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

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Annexes

SECTION A. General description of the project

A.1. Title of the project:

«Utilization of surplus coke oven gas with the electricity generation at JSC «Yasynivskyi Coke Plant»

Document Release: the fourth.

Date: 11.12.09.

A.2. Description of the project:

Non-technical project resume.

Offered project description provides energy efficiency improvement by utilization of energy resources that were not used before.

Joint Stock Company «Yasynivskyi Coke Plant» (JSC «YCP») – is one of the largest coke-chemical plants in Ukraine. The plant releases more than 1 mln. tons of carbonaceous coke of different types a year: blast-furnace coke, low-sulphur coke, casting coke, coke nut, rest and a wide range of coke-chemical products: carbonaceous tar, ammonium sulphate, crude benzol, synthesizing benzol, toluol, solvent, low-sulphur flavour to motor oils etc. Products of the plant are of high quality and may be used both as finished goods and as raw material for other industry sectors. Major product types are: metallurgic coke (with quality rate corresponding to consumer requirements), casting coke, coke nut, coke rest, carbonaceous tar, ammonium sulphate, benzol rectification products (synthesizing benzol, solvent, toluol).

Nowadays, JSC «YCP» is a modern dynamically developing enterprise, with full coke-chemical production cycle with three acting coke oven batteries (№ 1, 5, 6), reconstructed chemical workshops and wide material base. The company works stably and ensures more than 3000 working places.

The aim of the project is to ensure more full utilization of energy resources of the enterprise and obtaining self-produced electricity. On introduction of coke oven batteries №1 and № 4 the plants produce surpluse coke oven gas, which under conditions of project absence (utilization and waste electricity), will be flared. Under the project conditions, the surpluse coke oven gas will be burnt in the boilers and obtained steam will generate electricity. Thus, JSC «YCP» offers a joint implementation project on plant energy scheme improvement.

The project includes two implementation stages. Within the first stage, which was already implemented after reconstruction of coke oven battery №1, the PT-12 condensing turbine (with 12 MW capacity) was installed at commbined heat power (CHP) plant for aditional energy generation from surpluse coke oven gas.

The installation of condensing type turbine is imposed by the fact that the plant has experience of substantial fluctuations of heat energy consumption in warm and cold seasons. The amount of electricity generated by AR-6 backpressure type turbo-units is rigidly linked to the heat issued as technological steam at 0,5 MPa, 250 ^{o}C. With the decrease of the demand for heat during the warm season the electricity generation by these units is also reduced. Thus, heating pressure decline is possible in warm seasons while the project turbine would work in condensation mode, generating waste energy. So, it ensures the most appropriate and flexible use of different modes of the installed equipment.

The second stage foresees reconstruction of coke oven battery № 4. It will ensure possibility to additionally obtain of coke oven gas, which is planned to be commbusted in boilers to generate the steam with further generation of electricity. Energy will be exported to other consumers aside of the enterprise.

As of the time the decision on project implementation was taken by the top-management of the plant, Ukraine has signed Kyoto Protocol. Beginning of the project investment stage coincided with Kyoto Protocol ratification in Ukraine[1]. One of the core decision-making reasons for financing of JSC «YCP» project was the fact that representatives of the enterprise took part in a series of training

[1] The Law of Ukraine № 1430-IVfrom 14.02.2004.

seminars in the framework of the technical support program of the European Commission on «Technical assistance to Ukraine and Belarus with respect to their global climate change commitments (2004-2006). During the seminars all participants were presented the general principles of Kyoto Protocol and its flexible mechanisms. The industrial group "Donetskstal" that incorporates JSC "YCP along with several other companies CJSC "Donetskstal Metallurgical Plant", " Donetsk Mettallurgical Plant, was among the first Ukrainian companies to have joined the realization of the Kyoto protocol flexible mechanisms In part, the project documentation for the Letter of Endorsement for the project "CMM utilisation on the Joint Stock Company "Coal Company Krasnoarmeyskaya Zapadnaya № 1 Mine" was prepared.

The performed calculations have shown that the electricity production at project CHP plant of JSC «YCP» through use of surpluse coke oven gas is economically non-effective. However, the possibility to involve additional financing sources for the installation of two turbogenerators at the cost of selling green gas emissions reduction units and prevention of CO_2 emissions on power stations of energy system with electricity generation from surpluse coke oven gas at JSC «YCP», to some extent improves economic effectiveness of the mentioned project until the economy profit level.

Additional volumes of coke oven gas that were collected after reconstruction of the second coke oven battery №1, exceeded expectations and in the year 2006 JSC «YCP» started selling waste energy to other enterprises. Finances, which were saved on purchasing energy at the cost of its own production, and obtained from energy sales, were decided to invest into project development, i.e. into installation of the second turbogenerator with power of 12 MW.

With reference of uncertainty in JSC «YCP» production development the decision to construct the second turbogenerator with power of 12 MW was postponed. At present, the decision on coke oven battery № 4 reconstruction is taken (exploitation is to be started in the year 2012) and top-management of the plant considers the possibility to order an execution plan for turbogenerator. The exploitation of the second turbogenerator is to be started in coincidence with the start of coke oven battery № 4, after its reconstruction.

Description of the project environment.

Production of coke is executed by coke coal processing under anaerobic conditions with high temperatures (900-1100 ^{0}C) with parallel coke oven gas, carbonaceous tar and other products receiving, in addition to coke itself. This technological process is called "coking".

Major consumer of coke is blast-furnace production, which uses large coke in pieces («metallurgic» or «blast-furnace») sized 25-40 mm. Only large coke is used in casting production. Consuming small types of coke is appropriate for agglomerative production, for technological cycles where «coke rest» is used as fuel and partly as reducing agent. In ferrous alloy production "coke nut" is used as carbon reducing agent – sorted coke 10-15 mm size.

Coke products are also used in nonferrous-metals industry. Large coke is used as reducing agent and fuel reducing lead, tin and copper ores in mining stoves. Zinc is produced using coke rest. To make electrodes for ferrous alloy and to facilitate aluminium production low in mineral and low in sulphur types of coke are used. Coke is also used in burning limestone and cement clinker in mining stoves, and getting carbide of calcium in electric furnaces.

