth of 5,905 ft (1,800 m). Overall coal deposits are estimated at 725 billion tonnes. The corresponding estimated CMM amount is about 13 trillion cubic meters.

The region's other industries, such as machine construction, chemicals and metallurgy, are based on coal mining. The region is part of the political unit of the Kemerovo Oblast with its capital in the city of Kemerovo.

Kuzbass is one of the hazardous regions of Russia 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, which has a negative effect on work safety of miners and a negative influence on the environment of the region. In addition to active coal mines there are also a lot of abandoned mines, which still emit CMM after mining. Even after shut down of the mining activities, CMM escapes over many years through open shafts, cracks and existing degassing wells in the overburden directly or diffusely into the atmosphere, different buildings and facilities, industrial and social units and is a potential threat to them.

CMM mainly consists of the harmful greenhouse gas methane (GWP 21), so that CMM degasification, capture and utilisation are a complex task of mine safety and environment improvement problems. The solving of this task is unfortunately at a low level at the moment. It's important to note that the coal mines are just involved (relatively poorly) in seam and goaf degasification, but the captured gas is just released unused into the atmosphere.

The combustion of methane results in a significant emissions reduction. The conversion of the harmful greenhouse gas methane with a GWP of 21 into less harmful CO<sub>2</sub> with a GWP of 1 reduces the global warming potential of the emissions by 87%. The displacement of conventionally generated power and heat gains further CO<sub>2</sub> emissions reduction.

In this project CMM from the coal mine Chertinskaya-Koksovaya of OAO Belon (OAO = Open Joint Stock Company) should be utilised for heat and power generation and flaring. The project generates ERU's by destruction of methane and displacement of conventionally produced power.

The CMM of the coal mine is actually not utilised and it is simply vented to the atmosphere. The heat used by the coal mine facilities is generated by coal fired boilers. All power is purchased from the grid.

The hereby requested ERU’s from the conversion of the methane into carbon dioxide, as well as the displacement of conventionally generated heat and power are needed to finance the new units and the new infrastructure.

**A.3. Project participants:**

Table A- 1 – Project participants

Party involved (*) ((host indicates a host Party)	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Russia (host)	Novaya Energetika OOO	no
Netherlands	Carbon-TF B.V.	no

- Novaya Energetika OOO, operator of the CMM plants and holder of the CMM utilisation licence
- Carbon-TF B.V.  
Investor, buyer of the ERU’s; Dutch emissions trading company

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

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

The project is located on the coal mine Chertinskaya-Koksovaya, which belongs to the OAO Belon, in Russia, south Siberia, Kemerowo Oblast in the city of Belovo. The CMM utilisation licence is owned by Novaya Energetika OOO in the following shortly called Noven. Noven will be also the operator of the CMM plants.

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



Figure A-1: Location of the Project in the Russian Federation [CIA]

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

Kemerovo Oblast



Figure A-2: Location of Belovo in the Kemerovo Oblast

БЕЛОВО- Belovo

НОВОСИБИРСК - Novosibirsk

КЕМЕРОВО - Kemerovo

КРАСНОЯРСК- Krasnoyarsk

ЛЕНИНСК-КУЗНЕЦКИЙ - Leninsk-Kuznetsky

НОВОКУЗНЕЦК - Novokusnetsk

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

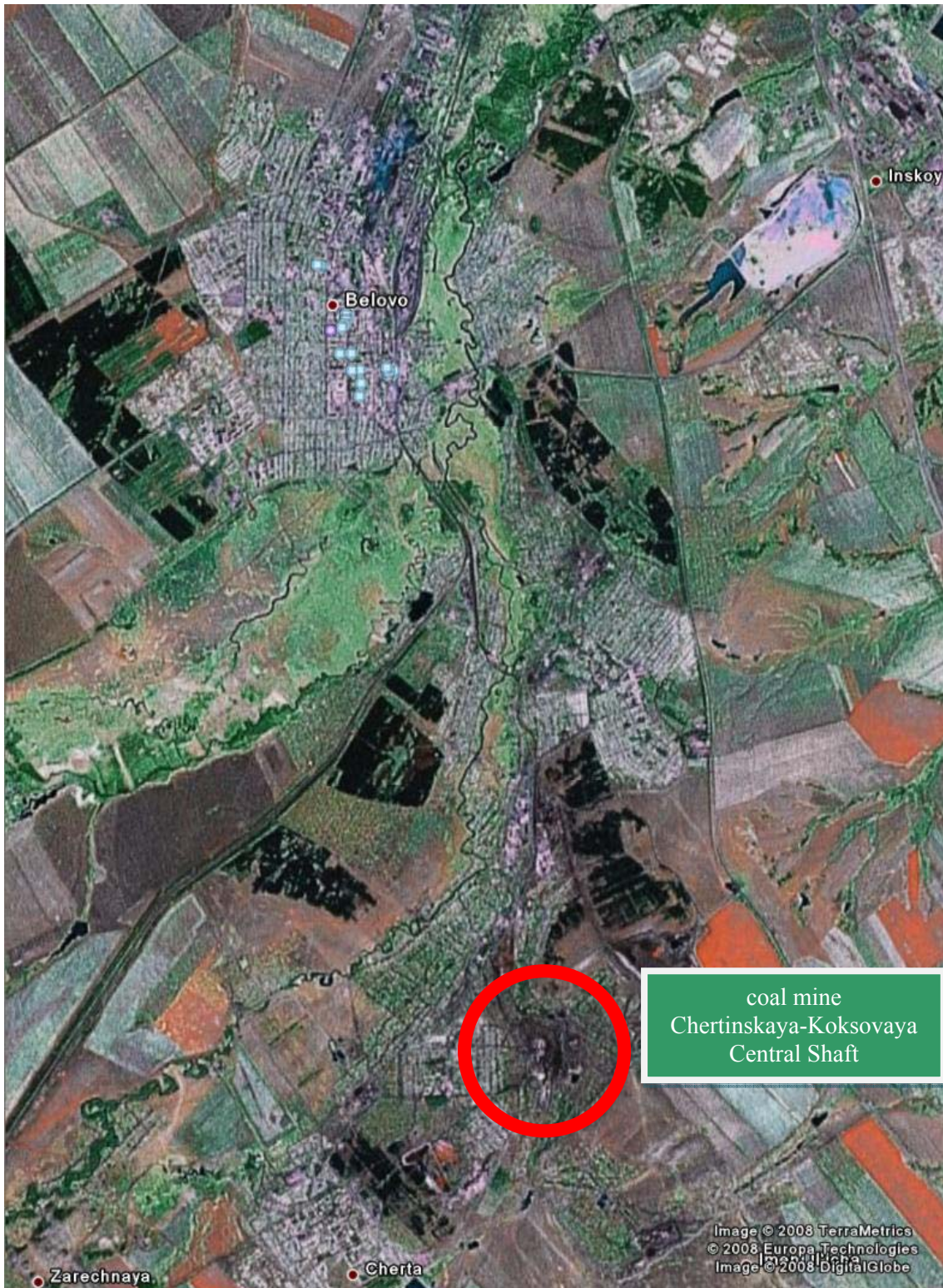


Figure A-3: Location of the coal mine Chertinskaya-Koksovaya in 652607 Belovo [GoogleEarth]

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



Figure A-4: Unit location plan of the coal mine Chertinskaya  
*Coal mine «Chertinskaya-Koksovaya»*  
652607 Kemerovo Oblast  
Belovo  
Promyshlennaya Street 3  
54°19'25'' N, 86°20'20'' E

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

**Coal mining activity**

The coal mine Chertinskaya-Koksovaya was put into operation in 1952 and disposes of about 40 million tons hard coal, belonging to a “G” coal technological grade. The object’s production capacity amounts 1.0 million tons coal a year. During the coming 4-5 years the capacity after mine reconstruction will be increased up to 2.0 million tons coal a year. Investment and followed introduction of up-to-date mining equipment will increase coal production rates on the mine, resulting in CMM emissions enlarged volumes. The mine is high dangerous concerning gas and dangerous concerning gas emissions. The relative gas content in the mine during 2008-2012 will make 69-75 m<sup>3</sup> CMM per ton coal output. The



absolute gas content is evaluated within the specified period in the range of 115-135 m<sup>3</sup>/min methane. [CHER]

### **Degasification activities**

To provide the coal mining technology different degasification alternations are applied, which includes preliminary methane degasification, degasification from boreholes in the collapse dome and CMM degasification of the gob by special ventilators (combined exhaust-and-forced ventilation). The mine has 5-7 surface vacuum-pumps and 2-4 special ventilators. All methane, delivered to the surface, is released into the atmosphere. At the whole CMM emissions about 70% is released to the atmosphere using ventilation systems (low concentration) and the remaining 30% of the CMM are released by active suction systems. The suction systems are 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. It is common practice at Russian coal mines to vent the CMM into the atmosphere.

The coal mine has a central suction system on the main shaft. Due to the insufficient collection system in the underground the methane concentration in the sucked gas is poor.

The main amount of methane released by the coal mine is released by degassing wells which are located over the actual mining area outside the main facilities of the coal mine. The degassing wells are drilled short before the beginning of the mining activity in the underground and are connected to a mobile suction system consisting of one or two compressors (water ring pumps). The CMM is sucked before, during and post mining and is simply vented to the atmosphere unused.

The suction on a degassing well is usually carried out for a period of about 3-12 months depending on the gas production of the well. After then further wells are drilled in the direction of mining and the suction system on the surface is moved. The CMM production of a well usually starts with a very high methane concentration, which is continuously falling down (to zero).

Detail data concerning the methane flow on each mine has been handed over to Emissions-Trader ET GmbH and has been taken into account. The utilisable methane flow from the suction systems is prospected by the ventilation engineers of the coal mines of about 96-110 m<sup>3</sup>/min for the years 2008-2011. The sucked CMM amount depends mainly on the actually mined coal seams and the coal mining progress. [CHER]

### **Project activities**

The first CMM utilisation on the coal mine Chertinskaya-Koksovaya took place in 2001 in a caterpillar cogeneration unit. Unfortunately the caterpillar had suffered a machine breakdown after only 650 operating hours and is out of order since then. In this project this existing caterpillar unit should be repaired, reactivated and become part of project.

The caterpillar unit has been supplied with CMM from several degassing wells via an approx. 3.5 km long pipeline. The pipeline already exists but is in bad condition.

The project owner Noven has been founded in 2005 as a Joint-Venture together with Emissions-Trader ET GmbH and other companies. The project idea has been developed in 2005. In 2006 a PDD has been



written by Emissions-Trader ET GmbH and has been validated by TUEV-Nord. [TUEV-Nord] The PDD has been published for stakeholder comments on 2006-08-26 on the TUEV-Nord website <http://global-warming.de>. A site visit has taken place in June 2006. In summer 2007 a flare has been installed as the first part of the project. The flare is actually in production.

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

In this project CMM should be utilised for heat and power generation, and flaring for methane destruction. The remaining amount of the CMM, which can not be utilised, should further be released to the atmosphere unused. The utilisation units should be installed coexistent at the main shaft, the air shaft and at the degassing wells outside in the field. It is planned to utilise up to 100% of the CMM amount.

Actually only the CMM from the degassing wells is utilisable. In the first step up to 10 flares should be installed on degassing wells and replace the existing gas pumps. Further on the existing CMM-Pipeline from older degassing wells to the central shaft should be reactivated and should supply a retrofitted boiler and a ventilation air heater with CMM.

In a second step a second pipeline with a length of about 2.5 km should be constructed and should connect new degassing wells with the air shaft. The CMM should be utilised in a second ventilation air heater and in cogeneration units.

In a third step the central suction system of the coal mine should be retrofitted, so that the gas quality (methane concentration) will be improved. The CMM should be utilised in the repaired caterpillar unit and in new cogeneration units.

The volume and concentration of the CMM through surface boreholes depend on different factors, which are still not explored enough and have to be observed within months for their forecasting. In view of above said the application of flares in the first step is the most optimal from the point of view of economic efficiency and safe utilisation of methane emissions from degasification systems of "Chertinskaya-Koksovaya".

