Project Design Document (PDD)

A General Project Description

A 1 PROJECT IDENTIFICATION

Title of the project activity *(CDM-PDD A.1.)*:

Recovery and utilization of coal methane through power generation

Applicant:

Zasydko Mine, Donetsk, Ukraine

Date of submission: April 2005

A 2 GENERAL INFORMATION

A 2.1 General information	
Project name	Zasyadko Coal Methane Utilization Project
Project type	X Avoidance ○ Reduction
Description of the project activity and its purpose ***(CDM-PDD A.2.)***	Avoidance of methane emissions into the atmosphere and of methane explosions in the mine works. **Coal mine methane**, drained and recovered in the operating and abandoned mine works and from mine ventilation works, as well as methane produced by surface wells at Zasyadko Coal Mine, will be **used to (i) produce electricity** for mine works thus reducing and avoiding methane emissions in the atmosphere; **(ii) replace coal** currently used to produce heat at a higher efficiency than the current coal-fired boiler by installing heat recovery systems at gas-fired power generators to produce heat for the Mine and external consumers, including municipal boilers; and **(iii) produce, by refining mine-gas mixture sale-quality natural gas** for domestic, commercial and industrial use by population and other users, including as truck fleet fuel. Gas-fired electricity generators will supply electricity to the Mine. Heat recovery systems will provide heat to the Mine and municipal boilers. Gas processing plant will supply sale-quality gas to the Mine and local gas distribution network. The **utilisation of around 150 Mio m³ CMM captured annually** from mining activities at the Zasyadko Coal mine will result in generation of 339.92 GWh of electricity and 294,560 Gcal of heat, 100 Mio. m³ purified gas for household consumption and approx. 10 Mio. m³ used as automotive fuel annually. Over the crediting period **2008-2012** an **emission reduction of 11.9 Mio. t CO_{2equi}** will be achieved within this project. Besides the project has positive social-economic impact since new jobs will be created and personnel will receive extra training thus improving their skills and qualifications. Additionally, the project will contribute to a reduction of pollutants such as NO_x, SO_2, CO_2 and particles as result of shut down of coal and gas boiler plants and replacing electricity from fossil power plants.
Description of the background to the project	Donetsk basin (Donbass) is the largest industrial region of Ukraine with coal, metallurgic and chemical industries, is one of the most hazardous regions of Ukraine in terms of environmental pollution. The main contributor of methane emissions to the atmosphere is the coal industry. Methane reserves in carboniferous deposits are estimated from 12 to 25 trillion m³. Every year, many millions of cubic meters of methane gas (CH4) are released from the coal mines in Donbass. The methane, present in large quantities in the porous structure of coal, is released by mining

	activity, collected by ventilating air circulating the workings, and then discharged into atmosphere leading thus to global warming as methane is number 2 greenhouse gas regulated by the Kyoto Protocol. Zasyadko coal mine has been under development since 1958. Its mining allotment includes neighboring territory of the cities Donetsk and Makeevka and Yasinovatskiy district of Donetsk oblast. Among nineteen coal seams bearing 125 million (mln) tones of coking coals the mine is developing only four, i.e. m3, l4 l1 and k8. The mine methane deposits contain about 18.9 billion (bln) m3 of gas. Annual coal recovery makes about 4 mln tones while methane release is at the level of 300 mln m3 per year. High methane content is among the key factors determining the complexity of coal recovery and its high production cost at the Zasyadko Coal Mine. The methane presence and the threat of methane-air mix explosion hamper the progress of mining works and demand to increase safety working conditions of miners. Statistical survey of fatal accidences occurred in mines witnesses that the great majority of those relate directly to ignition and explosion of methane. The President of Ukraine and the Government preoccupied with concerns on providing safety for coal miners have issued the decrees to support and to regulate activities to be implemented: – The Decree of the President of Ukraine as of 16 January 2002 Nr. 26/2002 "On urgent activities for improvement of work conditions and development of the state supervision at mining enterprises"; – The Governmental Decree as of 6 July 2002 Nr. 939 has approved the Complex Programme of coal-beds degasification at coal mines. *Degasification activities* To comply with provisions of Complex Programme the Zasyadko Coal Mine is implementing its own degasification project that envisages drilling underground boreholes, introduction of vacuum pumping stations (VPS) at three production sites, namely Vostochnaya, Grigorievskaya and Yakovlevskaya. As of 01. January 2005, the progress of the degasification project is as follows: – 10 drilling machines are in operation, – 35 km of ∅ 630 mm and 530 mm degasification pipelines has been laid out – 7 km of underground degasification boreholes is being drilled monthly – 2 vacuum pumping stations introduced: one at the Vostochnaya

	site comprised of 6 vacuum pumps and the other at the Yakovlevskaya site comprised of 9 vacuum pumps – daily methane captured flow rate is 150 m^3/min. Further development of degasification activity envisages the increase of methane drainage flow rate up to 500 m^3/min that will be achieved from: – increasing underground drilling up to 10-12 km per month (about 120 km per annum), – laying down more 20 km of pipelines, – purchasing 15 vacuum pumping stations with output capacity of 150 m^3/min each; – having 4 VPS in permanent operation. It is also necessary to purchase 2 machines for drilling surface wells. Each machine drills wells of 3 km in depth and 200 mm in diameter per month. To sum up, implementation of the degasification project will permit to drain annually up to 300 mln m^3 of methane. *Utilisation of methane captured* The implementation of the complex degasification programme at the Zasyadko Coal Mine contributes to environmental pollution and leading to climate change due to increasing the drainage of coal mine methane (CMM) into atmosphere. To prevent methane emissions the Mine started CMM utilisation projects by introducing modern best available technologies based on the application of methane energy content. To date there is only small portion (2%) of methane captured is utilized in two gas filling stations. The further uses of CMM will be provided through construction of three more gas filling stations, an CMM purification plant and combined heat and power (CHP) generation plants. Degasification activities at the Vostochnaya and Grigoryevskaya production sites are implemented independently and do not interfere in methane extraction volumes to the surface Therefore, CMM utilisation activities at the Yakovlev production site are part of a separate project.

A 2.2 Category(ies) of project activity	
Project category ***(CDM-PDD A.4.2.)***	X Construction (retrofitting) of combined heat and power coupling plants; ○ Energy sources transfer in energy conversion installations and production plants to renewable energy sources or from energy sources with high carbon content to energy sources with lower carbon content, especially in existing district heating systems; ○ Construction (or retrofitting) of generating plants operated with renewable energy sources (especially wind power plants, biogas or biomass combined heat and power plants as well as hydroelectric power plants); ○ Projects whose purpose is the avoidance or (energy) recovery of landfill gas; ○ Waste management measures which contribute to the avoidance of greenhouse gas emissions, especially through energy recovery from waste, if possible under consideration of waste heat utilisation; ○ Projects serving the reduction of end-user energy consumption in residential accommodation, public and private service office buildings as well as industrial applications and processes (including waste heat potentials) (energy efficiency projects) X Other: Avoidance and energy recovery of coal mine methane (CMM)

A 2.3 Greenhouse gases	
Greenhouse gases reduced by the project	X CO_2 X CH_4 ○ N_2O ○ HFCs ○ PFCs ○ SF_6

For "Small Scale" CDM projects simplifications in certain areas are possible (baseline, monitoring plan etc.). Information is available at http://cdm.unfccc.int/.

A 2.4 CDM project category	***Not applicable***
CDM project category	○ Normal project ○ Small-scale project o Renewable energy project activity with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent) o Energy efficiency improvement project activity which reduces energy consumption, on the supply and/or demand side, by up to the equivalent of 15 gigawatthours per year o Other project activity that both reduces anthropogenic emissions by sources and directly emits less than 15 kilotonnes of carbon dioxide equivalent annually

A 3 PROJECT PARTICIPANTS *(CDM-PDD A.3.)*

A 3.1 Applicant	
Name	A.F. Zasyadko Mine
Type of organisation	○ Authorities: _____ ○ Private enterprise ○ NGO X Other: Lease company
Other functions of applicant within the project	X Sponsor ○ Intermediary ○ Technical consultant ○ Other: _____
Main activities, knowledge and experience	Zasyadko Mine main activities include: – exploration and development of coal reserves; – extraction, handling, processing, and refining of coal; – transportation, marketing, and sales of coal concentrate It has been engaged in its core activities since 1958. It employs about 10,300 staff, including 920 engineering and technical personnel. It is one of the most efficient and profitable coal mining and processing companies in the Ukrainian coal industry. Since 2001, the Mine is implementing coal methane degassing, gathering and removal program. The Mine is also implementing pilot limited methane utilization through boiler co-firing with coal and utilization as truck fuel.
Address	A.F. Zasyadko Mine Pr. Zasyadko, Donetsk 83054, Ukraine
URL	
Phone/fax	B. Bokiy: tel. + 380 622 517 337; tel/fax + 380 62 385 67 32 A. Mistyuk: tel. + 380 622 517 370; tel/fax + 380 62 345 46 69
E-mail	B. Bokiy: zas_vtb@dn.farlep.net; A. Mistyuk: zsdkoves@velton.donetsk.ua
Contact person *Name, department, phone, fax, e-mail*	Boris V. Bokiy, Head of Ventilation, Degassing, and Methane Utilization Aleksandr M. Mistyuk, Director for Finance and Economics

A 3.2 Project developer	
Name	A.F. Zasyadko Mine
Type of organisation	○ Authorities: _____ ○ Private enterprise ○ NGO X Other: Lease company
Other functions of project developer within the project	X Sponsor ○ Intermediary ○ Technical consultant ○ Other: _____
Main activities, knowledge and experience	See A 3.1
Address	See A 3.1
URL	See A 3.1
Phone/fax	See A 3.1
E-mail	See A 3.1
Contact person *Name, department, phone, fax, e-mail*	See A 3.1

A 3.3 Other project participants	
Name	GE Jenbacher GmbH & CO OHG
Type of organisation	○ Authorities: _____ X Private enterprise ○ NGO ○ Other: _____
Other functions of project participant within the project	○ Sponsor ○ Intermediary ○ Technical consultant X Other: Equipment supplier
Main activities, knowledge and experience	GE Jenbacher is one of the world's leading manufacturers of gas-fueled reciprocating engines, packaged generator sets and cogeneration units for power generation: – Gas-fuelled reciprocating engines and packaged generator sets for power generation applications – Output range: 0.3 - 3 MW GE Jenbacher gas engines are known for their high efficiency, low operating cost and exceptionally high reliability. The engines combine a high output density with low exhaust emissions and low-cost construction. GE Jenbacher provides gas engine power systems for both combined heat and power applications (CHPs) and power generation alone. GE Jenbacher engines run on natural gas, a wide variety of biogases, liquid gases and combustible industrial waste gases. GE Jenbacher offers a full portfolio of services for our engines, including contractual service agreements, spare parts, the knowledge network and training.
Address	GE Jenbacher Headquarters Achenseestraße 1-3, 6200 Jenbach, Austria
URL	http://www.ge-energy.com/businesses/ge_jenbacher/de/index.htm
Phone/fax	tel +43 5244 600-0; fax +43-5244-600-548
E-mail	contact@gejenbacher.com;
Contact person *Name, department, phone, fax, e-mail*	Alex Pavlov, Sales tel: + 43 5244-600-2655; fax: +43 5244-600-42655 ; mobile: +43-676-8944-2655; alex.pavlov@gejenbacher.com

A 3.4 Other project participants	
Name	Energieverwertungsagentur– the Austrian Energy Agency (E.V.A.) GmbH
Type of organisation	○ Authorities: _____ X Private enterprise ○ NGO ○ Other: _____
Other functions of project participant within the project	○ Sponsor ○ Intermediary ○ Technical consultant X Other: JI-consultant
Main activities, knowledge and experience	Energieverwertungsagentur– the Austrian Energy Agency (E.V.A.) GmbH is a 100% daughter of the Austrian Energy Agency, a non-profit organisation. The overall mandate of Energieverwertungsagentur– the Austrian Energy Agency (E.V.A.) GmbH is to make "energy savings" an energy source which can successfully compete with conventional sources of energy, and to advocate boundary conditions under which market forces can act in favour of renewables and improved energy efficiency. The main focus of the company is: – elaboration of long term strategies for sustainable development – consultancy for concrete investment projects and programmes – decrease of costs of projects ready for the market – implementation of pilot projects
Address	Energieverwertungsagentur– the Austrian Energy Agency (E.V.A.) GmbH Otto-Bauer-Gasse 6, 1060 Vienna, Austria
URL	http://www.energyagency.at
Phone/fax	tel: +43 1 586 1524–0; fax: +43 1 586 1524-40
E-mail	office@energyagency.at
Contact person *Name, department, phone, fax, e-mail*	Michael Sattler Head of Unit Energy Economics and Energy Policy tel: +43 1 586 1524-25, fax: +43 1 586 1524-40 michael.sattler@energyagency.at

A 4 Location of the Project Activity

A 4.1 Host Country	
Host Country Party(ies) ***(CDM-PDD A.4.1.1.)***	Republic of Ukraine
Region/State/Province etc. ***(CDM-PDD A.4.1.2.)***	Donetsk Oblast
City/Town/Community etc. ***(CDM-PDD A.4.1.3.)***	Donetsk

A 4.2 Location of the project activity	
Detail of physical location, including information allowing the unique identification of this project activity ***(CDM-PDD A.4.1.4.)*** *Please enclose a map of the project location.*	The Coal Mine named after A.F. Zasyadko (Zasyadko Coal Mine) is located in Kiev district of the city of Donetsk, the capital of Donetsk oblast and has been under development since 1958. Its mining allotment includes neighboring territory of the cities Donetsk and Makeevka and Yasinovatskiy district of Donetsk oblast. The locations of the Donetsk region as well as the location of the Zasyadko coal mine are shown on the following two maps. 

	
Is the location in a nature reserve?	○ Yes X No
Will the project have effects on residents? *(e.g. noise, smell, other immissions, additional infrastructure, ...)*	The realisation of the project "Recovery and utilisation of coal methane through power generation" is expected to have the following positive effects on the residents of the City of Donetsk: – reduction of local emissions of the ambient air pollutants carbon monoxide, sulphur and nitrogen oxides, and particulates from coal-fired boilers that would be phased out and closed – removal of local environmental nuisance resulting from venting of large volumes of methane containing gas mix close to the residential areas and potential seepage – improvement of miners safety and health and improved work conditions improved work conditions by removing the threat of explosions and improving heating and cooling of the mine works – improvement of the residents' economic situation by providing heat, gas and electricity for households at a price which is 10 to 20% lower than the actual market price. Negative impacts of the project would be very limited in scope and time – largely small increase in emissions and noise during the construction period due to increase in vehicular traffic and operation of construction machinery. No new access roads will be built for the realisation of the project.