One of the most important carboning products is coke oven gas which is used as a raw material for chemical industry and, moreover, is a fuel energy source. As an energy source, the purified coke oven gas is used for getting heat and electricity. Besides, coke oven gas is used as technological fuel for heating coke oven batteries, Martin furnaces (alongside with natural gas), heating wells and rolling-mill stoves.

There are quite significant resources of coking coal in Donbas region. By means of it, in metallurgic centers of Donbas and Prydniprovya, locate large coke-chemical plants (Makiyivka, Mariupol, Gorlivka, Stahanov, Dniprodzerzhynsk, Zaporizhzhya, Kryvyi Rig, Dnipropetrovsk). More than a half of coke volume is delivered from coke plants of Donbas, where the majority of coke-chemical plants of the country are situated, as their location mostly depends on coking coal deposits.

An economic crisis in Ukraine that arose after the split of the Soviet Union led to a significant decline in production in all economy sectors, including metallurgical industry. Following this process, the coke production declined as well. Under these conditions, coke production volumes in Ukraine shortened down to 57% in the year 1996 in comparison with the year 1990. In years 1996-1997 the country managed to stop production decline both through a general economic rally and by means of increasing demand on the market of iron industry inside and outside the country. Further on, the trends of world production and consumption of ferrous metals show the increase of coke production and consumption volumes. The dynamics of coke production volumes in Ukraine for the period of 1990-2007 is shown at the Fig. 1[2].

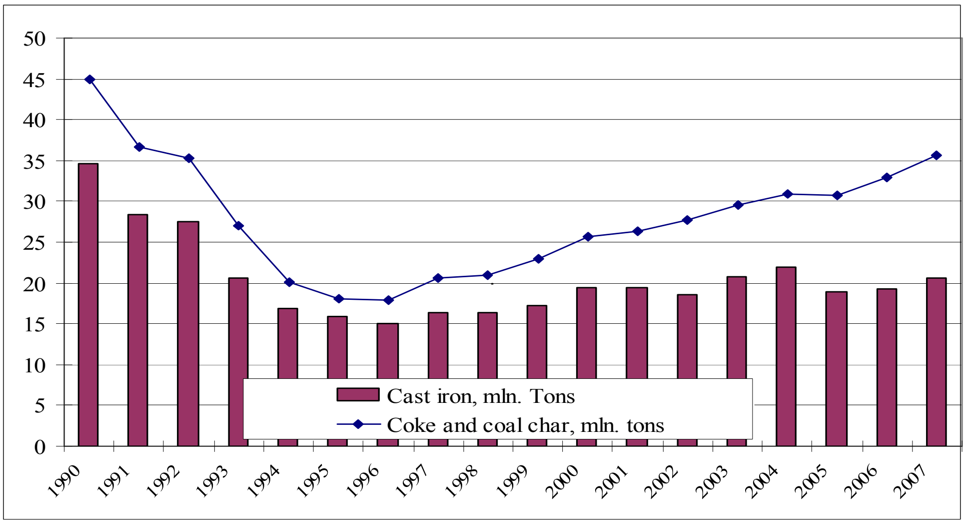

Figure 1. Coke production volumes for the period of years 1990-2007.

According to the International Institute of Steel and Iron (ISSI)[3] estimation, production of steel in the year 2000 has reached outstanding level of 828,4 mln. tons, having increased up to 7,4% in comparison to the year 1999. Thus, for the first time the level of 800 mln. tons was exceeded. China is the largest steel producer in the world, second place belongs to Japan, the USA occupies the third place, and Russia is on the fourth. Ukraine occupies the seventh place in the world among coke producers, and its part in world production is constantly growing. The production volume of coke in 2007 accounted for 41% of production volume in 1990. There is an industrial potential and raw materials potential for the further increase of coke production.

Project compliance to the long-term sustainable development strategy.

From the mid 90-s, one of the most important tasks of the country external economy course was obtaining an associated membership status in the European Union with the prospective of getting actual membership.

The substantial step towards the EU was made by Ukraine by conclusion of agreement on «Partnership and Cooperation between Ukraine and European Communities and their member countries»[4], the Article 61 of which declares intentions to cooperate in the frameworks of market economy principles and European Energy Charter under the conditions of evolutional integration of

[2] Form of Statistic Report №1-p «Report on natural production in Ukraine».

[3] www.worldsteel.org

[4] http://www.kmu.gov.ua/kmu/control/uk/publish/article?showHidden=1&art_id=31652&cat_id=31609&ctime=1148909555021

European energy markets. Moreover, the cooperation includes a range of issues aimed to increase energy efficiency and decrease negative effects for the environment.

European Parliament resolution of 13.01.2005 contains an appeal to the European Council and European Commission to «consider, except measures stipulated by Action Plan for European neighborhood policy, other association forms for Ukraine …, having provided the mentioned country with the clear European prospective, which would finally lead Ukraine to entering the European Union».

To integrate the EU, Ukraine needs to accomplish certain requirements, declared on the highest interstate level. In particular the EU strategy for Ukraine, Action Plan «Ukraine – EU» were developed, cooperation spheres were outlined. Among cooperation priorities between Ukraine and EU in the sphere of energy nowadays there is the energy policy implementation, which facilitates approximating with the goals of EU energy policy and gradual transfer to principles of internal EU energy markets. Besides, it is important to achieve progress in effective use of energy and renewable energy sources. A lot of work is done to ensure implementation of conditions of Memorandum on understanding between Ukraine and EU in the energy sphere.

The Action Plan developed between Ukraine and European Union states the necessity to facilitate sustainable development by means of further actions on including issues of environmental protection into the policies of other spheres, in particular, in the spheres of industry and energy. In connection to this it is necessary to accept Action Plans regarding increase of energy efficiency, development of cooperation on energy safety projects.

In terms of above-mentioned, it is possible to state that requirements of Ukraine Ecological Legislation and the role of energy safety in prospective, accrording to the implementation of plans on integration into the EU, will increase. More and more state attention is delivered to the problems of energy resources effective use.