In the beginning of the project only flares will be in operation. In long terms conditions the gas amount should be moved to cogenerations units and heat generators and flaring should be redeemed. The units should be supplied with CMM in the following order: primary the cogeneration units, than the boilers, and at last the flares should destroy the remaining amount of CMM. The prospected utilisation plan is shown in table A-2.

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

unit	installation date	firing capacity	product	efficiency*
upgrade of one boiler	Sep 2008	10.3 MW	hot water	99.5 %
ventilation air heater on main shaft	Sep 2008	22 MW	hot air	100%
ventilation air heater on air shaft	Sep 2009	9 MW	hot air	100%
flare No: 1	Jun 2007	5 MW	methane destruction	99.5%



flare No: 2	Apr 2008	5 MW	methane destruction	99.5%
flare No: 3-4	Jun 2008	2 x 5 MW	methane destruction	99.5%
flare No: 5-6	Oct 2008	2 x 5 MW	methane destruction	99.5%
flare No: 7-10	Apr 2009	4 x 5 MW	methane destruction	99.5%
cogeneration unit 1	Jul 2009	approx. 2.9 MW	power	99.5 %
cogeneration units 2-3	Jun 2010	2 x 4.3 MW	power and hot water	99.5 %
cogeneration units 4-5	Oct 2010	2 x 4.3 MW	power and hot water	99.5 %
cogeneration units 6-7	Oct 2011	2 x 4.3 MW	power and hot water	99.5 %
cogeneration units 8-9	Oct 2012	2 x 4.3 MW	power and hot water	99.5 %

\* combustion efficiency

## CMM supply

### Main shaft

The utilisation units on the main shaft should be supplied with CMM from old degassing wells via the existing pipeline. It is planned to retrofit the central suction system of the coal mine and utilise this CMM amount in the future. At the time the methane concentration in the gas from the central suction system is to low for utilisation.

### Air Shaft

The utilisation units on the air shaft should be supplied with CMM from degassing wells by a new pipeline which should be constructed in the second part of the project. The new utilisation units (air heater and cogeneration units) are supposed to replace some flares.

### Degassing Wells

In the first part of the project combined gas pumps / flares should be installed direct on the degassing wells and should replace old gas pumps. In the second part of the project some of these units should feed –in the sucked gas into a new gas pipeline for the supply of new utilisation units installed on the air shaft.

The amount of CMM sent to each unit group (cogeneration units, air heaters, boilers, flares, etc.) will be measured by separate flow meters. Each branch will be provided with a deflagration flame arrester which prevents backfiring from the utilisation unit into the suction system of the coal mine or any another utilisation unit.

No utilisation unit will affect the central suction system in any way. This is obligatory required by the coal mine.

**CMM boiler**

At the time the coal mine uses old coal boilers for heat generation. One of the existing old coal boilers on the central shaft should be upgraded with a CMM burner system. The upgraded boiler should have the same firing capacity as the old coal boilers and is supposed to generate heat for the central heating system.

The CMM will be fed into the combustion chamber of the boilers, where the methane will be burned completely. The boilers should be operated fully automatically and all essential measured data will be collected and recorded.

CMM burner systems have been tested at various sites in Western Europe and are now approved. Proved safety-related equipment is used to minimise the risks of the plant.

**Technical data – Upgraded boiler**

Technical data	Type KE-10-14 steam boiler, with a CMM burner system
Installed firing capacity	10.3 MW
Heat output	10 t/h steam, approx. 7.27 MW
Expected heat production	26,260 MWh/a
Efficiency measurement	82.8 % according to manufacturers data sheet, for coal 70.6 % according to efficiency measurement
Expected methane destruction	3,727,000 m <sup>3</sup> CH <sub>4</sub> per year

**Ventilation air heaters**

At the central shaft a heater for the ventilation air with a firing capacity of 22,000 kW should be installed. The heater is supposed to heat up fresh and cold ventilation air, which is sucked in into the coal mine in the winter period for preventing danger through possible icicle formation in the shaft. A direct heating system should be installed. The heater should replace an old heat exchanger, which is actually supplied with steam. In this way the efficiency of the ventilation air heating should be improved.

On the air shaft the installation of a new ventilation air with a firing capacity of 9,000 kW is planned.

Technical data	directly fired air heater
Installed firing capacity	22,000 kW central shaft 9,000 kW central shaft
Efficiency	100 % - direct heating system
Expected heat production	71,344 MWh/a central shaft 39,176 MWh/a air shaft
Expected methane destruction	11,075,000 m <sup>3</sup> CH <sub>4</sub> per year (both heaters)



### Cogeneration units

An old existing Caterpillar unit should be reactivated and up to 8 new Deutz units should be installed. The cogeneration devices should displace a part of the heat generation of the coal mine in long term devices.

The cogeneration units, should be fed with CMM from longwalls of the coal mine. Compressor stations should collect CMM from several degassing wells and convey the CMM to the cogeneration units, which should be placed at the central shaft and the air shaft of the coal mine.

#### Caterpillar unit

The technology for the CMM utilisation with the Caterpillar cogeneration has been already installed in 1998. The whole system is out of operation since a machine breakdown 8 years ago and is in very bad condition, so that a general overhaul or an acquisition of a new cogeneration unit (like Caterpillar, Deutz etc.) is needed.

The Caterpillar is connected to a gas collection system, which is fed by several degassing wells, which are located in an older mining area of the coal mine Chertinskaya-Koksovaya. An existing compressor station should suck the gas and feed it into a pipeline, which is about 3.5 kilometres long. The pipeline already exists but is in bad condition. The CMM has to be dehydrated first before feeding into the pipeline. Otherwise numerous problems caused by accumulating condensate and ice formation in winter could occur. The existing dehydrating plant is also in bad state. The complete existing CMM collection system should be reconditioned and reactivated and used further on. The produced power should be fed in into the power grid of the coal mine.

Technical data	cogeneration unit for combined power and heat generation completely build in a transportable container, including all necessary equipment, control and data collection system
Installed firing capacity	approx. 2,857 kW *
Power output	approx. 1,000 kW *
Efficiency (electricity)	approx. 35 %
Methane amount required	287 m <sup>3</sup> /h CH <sub>4</sub>
Expected operation time	6,720 h/a
Expected power generation	6,720 MWh/a
Methane amount destroyed	1,870,000 m <sup>3</sup> CH <sub>4</sub> per year

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

#### Deutz units

A total of up to 8 new cogeneration units should be installed on the air shaft and the central shaft. The cogeneration units are supposed to produce power and heat for the heating system of the coal mine.

A new pipeline from degassing wells to the air shaft has to be installed first. On the central shaft the central suction system has to be retrofitted first.



Currently containerised, transportable units with a power output of approx. 1,550 kW and heat output of 795 kW per unit (e.g. Deutz TD 620K16) are in discussion.

The CMM will be fed into the gas engines, where the methane will be burned completely with low exhaust emissions. The cogeneration units should be operated fully automatically and all essential measured data will be 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 minimise the risks of the plant.

Technical data per unit	Type: containerised Deutz TD 620K16 gas engine cogeneration unit for combined heat and power generation completely build in in a transportable container, including all necessary equipment, control and data collection system
Installed firing capacity	approx. 4,300 kW *
Power output	approx. 1,550 kW *
Heat output	approx. 795 kW *
Efficiency (electricity)	approx. 36 % *
Maximum methane amount required	4,309 m <sup>3</sup> /h CH <sub>4</sub>

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

### Flares

A total of up to 10 enclosed flares with a firing capacity of 5.0 MW each should be installed. The flares should be installed outside in the field on degassing wells in the active parts of the coal mine Chertinskaya-Koksovaya. Usually 12-20 wells are drilled into a coal seam and the suction system is moved 4-8 times. So each flare will be utilised on numerous degassing wells during the crediting period.

The CMM will be fed into the combustion chamber of a flare, where the methane will be burned completely. The plants should be operated fully automatically and all essential measured data will be gathered and recorded.

Flares like this have been tested at various landfill sites in Western Europe and are now approved. Proved safety-related equipment is used to minimize the risks of the plant.

Technical data (single flare)	Type: KGUU 5/8 manufactured by Pro2 Anlagentechnik GmbH, Germany (planned) enclosed flare with a nominal capacity of 5.0 MW automatically controlled combustion process with a combustion efficiency of at least 99.9 % (Combustion data according to German Legal Requirements for Landfill Gas Combustion). Despite that an efficiency of 90% is taken into account for calculations, according to the <i>“Tool to determine project emissions from flaring gases containing methane”</i> [Fl-Tool]
-------------------------------	--



	Flare, compressor and all other needed technical equipment are completely build in a container.
Installed firing capacity	5.0 MW per one flare
Maximum methane amount required	503 m <sup>3</sup> /h CH <sub>4</sub> per one flare

### Electricity utilisation

Currently the electricity for the coal mine facilities is purchased from the grid. In the case of the project the electricity generated by the cogeneration units is supposed to be primarily used for the own consumption of the coal mine. The surplus is supposed to be fed-in into the local power grid. Both, the own consumption of the coal mine and the feed-in into grid are reducing the amount of power, which is produced by the grid. This amount of conventionally generated power displaced by the project generates additional ERU's.

### Heat utilisation

Currently the heat supply of the coal mine is provided by old coal boilers. In the case of the project a part of this energy will be displaced by the heat generation of the project. This amount of conventionally generated heat displaced by the project generates additional ERU's.

### Training programme

The responsible personnel of Noven, the project supplier for maintenance, operation and monitoring has been trained on handling with CMM-utilisation units and the applied monitoring systems, during an eight week long practical course in Germany in the autumn of 2005 and an four week training in autumn 2007. In this courses which has been carried out by A-TEC Anlagentechnik GmbH, a partner company of Noven, also the basic principles of emissions trading and the background of the monitoring has been explained. A-TEC Anlagentechnik GmbH is already running several CMM utilisation plants and monitoring systems in Germany. Emissions-Trader ET GmbH, also a partner company of Noven, has extensive experience in monitoring of CMM utilisation plants in Germany and United Kingdom.

These trained personnel is the basis of a team of engineers, which should establish a specialised service team in the Russia and instruct further operating and monitoring personnel, as well for this project.

### Maintenance programme

The maintenance and operation of the project equipment will be provided by Noven and the coal mine personnel. For the maintenance of the cogeneration units a contract with a local representation of the manufacturer will be awarded.

### Risks of the project

Table A- 3: Risk and mitigation to the project

Risk	Mitigation
Lower CMM utilisation than expected	The amount of extracted CMM is 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 burner systems.	Training of the staff and regular maintenance of equipment.
Lower concentration of methane in extracted gas	The burner systems automatically regulate the amount of gas that is combusted in the utilisation units. Despite that a minimum concentration of 25% CH <sub>4</sub> is required due to legal regulations. The cogeneration units require a minimum concentration of about 30 % for proper operation.
Lower demand for heat	The annual demand of heat at the coal mine is nearly constant. In the estimation conservative values have been taken. Seasonal heat demand has been taken into account. See figure B-1.