A 5 SCHEDULE

A 5.1 Schedule			
Starting date of the project activity *(e.g. start of construction)* ***(CDM-PDD C.1.1.)***	October, 2004		
Construction period	October, 2004 to 12, 2007		
Construction phases	Nr.	Measure	Duration
	1	**Construction of gas gathering network and vacuum pump stations**	**10/2004 - 06/2006**
	1.1	Stage of extension 1: 3 vacuum pump stations	10/2004
	1.2	Stage of extension 2: 6 vacuum pump stations at Vostochnaya Site	12/2005
	1.3	Stage of extension 3: : 9 vacuum pump stations at Grigoryevskaya Site	06/2006
	2	**Procurement and installation of cogeneration units**	**01/2005 – 09/2007**
	2.1	Vostochnaya Site: 12 units - 36.42 MW	01/2005 – 06/2006
	2.2	Grigoryevskaya Site: 2 units – 6.07 MW	01/2006 – 09/2007
	3	**Procurement and installation of the CMM purification plant**	**12/2005- 12/2007**
	4	**Procurement and installation of automotive gas-filing stations**	**2006-2007**
	4.1	Automotive gas-filling station 1	**10/2006**
	4.2	Automotive gas-filling station 2	**10/2007**
Date of commissioning	Cogeneration units – Vostochnaya Site: 6 units		06/2005
	Cogeneration units – Vostochnaya Site: 3 units		03/2006
	Cogeneration units – Vostochnaya Site: 3 units		06/2006
	Cogeneration unit – Grigoriey Site: 2 units		09/2007
	Gas processing and refining plant:		12/2007
	Automotive gas-filling station 1		12/2006
	Automotive gas-filling station 2		12/2007

Expected operational lifetime of the project activity *(in years and months, e.g. two years and four months would be shown as: 2y-4m)* ***(CDM- PDD C.1.2.)***	From: 06/2005 – 06/2020: 15y

A detailed project schedule is to be enclosed.

A 5.2 Choice of the Crediting Period	
JI projects	Starting date of the Crediting Period *(DD/MM/YYYY):* 01/01/2008 In addition to the credits generated in the first commitment period 2008-2012, the project will reduce greenhouse gas emissions before 2008. It is intended that AAU equivalent to this emission reductions are transferred during the first commitment period.
	Duration of the Crediting Period *(in years and months)*: 5 years
CDM projects ***(CDM-PDD A.4.4.1., CDM-PDD C.2., CDM-PDD C.2.1., CDM-PDD C.2.1.1., CDM-PDD C.2.1.2., CDM-PDD C.2.2., CDM-PDD C.2.2.1., CDM-PDD C.2.2.2.)***	○ Renewable Crediting Period *(max. seven years per period)* ○ Fixed Crediting Period *(max. ten years)*
	Starting date of the (first) Crediting Period *(DD/MM/YYYY):* _____
	Length of the (first) Crediting Period *(in years and months)*: _____

A 6 TECHNICAL DESCRIPTION OF THE PROJECT

<table>
<tr><td>A 6.1 Technology to be employed by the project activity</td><td></td></tr>
<tr><td>Project technology used and listing of all measures

Please refer to Appendix 2 of the Invitation for Proposal.

(CDM-PDD A.4.3.)</td><td>
Combined heat and power plant

The project envisages the installation and operation of CHP plants comprising 14 GE Jenbacher cogeneration modules (

The CHP generation plant will be installed in a separate building and will include the following main technological and auxiliary production objects:
• gas treatment site
• CHP generation plant
• technological pipelines
• electrical wire ways
• communication network infrastructure.

JMS 620 cogeneration module consists of:
• four-stroke-cycle- gas engine with spark ignition
• generator
• intercoolers with two stage cooling circuits

Operational control and monitoring are performed with the automatic controlling complex to be delivered with the basic equipment.

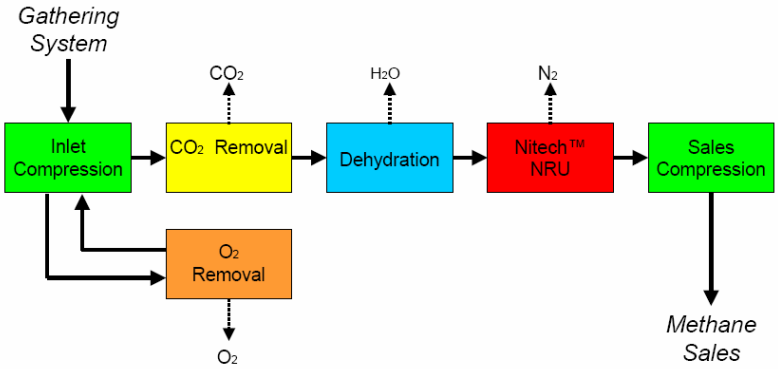
The key technical indicators of a JMS 620 module as follows
<table>
<tr><th>Indicator</th><th>Unit</th><th>Value</th></tr>
<tr><td>Electrical capacity</td><td>kW</td><td>3,035</td></tr>
<tr><td>Heat capacity</td><td>Gcal/h</td><td>2,630</td></tr>
<tr><td>Consumption of CMM*</td><td>m³/h</td><td>622.5</td></tr>
<tr><td>Consumption of ignition dose**</td><td>m³/h</td><td>25</td></tr>
<tr><td>Gas mixture methane content</td><td>%</td><td>25</td></tr>
<tr><td>Methane concentration of ignition dose</td><td>%</td><td>94.8</td></tr>
</table>
</td></tr>
</table>

CMM Purification plant

Utilisation of purification technology (owned and utilised by BCC Engineering (United States) will process methane removed from the mines and supply a natural gas product that will meet pipeline specifications.

The plant will be designed to produce a maximum of 100 Mio. m^3/a of sales gas. Gas will be routed from the vacuum pump stations at the Zasyadko mine to a central processing point where it will begin the treating process. About 16-18 Mio. m^3/a of this gas will be used to control the BTU stability of the fuel gas to the CHP plants.

Please refer to the block flow diagram below for a simple flow schematic of how the mine gas is to be processed for oxygen removal.



Automobile gas-filling compressor plant (AGFCP)

Gas with a methane content of more than 90% can be utilised as fuel for automotive transport. For this purpose, gas filling compressor plants manufactured by Sumygazmash (Ukraine) (www.sumygazmash.com)

The key technical indicators are as follows:

Description	Unit	Value
Gas capacity	nm^3/day	2,640 – 5,472
Suction pressure	MPA	0.05 – 0.3
Number of automobiles to be filled up	unit/day	min. 45 – max. 110
Number of compressors	unit	1
Number of compression states	unit	5
Total power consumption	kW	52

Project Implementation

All design, installation and supervision works are performed by Ukrainian entity, NPO "Cinapse" (www.cinapse.ua). The Zasyadko Coal Mine performs construction and a part of installation works.

	The installation of CHP generation plants comprising of GE Jenbacher (Austria) (www.jenbacher.com) cogeneration modules is planned in batches that presents separate projects at the mine's production sites, namely Vostochnaya, Grigoryevskaya and Yakovlev. The PDD will consider impact of methane emissions reduction of activities related to the introduction of CHP plants at Vostochnaya and Grigoryevskaya production site. The CMM purification plant is supplied by BCCK Engineering, Inc. (USA) (www.bcck.com), an international, multi-disciplinary engineering firm specializing in nitrogen rejection, NGL recovery, membrane based carbon dioxide extraction, helium extraction, and oxygen removal. The AGFCP (Automobile gas-filling compressor plants) are a product of the Urkainian company Sumygazmash (www.sumygazmash.com). Sumygazmash designs and manufactures technologies and equipment, providing alternative fuels energy use, meaning natural and associated petroleum gas. The equipment for the gas treatment plants such as refrigerators and heaters will be supplied by OAO "Refma" (www.refma.com.ua), an Ukrainian company. Separators for water extractions are produced by the Russian company OAO "Neftetermash". Measuring equipment for the gas treatment plant is provided by DBT (Germany) (www.dbt.de). DBT has far reaching experience in installation of measuring instruments and tools applied for monitoring of CMM work parameters world-wide. All companies mentioned above will provide supervision and adjustment works, train the staff as well as submit technical manuals ensuring therefore a proper use of the technology. The maintenance and operation of the project equipment will by provided by the mine itself. The personal for maintenance and operation of the technological equipment will be hired among graduates from the Donetsk Technical University.

A 7 ECONOMIC AND LEGAL ASPECTS

A 7.1 Economic aspects	
Public funding of the project activity *Please provide information on sources and level of public funding for the project activity, including, in the case of public funding for the project activity from Parties included in Annex I, an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.* ***(CDM-PDD A.4.5.)***	The project is 100 % self financed by A.F. Zasyadko Mine.
Economic viability *A detailed financing plan and a comprehensive description of the economic viability of the project has to be enclosed. Please refer to Appendix 1 of the Invitation for Proposal.*	See Business Plan
Indicative offer price for emission reductions (ERUs/CERs) *Please include an illustration of the price calculation and of the underlying assumptions.*	6 EUR per ERU t CO_{2equ}

A 7.2 Legal aspects	
Status of the official approval process in the Host Country	Positive evaluation of the business plan of the investment project "Prevention of Methane Explosions, Methane Utilisation, and Education of Methane Atmospheric Emissions at the A.F. Zasyadko Mine" by the following ministries: – Ministry of fuel and energy – Ministry of economy – Ministry of environmental protection – Ministry of industrial policy, customs committee and regional tax administration. Approval by the Donetsk Oblast (region) "Council of special economic zones and investment activities" (see annex) Letter of Endorsement, as a potential JI project eligible for transfer of ER, from the Ministry of environmental protection (see annex) Building licence for the Vostochnaya site (see annex) The request of Letter of Approval at the Ministry of environmental protection is ongoing. According to the Ukrainian regulations, no additional permits for construction and civil works are required since all project-related activities will be confined to the existing industrial site and no new land will be allotted. The building licence for the Grigoryevskaya site will be issued with the end of the construction work.

B Ecological, Socio-Economic and Development Aspects

According to article ***CDM-PDD F.1.*** documentation on the analysis of the environmental impacts, including transboundary impacts, of the project activity shall be provided. This documentation has to be attached to the PDD. If the environmental impacts are considered significant by the project participants or the Host Party, according to ***CDM-PDD F.2.***, conclusions and all references to support documentation of an Environmental Impact Assessment undertaken in accordance with the procedures as required by the Host Party shall be provided.

The Austrian PDD asks for the following (additional) specifications.

B 1 ECOLOGICAL EFFECTS OF THE PROJECT DURING CONSTRUCTION

The following section deals with the environmental effects of the project activity during the construction phase. Significant effects on the media *water* and *air* and with regard to *waste* and *noise* shall be described in detail as well as mitigation measures undertaken. Relevant regulations (national laws, directives etc.) have to be complied with. If nonexistent or not applicable the current national technological standards/practice are to be observed. Please also describe in detail if the project activity goes beyond these minimum requirements.

B 1.1 Environmental effects during construction	**Noise and dust emission due to increased traffic**
Environmental effects during construction	Environmental effect: Noise and dust emission due to increased traffic to the construction site Mitigation measures: Restriction of traffic flow during construction period exclusively to the access roads – within the limits of the temporarily allotted road lane. o Compliance with relevant regulations/national technological standards o Relevant regulation: _____ *(Please indicate where and how it is available.)* o National technological standard/practice: _____ *(Please state references.)* Does the project go beyond these minimum requirements? X No o Yes: _____

B 1.2 Environmental effects during construction	**Waste**
Environmental effects during construction	Environmental effect: Increased amounts of waste due to construction works Mitigation measures: Equipping of the construction and technical sites with tanks for the collection of waste for further removal and disposal. o Compliance with relevant regulations/national technological standards o Relevant regulation: Waste disposal law 5.3.98 Nr. 187/98-WR *(Please indicate where and how it is available.)* o National technological standard/practice: _____ *(Please state references.)* Does the project go beyond these minimum requirements? X No o Yes: _____

B 2 ECOLOGICAL EFFECTS DURING THE PROJECT LIFETIME

The following section deals with the environmental effects of the project activity during project lifetime. Significant effects on the media *water* and *air* and with regard to *land use*, *biodiversity* and *waste* shall be described in detail as well as mitigation measures undertaken. Relevant regulations (national laws, directives etc.) have to be complied with. If nonexistent or not applicable the current national technological standards/practice are to be observed. Please also describe in detail if your project activity goes beyond these minimum requirements or displays other positive effects.

Water

B 2.1 Effects on the medium water	
Effects on the medium water *(e.g. abstraction of ground or surface water, pollution of surface water, composition of effluents etc.)*	○ Not present X Present Environmental effect: Contamination of surface and underground water Mitigation measures: *Protection of surface water:* • Site selection in order to minimise the impact on the water regime; • No sewage from gas preparation and CHP plant construction. In the case of an accident at the gas preparation site waste water is directed to a closed sewage system. *Protection of underground water against desiccation and contamination:* • Assessment of water quantity taken from the water supply sources • Control of the impermeability of the sewage system • Collection of drainage flows in the closed sewage system ○ Compliance with relevant regulations/national technological standards ○ Relevant regulation: Protection of nature - hydrosphere: General requirements for the protection of superficial water against contamination; GOST 17.1.3.13-86 Sanitary rules and standards for the protection of surface water against contamination; SanPin 4630-88 ○ National technological standard/practice: _____ Does the project go beyond these minimum requirements? X No ○ Yes: _____
	X Positive effects: All the construction works and measures undertaken within this project are of a higher standard compared to typical quality of materials and safety measures.