Ukraine belongs to the countries partly provided with traditional types of primary energy, and therefore it has to import them. Energy dependence of Ukraine from organic fuel supplies in the year 2004 was as high as 60,7% (to compare, energy dependence of EU countries is 51%).

Taking above-mentioned into consideration and under conditions of economic indexes growth in the year 2006, on 15.03.2006 the Cabinet of Ministers of Ukraine has adopted «Ukraine energy strategy for the period till 2030», which defines priorities in energy sector development. Among one of the most important ways of development there is integration of the national energy system of Ukraine into European one, the energy export increase, reduction of local energy-output ratio in production and optimization of own energy recourses exploitation.

Thus, implementation of the JSC «YCP» project with the energy production based upon useful consumption of surpluse coke oven gas completely correlates with the long-term sustainable development strategy of Ukraine.

A.3. Project participants:

Parties-participants	Legal entities – project participants (when necessary)	Please state whether Parties-participants would like to be members of the project
Ukraine (hosting)	JSC «YCP»	No
Ukraine (hosting)	Environmental (Green) Investments Fund ltd	No
Switzerland	Rutek Trading AG	No

More detailed information on project participants is stated in Annex 1.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located at coke-chemistry plant in the city of Makiyivka, Donetsk region. Donetsk region is located in the steppe part of the South-East Ukraine. The geographical location is shown on the Fig. 2.

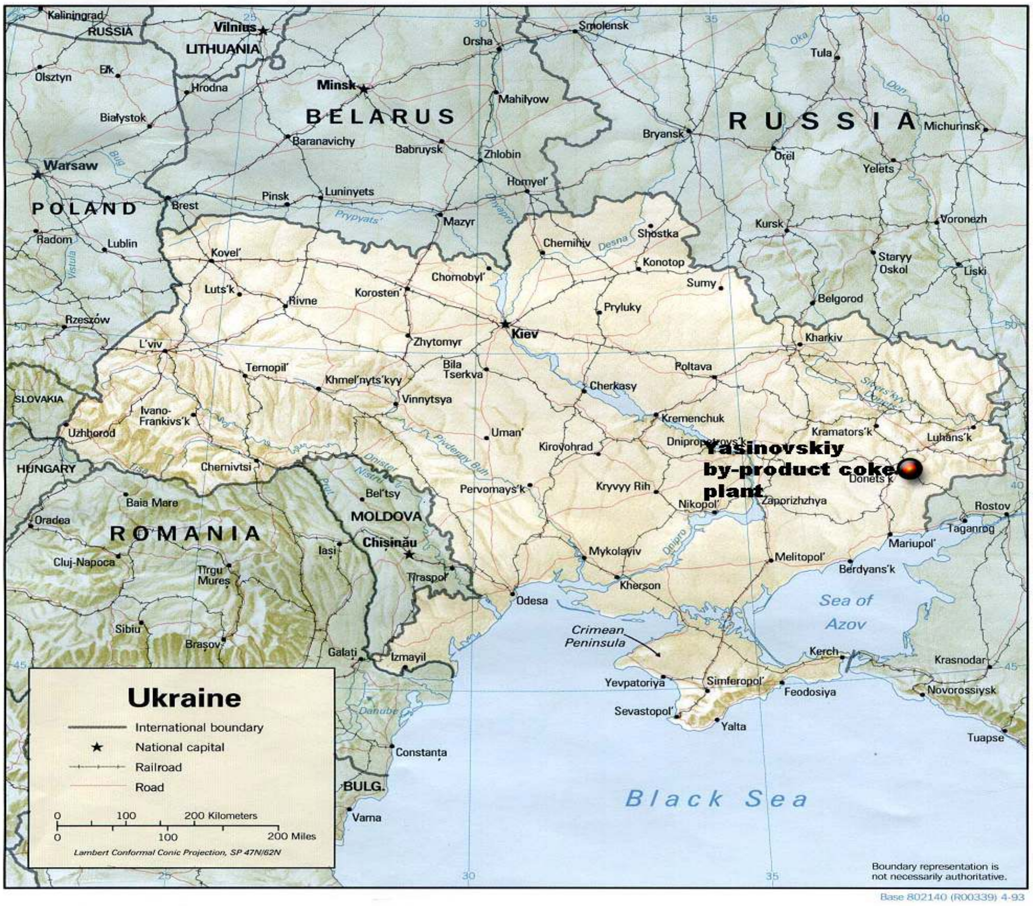

Figure 2. JSC «YCP» Location on the map of Ukraine

A.4.1.1. Host Party(ies):

Ukraine

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

Donetsk region

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

The city of Makiyivka

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

Offered project is implemented in Donetsk region, city of Makiyivka.

Coordinates of turbogenerator: N 48^{0}05'58,67" E 37^{0}54'36,91". Project objects are shown on the map, Fig. 3.

Figure 3. JSC «YCP» location

JSC «YCP» is located on the South-West part of the city of Makiyivka in Kirovskiy district. On the North-West part of the spot a CHP plant is situated, Fig. 4. A complex of constructions drafted in the project, are located on the Western side of the head building of JSC «YCP» CHP plant, Fig. 5. New buildings are marked at the picture with different color. Location of the PT-12 turbine on JSC «YCP» CHP plant is shown at the Fig. 6.

Figure 4. Location of CHP plant at JSC «YCP».

Figure 5. Place for extension of CHP as a result of the first stage of the project implementation

Figure 6. Location of the PT-12 turbine in the block of JSC «YCP» CHP plant.

A construction area was located on the South-West from the CHP plant head building between the block and internal railway of the plant and is limited by:

- Internal coke plant roads on the North-West side;

- Existing one-floor building on the West side;
- Head building of the CHP plant on the East side;
- Railway to fuel warehouse on the South side.

Territory adjoining the construction area is fully covered with buildings, constructions, overpasses and contains underground communications.