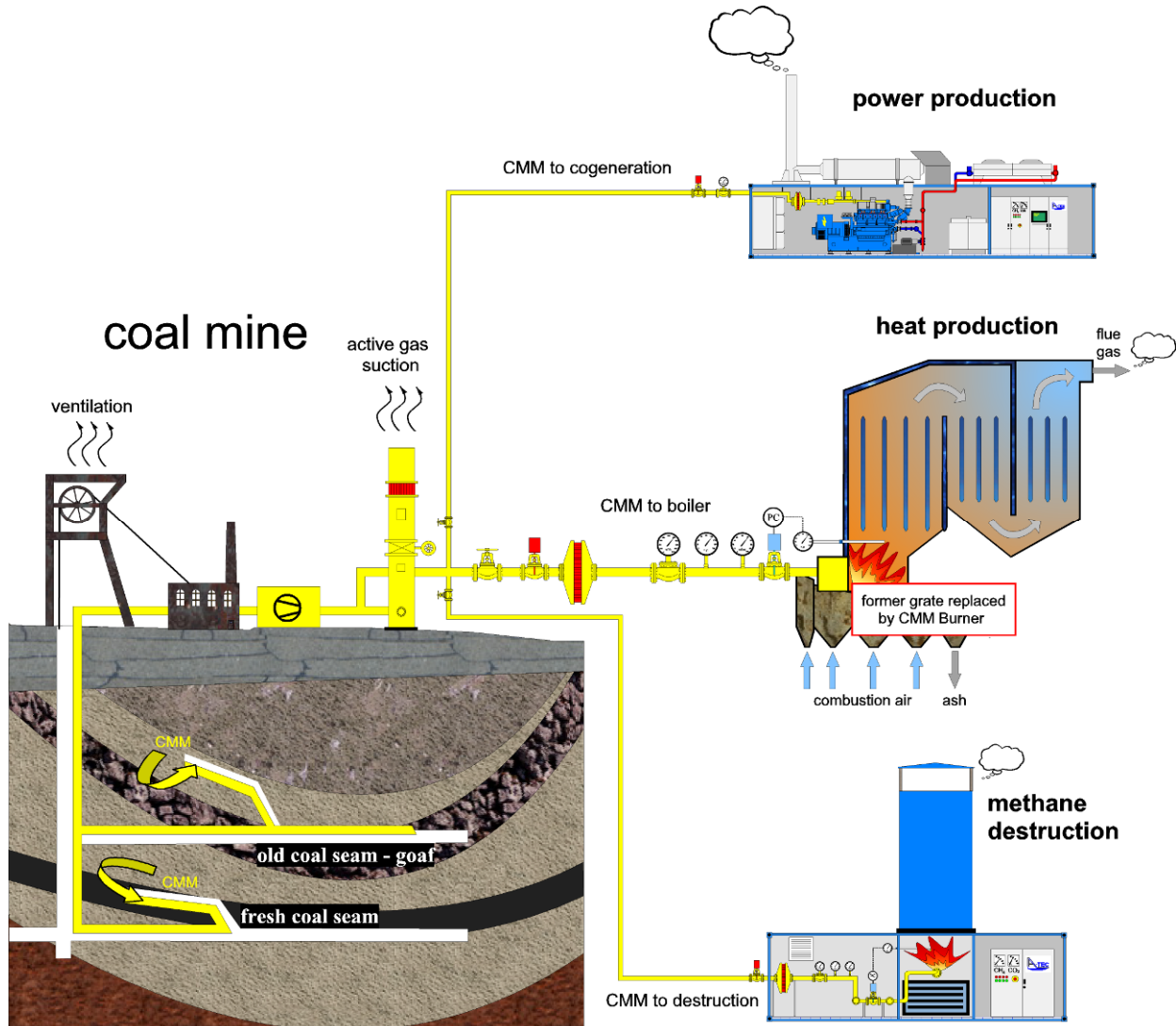


Figure A-5: General scheme of the installation with main project components



**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<sub>2</sub> (GWP 1) in combustion processes. In absence of the project the whole CMM amount, which should be converted into CO<sub>2</sub> in the heat and power generation units as well as in the flares 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 Russian grid.

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

According to the Russian laws all projects that can result in violation of ecological norms and/or negative influence on the state of natural environment are subject to ecological examination. In order to comply with regulation the coal mine will submit the project, which envisages CMM utilisation activities, to the Russian Ministry for Economic Development and Trade of the Russian Federation, <http://www.economy.gov.ru/> for preliminary state ecological expertise.

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)*

	Years
Length of the period within which ERUs are to be earned	10
Length of crediting period	2 x 5
Year	Estimate of annual emission reductions in tonnes of CO <sub>2</sub>
1 <sup>st</sup> Crediting Period 2008- 2012	
2008	241.477
2009	627.765
2010	704.762
2011	711.646
2012	705.319
Total estimated emission reductions over the crediting period (tonnes of CO <sub>2</sub> equivalent)	2.990.968
Annual average of estimated emission reductions over the crediting period (tonnes of CO <sub>2</sub> equivalent)	598.194
2nd Crediting Period 2013- 2017	
2013	726.175



2014	725.851
2015	725.851
2016	725.851
2017	725.851
Total estimated emission reductions over the crediting period (tonnes of CO <sub>2</sub> equivalent)	3.629.581
Annual average of estimated emission reductions over the crediting period (tonnes of CO <sub>2</sub> equivalent)	725.916
Total estimated emission reductions over the period within which ERUs are to be earned (tonnes of CO <sub>2</sub> equivalent)	6.620.549
Annual average of estimated emission reductions over the period within which ERUs are to be earned (tonnes of CO <sub>2</sub> equivalent)	662.055

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

The acceptance of the project by the host party, Russian Federation with a Letter of Approval is expected.

The acceptance of the project by the investor party, Kingdom of the Netherlands with a Declaration of Approval is expected.

**SECTION B. Baseline****B.1. Description and justification of the baseline chosen:**

The approved consolidated methodology ACM0008 / Version 04 "Consolidated baseline methodology for coal bed methane, coal mine methane and ventilation air 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 surface goaf wells, underground boreholes and gas drainage galleries to capture pre and post mining CMM. All this extraction activities are listed as applicable project activities.

The methane is captured and destroyed through flaring and through utilisation to produce electricity and thermal energy. Emission reductions for displacing energy from other sources (mainly coal for heat and power generation) are 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 the coal mine:

- The mine is not open cast mines
- The mine is not abandoned/decommissioned coal mines
- There is no capture of virgin coal-bed methane
- There is no usage of CO<sub>2</sub> 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 JI project.

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

According to the ACM0008 methodology, all technically feasible options to handle CMM or VAM have to be listed. The technically feasible options are:

- A. Pre mining CMM extraction including CBM to Goaf drainage and /or Indirect CBM to Goaf only
- B. Post mining CMM extraction
- C. Possible combinations of options A, B and C, with the relative shares of gas specified.

Usually the concentration of methane in the ventilation air ranges from 0.1-1%, so that the utilisation is technically difficult and economically not viable.

In the case of the project pre mining CMM and post mining CMM from several degassing wells is collected in several suction systems. The gas is sucked from the underground with mobile gas pumps. It is impossible to determine the shares of the different sources A and B, because several drainage branches are connected to each suction systems and every branch collects CMM as long as it is in operation - before, during and after mining. So that in this case option C is the only option that is technically feasible for utilisation purposes. Usually the concentration of methane in the extracted gas ranges from 25-100%.



In the case of the existing pipeline post mining CMM from degassing wells is collected in a suction system and transported to the coal mine with a mobile gas pump. So that in this case option B is the technically feasible option for utilisation purposes. Usually the concentration of methane in the extracted gas ranges from 25-100%.

In the case of the central suction system on the central shaft pre mining CMM and post mining CMM from underground boreholes and drainage galleries is collected together in a suction system and is transported to the surface with a gas pump. It is impossible to determine the shares of the different sources A and B, because numerous drainage branches are connected to the suction systems and every branch collects CMM as long as it is in operation -before, during and after mining. So that in this case the option C is the only option that is technically feasible for utilisation purposes. Actually the methane concentration in the sucked gas is too low for utilisation purposes, so that the system has to be retrofitted first.

### **Step 1b. Options for extracted CBM and CMM or VAM treatment**

Several approaches can be taken to treat the captured CMM or VAM in 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 iii. flaring, option iv. use for additional grid power generation, option v. use for captive power (and heat) generation and option vi. use for additional heat generation.

### **Step 1c. 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 iv. use for additional grid power generation, option v. use for captive power (and heat) generation and option vi. use for additional heat generation.



## 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/VAM, e.g. for heat and/or electricity generation. Therefore, all the alternatives listed in step 1b 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 1b and step 1c. In any case the coal mine has to extract the CMM and VAM from the mine for safety reasons. Therefore the alternatives below assume extraction as described in step 1a 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 Russian coal mines to release the CMM into the atmosphere. This alternative is the actual situation before project implementation – all of the CMM extracted by the project is 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 on-site boilers

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

Actually there is no fully developed alternative, which is state of the art, neither the use nor the destruction, due to the low concentration of the methane in the ventilation air. In Australia a first VAM power generation demonstration project has been put into operation in October 2007. This project supplies a completely new technology and is not state of the art yet.

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. The operation would generate additional costs. Without revenues from emissions trading this alternative would only generate costs and is economically not viable.

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

This alternative represents a part of the project scenario, see alternative viii.

### *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.

This alternative represents a part of the project scenario, see alternative viii.

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

The captured methane could be utilised for captive power generation, especially power and heat. Possible alternatives are those listed under point iv. - power generation and under point vi. - heat generation.

Furthermore for the on-site heat production also a combined heat and power generation is possible and eligible:

- a) cogeneration unit, CMM fired

The captive power (and heat) generation is part of the project scenario. See alternative viii.

*Alternative vi. – use for additional heat generation*

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

- a) conventional steam boiler, CMM fired
- b) conventional hot water boiler, CMM fired
- c) cogeneration unit, CMM fired

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

This alternative represents a part of the project scenario, see alternative viii.

*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 coal mines 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., so that only the project scenario should be described in the following.

The CMM should be primarily utilised for heat generation in an upgraded boiler and for captive heat and power generation in cogeneration units. The surplus of produced power should be fed-in in to the grid. The remaining CMM amount, which can not be utilised for heat and power generation (especially the amount utilised on the degassing wells) should be utilised for flaring.

The project scenario consists of the following utilisation steps:

1. Cogeneration units located on the coal mine will produce heat and power.
2. A CMM fired boiler will produce additional heat in the winter period
3. Flares installed on degassing wells should destroy methane
4. The surplus of power amount should be fed-in into grid.

All possible alternatives are outlined in the figure B-1. However not all of them will be part of the project.

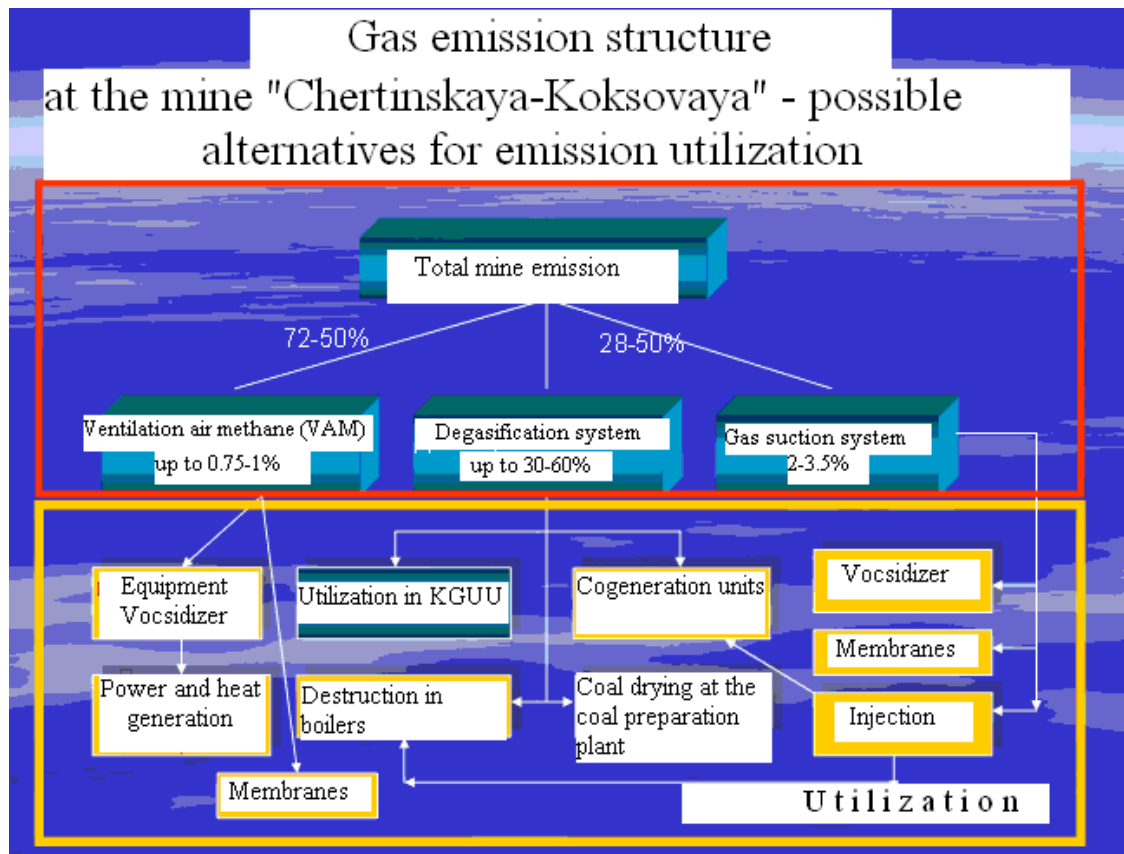


Figure B-1: Possible alternatives for CMM utilisation on the coal mine Chertinskaya-Koksovaya

The relative shares of gas vary during a year, mainly depending on the heat demand of the coal mine (summer/winter period). Figure B-2 shows exemplarily the relative shares of CMM used for power and heat generation, and flaring relative to the total amount of the utilised CMM (100%), on the coal mine Chertinskaya-Koksovaya for the year 20129.