Air

B 2.2 Effects on the medium air	**CO**
Effects on the medium air *(e.g. quantity of emissions, composition of emissions etc.)*	○ Not present X Present Environmental effect: CHP plants 650 mg/m^3 Mitigation measures: CO emissions are reduced to local levels by installing a catalyst o Compliance with relevant regulations/national technological standards o Relevant regulation: GKD 34.02.305-202 "Pollutant emissions of the energy plants to the atmosphere". State sanitary rules of protection of the atmospheric air of the inhabited localities. Donetsk, 1998. Instruction in execution and contents of the draft standard of the maximum permissible emissions of the contaminants emitted by the stationary sources into the atmospheric air/Ministry of Environmental protection and Nuclear Safety of Ukraine. – K: 1996. Emissions of the contaminants emitted by the energy plants into the atmosphere. Methods of determination. Kiev, 2002. Maximum allowable concentrations and approximate safety levels of impact of the contaminants in the atmospheric air of the inhabited localities. Donetsk, 1998. Instruction about the order of consideration, coordination and expertise of the air-protection measures and issuance of permissions for the emission of the contaminants to the atmosphere in the project decision: OND 1-84.-L.: Gidrometeoizdat, 1984. Standard instruction in organization of the control system for the industrial emissions in the branches of industry. – L.: Goskomgidromet, 1986. Digest of methods in calculation of pollutant emissions of different plants to the atmosphere. – L.: Gidrometeoizdat, 1986.

	Methods of calculation of concentrations of the hazardous substances in the atmospheric air of the enterprises: OND-86. – L.: Gidrometeoizdat, 1987. *Method instructions in regulating of the emissions in case of origination of the adverse conditions: RD 52.04.52-85.-L: Gidrometeoizdat, 1987.* *Method instructions in installation of the signaling devices and gas-analyzers for control of the highly explosive and maximum allowable concentrations of the chemical agents in the air of the production areas: VSN 64-86/Ministry of the Chemical Industry of the USSR/VNIIIB.* *Manual in control of the air pollution sources: OND-90.-S.-P.: PDNTP, 1992.* *Temporal instruction in control of the source of emissions of contaminants into the atmosphere with application of gas-analytic devices. – L:Goskomgidromet, 1986.* *Methods of estimation of the unorganized emissions of the gas-processing plants: RD 39-014306-413-88, 1988.* *Basic directions of the state policy of Ukraine in the sphere of the environmental protection, resource management and provision of the environmental safety. – Donetsk.: VAT "UkrNTEK", 1988.* *(Please indicate where and how it is available.)* o National technological standard/ practice: _____ *(Please state references.)* Does the project go beyond these minimum requirements? X No o Yes: _____
	X Positive effects: Reduction of pollutants such as NO_x, SO_2, CO_2 and particles as result of shut down of coal and gas boiler plants and replacing electricity from fossil power plants.

B 2.3 Effects on the medium air	**NO_x**
Effects on the medium air *(e.g. quantity of emissions, composition of emissions etc.)*	○ Not present X Present Environmental effect: CHP plants 500 mg/m^3 Mitigation measures: CO emissions are reduced to local levels by installing a catalyst o Compliance with relevant regulations/national technological standards o Relevant regulation: GKD 34.02.305-202 "Pollutant emissions of the energy plants to the atmosphere". State sanitary rules of protection of the atmospheric air of the inhabited localities. Donetsk, 1998. Instruction in execution and contents of the draft standard of the maximum permissible emissions of the contaminants emitted by the stationary sources into the atmospheric air/Ministry of Environmental protection and Nuclear Safety of Ukraine. – K: 1996. Emissions of the contaminants emitted by the energy plants into the atmosphere. Methods of determination. Kiev, 2002. Maximum allowable concentrations and approximate safety levels of impact of the contaminants in the atmospheric air of the inhabited localities. Donetsk, 1998. Instruction about the order of consideration, coordination and expertise of the air-protection measures and issuance of permissions for the emission of the contaminants to the atmosphere in the project decision: OND 1-84.-L.: Gidrometeoizdat, 1984. Standard instruction in organization of the control system for the industrial emissions in the branches of industry. – L.: Goskomgidromet, 1986. Digest of methods in calculation of pollutant emissions of different plants to the atmosphere. – L.: Gidrometeoizdat, 1986.

	Methods of calculation of concentrations of the hazardous substances in the atmospheric air of the enterprises: OND-86. – L.: Gidrometeoizdat, 1987. *Method instructions in regulating of the emissions in case of origination of the adverse conditions: RD 52.04.52-85.-L: Gidrometeoizdat, 1987.* *Method instructions in installation of the signaling devices and gas-analyzers for control of the highly explosive and maximum allowable concentrations of the chemical agents in the air of the production areas: VSN 64-86/Ministry of the Chemical Industry of the USSR/VNIIIB.* *Manual in control of the air pollution sources: OND-90.-S.-P.: PDNTP, 1992.* *Temporal instruction in control of the source of emissions of contaminants into the atmosphere with application of gas-analytic devices. – L:Goskomgidromet, 1986.* *Methods of estimation of the unorganized emissions of the gas-processing plants: RD 39-014306-413-88, 1988.* *Basic directions of the state policy of Ukraine in the sphere of the environmental protection, resource management and provision of the environmental safety. – Donetsk.: VAT "UkrNTEK", 1988.* *(Please indicate where and how it is available.)* o National technological standard/ practice: _____ *(Please state references.)* Does the project go beyond these minimum requirements? X No o Yes: _____
	X Positive effects: Reduction of pollutants such as NO_x, SO_2, CO_2 and particles as result of shut down of coal and gas boiler plants and replacing electricity from fossil power plants (see technical description)

Land use

Details on land use are normally only to be stated for Avoidance projects.

B 2.4 Land use	
Land use	11.000 m^2 - insignificant impact of the project related levelling of the surface layer of the construction site   

Effects with regard to land use

(e.g. erosion, landslip etc.)

Please provide at least 2-3 different pictures of the planned location of the project under different angles of view and show the dimension of the buildings of the project on these pictures.

X Not present

○ Present

Environmental effect: _____

Mitigation measures: _____

o Compliance with relevant regulations/national technological standards

o Relevant regulation:

Protection of nature – landscape, GOST 17.8.1.02-88
Constructional climatology and geophysics, SNip 23-01-99

o National technological standard/practice:

_____

(Please state references.)

Does the project go beyond these minimum requirements?

X No

o Yes: _____

○ Positive effects: _____

Biodiversity

Details on biodiversity are normally only to be stated for Avoidance projects.

B 2.5 Effects on biodiversity	
Effects on biodiversity *(Is the project situated in a protected zone, e.g. listed in a fauna or flora inventory? Are there any fauna /flora species mentioned on Red Lists present on the area of the project location?[1] Are there any endangered or indigenous plants or animals present on the area of the project location? etc.)*	X Not present ○ Present Environmental effect: _____ Mitigation measures: _____ o Compliance with relevant regulations/national technological standards o Relevant regulation: Law on Environmental Protection, 25.06.1995, No.1264-XXII o National technological standard/practice: _____ (Please state references.) Does the project go beyond these minimum requirements? o No o Yes: _____
	X Positive effects: Upon completion of the construction the territory around to the building of the power stations will be planted with trees and bushes.

[1] For information on such species cp. e.g. International Union for the Conservation of Nature (IUCN), www.iucn.org/themes/ssc/.

Waste

B 2.6 Waste	
Effects with regard to waste *(e.g. total amount of waste generated, composition of waste, total amount of hazardous waste generated, treatment of hazardous/non-hazardous waste etc.)*	○ Not present X Present Environmental effect: Used oil and ignition plugs from the biogas engines. Mitigation measures: Equipping of the sites with tanks for the collection of waste for further removal and disposal. There is no need for a special waste treatment. o Compliance with relevant regulations/national technological standards o Relevant regulation: Waste disposal law 5.3.98 Nr. 187/98-WR *(Please indicate where and how it is available.)* o National technological standard/practice: _____ *(Please state references.)* Does the project go beyond these minimum requirements? X No o Yes: _____
	○ Positive effects: _____

B 3 SOCIO-ECONOMIC AND DEVELOPMENT ASPECTS

The Austrian JI/CDM Programme touches on developing country interests, therefore the Austrian Development Cooperation Act, BGBl. 2002/49 idgF is also applicable to this Programme. The goals of the Austrian development cooperation policy are: poverty eradication, peace and human security, as well as environmental protection and sustainable use of natural resources. These goals lead to the following questions within the Austrian JI/CDM Programme.

The sections which apply to CDM projects only resp. to both JI and CDM projects are marked accordingly.

B 3.1 Poverty eradication	
CDM project How and how much does the project contribute to economic growth in the Host Country? *Please provide estimated figures of the added value of the project and the current GDP of the Host Country.*	Not applicable
CDM project Does any possible competition between the project and the productive sector in the Host Country exist? Do subsidies for the project hamper the competitiveness of the Host Country?	Not applicable
JI and CDM project Creation of new jobs by the project	○ Total number of new jobs: 364 ○ Number of highly qualified jobs: 31 ○ Number of low qualified jobs: 45

CDM project Is the Host Country an Austrian targeted country resp. an Austrian cooperation country within the Austrian Development Cooperation?[2] Does the Host Country belong to the LDCs?	Not applicable

B 3.2 Peace, security, democracy	***Not applicable***
CDM project How is the assessment resp. ranking of the Host Country in human rights reports resp. international corruption rankings? *Please refer to www.amnesty.org and www.transparency.org.*	
CDM project Is the Host Country involved in an internal or cross-border armed conflict?	

[2] Cp. e.g. http://www.bmaa.gv.at/view.php3?f_id=1463&LNG=en&version.

B 3.3 Social Situation, Cultural Awareness	
CDM project Does the project limit physical or de facto access by indigenous or local users to natural resources (e.g. water)?	Not applicable
CDM project How will possible negative socio-economic or cultural effects (resettlement, access to resources, conflict user-groups etc.) be healed?	Not applicable
JI and CDM project Social security of workforce *Description of services in comparison to local standards (health insurance, accident insurance, other social services)*	Workforce will have social securities according to the Ukrainian standards: • Labour Code of 11 April 1994 in the current version • Mining Act No. 1127-XIV of 6 October 1999 in the current version

B 3.4 Gender Equality	
JI and CDM project Equal Opportunities *Are the principles of equal opportunities reflected in the employment structure of middle and upper management?*	*Middle Management* Number of women: 12 Number of men: 15 *Upper Management* Number of women: 1 Number of men: 28

B 4 ADDITIONALITY AND SUSTAINABILITY

B 4.1 Additionality	
Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances *Please explain briefly how anthropogenic greenhouse gas (GHG) emission reductions are to be achieved and provide the estimate of anticipated total reductions as well as annual estimates for the chosen Crediting Period in tonnes of CO_2 equivalent (max. one page).* ***(CDM-PDD A.4.4., CDM-PDD A.4.4.1.)***	There are a number of barriers, that the project faces, which will have to be dealt with during its implementation. Barriers to prevailing practices According to publicly available information1 1,981 million cubic meters of CMM were generated by Ukraine coal mines in 1999 with approximately 13 percent being extracted through degasification systems while the rest released into atmosphere through ventilation systems. Only four percent of CMM (79 Mio. m^3) was utilized as the fuel primary at own small scale boiler houses but as well as for vehicles. The situation at the Zasyadko Coal Mine is totally in line with national one. Out of 164 Mio. $m^3$of CMM generated during mine works in 2002 only about 4 Mio. $m^3$of methane (2.4%) were utilized as the fuel for mine's vehicle fleet and boiler house at Vostochnaya production site. Moreover 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 project from being implemented and clearly encourage development and expansion of degasification activities. Technology barrier Currently Zasyadko Mine operates five boiler houses with total installed heat capacity of 68.9 Gcal/h. Boiler houses work on natural gas, coal and captured methane and fully cover own heat demand of the coal mine. All electricity currently is purchased from the grid. According to publicly available information as well as studies of the Institute of Geotechnical Mechanics of the National Academy of Science of Ukraine named after N.S. Polyakov the project represents the first application CHP technology for CMM utilization not only at Zasyadko Coal Mine but also in Ukraine. Therefore there is clear technology barrier for the realisation of the proposed project. Besides Zasyadko Coal Mine does not have skilled and properly trained labour force to operate CHP units. In order to overcome this barrier the suppliers of the equipment (GE Jenbacher and BCCk Engineering) will provide training courses for people that will be operating CHP units resp. the CMM purification unit. Such provision is included in the Contract between Zasyadko coal mine and the equipment suppliers.

	Institutional barriers Despite the fact that Ukraine ratified the Kyoto protocol on 12th of April 2004 the country has neither designated focal point for approving JI projects nor established national guidelines and procedures for approving such projects. Therefore to the date there is only one single officially approved Ukrainian JI project. According to PointCarbon's JI Host Country rating Ukraine is on the 9th place with B- rating. Only one country (Russia) has got lower JI attractiveness. Although substantial capacity building assistance were provided to the Ukraine in 2004 under TACIS programme to facilitate Kyoto protocol implementation, including JI, it is not clear when institutional setup for JI projects will be established. It should also be noted that Ukraine does not have national focal point under UNFCCC. Also bearing in mind that Zasyadko Coal Mine does not have any experience in developing JI projects it shall be concluded that there is substantial institutional barrier for the project implementation. *Therefore given the consideration of the above mentioned barriers the project is additional.*

B 4.2 Sustainability	
Summarising description of the project's contribution to the sustainable development of the Host Country *Please also describe the view of the project participants of the contribution of the project activity to sustainable development (max. one page).* ***(CDM-PDD A.2.)*** *This section should also include a description of how environmentally safe and sound technology and know-how to be used is transferred to the Host Party, if any. What kind of project specific training is planned? Which maintenance measures are planned?* ***(CDM-PDD A.4.3.)***	The project contributes to sustainable development in Ukraine through: • using as energy resource locally available fuel and improving the country's trade and current account balances • reducing energy costs for Zasyadko Mine and improving its viability contributing to growth in incomes • improving safety of coal mining operations and preserving important employment base, contributing to economic growth • removing a local environmental nuisance • reducing emissions of ambient air pollutants The project is expected to result only in positive global environmental impacts due to GHG abatement described above. It would also result in positive local environmental impacts, reducing local emissions of carbon monoxide, sulphur and nitrogen oxides, and particulates from coal-fired boilers that would be phased out and closed. This is particularly important since the project site is within a large industrial city with high concentration of population. The project will also remove an important local environmental nuisance resulting from venting of large volumes of methane containing gas mix close to the residential areas and potential seepage. The project will result in significant positive impacts on miners safety and health and improved work conditions by removing the threat of explosions and improving heating and cooling of the mineworks. Negative impacts of the project would be very limited in scope and time – largely small increase in emissions and noise during the construction period due to increase in vehicular traffic and operation of construction machinery. No new access roads will be built. Successful implementation of the project will allow replicating its experience to more than 20 mines with similar conditions in the Donetsk mining district thus multiplying its positive global and local environmental effect.