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

As a result of production process for the basic product (coke) at JSC «YCP» there is a by-product – coke oven gas. This product contains steams of water and carbon chemical products (tar, ammonia, benzol carbohydrates, hydrogen sulphide) with the temperature of 650-700 °C. It is supplied to gas collectors, where it is irrigated with over-tar water and cooled down to 80-85 °C. When the gas is beeing cooled, tar partly condensates and the gas itself disengages from hard parts of coke and fusion mixture. Then, the gas along with water is supplied to separators, with further extraction of over-tar water and tar. After that the gas is purified from ammonia, benzol carbons, hydrogen sulphide. Purified coke oven gas is supplied to heating coke oven batteries, boilers of the CHP plant, pipe furnaces of the chemical workshops, coal defrost garage.

As of 2003, nearly 59% of the obtained coke oven gas was used for coke oven batteries heating, approximately 31% was used at CHP plant boiler shop, around 1% was flared, and around 5% was used by other enterprises. Other consumers of JSC «YCP» used the rest (4%) of the produces coke oven gas. Production processes in the chemical workshops of JSC «YCP» also require high level of technological steam consumption.

The source of JSC «YCP» heat supply is the CHP plant, located inside the industrial area of the facility. Acting CHP plant releases steam for different technological needs of the plant, i.e.: pressure 3,9 MPa at 440 °C; 1,3 MPa at 300°C, and 0,5 MPa at 250 °C.

The turbine section is equipped with two 6 MW backpressure turbine AP-6 units; three 100 t/h atmospheric deaerators; two 80 t/h reducing coolers at 3,9/0,5 MPa. Basic and auxiliary equipment warehouse of the current CHP plant is shown in Table 1.

Table 1. Basic and auxiliary equipment warehouse of the current CHP plant

Equipment name	Quantity	Type
Basic Equipment:		
- steam boilers	5	TP-35
	2	BK-50
- turbogenerators	2	AP-6
Auxiliary equipment:		
- atmospheric deaerator	3	DSA-100
- reducing cooler	2	ROU 80

Electricity produced at CHP plant covers JSC «YCP» needs by 35%. The rest of electricity is imported from the grid. The principal scheme for CHP plant before the launch of the project is shown in Fig. 7. Red flagged is the live steam flows (Fig. 7 onwards) and black flaged is the technological steam flow.

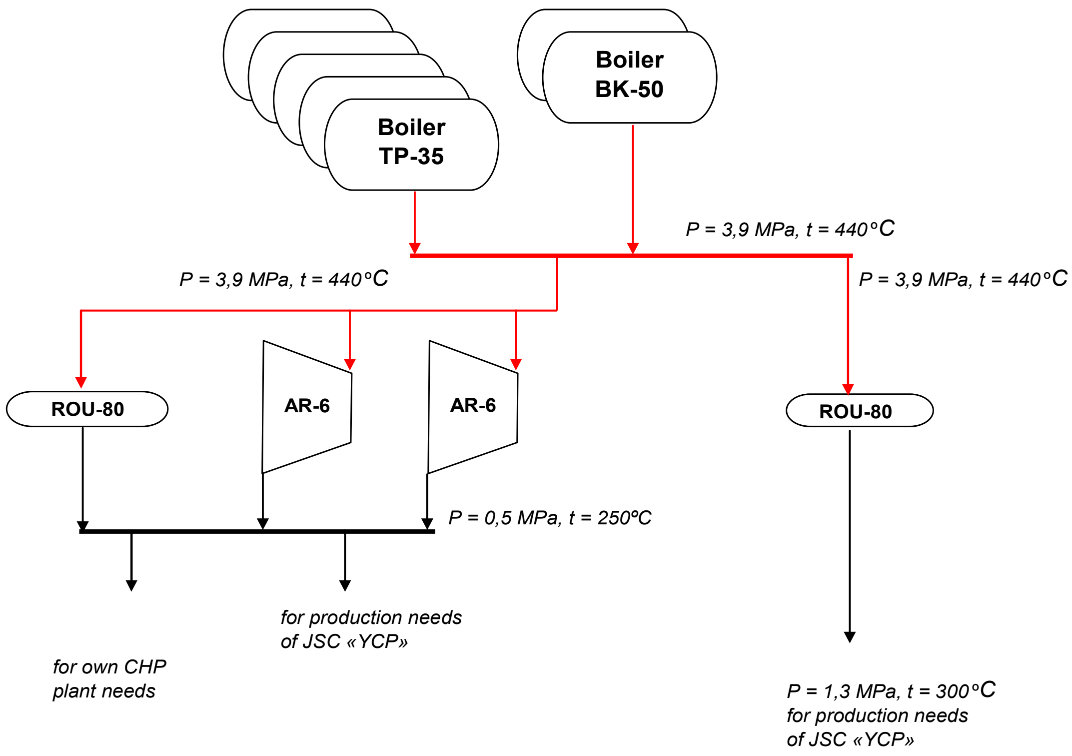

Figure 7 – Principal scheme for JSC «YCP» CHP plant before reconstruction

The project is expected to be implemented in two stages. The first stage, which was accomplished after coke oven battery №1 reconstruction, included the installation of the PT-12 12 MW condensing turbine on the CHP plant in order to produce additional energy using surpluse coke oven gas.

The installation of condensation turbine unit is caused by the substantially fluctuating consumption of thermal energy in warm and cold seasons. Only one third of electricity needs is covered by self-production at existing turbines.

The type of installed turbines allows to operate with steam extraction (for process needs the portion of steam in the relevant parameters is extracted) or to work in condensing mode (the entire volume of steam after the turbine enters the condenser) (see Table 2 of PDD). Quality of PT-12 turbines is confirmed by the fact that the plant manufacturer of these turbines (JSC "Kaluga Turbine Works") was certified in 2003 by the international quality standard EN ISO 9001:2000 by TŰV CERT[5] company (registration number №041005007).

Thus, if there is a reduction in heating pressure in warm seasons, work of the turbine would be possible in condensation mode, with waste energy production. So, the installed equipment is used in different modes with effective flexibility. It allows to completely cover the plant needs in self-generated energy. Table 2 shows the list of technical specification for the new PT-12 turbine installed by the project.