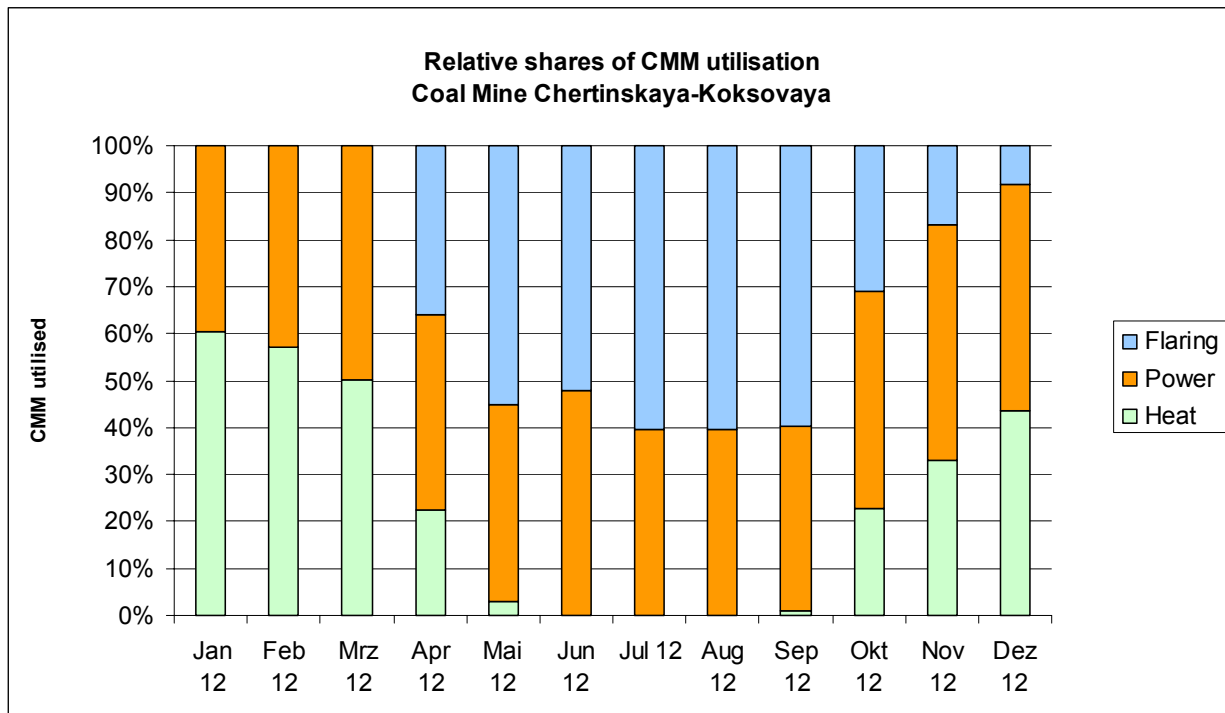


Figure B-2: Relative shares of the CMM utilisation by flaring, power and heat generation. The figure shows exemplarily the values for the coal mine Chertinskaya -Koksovaya for the year 2012. The value of 100% means 100% of the utilised CMM amount, whereas the total sucked amount is always higher than the utilised amount.

**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, there is only one first demonstration project in Australia. This project should originally have been started in summer 2005. The start of operation has been moved several times due to technical problems. In addition to the unknown risks of this new technology very high capital investment (about US\$ 4,000/kW) is need, so that this technology is not financially viable.

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. Without revenues from emissions trading no income but only costs are generated. So this scenario is facing a strong prohibitive barrier, because the investment will not generate any revenues.

This scenario is part of the project scenario with revenues from emissions trading taken into account.

*Alternative iv. Use for additional grid power generation*

Generally CMM can be used for electricity generation that is delivered to the grid. Under this alternative heat is not generated.

## a) conventional steam power plant, CMM fired

Usually power generation in conventional steam power plants is economically viable for middle and large scale plants and long term operation, so in case of the project the alternative d) is 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. Further on this alternative would be the first combined gas-steam power plant fired with CMM in Russia 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.

## 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. Further on this would be the first gas turbine fired with CMM in Russia and there are no skilled and properly trained personnel for the operation and maintenance of this kind of technology.

There have been some tests with used airplane engines, which have been fired with unconditioned CMM (there is still an existing demonstration plant in China). However, due to the high maintenance costs and low thermal efficiency, this technology is financially not viable.

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, especially the combined heat and power generation in cogeneration units.



Without additional income from emissions trading 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 for power is too low.

Therefore this alternative faces a prohibitive barrier and is eliminated.

This alternative is more suitable for captive energy generation in the project scenario, 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 Russia 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. See alternative viii.

*Alternative vi. Use for additional heat generation*

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 the alternative is not realisable.

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. Because no such a grid is available the alternative is not realisable.

Both alternatives face prohibitive barriers and are eliminated.

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

There are three possible ways to utilise the captured methane:

a) feeding into a gas pipeline

In this case a new connection to an existing pipeline has to be made. Also an additionally methane enrichment plant is required to fulfil the quality specification of the pipeline operator. The costs of the enrichment plant and the lacking piping infrastructure make this alternative economically not viable.

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 a prohibitive barrier 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 Russia 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 a prohibitive barrier and is eliminated.

*Alternative viii. ix. 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*

The project scenario alternative as described in step 3. requires a relatively 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 . E.g. coal which is actually used for heat generation in the existing boilers is available at cost price and must not be purchased at market price. The electricity price in Russia 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.

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

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, heat generation with the existing coal fired boilers, and the full purchase of electricity from the grid.

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

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

In accordance with the chosen methodology, additionality has to be proven by applying the "Tool for demonstration and assessment of additionality", (version 04), EB36 [CDM-EB]. The result is given below.

### **Step 1. Alternatives**

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

### **Step 2. Investment analysis**

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

The proposed JI project should save money, which is actually spent for power purchase and heat generation. Therefore, simple cost analysis (Option I) is not applicable.

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

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

The project should save money, which is actually spent for the energy supply of the site. The cost reduction should make the coal mine work more efficient; nevertheless investment capital is needed. According to business as usual rules a minimum requirement for Noven as the project owner is that the project should at least be profitable. Therefore the most relevant benchmark for Noven is the Net Present Value NPV, which should at least be +15% in the base case.

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

The economic indicators for the proposed project (alternative 8) without JI revenue has been calculated under the following assumptions:

Prices for electricity, and coal used for heat generation were taken as of 2005 when the decision to implement the project was taken and the first PDD was written. [Noven]

Degasification activities and vacuum pumps were excluded from the capital costs as they are not part of the project (the degasification activities would have to be implemented anyway irrespective of the JI project).

The project has the following economic indicators:

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

<b>Economic Parameters – CMM utilisation on Chertinskaya-Koksovaya</b>		
IRR	-0,71	%
NPV (0 %)	-374.834	EUR
NPV (10 %)	-3.056.240	EUR

It is obvious that the project is not feasible without JI revenues.

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

A sensitivity analysis of the proposed project has been carried out, showing the influence of the three main factors of influence: Investment (capex), operating costs (opex) und production on the Internal Rate of Return IRR. The factors have been varied in a range of +/-20

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

	<b>Base case</b>	<b>capex -20%</b>	<b>opex -20%</b>	<b>Production +20%</b>	
IRR	-0,71	5,82	6,04	8,90	%
NPV (0%)	-374.834	2.559.166	3.495.468	5.261.991	EUR
NPV (10%)	-3.056.240	-985.333	-1.221.410	-343.855	EUR

In the base case in absence of the project, the IRR is only marginal positive by a calculated value of 12.3%. This value is far below from general accepted industry standards in all known sectors.

The utilisation of Coal Mine Gas is extremely risky and could be compared at least with the risk of oil and gas exploration projects. Experiences from large scale CMM production were made in Germany and had shown, that for single project a failure rate of around 40 % could be estimated. The values shown above in the economics are based upon a success case and do not consider any parts as sunk investments.

For projects having comparable risks, IRR's above 20 % in any case have to be reached in conservative calculations before an investment could be considered. Even the sensitivity analysis shows that under a very optimistic scenarios opex minus 20 % or production plus 20 % an IRR target of 20 % could not be achieved. The minimum requirement for Noven is a NPV of at least +15% in the base case.

### **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 about 1.2 billion cubic meters of CMM are actually released by Russian coal mines [Ugletan].

The situation at the five coal mines is similar to the national situation. Most of the CMM is released to the atmosphere together with the ventilation air. Actually there is no practice with CMM utilisation.

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 prevent the project from being implemented and clearly prevent the development of CMM utilisation activities.

##### *Technology barrier*

According to official information the project is one of the first CMM Utilisation projects in Russia. Therefore there is a clear technology barrier for the realisation of the proposed project. The coal mine has no skilled and properly trained personnel to operate CMM utilisation units.

##### *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 JI activity is the continuation of the existing 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 Russia. There are no other major examples of using the CMM for heat or power generation that have been implemented without an additional JI incentive.

The proposed activity is not common practice.

**Step 5. Impact of JI revenues**

Acceptance of the proposed project as a JI activity will allow crossing the financial barrier.

**Conclusion**

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

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

*Table B-3: Overview on emissions sources included in or excluded from the project boundary*

**Baseline**

Source	Gas		Justification / Explanation
Emissions of methane as a result of venting	CH <sub>4</sub>	Included	The main emission source.  The amount of methane to be released depends on the amount. 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 <sub>2</sub>	Excluded	There is no flaring or use for heat and power in the applicable baseline scenario.
	CH <sub>4</sub>	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
	N <sub>2</sub> O	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
Grid electricity generation (electricity provided to the grid)	CO <sub>2</sub>	Included	Only CO <sub>2</sub> emissions associated to the same quantity of electricity than electricity generated as a result of the use of methane included as baseline emission will be counted.  A standardised carbon emission factor will be published by the Russian DNA in future. This factor



			will be used in future for calculation in the monitoring reports. For ex ante calculation values published by SenterNoven have been taken into account.
	CH <sub>4</sub>	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
	N <sub>2</sub> O	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
Captive power and/or heat, and vehicle fuel use	CO <sub>2</sub>	Included	In the baseline scenario heat would be generated by the on-site coal boilers.
	CH <sub>4</sub>	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
	N <sub>2</sub> O	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.