C Stakeholders' Comments

Stakeholders include all Parties or persons affected by the project. If several stakeholder comments are made, the table is to be copied and filled in separately for each stakeholder.

C 1 Identity of stakeholders	
Name	Trade Union of Zasyadko coal mine
Type of organisation	○ Authorities ○ Private Enterprise ○ NGO ○ Individual Person X Other: Trade Union
Description of the effects of the project on the stakeholder	The implementation of the project of extraction and utilisation of CMM at Zasyadko coal mine, namely activities that are being conduced at Vostochnaya and Grigoryevskaya site, will increase the safety of mining works. Setting into operations gas processing units will reduce pollutant emissions into atmosphere thus improving environmental situation in the region. Work of CHP units will reduce methane emissions (with closing down of boiler houses). The implementation of the project will create new jobs thus reducing unemployment in the region.
Address	Prospekt Zasyadko, 83054, Donetsk Ukraine
Phone/fax	tel. +380 622 517356; fax. +380 622 587590
E-mail	-
Contact person	A. Zaetz, Chairman of Trade Union of Zasyadko coal mine

C 2 Stakeholders' comments	
Brief description of how comments by (local) stakeholders have been invited and compiled Please describe the process by which comments by (local) stakeholders have been invited and complied. ***(CDM-PDD G.1.)***	There are no existing local planning/approval/permitting procedures for public consultation in Donetsk Oblast or in Ukraine. Nevertheless, the project owner – Zasyadko Coal Mine – involved the stakeholders from the beginning of the project. The business plan of the investment project "Prevention of Methane Explosions, Methane Utilisation, and Education of Methane Atmospheric Emissions at the A.F. Zasyadko Mine" was presented for approval to the following stakeholders: – Ministry of Fuel and Energy – Ministry of Economy – Ministry of environmental protection – Ministry of industrial policy – State customs committee – State tax administration of Donetsk region – Council of Special Economic Zones and Investment Activities of Donetsk Oblast (region) The trade union of Zasyadko Coal mine representing was involved in the stakeholder process in order to inform the coal mine workers about the project. Since 2003 the project has been presented to the local communities via news paper and on the occasion of various events in Donetsk and Dnepropetrovsk In particular information about the project was published in: – Magazine "Environmental protection", issue 5, 2003 – Magazine "Protection of labour", issue 8, 2003 – Magazine "Coal of Ukraine", December 2003 – Scientific papers bulleting "Rock geology, rock mechanics and mine surveying", Donetsk, 2004, National Academy of Sciences of Ukraine Copies of the articles are enclosed in the annex. During the validation process the project design document is public available on the homepage of the validator http://www.tuev-sued.de/ for 30 days in order to give international stakeholders the opportunity to comment the project.
Summary of the comments received *Please identify stakeholders that have made comments and provide a summary of these comments.* ***(CDM-PDD G.2.)***	All comments received by the coal mine were positive towards the project implementation. It was especially noted that the utilisation of CMM will increase the safety of mining works, create new jobs and improve the environmental situation in the region. The letter from the Trade Union of Zasyadko Coal is provided in the annex as example of the feedbacks received. The business plan of the investment project "Prevention of Methane Explosions, Methane Utilisation, and Education of Methane

	Atmospheric Emissions at the A.F. Zasyadko Mine" has been approved by the following ministries: – Ministry of fuel and energy – Ministry of economy – Ministry of environmental protection – Ministry of industrial policy, customs committee and regional tax administration. The Council of Special Economic Zones and Investment Activities of Donetsk Oblast (region) also approved the project. Stakeholder consultations also revealed that there is substantial interest to the technical details of the project implementation as well as expected results from other coal mines not only in Ukraine but also in neighbouring countries, in particular Russia. Other mining companies look forward to replicating the experience of Zasyadko Coal Mine if the project proves to be successful.
Report on how due account was taken of any comments received Please explain how due account has been taken of comments received. ***(CDM-PDD G.3.)***	The project has been presented transparently to the stakeholders. The approval of the business plan of the investment project "Prevention of Methane Explosions, Methane Utilisation, and Education of Methane Atmospheric Emissions at the A.F. Zasyadko Mine" by the involved ministries and the Council of Special Economic Zones and Investment Activities of Donetsk Oblast (region) was a precondition for the start of project implementation. The feedback to the information activities via newspapers and presentation at various events and conferences was very positive. Negative comments have not been received so far. Zasyadko Coal mine intends to continue interacting with stakeholders during project realisation and operation.

D Baseline Study

A JI or CDM project has to result in additional emission reductions, i.e. emission reductions which would not take place without the project.

Basically, the actually achieved emission reductions are calculated applying the following formula[3]:

Emission Reductions = (Baseline Emissions) – (Project Emissions)

[3] Additionally, Leakage has to be taken into account.

D 1 GENERAL INFORMATION

D 1.1 Baseline information	
Name and address of person(s)/entity(ies) determining the Baseline resp. Baseline Study *Please provide contact information and indicate if the person/entity is also a project participant.* ***(CDM-PDD B.5.)***	Energieverwertungsagentur – the Austrian Energy Agency (E.V.A.) GmbH Otto-Bauer-Gasse 6 1060 Vienna, Austria Contact Persons: Michael Sattler (michael.sattler@energyagency.at) Elvira Lutter (elvira.lutter@energyagency.at) Energieverwertungsagentur – the Austrian Energy Agency (E.V.A.) GmbH participate in the project as JI consultant.
Date of completion of the Baseline Study *(DD/MM/YYYY)* ***(CDM-PDD B.5.)***	14/04/2005
Further detailed Baseline information *Please attach detailed Baseline information[4] and state whether it is planned to update the Baseline during the project lifetime.* ***(CDM-PDD B.5.)***	

[4] Please provide a table containing the key elements used to determine the Baseline for the project activity including elements such as variables, parameters and data sources. For methodologies approved by the Executive Board you may find a draft table on the UNFCCC CDM web site.

D 2 BASELINE METHODOLOGY AND SCENARIO

A Baseline methodology encompasses inter alia the methods used to determine the Baseline emissions.

D 2.1 Baseline methodology	
Is an existing Baseline methodology used or adapted for the project? *If a methodology approved by the Executive Board is chosen, please state title and reference of the approved Baseline methodology applied to the project activity. In this context please refer to the UNFCCC CDM web site for the title and reference list as well as the details of approved Baseline methodologies.* [5] ***(CDM-PDD B.1.)***	○ Yes: _____ *(State sources and matters used.)* X No
Description of the selected methodology and justification of the choice of the methodology and why it is applicable to the project activity *In the case of an approved methodology please justify the choice of methodology by showing that the proposed project activity meets the applicability conditions under which the methodology is applicable.* ***(CDM-PDD B.1.1.)***	Not applicable

[5] If a new Baseline methodology shall be applied to a CDM project activity, a special procedure has to be observed. For details please refer to http://cdm.unfccc.int/.

Description of how the methodology is applied in the context of the project activity *Please explain the basic assumptions of the Baseline methodology in the context of the project activity and show that the key methodological steps are followed in determining the Baseline scenario. Provide the key information and data used to determine the Baseline scenario (variables, parameters, data sources etc.) in table form.* ***(CDM-PDD B.2.)***	As there does not exist an approved methodology that deals with CMM, the following approach has been chosen. The greenhouse gas emissions in the baseline scenario are made of three parts. First part relates to methane emissions from degasification activities. The second part includes mainly the emissions related to electricity and heat generation as part of the project and emissions from combustion gas, natural gas and CMM in the boiler-houses. The third part includes emissions from CMM gas refining and processing for feeding into the natural gas network. Thus a complex structure of the baseline for a CMM utilisation project necessitates considering two batches of off-site key factors one of which influences methane drainage activities while the other determines the development of carbon emission factors related to in-house and off-site electric power and heat generation.

For each methodology different scenarios can be drafted.

D 2.2 Identification of different Baseline scenarios	
Baseline scenario 1	**CMM collection and release o the atmosphere** Due to security reasons (the Decree of the President of Ukraine as of January 16th, 2002 No. 26/2002 On "Urgent activities for improvement of work conditions and development of the state supervision at mining enterprises") it is a must to improve the conditions in coal mines. Therefore, a pilot project on coal bed degasification of the A.F. Zasyadko Mine has been approved by the Ukrainian government resulting in increased amounts of methane emissions. The following activities under this baseline scenario are possible: i) an increase of annual methane drainage due to the development of mining works on new coalbeds; ii) electric power purchase from the grid; iii) heat supply for project facilities is provided by the site's natural gas- and coal– fuelled boiler-house iv) natural gas used for domestic, commercial and industrial use of the population and other uses incl. as truck fleet fuel.

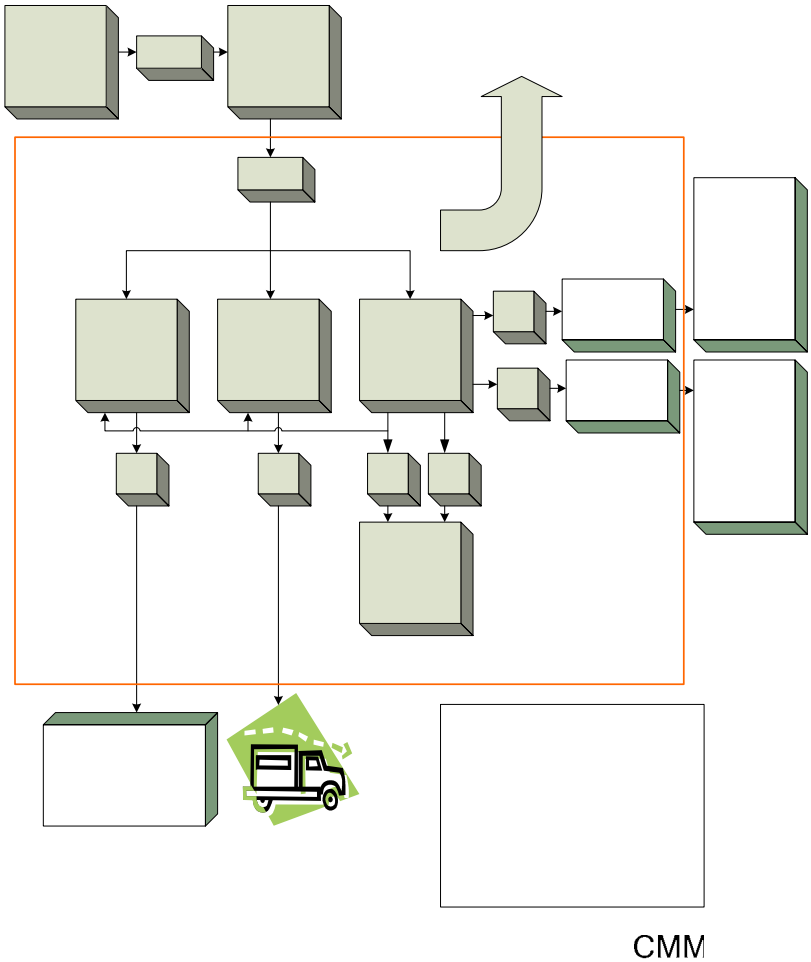
	Therefore GHG emissions in the baseline scenario are made up of two parts. First part relates to atmospheric methane emissions from degasification activities. The second part includes the emissions from the grid otherwise displaced by the project and the emissions from combustion of natural gas and coal in the boiler-house. The emissions from natural gas used for domestic, commercial and industrial use mentioned under point iv) are not taken into consideration, as the supply of CMM to the natural gas network substitutes imported natural gas but there is no decrease of consumption.
Baseline scenario 2	**CMM collection and flaring** In Scenario 2, which is similar to Scenario 1, the aforementioned activities (increase of annual methane drainage due to further development of mining works on new coal beds; electric power purchase from the grid, heat supply from natural gas and coal boilers) would also take place. But in this scenario the company additionally would flare the increasing amounts of collected CMM. Due to the low methane concentration (lower than 25 %) in most of the collected CMM streams, the gas would need further treatment to increase the methane concentration before flaring. This option would not be economically feasible. So this scenario has to be rejected for further consideration.
Baseline scenario 3	

Every suggested scenario has to be justified.

D 2.3 Selected Baseline scenario	
Description of the selected Baseline scenario and justification of the choice	Due to the Decree of the President of Ukraine as of January 16th, 2002 No. 26/2002 on "Urgent activities for improvement of work conditions and development of the state supervision at mining enterprises" Zasyadko Coal Mine is obliged to collect CMM. Utilisation of such CMM, then, became an option for the Zasyadko Coal Mine whether to seek power generation utilising CMM in order to meet their growing demand of energy (electricity, heat and cooling) driven by increasing production of coal. Because the concentration of CMM is not high enough to flare the gas, the only economic feasible option without carbon credits is to release methane to the atmosphere taking into consideration that currently there are no signs for changing the national regulation for this subject. To satisfy the energy needs of the mine it can be expected that the company will make use of their own boiler houses to produce heat and to purchase power from the public grid. The GHG emissions in the baseline scenario are made up of three parts. First part relates to methane emissions from degasification activities. The second part includes mainly the emissions related to electricity generation as part of the project and emissions from combustion of coal, gas and CMM in the boiler-houses. The third part relates to CO2 emissions from

D 3 PROJECT BOUNDARY

The Project Boundary shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the project activity.