[5] http://www.ktz.kaluga.ru/english/industry/industry04.htm

Table 2. Technical specification of PT-12 turbogenerator

Parameter name	Data unit	Parameter value
1. Nominal power	kW	12000
2. Nominal parameter for produced steam	MPa	3,9
3. Nominal temperature for produced steam	°C	440
4. Nominal pressure of produced steam outside the turbine	MPa	0,0035
5. Nominal absolute steam pressure in regulated productive selection (band)	MPa	1,0 (0,8-1,3)
6. Nominal absolute steam pressure in regulated heating selection (band)	MPa	0,12 (0,07-0,25)
7. Production steam input	t/h	50
8. Selected heating steam input	t/h	40
9. Steam input for turbine	t/h	106,7
10. Steam input for turbine in condensation mode	t/h	56,3

The outgoing steam after cooling in turbine condensers goes to the close-cycle water-supply system. Water power supply of the system is made by an individual cycle water supply system in the framework of water cooling tower and pump station. Fig. 8 shows the principle plant scheme for JSC «YCP» after accomplishment of the first project stage.

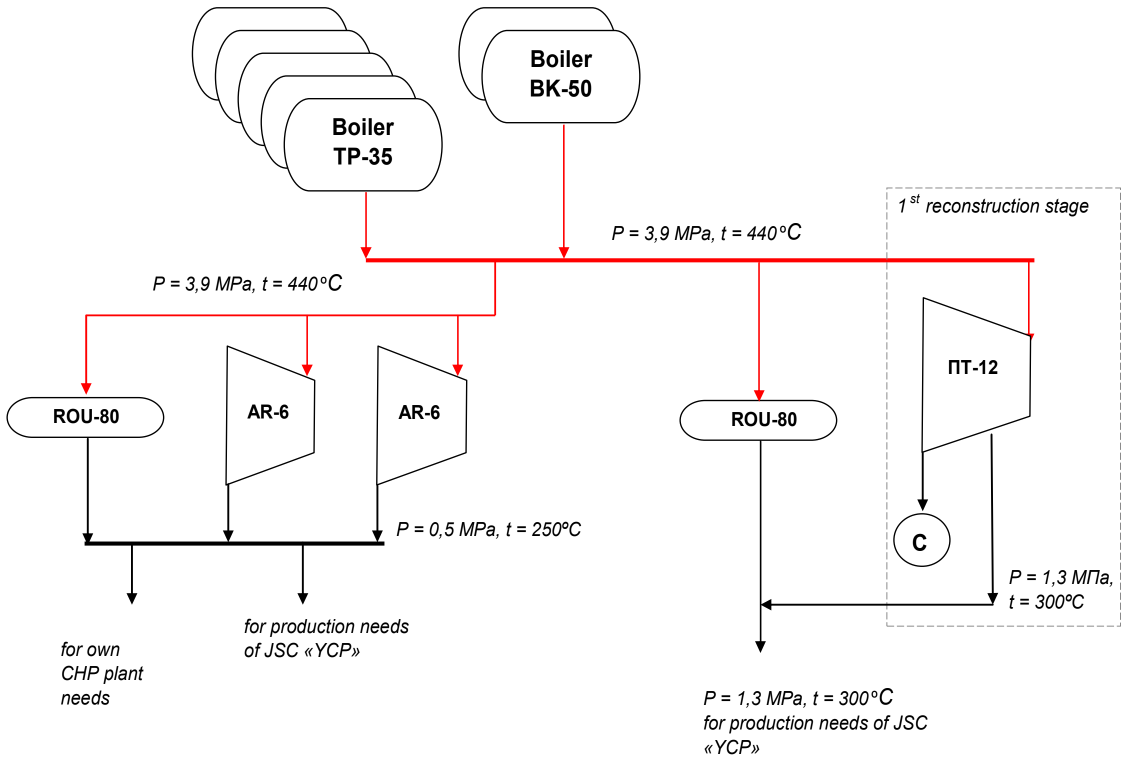

Figure 8. Principle plant scheme for JSC «YCP» after accomplishment of the first project stage.

The decision on coke oven battery № 4 modernization (in March 2009) was followed by the one on the preparation for the possible implementation of the second stage of the project. The modernization of coke oven battery № 4 will lead to increase of coke oven gas production volumes.

The second project stage requires surplus coke oven gas utilization and stipulates additional steam boiler installation, with steam production of 50 t/h and another PT-12 turbogenerator that are planned to start working after coke oven battery № 4 modernization is completed in the years 2011-2012 and other auxiliary equipment.

The electricity, produced by new generator, will be sold to other consumers. Principle scheme for JSC «YCP» CHP plant after the second project stage implementation is shown at the Fig. 9.