Table B-4: 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 <sub>4</sub>	Excluded	Only the change in CMM/CBM/VAM 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 <sub>2</sub>	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.
		Included	The own electricity consumption of the cogeneration units (cooling fans) is included.
		Excluded	The own electricity consumption of the boilers and flares is not significant*) and is excluded.
	CH <sub>4</sub>	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
	N <sub>2</sub> O	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
Emissions from methane destruction	CO <sub>2</sub>	Included	From the combustion of methane in the flares, cogeneration units and heat generators.
Emissions from	CO <sub>2</sub>	Included	Actually NMHC accounts less than 1% by volume of the

NMHC destruction			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 <sub>4</sub>	Included	In accordance with ACM0008, a small amount of uncombusted methane, 0.5% for each unit, will be accounted to keep conservative.  For the flares the “ <i>Tool to determine project emissions from flaring gases containing methane</i> ” [FI-Tool] is used to determine the amount of unburned methane.
Fugitive methane emissions from on-site equipment	CH <sub>4</sub>	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 <sub>4</sub>	Excluded	Excluded for simplification in accordance with ACM0008. (Besides it is not applicable to the project.)
Accidental methane release	CH <sub>4</sub>	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.

\*) 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<sub>2eq</sub>. Reference JISC "Guidance on Criteria for Baseline Setting and Monitoring".

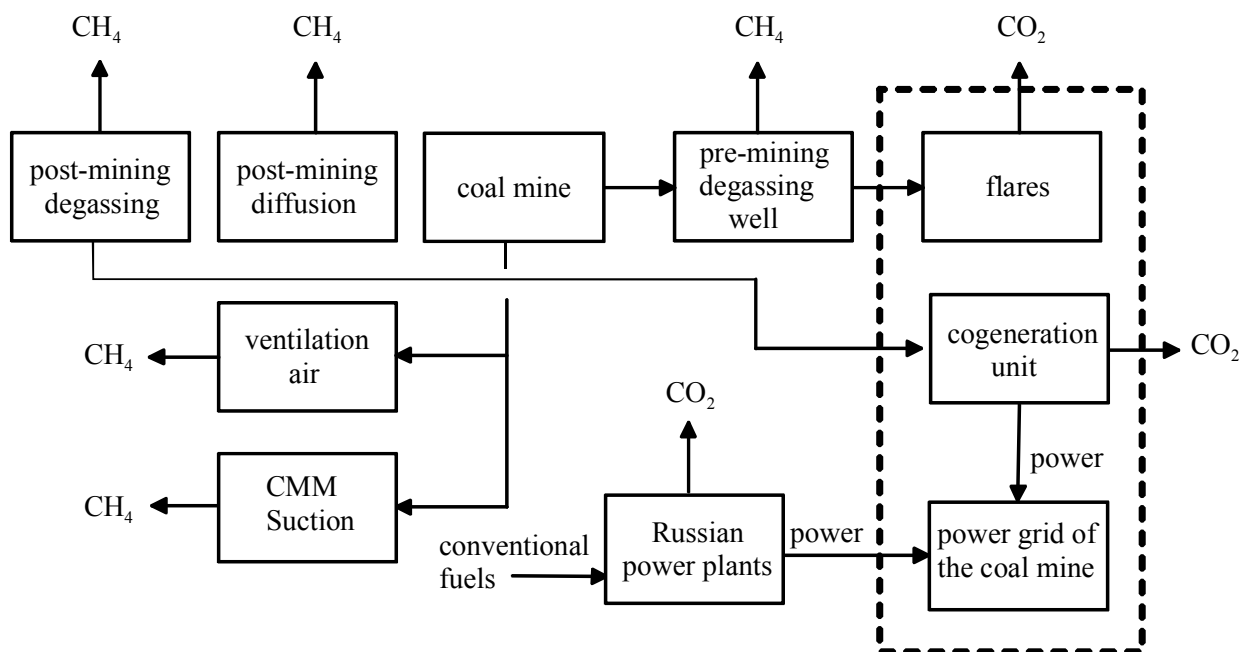


Figure B-3: Project boundary



**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: 2008-03-18

Name of person / entity setting the baseline: Emissions-Trader ET GmbH



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

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

2007-06-01

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

at least 10 years, minimum until the end of the second crediting period

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

2 x 5 years

1<sup>st</sup> crediting period starting with 2008-01-01

2<sup>nd</sup> crediting period starting with 2013-01-01

**SECTION D. Monitoring plan****D.1. Description of monitoring plan chosen:**

A monitoring plan provided by the “Approved consolidated baseline methodology ACM0008”, Version 04, Sectoral Scope: 8 and 10, EB35 is applied to the project [ACM0008].

According to ACM0008 the methodological “*Tool to determine project emissions from flaring gases containing methane*”, EB 28 Meeting report, Annex 13, [Fl-Tool], has been taken for the determination of the project emissions from flaring. The default value for the flare efficiency of 90% for an enclosed flare has been taken into account.

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

General remarks to the Monitoring Plan:

- The monitoring plan will be updated during the first verification;
- 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<sub>x</sub>, or SO<sub>x</sub> will be available to the verifier. These indicators are being reported to the Regional Supervisory Authority on an annual basis;
- The CH<sub>4</sub> and N<sub>2</sub>O emission reductions will not be claimed as mentioned in section B.3 and will therefore not be monitored. This is conservative and in accordance with ACM0008;
- 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 measured.

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

The ID Numbers used in the tables below refer to the ID numbers as used in ACM0008, up to Version 3; missing ID numbers refer to parameters, which are listed in the monitoring plan of the ACM0008, and which are not applicable to the project.

**D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:**

ID number (Please use numbers to ease cross-referencing to D.2.)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P1 PE <sub>y</sub>	Project emissions in year y	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below
P2 PE <sub>ME</sub>	Project emissions from energy use to capture and use methane	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below
P3 PE <sub>MD</sub>	Project emissions from methane destroyed	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below



P4 PE <sub>UM</sub>	Project emissions from uncombusted methane	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below
P5 CONS <sub>ELEC,PJ</sub>	Additional electricity consumption by project	electricity meter	MWh	m	continuous	100%	Electronic and paper	cumulative value
P8 CEF <sub>ELEC,PJ</sub>	Carbon emission factor of CONS <sub>ELEC,PJ</sub>	official data approved by the Russian DNA	t CO <sub>2eq</sub>	e, c	ex ante, annually	main power generation plants	paper	
P11 MD <sub>FL</sub>	Methane destroyed by flare	monitored data	t CH <sub>4</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below



P12 MM <sub>FL</sub>	Methane sent to flare	flow meter	t CH <sub>4</sub>	m	15 min. cycle	100%	electronic	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.717 kg/m <sup>3</sup> [DIN ISO 6976 (1995)] (1013 mbar, 273.15°K)
-------------------------	--------------------------	------------	-------------------	---	---------------	------	------------	---



P13 PE <sub>Flare</sub>	project emissions from flaring of the residual gas stream	monitored data	t CO <sub>2eq</sub>	m/c	15 min. cycle	100%	electronic	The parameters used for determining the project emissions from flaring of the residual gas stream (PE <sub>Flare</sub> ) should be monitored as per the <i>“Tool to determine project emissions from flaring gases containing Methane”</i> .
P14 MD <sub>ELEC</sub>	Methane destroyed by power generation	monitored data	t CH <sub>4</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below



P15 MM <sub>ELEC</sub>	Methane sent to power plant	flow meter	t CH <sub>4</sub>	m	15 min. cycle	100%	electronic	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.717 kg/m <sup>3</sup> DIN ISO 6976 (1995) (1013 mbar, 273.15°K)
P16 Eff <sub>ELEC</sub>	Efficiency of methane destruction / oxidation in power plant	IPCC	-	e	ex ante	100%	paper	set at 99.5% (IPCC)
P17 MD <sub>HEAT</sub>	Methane destroyed by heat generation	monitored data	t CH <sub>4</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.2, see below



P18 MM <sub>HEAT</sub>	Methane sent to boiler	flow meter	t CH <sub>4</sub>	m	15 min. cycle	100%	electronic	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.717 kg/m <sup>3</sup> DIN ISO 6976 (1995) (1013 mbar, 273.15°K)
P19 Eff <sub>HEAT</sub>	Efficiency of methane destruction / oxidation in heat plant	IPCC	-	e	ex ante	100%	paper	set at 99.5% (IPCC)
P23 CEF <sub>CH4</sub>	Carbon emission factor for combusted methane	IPCC	-	e	ex ante	100%	paper	set at 2.75 t CO <sub>2eq</sub> /t CH <sub>4</sub>
P24 CEF <sub>NMHC</sub>	Carbon emission factor for combusted non methane hydrocarbons (various)	lab analysis	-	c	annually	main components	paper	Calculated if applicable, based on the lab analysis. (See P26)
P25 PC <sub>CH4</sub>	Concentration of methane in extracted gas	IR measurement	%	m	15 min. cycle	100%	electronic	measurement



P26 PC <sub>NMHC</sub>	NMHC concentration in coal mine gas	lab analysis	%	m	annually	main components	paper	Used to check if more than 1% of emissions and to calculate r
P27 r	Relative proportion of NMHC compared to methane	lab analysis	%	c	annually	100%	paper	Calculated if applicable, based on the lab analysis.
P28 GWP <sub>CH4</sub>	Global warming potential of methane	IPCC	-	e	ex ante	100%	paper	set at 21

**D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

Project emissions are defined by the following equation

$$PE_y = PE_{ME} + PE_{MD} + PE_{UM} \quad (1)$$

where:

- PE<sub>y</sub> Project emissions in year y (t CO<sub>2</sub>eq)  
PE<sub>ME</sub> Project emissions from energy use to capture and use methane (t CO<sub>2</sub>eq)  
PE<sub>MD</sub> Project emissions from methane destroyed (t CO<sub>2</sub>eq)  
PE<sub>UM</sub> Project emissions from uncombusted methane (t CO<sub>2</sub>eq)

Project emissions from energy use to capture and use methane (PE<sub>ME</sub>), is obtained by the equation:

$$PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC,PJ} \quad (2)$$

where:

- PE<sub>ME</sub> Project emissions from energy use to capture and use or destroy methane (t CO<sub>2</sub>eq)



$CONS_{ELEC,PJ}$  Additional electricity consumption for capture and use or destruction of methane (MWh)

$CEF_{ELEC,PJ}$  Carbom emission factor of electricity used by coal mine (t CO<sub>2</sub>/MWh)

The upgraded boiler and the new utilisation units are supplied with CMM from the CMM suction systems 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 methane would be simply blown into the atmosphere. Thus the energy use for capture of this methane is outside the project boundaries and only the part of utilised methane is regarded.

The old caterpillar cogeneration unit is supplied with CMM with an own compressor. Further electric power is needed for the operation of the cooling fan. The consumed power amount is measured and is taken into account as  $CONS_{ELEC,PJ}$ .

The upgraded CMM fired boiler needs less electric power than the old coal fired boilers. In absence of the project the heat generation would furthermore remain in operation using the coal fired boilers. In case of the project less power will be consummated. To keep conservative  $CONS_{ELEC,PJ}$  is set to zero.

The flares needs only very few additional electric power for operation – only for the measurement and control devices. This power consumption is negligible and is not taken into account. All units are supplied with CMM from an active coal mine. The CMM suction system of the active coal mine is always in operation for safety reasons in the underground. The CMM suction system would be also in operation in absence of the project; in this case the methane would be simply blown into the atmosphere. Thus the energy use for capture of the methane is outside the project boundaries.