D 3.1 Project Boundary	
Description of how the definition of the Project Boundary related to the Baseline methodology selected is applied to the project activity ***(CDM-PDD B.4.)*** *Please enclose a graphical presentation of the Project Boundary.*	In the following graph all human caused emissions within the project boundary are included. These emissions are generated by the following sources: • CO_2 from CMM combusted in 14 CHP units • CO_2 from CMM refinery and processing • $CO_{2equ.}$ from not utilised CMM 
Justification of the selected Project Boundary	The project boundary encloses three methane utilisation facilities for the production of electricity and heat, refining of CMM for feeding in gas into the public gas pipeline and the use of CMM as truck fuel. Activities within the project boundary include 14 CHP plants, one gas processing and refining plant and three automotive gas filling stations at Zasyadko coal mine (without Yakovlev Site). Any energy usage or

m/a

	emission resulting from operation of the aforementioned installations must be taken into account as project emissions. CMM drainage and collection Coal-methane containing gas is captured and drained at the Mine through both horizontal wells, drilled under ground, and vertical wells, drilled from the surface. Under the degassing program currently under implementation, 154 vertical wells will be drilled in 2004-2015 to capture the coal gas from both operating and closed mine works. Thus captured gas will be collected from the well-heads and transported, via the dedicated pipeline gathering network, to the two groups of gas engines (14 CHP units) located, respectively, at two industrial sites located within the Mine – Vostochnaya Site and Grigorievskaya Site. Furthermore, the captured gas will be transported to a gas processing and refinery plant located north of the Vostochnaya Site and to three Automobile Gas Filling Compressor plants (AGFCP). The drainage system is not included within the project boundary as it is an integral and necessary part of the mine required for safety reasons. The operation of the drainage system is driven by the requirement for the mine and is not impacted by the implementation of the project. Power and heat generation and cooling 14 CMM-fired CHP units will be installed at the two sites above from 2005 to 2006. Each generator set has installed capacity of 3.035 MWt, bringing the total installed electricity generation capacity to more than 42,5 MW_{el} by the end of 2006. The generated electricity will be used to supply operational and auxiliary units of the Mine; any surplus will be exported to the grid. The project will therefore substitute part of the coal-based electricity production thus reducing carbon intensity of power generation. Similarly, the above generation sets will produce thermal energy at 2.92 Gcal/hr, with the total heat capacity of 70 MW_{th} by the end of 2006. Heat will be supplied to the Mine in-house consumers (Central and Vostochnaya sites). Surplus heat will be supplied to the surrounding residential areas (heat boiler plants of the 87^{th} and 518^{th} residential blocks) of Donetsk. In addition, heat absorption units will be installed to utilise waste heat from the gas engines and provide cooling to improve the microclimate in the underground mine works. The four boilers operated at Vostochnaya and Grigoryevskaya site will be decommissioned after the start up of the CHP units. Boiler houses work on natural gas, coal and captured methane and folly cover own heat demand of the coal mine. Gas refining and processing plant In 2007, methane processing and purification plant could be built. The plant would process up to 100 million m^3 per year of methane contained in the gas drained and captured by the wells drilled from the surface. The methane-containing gas would be refined to sale-quality gas (with methane content of 95%) and injected into the Donetsk gas distribution network for sale to the municipal gas utility or large industrial customers. Additional products of the gas processing plant include surplus heat and chilled nitrogen for utilization at the Mine.

	Automobile gas filling compressor plant Gas with a methane content of more than 90 % can be used as fuel for automotive transport. For this purpose, three gas filling compressor plants will be installed from 2005 to 2007 (one per year). The emissions resulting from the use of processed CMM fed into the gas network as well as fuelled in to the truck fleet are not taken into consideration. It substitutes natural gas consumption and therefore does contribute neither to a decrease nor to an increase of emissions.

D 4 EMISSIONS

Project emissions

D 4.1 Project emissions within the Project Boundary	
Project emissions within the Project Boundary	X Emission 1 Source: CMM combustion Type of emission: CO_2 X Emission 2 Source: CMM not utilised Type of emission: CH_4 X Emission 3 Source: CMM purification Type of emission: CO_2, CH_4 ○ Emission 4 Source: _____ Type of Emission _____
	○ No emissions within the Project Boundary

D 4.2 **Estimate/calculation of project emissions within the Project Boundary** ***(CDM-PDD E.1., CDM-PDD E.6.)***	
Emission 1	These emissions will be generated from combustion of CMM captured and supplied to Jenbacher cogeneration modules. Unless better methodologies and emissions factors are available, the Revised 1996 IPCCC Guidelines for National greenhouse gas Inventories is used to calculate project emission factor. Therefore, the following IPCC factors were used: • emission factor for methane natural gas – 15.3 tC/TJ • fraction of oxidized carbon for natural gas – 99.5% • factor of recalculation of C into CO2 emission - 3.67 tCO_2/tC Thus, EF ($_{CCM-Comb.}$), the carbon emission factor, will be 2.913 tCO_2 / tCH_4. CH_4 density is 0.7167 kg/m^3. As detailed in table below the operation of the CHP is increasing from 2005 – 2007 and after that it remains on the same level. The amount of methane used is increasing proportionally resulting in CO2 Emissions from combustion from 16,490 t (2005) up to 153,900 t (2008 – 2012). Calculation formula: t CH_4 = m^3 CH_4 * density $_{CH4}$ / 1,000 t $CO_{2equ.}$ = t CH_4 * EF ($_{CCM-Comb.}$)

Year	Modules	Operation	Total methane used		$CO_{2equ.}$ from combustion
		1,000 hours	1,000 m3	1,000 tonnes	1,000 tonnes
2005	6	12	7.896	5,66	16,49
2006	12	78	51.324	36,78	107,18
2007	14	100	65.800	47,16	137,41
2008	14	112	73.696	52,82	153,90
2009	14	112	73.696	52,82	153,90
2010	14	112	73.696	52,82	153,90
2011	14	112	73.696	52,82	153,90
2012	14	112	73.696	52,82	153,90

Source: Zasyadko A.F.: Technical description of coal mine methane utilisation at Zasyadko Coal Mine , 2005

Emission 2

These emissions will be calculated in several steps:

Step 1: Estimation of total CMM (CMM_{tot}) volumes drained and collected according to the "*Schedule of putting into operation-retirement of longwalls 2005-2015*" provided by the mine.

Step 2: Estimation of CMM volumes used for the operation of the CHP units (CMM_{chp})

Step 3: Estimation of CMM volumes used for AGFCP (Automobile gas filling compressor plant) and for CMM purification plant (CMM_{cons})

Calculation formula:

CMM not utilised (CMM_{nu}) = CMM_{tot} – CMM_{chp} – CMM_{cons}

Estimation Step 1 - CMM_{tot}:

Period		100% methane drainage			
		Boreholes	Gas Suction	Total	
Year	Month	m3/min	m3/min	Mio. m3/year	1,000 t/year*
2005	1-12	44.0	0.0	82.6	59.2
	1-4	54.0	0.0		
	5-12	54.0	0.0		
2006	1-12	45.7	35.6	110.4	79.1
	1-2	54.0	0.0		
	3-11	59.2	0.0		
	12	60.6	0.0		
2007	1-5	41.7	0.0	136.4	97.8
	1-12	43.3	38.5		
	6-12	59.5	49.0		
2008	1-2	43.3	0.0	155.1	111.2
	3-11	50.6	45.0		
	3-12	47.0	0.0		
	1-12	0.0	45.1		
	1-2	59.5	49.0		
	12	59.7	49.1		
2009	1-2	54.9	48.8	185.6	133.0
	3-12	54.9	48.8		
	1-12	59.7	53.1		
2010	2-12	45.2	45.2	193.1	138.4
	1-8	54.9	48.8		
	1	59.7	53.1		
	9-12	54.9	48.8		
2011	1-12	59.2	52.7	233.2	167.1
	1-12	54.9	48.8		
2012	3-12	43.8	43.8	222.8	159.7
	1-4	54.9	48.8		
	5-12	54.9	48.8		
	1-2	59.2	52.7		

* CH_4 density is 0.7167 kg/m^3

Source: Zasyadko A.F.: Technical description of coal mine methane utilisation at Zasyadko Coal Mine , 2005

Estimation Step 2 - CMM_{chp}:

The amount of CMM fed into the CHP units has already been calculated as input factor for "Emission 1".

Emission 2 (continued)

Year	Modules	Operation	Total methane used	
		1,000 hours	1,000 m3	1,000 tonnes
2005	6	12	7.896	5,66
2006	12	78	51.324	36,78
2007	14	100	65.800	47,16
2008	14	112	73.696	52,82
2009	14	112	73.696	52,82
2010	14	112	73.696	52,82
2011	14	112	73.696	52,82
2012	14	112	73.696	52,82

Source: Zasyadko A.F.: Technical description of coal mine methane utilisation at Zasyadko Coal Mine , 2005

Estimation Step 3 - CMM_{cons}:

Year	Input gas. plant		Input gas filling stations	
	in mio. m3	1,000 t CH_4	in mio. m3	1,000 t CH_4
2005	0,00	0,00	2,80	2,01
2006	0,00	0,00	4,00	2,87
2007	0,00	0,00	8,00	5,73
2008	15,00	10,75	10,00	7,17
2009	42,00	30,10	10,00	7,17
2010	78,00	55,90	10,00	7,17
2011	90,00	64,50	10,00	7,17
2012	95,00	68,09	10,00	7,17

Source: Zasyadko A.F.: Technical description of coal mine methane utilisation at Zasyadko Coal Mine , 2005

CMM not utilised (CMM_{nu}):

Year	CMMtot	CMMCHP	CMMcons	CMMnu	GWP	CMMnu
	1,000 t CH_4	1,000 t CH_4	1,000 t CH_4	1,000 t CH_4		1,000 t $CO_{2equ.}$
2005	59,20	5,66	2,01	51,53	21,00	1.082,22
2006	79,12	36,78	2,87	39,47	21,00	828,84
2007	97,76	47,16	5,73	44,87	21,00	942,21
2008	111,16	52,82	17,92	40,42	21,00	848,82
2009	133,02	52,82	37,27	42,93	21,00	901,52
2010	138,40	52,82	63,07	22,51	21,00	472,68
2011	167,13	52,82	71,67	42,65	21,00	895,57
2012	159,68	52,82	75,25	31,61	21,00	663,83

GWP: global warming Potential of CH_4 is used to recalculate methane emissions into CO_2 emissions that is 21 and is constant over the first crediting period (2008 – 2012).

<table>
<tr><td>Emission 3</td><td>During the operation of the purification of the gathered CMM the following yearly emissions (t CH_4 and t CO_2) will be generated.
Calculation formula:
Sum t $CO_{2equ.}$ = ((t CH4 * 21 (=GWP)) + t CO_2) / 1000

<table>
<tr><th rowspan="2">Year</th><th colspan="3">Emission of plant</th></tr>
<tr><th>t CH_4</th><th>t CO_2</th><th>sum 1000 t $CO_{2equ.}$</th></tr>
<tr><td>2005</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
<tr><td>2006</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
<tr><td>2007</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
<tr><td>2008</td><td>634.13</td><td>10,293.00</td><td>23.61</td></tr>
<tr><td>2009</td><td>634.13</td><td>10,293.00</td><td>23.61</td></tr>
<tr><td>2010</td><td>634.13</td><td>10,293.00</td><td>23.61</td></tr>
<tr><td>2011</td><td>634.13</td><td>10,293.00</td><td>23.61</td></tr>
<tr><td>2012</td><td>634.13</td><td>10,293.00</td><td>23.61</td></tr>
</table>
</td></tr>
<tr><td>Emission 4</td><td></td></tr>
</table>

Please include a description of the formulae used to estimate /calculate project emissions (for each gas, source, formulae /algorithm, emissions in units of CO_{2e}).

D 4.3 Development of project emissions ***(CDM-PDD E.1., CDM-PDD E.6.)***									
	2005	2006	2007	2008	2009	2010	2011	2012	Σ
Project emissions (in t CO_{2e})	1,098,707	936,025	1,079,624	1,026,325	1,079,034	650,194	1,073,083	841,337	7,78

Baseline emissions

D 4.4 Baseline emissions within the Project Boundary	
Baseline emissions within the Project Boundary	X Emission 1 Source: Degasification activities (draining and collecting of CMM) Type of emission: CH_4 X Emission 2 Source: coal and gas boiler houses Type of emission: CO_2 X Emission 3 Source: Emissions related to off-site power generation Type of emission: CO_2 X Emission 4 Source: Emissions related to off-site heat generation Type of emission: CO_2
	○ No emissions within the Project Boundary

D 4.5 Estimate of Baseline emissions within the Project Boundary ***(CDM-PDD E4., CDM-PDD E6.)***	
Emission 1	Estimation of total CMM (CMM_{tot}) volumes drained and collected according to the "*Schedule of putting into operation- retirement of longwalls 2005-2015*" provided by the mine.

Period		100% methane drainage			
		Boreholes	Gas Suction	Total	
Year	Month	m3/min	m3/min	Mio. m3/year	1,000 t/year*
2005	1-12	44.0	0.0	82.6	59.2
	1-4	54.0	0.0		
	5-12	54.0	0.0		
2006	1-12	45.7	35.6	110.4	79.1
	1-2	54.0	0.0		
	3-11	59.2	0.0		
	12	60.6	0.0		
2007	1-5	41.7	0.0	136.4	97.8
	1-12	43.3	38.5		
	6-12	59.5	49.0		
2008	1-2	43.3	0.0	155.1	111.2
	3-11	50.6	45.0		
	3-12	47.0	0.0		
	1-12	0.0	45.1		
	1-2	59.5	49.0		
	12	59.7	49.1		
2009	1-2	54.9	48.8	185.6	133.0
	3-12	54.9	48.8		
	1-12	59.7	53.1		
2010	2-12	45.2	45.2	193.1	138.4
	1-8	54.9	48.8		
	1	59.7	53.1		
	9-12	54.9	48.8		
2011	1-12	59.2	52.7	233.2	167.1
	1-12	54.9	48.8		
2012	3-12	43.8	43.8	222.8	159.7
	1-4	54.9	48.8		
	5-12	54.9	48.8		
	1-2	59.2	52.7		

* CH_4 density is 0.7167 kg/m^3

Source: Zasyadko A.F.: Technical description of coal mine methane utilisation at Zasyadko Coal Mine , 2005

For recalculation of methane emissions into CO_2 – emissions the following calculation formula using the global warming potential for methane is applied :

Emission 1 (continued)

CMM_{tot} [1000 t $CO_{2equ.}$] = ((1000 t CH_4 * 21 (=GWP))

Year	CMMtot 1,000 t CH_4	GWP	CMMtot 1,000 t $CO_{2equ.}$
2005	59.20	21.00	1,243.20
2006	79.12	21.00	1,661.51
2007	97.76	21.00	2,052.95
2008	111.16	21.00	2,334.26
2009	133.02	21.00	2,793.34
2010	138.40	21.00	2,906.32
2011	167.13	21.00	3,509.82
2012	159.68	21.00	3,353.33

Emission 2

Two coal boiler plants are located on the Central site of the mine. Both boiler plants utilize the coal concentrate of "G" grade. The low heat value of the working mass of the coal concentrate is 29.409 MJ/kg. In 2004 the boiler plants consumed 20,258 t coal. According to the document "*Estimate of the reduction of pollutant emission to the atmosphere during utilization of the mine methane at the sites of the coalmine named after A.F. Zasyadko taking into account the distribution of discharge and consumption of the gas mixture in 2005 – 2014"; Institute of the Geotechnical Mechanics, Ukraine; 2005"* the emissions of carbon dioxide is calculated as using the following formula:

$E_{CO2} = 10^{-6} * k_{CO2} * Q^r_i * B$ [t/a]

Q^r_i = 29.409 MJ/kg (low heat value)

B = consumption of the solid fuel [t/a]

k_{CO2} = 44/12 * C_r/100 * 10^6/ Q^r_i * oxidation level of coal [g/GJ]

Cr is mass content of coal = 73.49 %

oxidation level of coal = 0,9984

The gas boiler plant is located on the Eastern site. In 2004 the gas boiler plant consumed 762.2 thousand m^3 of natural gas.