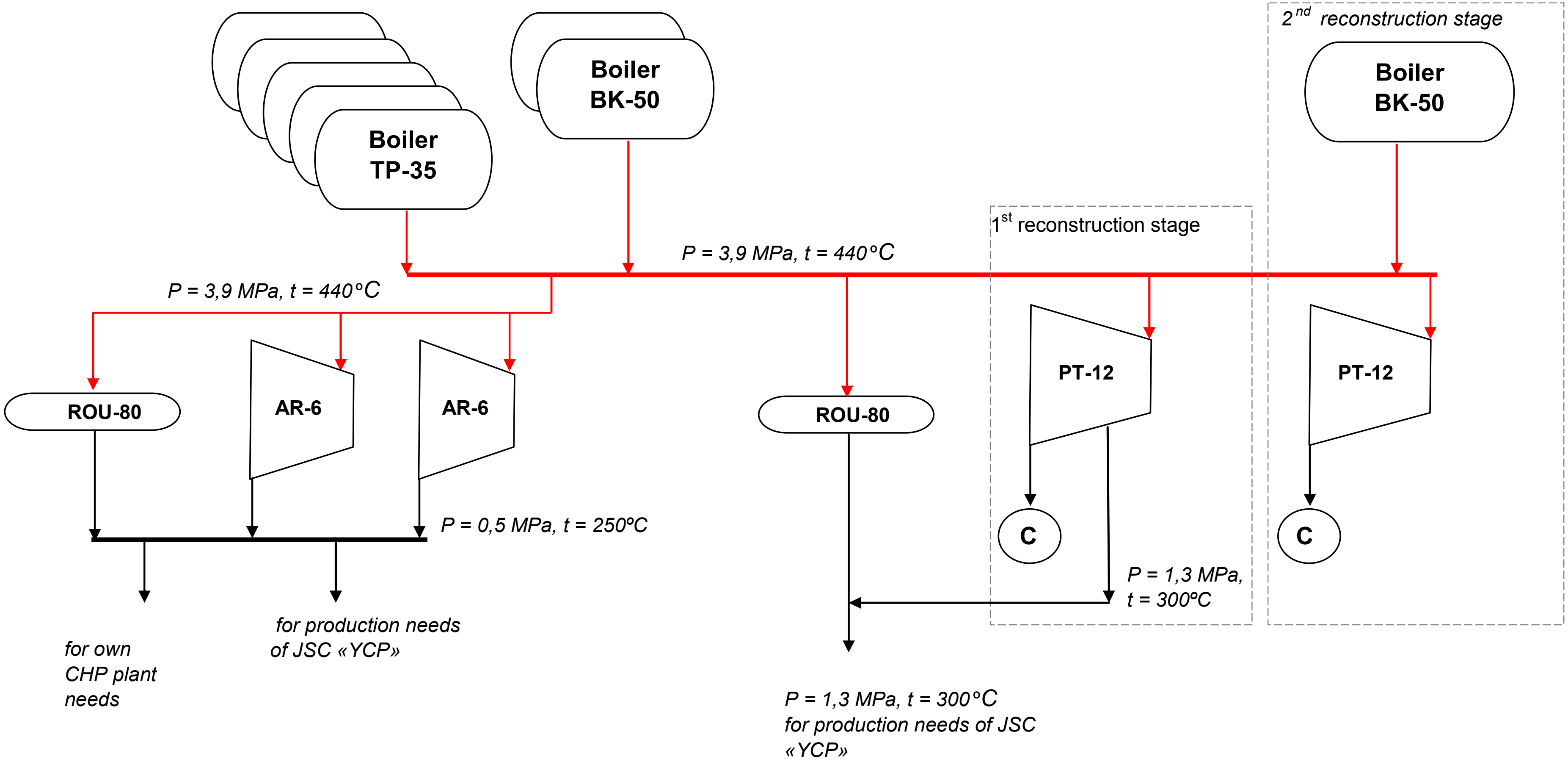

Figure 9. Principle scheme for JSC «YCP» CHP plant after the second project stage implementation

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

Anthropogenic greenhouse gas emissions reduction by implementation of the project activity corresponds to the one described in ACM0012[5] «Approved «Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects», Version 03.1 of 28.11.2008, hereinafter ACM0012.

To define the greenhouse gas emission level in the project calculations, only the CO_2 emissions are taken into account, which are the result of flaring of other (non-surplus coke oven gas) fuel, as a result of the project performance. Surplus coke oven gas emissions are not taken into consideration, as in the baseline scenario the gas would have been flared the same way, however without useful utilization. Besides, emissions that result from flaring or combustion are also considered to be equal to zero. According to ACM0012 methodology, methane and nitric oxide emissions are not considered due to their small amounts.

Without the project, surplus coke oven gas would be flared without energy utilization. While under project implementation the produced electricity will push off the equivalent volume of electricity from the national grid, i.e. the electricity generated by old stations that work on fossil fuels. So, the project will facilitate GHG emissions reduction by stations that generate power for the Ukrainian power grid, and to estimate their baseline emissions the Ukrainian United Energy System emissions were considered. (Justification of the project additionality principle and data for its financing are stated in Annexes 4 and 5, accordingly).

To define emissions factor for Ukrainian United Energy System the Global Carbon B.V.[6] research results for standard factors of dioxide carbon emissions within Ukraine energy network were used. The results of this study were also used in the project documentation 0035 “Utilization of Coal Mine Methane at The Coal Mine named after A.F. Zasyadko”, which was approved by Joint Implementation Supervisory Committee under the auspices of Secretariat for UN Framework Convention on Climate Change (UNFCCC).

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

This Section describes terms of emission reduction levels for two possible crediting periods – for so-called early credits (2006-2007) and for the first commitment period under Kyoto Protocol (2008-2012), Table 3.

Table 3. Emission reduction levels for different crediting periods

Early credits (2 years)	
Year	Estimation of annual emission reductions for early credits calculated in tons of CO2-equivalent
2006	36425
2007	62673
Total estimated level of emissions reduction during the crediting period, tons of CO2-equivalent	99098
Average annual calculation for emissions reduction level for early crediting period, tons of CO2-equivalent	49549

[5] “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”. Version 03.1

[6] Study “Standardized emission factors for the Ukrainian electricity grid” (Version 5, 2.02.2007) developed by Global Carbon B.V.

First period of commitments under Kyoto Protocol (5 years)	
Year	Estimation of annual emission reductions for obligation period under Kyoto Protocol calculated in tons of CO2-equivalent
2008	61841
2009	63261
2010	63261
2011	63261
2012	102390
Total estimated level of emissions reduction during the crediting period, tons of CO2-equivalent	354014
Average annual calculation for emissions reduction level for first period of commitments under Kyoto Protocol, tons of CO_2-equivalent	70802,8

Provide an estimation of emission reductions for late credits (2013-2036) under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged, Table 4.

Table 4. Emission reduction levels for late crediting period under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged

Late credits (24 years)	
Year	Estimation of annual emission reductions for late credits calculated in tons of CO2-equivalent
2013	102287
2014	102287
2015	105651
2016	105651
2017	105651
2018	105651
2019	105651
2020	105651
2021	108911
2022	108911
2023	108911
2024	108911
2025	108911
2026	118693
2027	118693
2028	118693
2029	118693
2030	118693
2031	79565
2032	63261
2033	63261
2034	63261
2035	63261
2036	63261
Total estimated level of emissions reduction during the crediting period, tons of CO2-	2372370

equivalent	
Average annual calculation for emissions reduction level for late crediting period, tons of CO2-equivalent	98848,7

A.5. Project approval by the Parties involved:

Letter of Endorsement from the National Environmental Investment Agency of Ukraine (NEIA) is expected in September 2009. According to Ukrainian standards, the last version of project documentation will be submited to NEIA together with the positive determination report in order to receive the Letter of Approval.