The cogeneration units need additional power especially for the cooling fans. The power amount consumed by the power generation units

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

$$PE_{MD} = (MD_{FL} + MD_{ELEC} + MD_{HEAT}) \times (CEF_{CH4} + r \times CEF_{NMHC}) \quad (3)$$



with:

$$r = PC_{NMHC} / PC_{CH_4} \quad (4)$$

where:

$PE_{MD}$	Project emissions from CMM destroyed (t CO <sub>2</sub> eq)
$MD_{FL}$	Methane destroyed through flaring (t CH <sub>4</sub> )
$MD_{ELEC}$	Methane destroyed through power generation
$MD_{HEAT}$	Methane destroyed through heat generation
$CEF_{CH_4}$	Carbon emission factor for combusted methane (2.75 t CO <sub>2</sub> eq / t CH <sub>4</sub> )
$CEF_{NMHC}$	Carbon emission factor for combusted non methane hydrocarbons (various) (t CO <sub>2</sub> eq/tNMHC)
$r$	Relative proportion of NMHC compared to methane
$PC_{CH_4}$	Concentration (in mass) of methane in extracted gas (%)
$PC_{NMHC}$	NMHC concentration (in mass) in extracted gas (%)

The amount of gas destroyed in the flare depends on the efficiency of combustion in the flare:

$$MD_{FL} = MM_{FL} - PE_{Flare} / GWP_{CH_4} \quad (5)$$

where:

$MD_{FL}$	Methane destroyed through flaring (t CH <sub>4</sub> )
$MM_{FL}$	Methane measured sent to flare (t CH <sub>4</sub> )
$PE_{Flare}$	Project emissions of non-combusted CH <sub>4</sub> expressed in terms of CO <sub>2</sub> eq, from flaring of the residual gas stream (t CO <sub>2</sub> eq)
$GWP_{CH_4}$	Global warming potential of methane (21 t CO <sub>2</sub> eq / t CH <sub>4</sub> )

The project emissions of non-combusted CH<sub>4</sub> expressed in terms of CO<sub>2</sub>eq from flaring of the residual gas stream ( $PE_{Flare}$ ) shall be calculated following the procedures described in the *“Tool to determine project emissions from flaring gases containing Methane”* [F1-Tool].  $PE_{Flare}$  can be calculated on an annual basis or for the required period of time using this tool.

$$MD_{ELEC} = MM_{FL} \times Eff_{ELEC} \quad (7)$$

where:



$MD_{ELEC}$  Methane destroyed through power generation (t CH<sub>4</sub>)  
 $MM_{ELEC}$  Methane measured sent to power plant (t CH<sub>4</sub>)  
 $Eff_{ELEC}$  Efficiency of methane destruction/oxidation in power plant (taken as 99.5 % from IPCC)

$$MD_{HEAT} = MM_{HEAT} \times Eff_{HEAT} \quad (8)$$

where:

$MD_{HEAT}$  Methane destroyed through heat generation (t CH<sub>4</sub>)  
 $MM_{HEAT}$  Methane measured sent to heat plant (t CH<sub>4</sub>)  
 $Eff_{HEAT}$  Efficiency of methane destruction/oxidation in heat plant (taken as 99.5 % from IPCC)

Uncombusted methane from project activity ( $PE_{UM}$ ) can be obtained through the equation:

$$PE_{UM} = [GWP_{CH_4} \times \sum_i MM_i \times (1 - Eff_i)] + PE_{Flare} \quad (109)$$

Where:

$PE_{UM}$  Project emissions of un-combusted methane (t CO<sub>2</sub>eq)  
 $GWP_{CH_4}$  Global warming potential of methane (21 t CO<sub>2</sub>eq / t CH<sub>4</sub>)  
 $i$  Use of methane (power generation, heat generation)  
 $MM_i$  Methane measured sent to use  $i$  (t CH<sub>4</sub>)  
 $Eff_i$  Efficiency of methane destruction in use  $i$  (%)  
 $PE_{Flare}$  Project emissions of non-combusted CH<sub>4</sub> expressed in terms of CO<sub>2</sub>eq, from flaring of the residual gas stream (t CO<sub>2</sub>eq)

The project emissions from flaring of the residual gas stream ( $PE_{Flare}$ ) shall be calculated following the procedures described in the “*Tool to determine project emissions from flaring gases containing Methane*” [FI-Tool].  $PE_{Flare}$  can be calculated on an annual basis or for the required period of time using this tool.



<b>D.1.1.3. Relevant data necessary for determining the <u>baseline</u> of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:</b>								
ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B1 BE <sub>y</sub>	Baseline emissions in year y	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.4, see below
B3 BE <sub>MR,y</sub>	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.4, see below
B4 BE <sub>Use,y</sub>	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y	monitored data	t CO <sub>2eq</sub>	c	monthly	100%	electronic	calculated using formulae in Section D.1.1.4, see below



B14 CMM <sub>PJ,y</sub>	CMM captured and destroyed in the project activity in year y	flow meter	t CH <sub>4</sub>	m	15 min. cycle	100%	electronic	pre-mining + during mining + post-mining methane is collected as a cumulative value, see section B.1, Step 1a for explanation
B18 GWP <sub>CH4</sub>	Global warming potential of methane	IPCC	t CO <sub>2eq</sub> / t CH <sub>4</sub>	e	ex ante	100%	paper	21 t CO <sub>2eq</sub> / t CH <sub>4</sub>
B19 CEF <sub>CH4</sub>	Carbon emission factor for combusted methane	IPCC	t CO <sub>2eq</sub> / t CH <sub>4</sub>	e	ex ante	100%	paper	44/16 = 2.75 tCO <sub>2e</sub> /tCH <sub>4</sub>
B46 GEN <sub>y</sub>	Electricity generation by project	electricity meter	MWh	m	monthly	100%	electronic and paper	cumulative value
B47 HEAT <sub>y</sub>	Heat generation by project	heat meter	MWh	m	monthly	100%	electronic and paper	cumulative value
B49 EF <sub>elec</sub>	CO <sub>2</sub> emission factor of the grid	official data of Russian power grid	t CO <sub>2</sub> / MWh	c	ex ante, annually	main power generation plants	paper	Calculated as per ACM0002
B55 EF <sub>CO2,Coal</sub>	CO <sub>2</sub> emission factor of fuel used for captive power or heat	IPCC	tCO <sub>2</sub> /TJ	e	ex ante	100%	paper	IPCC defaults.



B57 Eff <sub>heat</sub>	Energy efficiency of heat plant	manufacturer data	%	e	ex ante	100%	paper	the old coal boilers will be decommissioned, so that a continuous monitoring of Eff <sub>HEAT</sub> is not possible
----------------------------	---------------------------------	-------------------	---	---	---------	------	-------	---

**D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

There is no methane destruction in the baseline scenario, so that the baseline emissions are given by the following simplified equation:

$$BE_y = BE_{MR,y} + BE_{Use,y} \quad (11)$$

Where:

- BE<sub>y</sub>            Baseline emissions in year y (tCO<sub>2e</sub>)  
BE<sub>MR,y</sub>        Baseline emissions from release of methane into atmosphere in year y (tCO<sub>2e</sub>)  
BE<sub>Use,y</sub>        Baseline emissions from the production of power or heat replaced by the project activity in year y (tCO<sub>2e</sub>)

According to the justification in chapter B.1, step 1.a there are only CMM emissions, so that the baseline emissions from release of methane into the atmosphere in the year y (BE<sub>MR,y</sub>) is obtained by the following simplified equation:

$$BE_{MR,y} = CMM_{PJ,y} \times GWP_{CH4} \quad (15)$$

Where:

- BE<sub>MR,y</sub>        Baseline emissions from release of methane into atmosphere in year y that is avoided by the project activity (tCO<sub>2e</sub>)  
CMM<sub>PJ,y</sub>        Total CMM capture, sent to and destroyed by the project activity in year y (tCO<sub>2e</sub>)



The total emissions reductions from displacement of power/heat generation are given by the following equation:

$$BE_{Use,y} = GEN_y * EF_{ELEC} + (HEAT_y / Eff_{HEAT}) * EF_{HEAT} \tag{25}$$

Where

- $BE_{Use,y}$  Total baseline emissions from the production of power or heat replaced by the project activity in year y (tCO<sub>2e</sub>)
- $GEN_y$  Electricity generated by project activity in year y (MWh)
- $EF_{ELEC}$  Emissions factor of electricity (grid, captive or a combination) replaced by the project (tCO<sub>2</sub>/MWh)
- $HEAT_y$  Heat generation by project activity in year y (MWh)
- $EF_{HEAT}$  Emissions factor for heat production replaced by project activity (tCO<sub>2</sub>/MWh)
- $Eff_{HEAT}$  Efficiency of the former heat generation unit, which is displaced by project activity (%)

**D. 1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):**

**D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:**

ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

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<sub>2</sub> 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 JI project on coal production
4. Impact of the JI project on coal prices

There is no leakage in the project as:

1. There is no CMM being used for thermal demand under the baseline scenario. Hence there is no leakage for displacement of baseline thermal energy uses;
2. There is no CBM involved hence no leakage occurs from CDM drainage from outside the de-stressed zone
3. There is no impact of the JI project on coal production as degasification activities are independent from the JI project
4. The impact of the JI project on coal prices is difficult to assess. The JI project as such does not influence coal production so it is unlikely that the JI 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:**

ID number (Please use numbers to ease cross-referencing to D.2.)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not applicable. There are no leakages and no indirect emissions

**D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

Not applicable. There are no leakages and no indirect emissions.

**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<sub>2</sub> 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:

$$ER_y = BE_y - PE_y \quad (39)$$

where:

ER<sub>y</sub> Emissions reductions of the project activity during the year y (t CO<sub>2eq</sub>)

BE<sub>y</sub> Baseline emissions during the year y (t CO<sub>2eq</sub>)

PE<sub>y</sub> Project emissions during the year y (t CO<sub>2eq</sub>)

**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 (Indicate table and ID number)	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
P5 Power consumption	low	The calibration interval of the power meters is 1 year. Calibration procedures for power meters are implemented in compliance with the calibration methodology applied by the Headquarter of the GOS Standard of the Russian Federation, Kemerovo.



<p>P12 P15 P18 B14 <i>Methane amount</i></p>	<p>low</p>	<p>The flow meters consist of an orifice, a pressure difference meter, pressure and temperature meters for the required correction to standard gas condition.</p> <p>The indications of the orifice pressure difference meter and the respective temperature and pressure meters have usually hardly any fluctuations and no recalibration is needed. The meters should be initially controlled during the final inspection by the manufacturer and will be checked regularly according to the manufacturer's instructions. The indications of the measurement instruments should be controlled during the regular inspections while the operation time and a gauge which is obviously out of order should be substituted.</p> <p>The quality of the determined value for the methane amount is also affected by the methane concentration, see P25.</p>
<p>P13 <i>Project Emissions from un-combusted methane in the flare using the "Tool to determine project emissions from flaring gases containing Methane"</i></p>	<p>low</p>	<p>The "Tool to determine project emissions from flaring gases containing Methane" uses the methane concentration P25 and the methane amount sent to flare P12. Additionally the flame temperature in the flare is measured.</p> <p>The indication of the flame temperature has usually hardly any fluctuations and no recalibration is needed. The meter should be initially controlled during the final inspection by the manufacturer and will be checked regularly according to the manufacturer's instructions. The indication of the meter should be controlled during the regular inspections while the operation time and a gauge which is obviously out of order should be substituted. According to the "Tool to determine project emissions from flaring gases containing Methane" the flame temperature pick-up should be recalibrated or replaced every year.</p>
<p>P25 <i>Methane concentration</i></p>	<p>low</p>	<p>The indication of the CH<sub>4</sub> gas analyser has to be recalibrated periodically. The recalibration will be carried out according to the manufacturer's instructions.</p>
<p>P26 <i>NMHC Concentration</i></p>	<p>low</p>	<p>The determination will be provided by an accredited laboratory.</p>
<p>B46 <i>Power production</i></p>	<p>low</p>	<p>The calibration interval of the power meters is 1 year. Calibration procedures for power meters are implemented in compliance with the calibration methodology developed by the Headquarter of the GOS Standard of the Russian Federation, Kemerovo.</p>
<p>B47 <i>Heat production</i></p>	<p>low</p>	<p>The indication of the measurement instrument should be initially controlled during the final inspection by the manufacturer and will be checked regularly according to the manufacturer's instructions. The gauge will be recalibrated by the manufacturer according to his own recalibration intervals.</p> <p>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.</p>



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, NO<sub>x</sub> etc. for all combustion units will be carried out and archived as required by the legal requirements of the Russian 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 and emergency the plant will be shut down automatically and no unintended emissions are caused. The CMM supply will be locked by quick acting valves. Fire arresters prevent from backfiring into the CMM pipe for safety of the personnel and equipment. During the downtime of the plant the unused CMM will be vented by the coal mine as it would be vented without the project activity.