To calculate the carbon emission factor the following IPCC factors were used:

- emission factor for methane natural gas – 15.3 tC/TJ
- fraction of oxidized carbon for natural gas – 99.5%
- factor of recalculation of C into CO2 emission - 3.67 tCO_2/tC

Thus, EF, the carbon emission factor, will be 2.913 tCO_2/tC. CH_4 density is 0.7167 kg/m^3.

Calculation formula:

t CH_4 = m^3 CH_4 * density $_{CH4}$ / 1,000

t $CO_{2equ.}$ = t CH_4 * EF

Year	Coal	Gas
	t CO_2/a	t CO_2/a
2005	54,502.18	1,591.71
2006	54,502.18	1,591.71
2007	54,502.18	1,591.71
2008	54,502.18	1,591.71
2009	54,502.18	1,591.71
2010	54,502.18	1,591.71
2011	54,502.18	1,591.71
2012	54,502.18	1,591.71

Emission 3

The following table shows the ratio between the on-site electricity production, the in-house electricity consumption and the electricity fed into the public grid.

in GWh	2005	2006	2007	2008	2009	2010	2011	2012
Electricity production	36.42	236.73	303.5	339.92	339.92	339.92	339.92	339.92
In-house electricity consumption	261	274.65	289	303.03	319.06	335.37	352.49	370.48
Electricity fed into public the electricity network	0	0	14.5	36.95	20.86	4.55	0	0

Two types of baseline carbon emissions factors for Ukraine shall be applied:

1. For calculation of baseline emissions related to in-house electricity consumption the following emission factors ($EF_{in\text{-}house}$ [t CO_2/GWh]) are used:

	$EF_{in\text{-}house}$ in t CO2/GWh	**In-house elect. Consumption in GWh**	**CO2 Emissions in 1000 t/a**
2005	896	36.42	32.63
2006	876	236.73	207.38
2007	856	289	247.38
2008	836	303.03	253.33
2009	816	319.06	260.35
2010	796	335.37	266.95
2011	776	339.92	263.78
2012	756	339.92	256.98

2. For calculation of baseline emissions related to feed in grid electricity the following emission factors ($EF_{feed\text{-}in}$ [t CO_2/GWh]) are used:

	$Ef_{feed\ in}$ in t CO2/GWh	**Electricity fed into public the electricity network**	**CO2 Emissions in 1000 t/a**
2005	740	0	0.00
2006	725	0	0.00
2007	710	14.5	10.30
2008	695	36.95	25.68
2009	680	20.86	14.18
2010	666	4.55	3.03
2011	651	0	0.00
2012	636	0	0.00

Source of calculation factors: Operational Guidelines for Project Design Documents of Joint Implementation Projects (Volume 1, Version 2.3) of ERUPT-5 TOR.

Emission 4

The following table shows the ratio between the on-site heat production, the in-house heat consumption and the heat fed into the public district heating network:

.

in 1,000 Gcal	2005	2006	2007	2008	2009	2010	2011	2012
Heat Production	31.56	205.14	275.84	294.56	294.56	294.56	294.56	294.56
In-house heat consumption	0	135.2	152.8	251.2	251.2	251.2	251.2	251.2
Heat fed into the public district heating network	0	0	0	43	43	43	43	43

In order to take baseline emissions from the municipal boiler plants into consideration it will be assumed they are fuelled with natural gas.

	Heat fed into the public district heating network in Gcal	**Heat fed into the public district heating network in GJ**	**carbon emission factor t CO_2/GJ**	**CO2 Emissions in 1000 t/a**
2005	0.00	0.00	0.06	0.00
2006	0.00	0.00	0.06	0.00
2007	0.00	0.00	0.06	0.00
2008	43,000.00	180,032.40	0.06	10.10
2009	43,000.00	180,032.40	0.06	10.10
2010	43,000.00	180,032.40	0.06	10.10
2011	43,000.00	180,032.40	0.06	10.10
2012	43,000.00	180,032.40	0.06	10.10

Please describe the formulae used to estimate Baseline emissions (for each gas, source, formulae /algorithm, emissions in units of CO_2 equivalent).

D 4.6 Development of Baseline emissions ***(CDM-PDD E4., CDM-PDD E6.)***									
	2005	2006	2007	2008	2009	2010	2011	2012	∑
Baseline emissions (in t CO_{2e})	1,331,926	1,924,979	2,366,723	2,679,467	3,134,071	3,242,499	3,839,792	3,676,503	22,1

Leakage

Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the Project Boundary, and which is measurable and attributable to the project activity.

D 4.7 Leakage	
Leakage	○ Leakage 1 Source: _____ Type of Leakage: _____ ○ Leakage 2 Source: _____ Type of Leakage: _____
	X No Leakage

D 4.8 Estimate of Leakage ***(CDM-PDD E.2., CDM-PDD E.6.)***	
Leakage 1	*Not applicable*
Leakage 2	Not applicable

Please include a description of the formulae used to estimate Leakage (for each gas, source, formulae /algorithm, emissions in units of CO_2 equivalent).

D 4.9 Development of Leakage ***(CDM-PDD E.2., CDM-PDD E.6.)***						
	Year 1	Year 2	Year 3	Year 4	Year ...	Σ
Leakage (in t CO_{2e})						

D 5 EMISSION REDUCTIONS

D 5.1 Expected emission reductions ***(CDM-PDD E1., CDM-PDD E2., CDM-PDD E3., CDM-PDD E4., CDM-PDD E5., CDM-PDD E6.)***									
	2005	2006	2007	2008	2009	2010	2011	2012	Σ
Project emissions (in t CO_{2e})	1,098,707	936,025	1,079,624	1,026,325	1,079,034	650,194	1,073,083	841,337	7,78
+ Leakage (in t CO_{2e}									
(-) Sum	1,098,707	936,025	1,079,624	1,026,325	1,079,034	650,194	1,073,083	841,337	7,78
+Baseline emissions (in t CO_{2e})	1,331,926	1,924,979	2,366,723	2,679,467	3,134,071	3,242,499	3,839,792	3,676,503	22,1
Total emission reductions (in t CO_{2e})	233,219	988,954	1,287,099	1,653,143	2,055,038	2,592,305	2,766,708	2,835,166	14,4

The project emissions and the Baseline emissions (scenario), as well as Leakage, can be influenced by a number of factors. Examples are e.g. the energy policy of the Host Country, raw material prices etc. Factors relevant to the project and their possible effects are to be stated.

D 5.2 Influencing factors	
Legal influencing factors	Type of influencing factor Factor A: Regulations on degasification activities Factor B: _____ Relevance for the project Factor A: Decree of the President of Ukraine as of January 16, 2002 Nr. 26/2002 "On urgent activities for improvement of work conditions and development of the state supervision at mining enterprises" Governmental Decree as of July 6, 2002 Nr. 939 approving the "Complex Programme of coal-beds degassing at coal mines" There are no legal requirements obliging coal mine operators to use CMM drained and captured under implementation of degasification activities. Factor B: _____ Expected development Factor A: The regulations on degasification activities facilitate further implementation and acceleration of the degasification programme at the coal mine and, consequently, increasing CMM emissions. Factor B: _____

Economic and political influencing factors	Type of influencing factor Factor A: Market development Factor B: Capital availability Relevance for the project Factor A: Zasyadko Mine being an important domestic producer of coking coal is one of the key suppliers to important domestic smelters such as Krivorozhstal (Nr. 1 Ukrainian leading mining and smelting company), Azovstal, Mariupol smelters and others. For example, Krivorozhstal is an export oriented entity; it ranks 26th in world smelters list in terms of sales volumes Ambitious plans of Krivorozhstal to expand its overseas markets given Ukraine's prospects to join the WTO will require the Zasyadko Mine to increase its coal production from currently 2 Mio. tonnes to 3 – 3.3 Mio. tonnes within the upcoming 8 years. Factor B: Due to safety reasons, the Zasyadko mine is forced to fund their degasification works from own funds. Among incentives to start with the project of utilising CMM as fuel for energy production were possibilities of attracting additional funds from the sales of emission reduction units (ERUs). Expected development Factor A: The growing demand for coal due to smelters expansion plans will significantly affect the baseline scenario. The increase in coal production will result in more intensive degasification activities. As such methane drainage at the Zasyadko Mine will increase from 51.5 Mio. m^3 in 2005 to approx. 100 Mio. m^3 over the period 2008 to 2012. Factor B: The availability of capital funds for the CMM utilisation at Zasyadko coal mine will secure the implementation of the degasification programme in combination with the CMM utilisation for the production of heat, electricity, gas for domestic uses and automotive fuel. A decline of the project as JI would postpone the implementation of the described activities.
Other influencing factors	Type of influencing factor Factor A: Available local technology, skills and knowledge, availability of best available technologies in the future Factor B: _____ Relevance for the project

	Factor A: A successful implementation of the degasification programme and the introduction of the CHP plants, the AGFCP, and the CMM purification plant depend primarily on safe and reliable technological equipment and machinery (drilling machines, vacuum pumps, CHP units, electricity substation, control and monitoring instruments etc.) that represents best available technologies. At present a substantial part of it has been imported from countries such as Austria, Germany or Canada. Lack of experience in installation and operation of the CHP units and the CMM purification plant requires in-depth preparatory work on ensuring reliable feeding methane-air mixture of certain quality and volumes as well as on the operation and maintenance of the equipment. The realisation of the project will require appropriate qualification of the staff. At present such qualified staff is not available. Factor B: _____ Expected development Factor A: Additional staff training and testing will be provided to ensure a proper project implementation. Factor B: _____

D 5.3 Sensitivity analysis	***Not applicable***
Sensitivity analysis *A sensitivity analysis illustrating the effects of the variation of the influencing factors mentioned in D 5.2 especially on the expected emission reductions is to be enclosed.*	

D 6 ADDITIONALITY

D 6.1 Additionality	
Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the project activity *Explanation of how and why this project is additional and therefore not the Baseline scenario in accordance with the selected Baseline methodology. Include 1) a description of the Baseline scenario determined by applying the methodology, 2) a description of the project scenario, and 3) an analysis showing why the emissions in the Baseline scenario would likely exceed emissions in the project scenario.* ***(CDM-PDD B.3.)*** *For analysing the Additionality of a project please take into account the relevant decisions of the Executive Board.*	See Business Planb

E Monitoring Plan

Emission reductions can only be acknowledged if proved by traceable Monitoring of the project activities and emissions.

The completed Monitoring Plan documents the actually achieved emission reductions as well as significant additional ecological, socio-economic and development effects. No differentiation is made between a JI and a CDM project regarding the structure of the Monitoring Plan.

The Monitoring reports must be delivered to an independent verification entity (an Independent Entity or an Operational Entity) at regular intervals. This entity examines the reports. Monitoring data are to be kept for at least 2 years after the end of the Crediting Period or the last transfer of ERUs resp. the last issuance CERs for the project activity, whatever occurs later.

The Monitoring Plan encompasses the following five subjects:

1. Development of Monitoring Plan and methodology selected;
2. Organisation of Monitoring and calculation of ERUs or CERs;
3. Monitoring of ecological, socio-economic and development effects;
4. Quality and self-checking of Monitoring process; and
5. Monitoring responsibilities.

E1 DEVELOPMENT OF MONITORING PLAN AND METHODOLOGY SELECTED

E1.1 Details of Monitoring Plan development	
Name and address of person/entity determining the Monitoring methodology resp. Plan Please provide contact information and indicate if the person/entity is also a project participant. ***(CDM-PDD D.5.)***	Energieverwertungsagentur – the Austrian Energy Agency (E.V.A.) GmbH Otto-Bauer-Gasse 6 1060 Vienna, Austria Contact Persons: Elvira Lutter (elvira.lutter@energyagency.at) Michael Sattler (michael.sattler@energyagency.at) Energieverwertungsagentur – the Austrian Energy Agency (E.V.A.) GmbH participate in the project as JI consultant. The monitoring plan is part of the Project Design Document (PDD) and is based on the methodology and results of the Baseline Study. It defines the ongoing process which will be used to collect, analyse and verify the data and calculations used to determine the qualifying ERUs that can be sold in each year covered by the Emission Reduction Purchase Agreement (ERPA) between
Date of completion of the Monitoring Plan (DD/MM/YYYY)	21/04/2005

E 1.2 Monitoring methodology	
Description of the selected methodology and justification of the choice of the methodology and why it is applicable to the project activity *If a national or international Monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.* *If an approved methodology is chosen, please state name and reference of the approved Monitoring methodology applied to the project activity. In this context please refer to the UNFCCC CDM web site for the name and reference as well as details of approved methodologies. In case of an approved methodology please justify the choice of methodology by showing that the proposed project activity and the context of the project activity meet the conditions under which the methodology is applicable.*[6] ***(CDM-PDD D.1., CDM-PDD D.2.)***	As there exists no approved methodology for the utilisation of CMM neither for power and heat generation nor for CMM purification, so non Monitoring Plan can be developed for and applied to the respective project. The chosen monitoring methodology is designed for the project activities, that reduce greenhouse gas emissions through the utilisation of captured CMM in the following applications: • 14 Combined heat and power plants • one CMM purification plant • three automobile gas-filling compressor plants (AGFCP) The monitoring methodology is based on direct and continuous measurement of the following parameters: – CMM mix pressure, – volumes of methane-air mixture, – methane concentration in the mixture, – electric power output produced, – electric power used on site, – electric power surplus fed into the public grid, – heat output produced, – heat used on site, – heat surplus fed into the public grid, and – CMM combustion efficiency. The emissions reductions are defined as the difference of emissions in the baseline situation and in the project situation.