SECTION B. Baseline

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

The baseline scenario of the project was defined according to ACM0012 methodology. The following facts confirm the correct implementation of the mentioned methodology during the project preparation at JSC "YCP":

- Energy generated in the project activity may be used within the industrial facility or exported from the industrial facility (to the grid). Electricity generated by PT-12 turbines is consumed for captive purposes of the plant. Surplus is exported to the grid;
- Electricity is generated at the own CHP of the JSC "YCP". Waste coke oven gas, which utilized for electricity generation, is produced by the own coke oven batteries of the plant;
- Acting regulations do not constrain the industrial facilities to consume extra coke oven gas to produce electric power, which was obtained as a by-product of technological cycle of coke production from fossil resources (in this case from coal). According to the «Safety rules for gas system of coke-chemical enterprises and producers» (came into force by the Order of the State Committee on Industrial Safety, Labor Protection and Mining Supervision of Ukraine № 61 of 27.03.2007) the surplus coke oven gas is periodically flared;
- The methodology covers both new and existing facilities. In case of proposed project we have new PT-12 turbines implementation and existing AR-6 turbines at the existing CHP.;
- The emission reductions are claimed by the generators of energy that use steam produced by using waste gas CHP boilers;
- Surplus of generetad electric energy is exported to the grid. No official agreement about emission reductions ownership between the project owner and National electricity grid operator is necessary;
- Waste energy that is released under abnormal operation of the plant was not taken into consideration (e.g. pressure fluctuations in coke oven gas flow taking away by flaring).

Since all the criteria for applicability are met, then consider the project as a Type-1 project in accordance with the methodology ACM0012.

Demonstration of use of waste energy in absence of CDM project activity

The surplus of coke oven gas, which is utilized after the project implementation, came as a result of launch of coke oven battery №1 (for the first stage of project) and coke oven battery №4 (for the second) after the reconstruction. Prior to the project implementation this surplus was absent. Energy recovery activities were already implemented in other streams of coke oven gas.

For demonstration of waste energy use in the absence of JI project activity direct measurements of the energy content and amount of the coke oven gas produced for three years prior to the start of the project activity is applied.

There is no decrease in energy generated from the waste energy recovered previous to the implementation of the JI project activity. This is confirmed by monitoring of electricity that generated at the existing AR-6 turbines and considered in baseline emissions estimation (see section D.1.1.4 below).

Study of baseline variants

On the base of technological and economic aspects of coke oven gas possible use analysis, it is possible to define the following scenarios of waste coke oven gas use:

Scenario 1 – surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid.

Scenario 2 – chemical products production development within the own plant using surplus coke oven gas, absence of electricity export and purchase of electricity from the grid.

Scenario 3 – surplus coke oven gas exports to other industrial facilities for the purpose of energy generation using waste energy, absence of electricity export and purchase from the grid.

Scenario 4 – surplus coke oven gas sales to municipal enterprises for the purpose of heat generation, absence of electricity export and purchase of electricity from the grid.

Scenario 5 – combustion of surplus coke oven gas in boilers of JSC «YCP» CHP plant for steam production with further electricity generation to cover the plant own needs and possible sales of extra-energy to other consumers.

Analysis of the advantages and disadvantages of the above mentioned scenarios is stated hereunder.

The development under the scenario (1) is widespread in a local practice. According to the «Safety rules for gas system of coke-chemical enterprises and producers» (came into force by the Order of the State Committee on Industrial Safety, Labor Protection and Mining Supervision of Ukraine № 61 of 27.03.2007) the surplus coke oven gas is periodically flared.

The advanteges of the scenario (1):

- Doesn't require additional expenses;
- Doesn't have risks, caused by the implementation and the exploitation of complex technological equipment.

The basic disadvantage of the mentioned scenario is non-productive flaring of coke oven gas. Besides, additional anthropogenic load is created indirectly for environment in the result of GHG emissions from the plants of the grid wherefrom JSC «YCP» uses energy to cover its own needs.

The chemical production development within the own plant using surplus coke oven gas under the scenario (2) requires productive capacity increase. Such variant makes disadvantages such as difficulties due to the necessity to ensure the additional construction territory for building additional facilities. In addition, coke oven gas used by JSC «YCP» for the chemical production is just 2-4 % from the total amount of own produced coke oven gas. The amount of coke oven gas produced after modernization of coke oven battery № 4 exceeds the demand of the chemical production facility in several times, and possibility to implement this scenario is limited by the lack of demand for additional chemical products that might have been produced from surplus coke oven gas until its full utilization.

Coke oven gas exports to other industrial facilities (Scenario 3) has also got its own disadvantages. The main coke oven gas customer – Makiyivka Metallurgic Plant (MMP) – in the year 2008 stopped purchasing completely the small volume of coke oven gas which it used to buy before. Partly it was caused by the fact that it gets coke oven gas from the enterprise that belongs to the same owner, as MMP, and partly – due to too high content of hydrogen sulphide in the coke oven gas produced by JSC «YCP». All attempts to find other coke oven gas customers failed.

The disadvantage of the scenario (4) is non-regulated institutional problems with the introduction of intersectoral project, including the problem of non-payment for consumed energy resources in residental sector. Besides, consumption of coke oven gas depends on the seasons of heating (in Makiyivka the heating season (period when daily temperature is lower than +8ºC) lasts 183 days, while most of this time boiler houses are working with a not full loading due to outer space temperature variations). Thus, residental boiler houses may consume less than 50 % of surplus coke oven gas.

Coke oven gas for residental use instead of natural gas wasn't considered because coke oven gas contains large amount of hydrogen sulphide, which greatly exceeds feasible regulations constrains for residental consumers.