In case of emergency an alarm message is sent to a permanently manned place in the control room. The operating personnel, who are on duty, check the plant status and decide on further procedures as clearing the fault, eliminating danger and restarting the plant, sending a service team, informing the project manager, a fire brigade, etc.

Every emergency case is journalised.

The collected data should be stored electronically by the installed data logger and on paper by the plant manager. The data should be read out daily from the data logger and stored and archived in a central data base. The data base can be provided with an internet front end by which all stored data can be visualised, controlled and analysed. The administrator of the data base is responsible for the proper work of the data base, routine backups and save storage.

The plant manager is responsible for correctness of the logged data and the administration of the data base. He should regularly verify the electronically recorded data with the handwritten data and check the stored data for plausibility, errors, deviations and non-conformity. All inconsistencies should be discussed with the service and the operation teams, at which the operational and monitoring experience is gained, the plant operation is optimised, and a more accurate monitoring should result.

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

The plant manager is responsible for the preparation of the standardised weekly 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

The visualisation of the data via internet provides a prompt control of the project operation by the project manager. All data should be continuously checked for consistency, completeness and integrity by the project manager and the monitoring team. 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 the project manager and should be confirmed by the verifier.

The responsible personnel from Noven has been trained on the handling with CMM-utilisation units and the applied monitoring systems, during an eight week long practical course in Germany in the autumn of 2005. In this course which has been carried out by A-TEC Anlagentechnik GmbH also the basic principles of emissions trading and the background of the monitoring has been explained. A-TEC Anlagentechnik GmbH is already running several CMM utilisation plants and monitoring systems in Germany.

These trained personnel is the basis of a team of engineers, which should establish a specialised service team in the Russia and instruct further operating and monitoring personnel, as well for this project. Actually there is no final training procedure established. The project management should be done by personnel of Noven. The operation of the plants should be done by the operational personnel of the coal mines together with the personnel of the CHP supplier. The service and maintenance of the boilers and flares should be done by the operational personnel of the coal mine. The service and maintenance of the cogeneration units should be done by the service personnel of the manufacturer of the CHP plants or other specialised personnel. The monitoring should be carried out by the project manager and Emissions-Trader ET GmbH.

The experience of the Russian personnel will be gained by training on the job together with the German service team. During this period detailed work instruction should be worked out and wrote down.

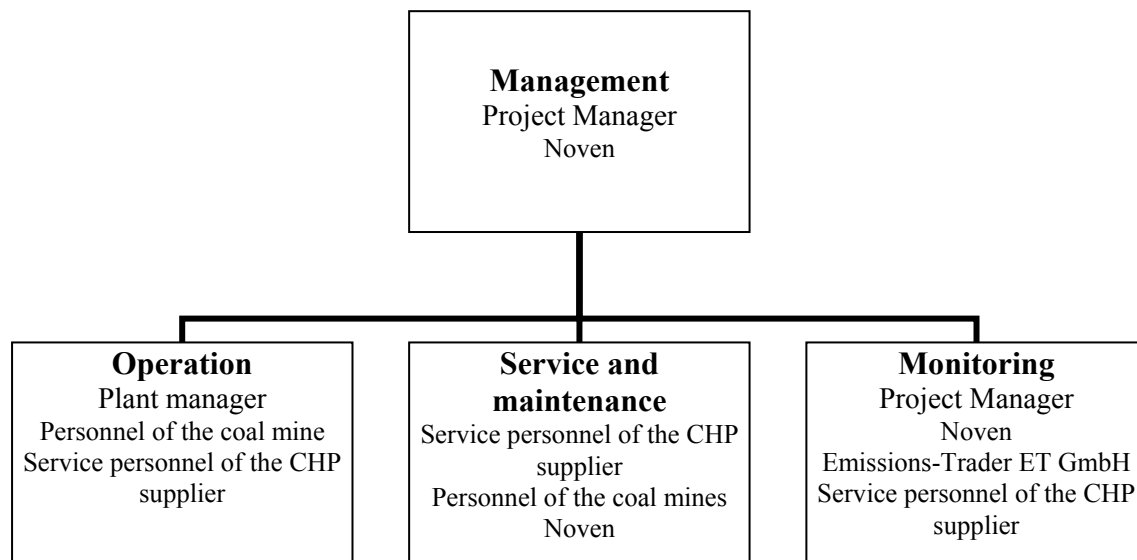


Figure D-1 - Project management structure

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

Date of completion of the monitoring plan: 2008-03-18

Name of person / entity setting the monitoring plan: Emissions-Trader ET GmbH

**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 boilers, cogeneration units and flares is concurrently avoided CMM, which would otherwise escape to the atmosphere in absence of the project. All heat, which is generated by the project, is concurrently displaced heat, which would otherwise be generated by coal combustion. All power, which is generated by the project, is concurrently displaced power, which would otherwise be generated by conventional power generation in the grid.

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

*Table E-1 – Estimated project emissions*

Estimated project emissions [t CO <sub>2</sub> eq / a]						
year	2008	2009	2010	2011	2012	2013-2017
methane destruction						
flaring	25.519	59.751	52.994	38.500	26.764	25.588
heat generation	8.134	24.243	28.093	25.056	22.733	22.145
power generation	0	2.152	13.217	29.415	40.848	48.114
additional power consumption						
power generation	0	0	299	807	1.166	1.394
<b>sum</b>	<b>33.653</b>	<b>86.146</b>	<b>94.602</b>	<b>93.778</b>	<b>91.511</b>	<b>97.241</b>

**E.2. Estimated leakage:**

There is no leakage in this kind of 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 <sub>2</sub> eq / a]						
year	2008	2009	2010	2011	2012	2013-2017
methane destruction						
flaring	25.519	59.751	52.994	38.500	26.764	25.588
heat generation	8.134	24.243	28.093	25.056	22.733	22.145
power generation	0	2.152	13.217	29.415	40.848	48.114
additional power consumption						
power generation	0	0	299	807	1.166	1.394
<b>sum</b>	<b>33.653</b>	<b>86.146</b>	<b>94.602</b>	<b>93.778</b>	<b>91.511</b>	<b>97.241</b>

**E.4. Estimated baseline emissions:**

Table E-4 – Estimated baseline emissions

Estimated baseline emissions [t CO <sub>2</sub> eq / a]						
year	2008	2009	2010	2011	2012	2013-2017
release of methane that is avoided by the project						
flaring	216.523	506.980	449.643	326.670	227.085	195.398
heat generation	62.115	185.127	214.527	191.338	173.599	169.111
power generation	0	16.430	100.927	224.620	311.933	367.414
production of heat that is displaced by the project	18.144	53.916	65.988	65.988	65.988	65.988
production of power that is displaced by the project	0	2.156	13.244	29.476	40.933	48.214
<b>sum</b>	<b>296.782</b>	<b>764.608</b>	<b>844.328</b>	<b>838.092</b>	<b>819.538</b>	<b>846.124</b>

**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, 1<sup>st</sup> crediting period (2008-2012) and 2<sup>nd</sup> crediting period (2013-2017)

Year	Estimated project emissions (tonnes of CO <sub>2</sub> equivalent)	Estimated leakage (tonnes of CO <sub>2</sub> equivalent)	Estimated baseline emissions (tonnes of CO <sub>2</sub> equivalent)	Estimated emissions reductions (tonnes of CO <sub>2</sub> equivalent)
1st Crediting period 2008-2012				
2008	55.305	-	296.782	241.477
2009	136.844	-	764.608	627.765
2010	139.566	-	844.328	704.762
2011	126.445	-	838.092	711.646
2012	114.220	-	819.538	705.319
Total (tonnes of CO <sub>2</sub> equivalent)	572.380	-	3.563.348	2.990.968
2nd Crediting period 2013-2017				
2013	119.949	-	846.124	726.175
2014	119.906	-	845.757	725.851
2015	119.906	-	845.757	725.851
2016	119.906	-	845.757	725.851
2017	119.906	-	845.757	725.851
Total (tonnes of CO <sub>2</sub> equivalent)	599.571	-	4.229.152	3.629.581
Total (tonnes of CO <sub>2</sub> equivalent), both periods	1.171.951	-	7.792.501	6.629.549

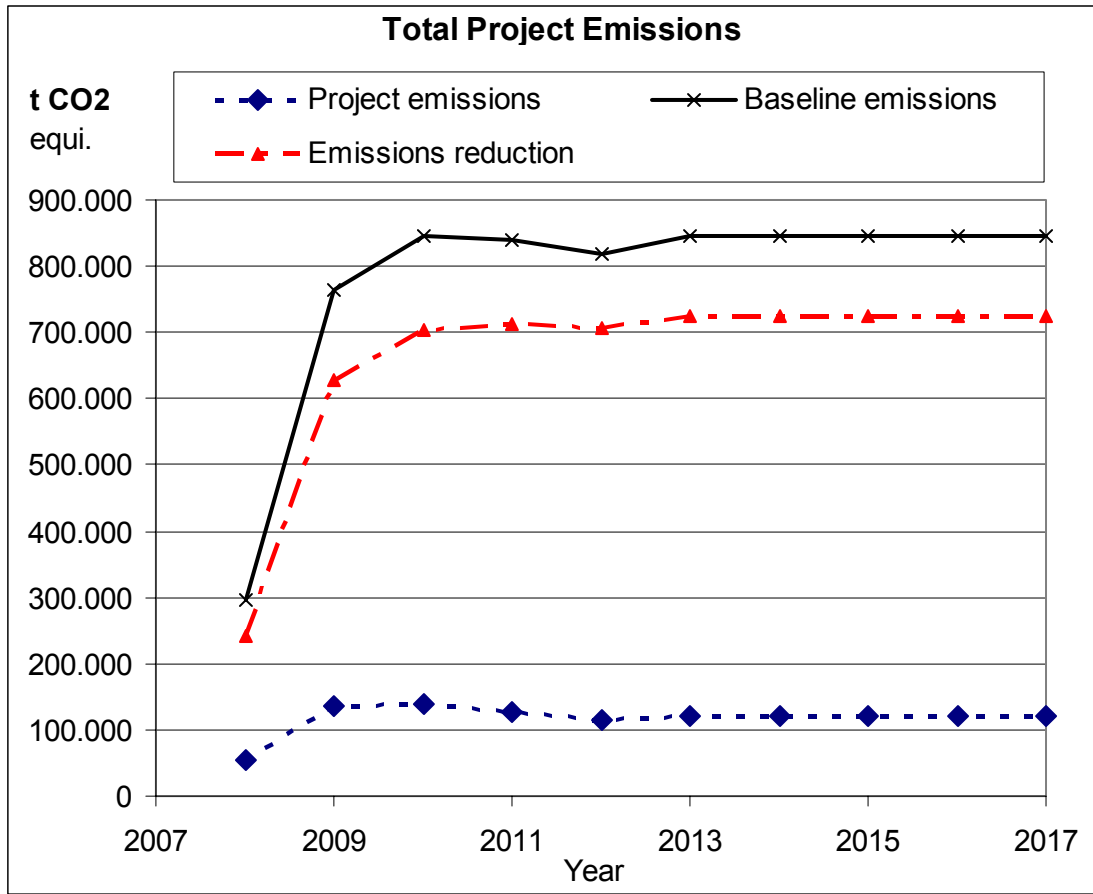


Figure E-1 - Baseline emissions, project emissions and emissions reduction; total project, both crediting periods