[6] If a new Monitoring methodology shall be applied to a CDM project activity, a special procedure has to be observed. For details please refer to http://cdm.unfccc.int/.

E2 Organisation of Monitoring and Calculation of ERUs or CERs

Basically two options exist:

- Option 1: Monitoring of the emissions in the project scenario and the Baseline scenario ***(CDM-PDD D.2.1.);***
- Option 2: Direct Monitoring of emission reductions from project activity ***(CDM-PDD D.2.2.)***

In the case of option 1 both project emissions and Baseline emissions are monitored, i.e. both E 2.1/E 2.2 and E 2.3/E 2.4 apply. In the case of option 2 only project emissions are monitored, i.e. only E 2.1/E 2.2 applies.

Project emissions

E2.1 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	1
Data variable	CMM mix pressure
Source of data	Pump manometer
Data unit	kg/cm^2
Data quality	Measurement X Yes: Automatic online measurement system installed at vacuum pump station, including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drivers (see annex). *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation X Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is*

	perfoormed.) ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	Flow meters will be subject to regular calibration according to the DBT technical documentation. Body in charge of calibration: Ukrainian Centre for Standardisation and Metrology

E2.2 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	2
Data variable	CMM mix flow rate
Source of data	-
Data unit	m^3/min
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation X Yes: Calculation of CMM mix flow rate based on data of CMM mix pressure measured at pump manometer (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.3 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	3
Data variable	Methane concentration in CMM mix
Source of data	Gas analyser
Data unit	vol. %
Data quality	Measurement X Yes: Automatic online measurement system installed at vacuum pump station, including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drivers (see annex). (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years

Comment	Flow meters will be subject to regular calibration according to the DBT technical documentation. Body in charge of calibration: Ukrainian Centre for Standardisation and Metrology

E2.4 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	4
Data variable	Methane concentration
Source of data	Gas analyser
Data unit	vol.%
Data quality	Measurement X Yes: Automatic online measurement system installed at gas treatment plant including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drivers (see annex). (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years

Comment	Gas analysers will be subject to regular calibration according to the DBT technical documentation. Body in charge of calibration: Ukrainian Centre for Standardisation and Metrology

E2.5 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	5
Data variable	CMM mix pressure
Source of data	Manometer
Data unit	mbar
Data quality	Measurement X Yes: Automatic online measurement system installed at gas treatment plant stations, including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drivers (see annex). (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years

Comment	Manometer will be subject to regular calibration according to the DBT technical documentation. Body in charge of calibration: Ukrainian Centre for Standardisation and Metrology

E2.6 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	6
Data variable	CMM mix temperature
Source of data	Temperature sensors
Data unit	°C
Data quality	Measurement X Yes: Automatic online measurement system installed at gas treatment plant, including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drivers (see annex). (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years

Comment	Temperature sensors will be subject to regular calibration according to the DBT technical documentation. Body in charge of calibration: Ukrainian Centre for Standardisation and Metrology

E2.7 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	7
Data variable	Pure methane volume
Source of data	Flow meter and gas analyser
Data unit	nm^3
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation X Yes: Calculation of pure methane volume from CMM volume and methane concentration (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.8 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	8
Data variable	Volume of CMM to CHP
Source of data	Flow-meter
Data unit	m^3
Data quality	Measurement X Yes: measurements by means of "DIANE XT", the plant management system used in GE Jenbacher CHP units (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.9 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	9
Data variable	Combustion efficiency
Source of data	Methane content of exhaust gas
Data unit	%
Data quality	Measurement X Yes: Sample measurements by means of "DIANE XT", the plant management system used in GE Jenbacher CHP units (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	100%
Proportion of data to be monitored	Sample measurement
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	Periodic measurement of the methane content in the exhaust gas.

E2.10 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	10
Data variable	Volume of CMM to CMM purification plant
Source of data	Flow-meter
Data unit	m^3
Data quality	Measurement X Yes: Automatic online measurement system installed at the CMM purification plant (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.11 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	11
Data variable	Emissions from CMM purification plants
Source of data	Flow-meter
Data unit	kg/h
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation X Yes: Calculation of CH_4 and CO_2 emissions arising from CMM purification from CMM flow into the CMM purification plant. (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.12 Data relevant to Monitoring of project emissions ***(CDM-PDD D.2.1.1., CDM-PDD D.2.2.1.)***	
ID number *Please use numbers to ease cross-referencing.*	12
Data variable	Volume of CMM to AGFCP plant
Source of data	Flow-meter
Data unit	m^3
Data quality	Measurement X Yes: Automatic measurement system installed at the AGFCP. (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ (*State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.13 Estimate/calculation of project emissions	
Estimate/calculation of project emissions *Description of formulae used to estimate /calculate project emissions (for each gas, source, formulae /algorithm, emissions in units of CO_{2e}). Formulae should be consistent with the formulae outlined in the description of the Baseline methodology.* ***(CDM-PDD D.2.1.2., CDM-PDD D.2.2.2.)***	The formula for project emissions is as follows: (1) $PE = PE_{com}+PE_{nu}+PE_{pur}$ PE_{com} … project emissions from CMM combustion, tonnes of $CO_{2equiv.}$ PE_{nu} … project emissions from CMM not utilised, tonnes of $CO_{2equiv.}$ PE_{pur} … project emissions arising from CMM purification, tonnes of $CO_{2equiv.}$ (2) $PE_{com} = CMM_{CHP} * EF_{com}$ CMM_{CHP} … methane combusted in the CHP engines, tonnes EF_{com} … carbon emission factor for methane combustion that is 2,913 tonnes of CO_2/tonne of CH_4 (3) $PE_{nu} = (CMM_{tot} – CMM_{CHP} – CMM_{PUR} – CMM_{AGFCP}) * GWP$ CMM_{tot} … volume of methane emitted to the atmosphere, tonnes of $CO_{2equiv.}$ CMM_{pur} … volume of methane fed into the CMM purification plant, tonnes of $CO_{2equiv.}$ CMM_{AGFCP} … volume of methane fed into the AGFCPs, tonnes of $CO_{2equiv.}$ GWP… Global Warming Potential for methane, 21 tonnes of CO_2/tonneCH_4 (4) $PE_{pur} = CMM_{PUR} * EF_{pur}$ EF_{pur}… carbon emission factor for methane processing in CMM purification plant The formula (1) can be represented as follows: (5) $PE = CMM_{CHP} * EF_{com} + (CMM_{tot} – CMM_{CHP} – CMM_{PUR} – CMM_{AGFCP}) * GWP + CMM_{PUR} * EF_{pur}$

Baseline emissions

E2.14 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	13
Data variable	Annual electric power production of CHP engines
Source of data	Power meter
Data unit	kWh
Data quality	Measurement X Yes: The electricity produced by the CHP engines will be measured with the DIANE XT, the plant management system used in GE Jenbacher CHP units *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.15 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	14
Data variable	Electricity In-house consumption
Source of data	Power meter
Data unit	kWh
Data quality	Measurement X Yes: The in-house power consumption is measured by ABB electricity supply meters to be installed at the sub-station *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	Calibration interval of such meters is 6 years. Calibration procedures for meters are implemented in compliance with calibration methodology developed for MCC ALFA Smart. Body in charge of calibration : Ukrainian Centre for Standardisation and calibration

E2.16 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	15
Data variable	Electricity fed into the public grid
Source of data	Power meter
Data unit	kWh
Data quality	Measurement X Yes: The power fed into the public grid is measured by ABB electricity supply meters to be installed at the sub-station *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	Calibration interval of such meters is 6 years. Calibration procedures for meters are implemented in compliance with calibration methodology developed for MCC ALFA Smart. Body in charge of calibration : Ukrainian Centre for Standardisation and calibration

E2.17 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	16
Data variable	Annual heat production of CHP engines
Source of data	Heat meter
Data unit	kWh
Data quality	Measurement X Yes: The heat produced by the CHP engines will be measured with the DIANE XT, the plant management system used in GE Jenbacher CHP units *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

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E2.18 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	17
Data variable	Heat in-house consumption
Source of data	Heat meter
Data unit	kWh
Data quality	Measurement X Yes: The heat consumed on the site of the coal mine will be measured with heat meters that comply with international standards *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.19 Data relevant to Monitoring of Baseline emissions ***(CDM-PDD D.2.1.3.)***	
ID number *Please use numbers to ease cross-referencing.*	18
Data variable	Heat fed into the public grid
Source of data	Heat meter
Data unit	kWh
Data quality	Measurement X Yes: The heat fed into the public grid will be measured with heat meters that comply with international standards *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Permanent
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	5 years
Comment	

E2.20 Estimate of Baseline emissions	
Estimate of Baseline emissions *Description of formulae used to estimate Baseline emissions (for each gas, source, formulae /algorithm, emissions in units of CO_{2e}). Formulae should be consistent with the formulae outlined in the description of the Baseline methodology.* ***(CDM-PDD D.2.1.4.)***	(6) $BE = BE_{CMM} + BE_{el} + BE_{th}$ BE_{CMM}… atmospheric emissions derived from degasification activities, tonnes of $CO_{2equiv.}$ BE_{el}… emissions related to off-site electric power generation to be displaced by the project performance, tonnes of CO_2 BE_{th}… emissions related to heat power generation to be displaced by the project performance, tonnes of CO_2 (7) $BE_{CMM} = CMM_{tot} * GWP$ CMM_{tot}… volume of methane emitted to the atmosphere, tonnes of $CO_{2equiv.}$ GWP… Global Warming Potential for methane, 21 tonnes of CO_2/tonne of CH_4 (8) $BE_{el} = (EL_{in\text{-}house} * EFE_{in\text{-}house} + EL_{feed\text{-}in} * EFE_{feed\text{-}in})$ $EL_{in\text{-}house}$ ... amount of electricity for own use, in Mio. kWh $EFE_{in\text{-}house}$ = baseline carbon emission factors used for calculation of baseline emissions related to in-house electricity consumption, gCO_2/kWh $EL_{feed\text{-}in}$ ... amount of electricity fed into the public network, in Mio. kWh $EF_{feed\text{-}in}$ = baseline carbon emission factors used for calculation of baseline emissions related to electricity supplied to the public grid, gCO_2/kWh (9) $BE_{th} = (TH_{in\text{-}house} * EFH_{in\text{-}house} + TH_{feed\text{-}in} * EFH_{feed\text{-}in})$ $TH_{in\text{-}house}$ ... amount of heat for own use, in Mio. kWh $EFH_{in\text{-}house}$ = baseline carbon emission factors used for calculation of baseline emissions related to in-house heat consumption, gCO_2/kWh $TH_{feed\text{-}in}$ ... amount of heat fed into the public network, in Mio. kWh $EFH_{feed\text{-}in}$ = baseline carbon emission factors used for calculation of baseline emissions related to heat supplied to the public grid, gCO_2/kWh Substituting BE_{CMM} and BE_{el} and BE_{th} with (7), (8) and (9) the following formula could be obtained: (10) $BE = CMM_{tot} * GWP + (EL_{in\text{-}house} * EFE_{in\text{-}house} + EL_{feed\text{-}in} * EFE_{feed\text{-}in}) + (TH_{in\text{-}house} * EFH_{in\text{-}house} + TH_{feed\text{-}in} * EFH_{feed\text{-}in})$

Leakage

If applicable, please describe the data and information that will be collected in order to monitor Leakage effects of the project activity.

E2.21 Data relevant to Monitoring of Leakage ***(CDM-PDD D.2.3.1.)***	***Not applicable***
ID number *Please use numbers to ease cross-referencing.*	
Data variable	
Source of data	
Data unit	
Data quality	Measurement ○ Yes: _____ *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	
Proportion of data to be monitored	
How will the data be archived?	○ Electronic ○ In paper form
For how long is archived data to be kept?	
Comment	

E2.22 Estimate of Leakage	***Not applicable***
Estimate of Leakage *Description of formulae used to estimate Leakage (for each gas, source, formulae /algorithm, emissions in units of CO_{2e}). Formulae should be consistent with the formulae outlined in the description of the Baseline methodology.* ***(CDM-PDD D.2.3.2.)***	

Emission reductions

E2.23 Estimate of emission reductions	
Estimate of emission reductions for the project activity *Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae /algorithm, emissions in units of CO_{2e}). Formulae should be consistent with the formulae outlined in the description of the Baseline methodology.* ***(CDM-PDD D.2.4.)***	The emission reductions can be calculated directly based on the following parameters • CMM volumes used in the CHP plants, the CMM purification and the AGFCPs • Electricity generated and used • Heat generated and used (11) ER = BE - PE ER… emission reductions, tonnes of CO_2 BE… baseline emissions, tonnes of $CO_{2equiv.}$ PE… project emissions, tonnes of $CO_{2equiv.}$ Substitution formula (11) with (5) and (10) the following development can be obtained: (12) $ER = CMM_{tot}*GWP + (EL_{in\text{-}house} * EFE_{in\text{-}house} + EL_{feed\text{-}in} * EFE_{feed\text{-}in}) + (TH_{in\text{-}house} * EFH_{in\text{-}house} + TH_{feed\text{-}in} * EFH_{feed\text{-}in}) - CMM_{CHP} * EF_{com} - (CMM_{tot} - CMM_{CHP} - CMM_{PUR} - CMM_{AGFCP}) * GWP - CMM_{PUR} * EF_{pur}$ or (13) $ER = CMM_{tot}*GWP + (EL_{in\text{-}house} * EFE_{in\text{-}house} + EL_{feed\text{-}in} * EFE_{feed\text{-}in}) + (TH_{in\text{-}house} * EFH_{in\text{-}house} + TH_{feed\text{-}in} * EFH_{feed\text{-}in}) - CMM_{CHP} * EF_{com} - CMM_{tot} * GWP - CMM_{CHP} * GWP - CMM_{PUR} * GWP - CMM_{AGFCP} * GWP - CMM_{PUR} * EF_{pur}$

	or (14) $ER = (EL_{in\text{-}house} * EFE_{in\text{-}house} + EL_{feed\text{-}in} * EFE_{feed\text{-}in}) + (TH_{in\text{-}house} * EFH_{in\text{-}house} + TH_{feed\text{-}in} * EFH_{feed\text{-}in}) - CMM_{CHP} * (EF_{com} – GWP) – CMM_{pur} (EF_{pur} – GWP) – CMM_{AGFCP} * GWP$

E3 MONITORING OF ECOLOGICAL, SOCIO-ECONOMIC AND DEVELOPMENT EFFECTS

The Monitoring Plan shall take into account major ecological, socio-economic and development effects of the project. If applicable, the following table shall be used.