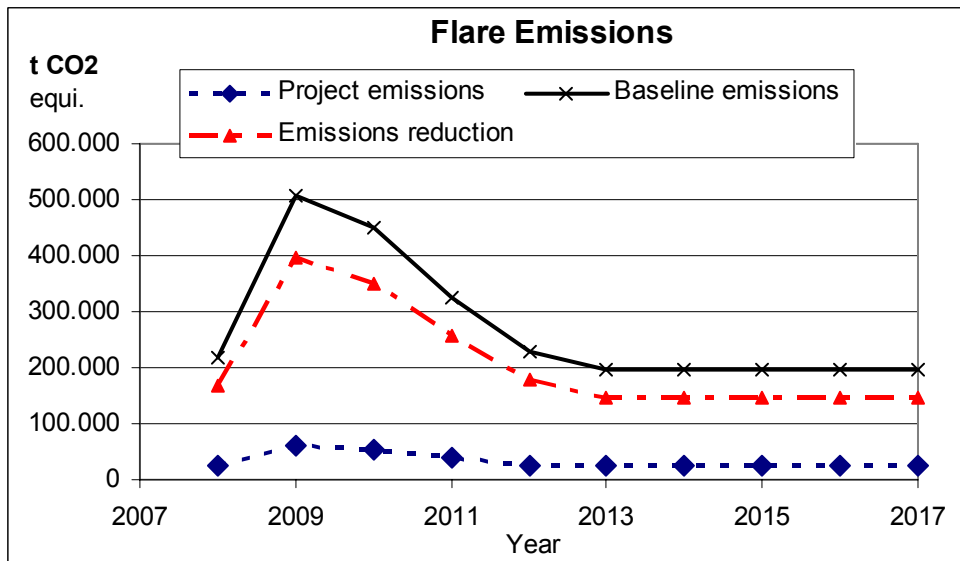


Figure E-2 - Baseline emissions, project emissions and emissions reduction; flaring, both crediting periods

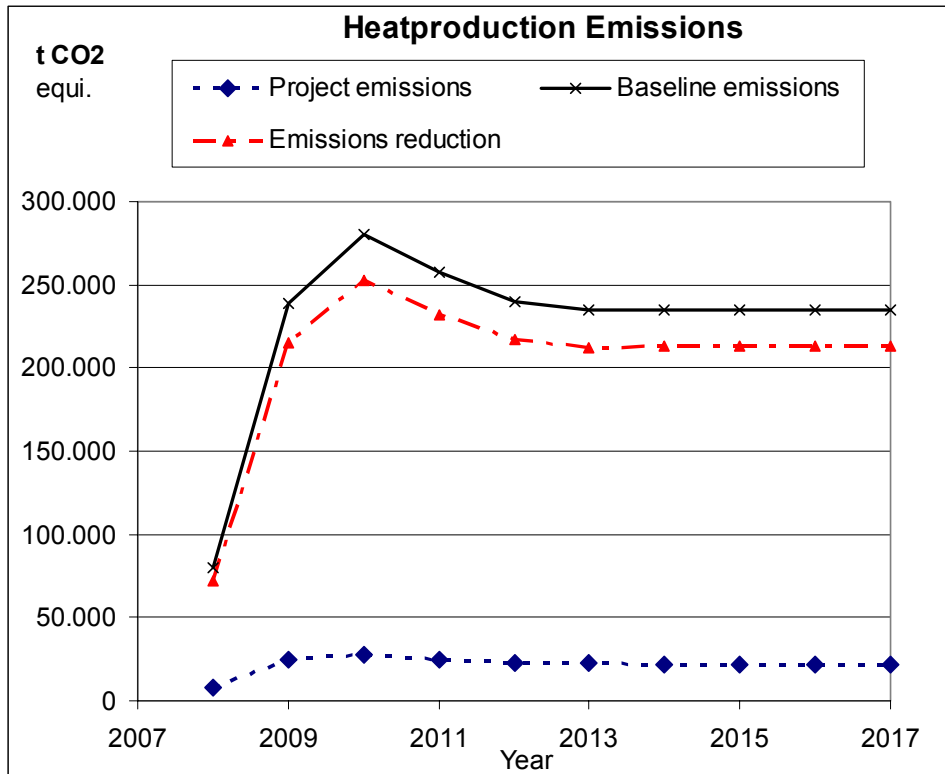


Figure E-3 - Baseline emissions, project emissions and emissions reduction; heat generation units, both crediting periods

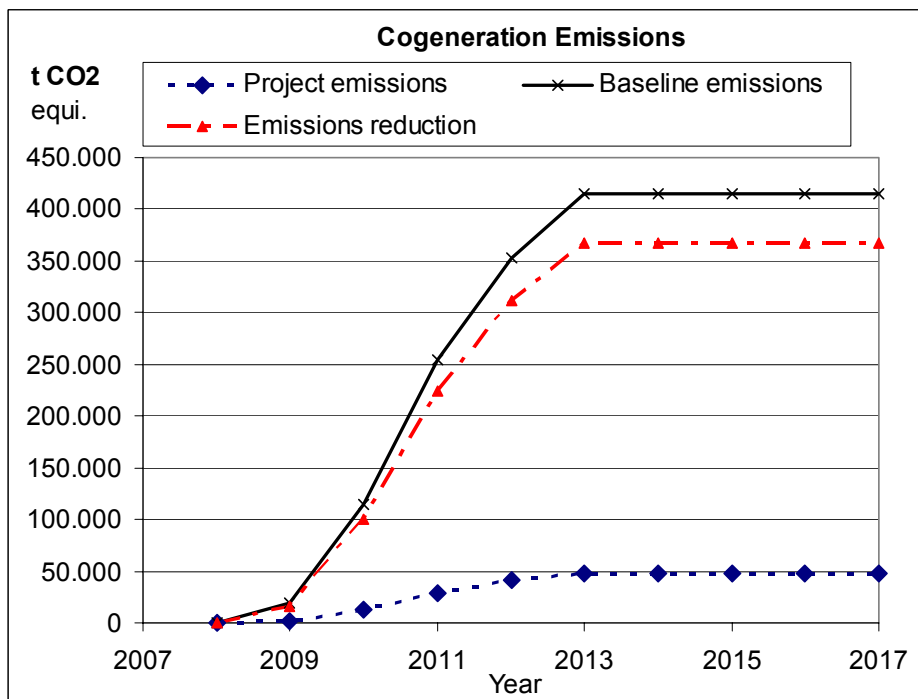


Figure E-4 - Baseline emissions, project emissions and emissions reduction; power generation units, both crediting periods

**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 cogeneration units and the flares are built-in in transportable container modules including the switchgear and all other accessories needed. This principle allows a fast adoption in case of changes in CMM flow or quality by simple regrouping of the units. The complete facilities are built in series production at the manufacturer.

The container technology provides an easy removal of the facility after shutdown. The container has only a small footprint and is set up on four small ready-mix concrete plates, which are put under the four angles of the container. Because no groundwork is needed the complete plant can be removed fast and easy and the original state of the site can be restored in an uncomplicated way after shut down.

The facilities do not use the natural resources: water, ground and landscape, so that no impairment on nature or landscape is given. The facilities do not produce any waste, sewage or condensate. Due to the very high operational safety standards supplied a very low accident hazard is given. Due to the low intervention to the nature renaturalisation is easy.

All combustion units require an approval by the Russian Mining Authorities. The combustion processes are designed to comply for the German emissions limits (German "TA-Luft"), especially for NO<sub>x</sub>, CO and C<sub>n</sub>H<sub>m</sub>.

Both facilities cause 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 plants reduces the uncontrollable migration of CMM to the surface in the surrounding area and reduces consequently the accident hazard by fire and explosions caused through methane which would otherwise uncontrollable discharge to the atmosphere.

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 supporting 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 Ministry for Economic Development and Trade of the Russian Federation. The requirements should be checked by the government when the permission of the plant will be applied.

**SECTION G. Stakeholders' comments****G.1. Information on stakeholders' comments on the project, as appropriate:**

The project has been introduced to the Russian Government the Ministry for Economic Development and Trade of the Russian Federation in Moscow and local authorities of the Kemerovo Oblast in Kemerovo. The authorities appreciated the project. It was especially noted that utilisation of coal mine methane will increase the safety of the work at the coal mine and create some new working places.

Annex 1**CONTACT INFORMATION ON PROJECT PARTICIPANTS**

Organization:	Novaya Energetika OOO
Street/P.O.Box:	Prospekt Oktyabrskiy
Building:	4
City:	Kemerovo
State/Region:	
Postfix/ZIP:	650040
Country:	Russia
Telephone:	+7 (3842) 777 272
FAX:	+7 (3842) 777 272
E-Mail:	Noven42@mail.ru
URL:	
Represented by:	Mr. Maxim Zolotich
Title:	Director
Salutation:	Mr.
Last Name:	Zolotich
Middle Name:	Stanislavovitsch
First Name:	Maxim
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+7 (960) 9080220
Personal E-Mail:	Goldem42@mail.ru

Organization:	Carbon-TF B.V.
Street/P.O.Box:	Horsterweg 217
Building:	
City:	Venlo
State/Region:	
Postal code:	5928 ND
Country:	Netherlands
Phone:	+31 (0) 77 351 7985
Fax:	+31 (0) 77 354 8687
E-mail:	<a href="mailto:info@carbon-tf.com">info@carbon-tf.com</a>
URL:	<a href="http://www.carbon-tf.com">www.carbon-tf.com</a>
Represented by:	Jürgen Meyer
Title:	Managing Director
Salutation:	Dr.
Last Name:	Meyer
Middle Name:	
First Name:	Jürgen
Department:	
Phone(direct):	
Fax (direct):	
Mobile:	
Personal e-mail:	<a href="mailto:jm@carbon-tf.com">jm@carbon-tf.com</a>

Annex 2**BASELINE INFORMATION****Baseline emissions reduction from displacement of power and heat**

The emissions reduction from displacement of power and heat are given by formula (25) from ACM0008, see pg. 42, Chpt. D.1.1.4.

The emissions reduction from displacement of power is calculated using the prospected power generation of the project  $GEN_y$  and the standardised carbon emission factor for the Russian Grid  $EF_{ELEC}$ .

The emissions reduction from displacement of heat is calculated using the prospected heat generation of the project  $HEAT_y$ , the carbon emissions factor of coal  $EF_{HEAT}$  and the efficiency of the displaced old coal boilers  $Eff$ .

**Baseline Carbon Emission Factor for Coal**

The current fossil fuel used at the coal mine is coal from own production. The fraction used for firing of the coal boilers is not analysed in a laboratory so that no data is available. The standard carbon emission factor from the IPCC guidelines is taken instead.

The value for “Coking Coal” / “Other Bit. Coal” of 25.8 t C/TJ has been taken. This is the value with the lowest carbon emissions, thus this is conservative for coal displacement. The value of 25.8 t C/TJ is responding to 0.3406 t CO<sub>2</sub>/ MWh generated heat.

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

The standardised carbon emission factor for the Russian Grid should be approved and published by the Russian DNA, the Ministry for Economic Development and Trade of the Russian Federation.

At the time this official factor is not available. For ex ante calculation carbon emission factors for the Russian Grid published by SenterNoven [Senter] have been taken into account.

Type of project	Parameter	EF (t CO <sub>2</sub> / MWh)
JI project producing electricity	$EF_{grid,produced,y}$	0.492*
JI projects reducing electricity	$EF_{grid,reduced,y}$	0.550*

\*) average values

Table 33: Emission Factors for the Russian grid, average values for the years 2008 – 2012 [Senter]

A part of the electricity produced by the project is used at the coal mine and the surplus is fed-in into the grid. Both parts displace the equivalent power amount produced in the grid. Hence the project is reducing electricity.

The electricity consumption of the cogeneration units is additional consumption, so that this part of the project is producing electricity.

**Efficiency of the old coal boilers**

The efficiency of the old coal fired boilers is given by the manufacturer as 82.8 % a measurement has shown that in fact only an efficiency of 70.6% is given.

**Efficiency of the upgraded boiler**

The efficiency of the upgraded boiler has to be measured after the upgrade. For the calculation the measured efficiency of the old coal boiler of 70.6% has been taken into account.

**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 more than 100 CMM cogeneration units in Germany.

**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.

Annex 3**MONITORING PLAN**

The monitoring plan is listed in section D. In this section additional information concerning the flaring technology used is given.

**Justification of the combustion efficiency of the chosen flare**

According to ACM0008 the methodological “Tool to determine project emissions from flaring gases containing methane” [Fl-Tool], EB 28 Meeting report, Annex 13, has been taken for the determination of the project emissions from flaring. The default combustion efficiency of 90% for enclosed flares has been taken into account.