E3.1 Data relevant to Monitoring of ecological, socio-economic and development effects of the project	**Not applicable**
ID number *Please use numbers to ease cross-referencing.*	
Data variable	
Source of data	
Data unit	
Data quality	Measurement X Yes: _____ *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	
Proportion of data to be monitored	
How will the data be archived?	○ Electronic ○ In paper form
For how long is archived data to be kept?	

Comment	

Examples of data relating to particular environmental media and socio-economic and development aspects are included in the appendix.

E4 QUALITY AND SELF-CHECKING OF MONITORING PROCESS

The entire process of data acquisition and processing must be documented. In addition a system for information procurement and processing and quality control must be established. Furthermore, the Monitoring should be capable of self-checking using plausibility checks.

E4.1 Quality control (QC) and quality assurance (QA) procedures	
Data *Please indicate table and ID number.* ***(CDM-PDD D.3.)***	1; 3 – 6; 8 - 10; 12 - 18
Data acquisition (including measuring methods)	The modern automatic controlling on-line system made by DBT (www.dbt.de) will be introduced for the measurement of the CMM gas including high accuracy measuring instruments and sensors as well as control and stop valves activated by remote drives. For reference see the Annex. All data collected will be screened at the operator's desk monitors in the vacuum pumping station and in the cogeneration plant. Afterwards the work parameters will be channelled to the central dispatching office for further review and storing. The system will be monitoring the followings parameters: – CMM flow rate – CMM mix pressure and temperature – methane and oxygen concentration – relative humidity natural gas temperature, pressure, flow rate. The management, control and monitoring of cogeneration plant performance is implemented by program complex "DIANE XT" included in a delivery set of GE Jenbacher. It will measure the CMM input, the heat and the electricity output of the CHP plants. The amount of in-house electricity consumed as well as the amount of electricity fed into the grid will be measured by ABB electricity supply meters to be installed at the substation. The amount of heat consumed in-house and fed into the grid will be measured with modern heat meters to be installed at the heat exchanger.
How is the data transmitted?	On-line measurement
Uncertainty level of data *(high/medium/low)*	The data on uncertainty of instruments applied for measuring the quantity and quality of CMM flow are unavailable at this stage. Evidently uncertainty level could be deemed as low because such

(CDM-PDD D.3.)	measuring equipment will be complied with modern EU norms and standards of accuracy demanded for such kind of equipment. Nevertheless, in a view of lack of information on uncertainty values of DBT measuring instruments inaccuracy values of currently available instruments could be applied as conservative estimates. The accuracy value of manometers currently applied at the vacuum pumping stations of Zasyadko Coal Mine is 1%. The accuracy value of gas-analyzers is 2,5%. Zasyadko Coal Mine has introduced a computerized measuring-calculation complex (MCC), ALFA SMART, that is assigned for commercial accounting and measuring electricity and power produced as well as for automatic collection, processing, storing and on-line screening of data obtained. Such complex installed in the VPS substation at the Vostochnaya production site. On-site metering of electricity produced and consumed are implemented by "Alfa" meters supplied by an ABB affiliated company (Russia), Joint Venture ABB VEI Metronika. The meters are integrated into the MCC. The MCC and applied meters fully comply with requirements set by standard-technical documentation of Russia. Ukrainian Centre for Standardization and Metrology recommended to the State Standardization of Ukraine to accept a certificate issued by appropriate Russian standardization body and include ALFA SMART MCC into the State Registry. The uncertainty level of MCC ALFA SMART can be assessed as equal to inaccuracy value of electricity supply meters, which is 0,1%. DIANE XT of the GE Jenbacher CHP units is a time-tested engine management system. The system comprises powerful central industrial controls that handle master control and feedback control for the engine plant. The uncertainty level of DIANE XT can be assessed as very low with 0,1%. Measuring instruments for metering pressure, flow rates, methane concentration and oxygeny concentration, humidity and temperature of CMM mix will be supplied by DBT (Germany), lead company of world class supplying equipment for mining industry. With the introduction of the DBT measuring system the uncertainty level of the project will decrease furthermore.
Quality assurance/quality control procedures *Explain QA/QC procedures planned for these data, or why such procedures are not necessary. Please specify measures for quality assurance and how data are checked for consistency, completeness and correctness. How are*	All operators responsible for data administration will be duly qualified and receive training by the installers of the metering equipment. All relevant data will be summarised daily and archived electronically and as a printout. All source information on performance parameters and calculations will be obtained directly on site and after that reported to the Coal Mine dispatching office. The work parameters of CMM flows as well as heat and power produced will be cross checked to provide quality and reliability of monitored data. Any considerable deviation of monitored data from given work parameters will be noticed and source of such deviation will be identified.

errors during data acquisition dealt with? ***(CDM-PDD D.3.)***	The Coal Mine dispatching office will be responsible for calculation of CO2 equivalent emission reductions. Such calculations will be implemented on monthly basis. The general supervision of the monitoring system will be executed by Zasyadko Coal mine administration under the existing control and reporting system. To maintain a consistent and reliable performance of the automatic controlling and monitoring system an adequate quality control and assurance procedures that are regulated by the calibration standards and quality norms of national legislation will be implemented. Under requirements of quality control system, regular maintenance and testing regime to ensure accuracy of flow meters, gas-analyzers, electricity and heat measuring instruments will be provided. All measuring instruments will be duly calibrated. 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 every month.

E 5 MONITORING RESPONSIBILITIES

E 5.1 Responsibilities	
Operational and management structure regarding Monitoring *Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any Leakage effects, generated by the project activity.* ***(CDM-PDD D.4.)***	The monitoring system for the emission reductions achieved within this project will be an integral part of the existing controlling and reporting system Zasyadko Coal. That will allow for obtaining reliable and easy verifiable data related to the project performance, ensuring thus the quality and efficiency of the monitoring system. All source information on performance parameters and calculations will be obtained directly on site and after that reported to the Coal Mine dispatching office. The work parameters of CMM flows as well as heat and power produced will be crosschecked to provide quality and reliability of monitored data. To ensure reliable and non-stop performance of cogeneration plant the inputs of natural gas from the natural gas pipeline are envisaged. In case of break down of CMM supply system (either of whole system or separate feeding pipe) methane-air mixture will be urgently released into atmosphere through the emergency gas vent stack. The shut-off valves will automatically close CMM supply pipes, natural gas will be fed into gas treatment plant and consequently into the inlets of engines and into those of pre-chambers. The employees responsible for monitoring control will be duly trained during installation of such system. n
Technical responsibility	Contact person: Boris V. Bokiy Address: Pr. Zasyadko, Donetsk 83054 Phone/fax: + 380 622 517 337 E-mail: zas_vtb@dn.farlep.net
Commercial responsibility	Contact person: M. Mistuyuk Address: Pr. Zasyadko, Donetsk 83054 Phone/fax: + 380 622 517 370 E-mail: zsdkoves@velton.donetsk.ua
Responsibility for data acquisition	Contact person: Boris V. Bokiy Address: Pr. Zasyadko, Donetsk 83054 Phone/fax: + 380 622 517 337 E-mail: zas_vtb@dn.farlep.net

Responsibility for calculation of emission reductions	Contact person: Boris V. Bokiy Address: Pr. Zasyadko, Donetsk 83054 Phone/fax: + 380 622 517 337 E-mail: zas_vtb@dn.farlep.net
Responsibility for Monitoring supervision	Contact person: Boris V. Bokiy Address: Pr. Zasyadko, Donetsk 83054 Phone/fax: + 380 622 517 337 E-mail: zas_vtb@dn.farlep.net

II. Appendix

A Monitoring Data Examples regarding Ecological, Socio-Economic and Development Effects

Ecological Effects

Water

Ap A 1 Effects on the medium water	
Abstraction of ground water	Abstraction: _____ m³/week
Abstraction of surface water	*River* Abstraction: _____ m³/second Mean low water: _____ m³/second *Lake* Abstraction: _____ m³/second Regeneration of water (inflow): _____ m³/second
Pollution of surface water	*Before discharge of effluents* Water quality according to biological water organisms: _____ *(Please refer to your country specific regulations.)* Oxygen content in the water: _____ mg/l Ammonia concentration: _____ mg/l NH4-N *After discharge of effluents* Water quality according to biological water organisms: _____ *(Please refer to your country specific regulations.)* Oxygen content of the water: _____ mg/l Ammonia concentration: _____ mg/l NH4-N Average temperature increase in the receiving water body: _____ °C
Further particular effects within the framework of	

the local conditions	

Air

Ap A 2 Effects on the medium air	
Emissions	SO_2: _____ mg/ m^3 NO_x: _____ mg/ m^3 Dust: _____ mg/ m^3 Organ. C : _____ mg/ m^3 HCl: _____ mg/ m^3 Dioxins and furans: _____ mg/ m^3 Hg: _____ mg/ m^3 Other: _____ mg/ m^3
Further particular effects within the framework of the local conditions	

Land

Ap A 3 Land use	
Land use	_____ m^2
Effects caused by the project	Erosion: _____ Landslip: _____ Other: _____

Biodiversity

Ap A 4 Effects on biodiversity	
Diversity of flora	
Local fauna	

Waste

Ap A 5 Waste	
Amounts of non hazardous wastes and details of treatment	
Amounts of hazardous wastes and details of treatment	
Other project influences on the occurrence of wastes	

Socio-Economic and Development Effects

Ap A 6 Job creation	
Creation of new jobs through the project	Number of highly qualified jobs: _____ Number of low qualified jobs: _____

Ap A 7 Social security	
Social security of workforce	

Ap A 8 Gender equality	
Equal Opportunities	*Middle Management* Number of women: _____ Number of men: _____ *Upper Management* Number of women: _____ Number of men: _____

Sustainability

Ap A 9 Sustainability	
Contribution of the project to the sustainable development of the Host Country	

B Comparison of the CDM-PDD (Version 02) and the PDD of the Austrian JI/CDM Programme

CDM-PDD (Version 02)	Austrian PDD
A. General description of project activity	
A.1. Title of the project activity	A 1
A.2. Description of the project activity	A 2.1, B 4.2
A.3. Project participants	A 3
A.4. Technical description of the project activity	A 2.2, A 4.1, A 4.2, A 5.2, A 6.1, A 7.1,
A.4.1. Location of the project activity	B 4.1, B 4.2
A.4.1.1. Host Party(ies)	A 4.1, A 4.2
A.4.1.2. Region/State/Province etc.	A 4.1
A.4.1.3. City/Town/Community etc.	A 4.1
A.4.1.4. Detail of physical location	A 4.1
A.4.2. Category(ies) of project activity	A 4.2
A.4.3. Technology to be employed by the project activity	A 2.2
A.4.4. Brief explanation of how the emissions are to be reduced, including Additionality	A 6.1, B 4.2 B 4.1
A.4.4.1. Estimated amount of emission reductions	A 5.2, B 4.1
A.4.5. Public funding of the project activity	A 7.1
B. Application of a Baseline methodology	
B.1. Title and reference of the approved Baseline methodology applied	D 2.1
B.1.1. Justification of the choice of the methodology	D 2.1
B.2. Description of how the methodology is applied	D 2.1
B.3. Description of how the emissions are reduced below those that would have occurred in the absence of the project activity	D 6.1
B.4. Application of the Project Boundary to the project activity	D 3.1
B.5. Detailed Baseline information	D 1.1
C. Duration of the project activity / Crediting Period	
C.1. Duration of the project activity	A 5.1
C.1.1. Starting date of the project activity	A 5.1
C.1.2. Expected operational lifetime of the project activity	A 5.1
C.2. Choice of the Crediting Period	A 5.2
C.2.1. Renewable Crediting Period	A 5.2
C.2.1.1. Starting date of the first Crediting Period	A 5.2
C.2.1.2. Length of the first Crediting Period	A 5.2
C.2.2. Fixed Crediting Period	A 5.2
C.2.2.1. Starting date	A 5.2
C.2.2.2. Length	A 5.2

D. Application of a Monitoring methodology and Plan	
D.1. Name and reference of approved Monitoring methodology applied	E 1.2
D.2. Justification of the choice of the methodology	E 1.2
D.2.1. Option 1: Monitoring of the emissions in the project scenario and the Baseline scenario	E 2, E 2.1, E 2.2, E 2.3, E 2.4
D.2.1.1. Data to be collected in order to monitor project emissions	E 2.1 E 2.2 E 2.3 E 2.4
D.2.1.2. Description of formulae used to estimate project emissions	E 2, E 2.1, E 2.2
D.2.1.3. Relevant data necessary for determining Baseline emissions	E 2.1 E 2.2
D.2.1.4. Description of formulae used to estimate Baseline emissions	E 2.5, E 2.6
D.2.2. Option 2: Direct Monitoring of emissions reductions from the project activity	E 2.5
D.2.2.1. Data to be collected in order to monitor project emissions	E 2.6 E 2.7
D.2.2.2. Description of formulae used to calculate project emissions	
D.2.3. Treatment of Leakage in the Monitoring Plan	
D.2.3.1. Data and information that will be collected in order to monitor Leakage	
D.2.3.2. Description of formulae used to estimate Leakage	
D.2.4. Description of formulae used to estimate emission reductions	
D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored	E 4.1
D.4. Operational and management structure that the project operator will implement in order to monitor emission reductions and any Leakage effects, generated by the project activity	E 5.1
D.5. Name of person/entity determining the Monitoring methodology	E 1.1
E. Estimation of GHG emissions by sources	
E.1. Estimate of GHG emissions by sources	D 4.2, D 4.3, D 5.1
E.2. Estimated Leakage	D 4.8, D 4.9, D 5.1
E.3. The sum of E.1. and E.2. representing the project activity emissions	D 5.1
E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the Baseline	D 4.5, D 4.6, D 5.1
E.5. Difference between E.4. and E.3. representing the emission reductions of the project activity	D 5.1
E.6. Table providing values obtained when applying formulae above	D 4.2, D 4.3, D 4.5, D 4.6, D 4.8, D 4.9, D 5.1

F. Environmental impacts	
F.1. Documentation on the analysis of the environmental impacts	B
F.2. In the case of significant environmental impacts, conclusions and all references to support documentation of an EIA	B
G. Stakeholders' comments	
G.1. Brief description how comments by local stakeholders have been invited and compiled	C 2
G.2. Summary of the comments received	C 2
G.3. Report on how due account was taken of any comments received	C 2