The disadvantages of the scenario (5) are first of all the following:

- Significant expenses for purchasing and installation of technological equipment;
- Risks due to the exploitation of complicated technological equipment;

- Necessity to change the enterprise energy supply system.

Conclusion from the above-stated analysis is that the only possible way to use as baseline is the Scenario (1) – surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid.

This baseline scenario corresponds to Scenario 2 in ACM0012 methodology for electricity generation only:

- prior the project implementation a portion of the waste coke oven gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste coke oven gas produced at the facility is flared;
- existing power generating equipment (AR-6 turbines) is maintained and additional electricity generated by grid connected power plants.

Data for baseline emissions calculation are stated in Annex 2.

Overview of emission sources included in or excluded from the project boundary is provided in Table 5.

Table 5 – Summary of gases and sources included in the project boundary, and justification explanation where gases and sources are not included

	Source	Gas	Included	Justification / Explanation
Basic scenario	Electricity generation, grid or captive source	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. Analysis is conservative
		N_2O	No	Excluded for simplification. Analysis is conservative
Project scenario	Supplemental fossil fuel consumption at the project plant	CO_2	Yes	Main emission source Presence and quantity of emissions are indicated after monitoring
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification

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

Baseline scenario emissions

The baseline scenario represents the situation where the surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid. To define baseline emissions standardized carbon dioxide emission factor was used, wich performed in accordance with «Standardized emission factors for the Ukrainian electricity grid» research, developed by «Global Carbon B.V.» for the period of 2006-2012. The document specifies emission factors for baseline emission estimation for JI projects in Ukraine, according to which electricity generates and exports to the grid, as well as the generated electricity uses for own needs (Table Ann 2.1 in Annex 2).

The baseline emissions according to ACM0012 methodology determined as follows:

$$BE_y = BE_{En,y} + BE_{flst,y}\,, \tag{1}$$

Where BE_y - the total baseline emissions during the year y in tons of CO_2;

$BE_{En,y}$ - the baseline emissions from energy generated by project activity during the year y in tons of CO_2;

$BE_{flst,y}$ - baseline emissions from steam generation if any, using fossil fuel that would have been used for flaring the coke oven gas in absence of the project activity (tons CO2 per year *y*);

The enterprise doesn't use additional energy resources for flaring of coke oven gas in gas collection torch. Thus, the second part of the formula (1) in our case is absent ($BE_{flst,y} = 0$).

Baseline emissions for energy production, according to ACM0012 methodology, are defined by the following formula:

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}, \tag{2}$$

where $BE_{Elec,y}$ - baseline emissions for energy production during the year *y*, tons CO_2

$BE_{Ther,y}$ - baseline emissions for thermal energy generation for the year *y*, tons CO_2

Under this project thermal energy generation emissions are not considered, as the producer covers all its production needs, and thermal energy sales to other customers are practically impossible and economically irrelevant. So, the second part of the formula (2) in our case is absent ($BE_{Ther,y} = 0$).

To define baseline emissions for energy production, according to ACM0012 methodology, the following formula is used:

$$BE_{Elec,y} = f_{cap} \cdot f_{wcm} \cdot EG_y \cdot EF_{Elec,produc}, \tag{3}$$

where EG_y – amount of energy, produced within the framework of the project for the year *y*, which would have been generated by Ukrainian United Energy System power stations, that use fossil fuels

$EF_{Elec,produc}$ – emission factor, which is used in cases of electricity displacement in the National Energy System of Ukraine for the electricity, generated within the implementation of the project activity;

f_{wcm} – fraction of total electricity generated with the use of coke oven gas in the framework of the project from the general amount of electricity, generated during implementation of the project activity;

f_{cap} – energy that would have been produced in project year y using waste energy generated in base year expressed as a fraction of total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is same or less than that generated in base year.

Let us consider emissions coefficient in more detail. It is considered as equal to 0,807 tCO_2/MWh , in accordance with the *Global Carbon B.V.* study of standardized emission factors of dioxide carbon by Ukrainian electricity grid [6].

The special feature of the electricity supply scheme at JSC «YCP» is that the enterprise has to supply a part of project-generated energy to the grid, wherefrom it is delivered to consumers of JSC «YCP» via power step down transformer. The conservative baseline suggests that all the electricity produced due to the project activity is supplied to the grid. To calculate emissions reduction it is necessary to use emissions factor which is defined for energy displacement in the National Energy System of Ukraine for the energy, produced during the project activity. The factor in the above mentioned Global Carbon B.V. study is defined equal to 0,807 tCO_2/MWh.

As to the f_{wcm} factor, it is necessary to mention that according to ACM0012 methodology, if all the electricity generated in the result of project activity was produced using exclusively coke oven gas, the factor is considered as equal to one. JSC «YCP» CHP plant uses coal as a reserve fuel for boilers. But the amount of this coal consumed within a year is insignificant. Besides, according to the monitoring data the amount of coal used at JSC «YCP» as reserve fuel has been reduced in the first stage of the project implementation. Thus, during the three years before the project activity implementation, the average annual amount of coal used by the plant was about 1419 tons, while during the three years after the project's launch – 1332 tons of coal per year. However, the conservative principle for baseline emission level defines that coefficient f_{wcm} :

$$f_{WCM} = \frac{\dfrac{\sum_{h=1}^{8760} Q_{WCM,h} \cdot (Cp_{wcm} \cdot (t_{wcm,h} - t_{ref}) + NCV_{WCM,y})}{H_r}}{EG_{tot,y}} \quad (4),$$

Where:

$Q_{WCM,h}$ - Quantity of coke oven gas recovered in hour h, (m3/h);

$NCV_{WCM,y}$ - Net Calorific Value of coke oven gas in year y, (TJ/m3);

$EG_{tot,y}$ - Total annual electric energy produced at the CHP, (TJ/year).

Cp_{wcm} - Specific Heat of coke oven gas (TJ/ m3-deg C);

$t_{wcm,h}$ - The temperature of WECM in hour h (deg C);

t_{ref} - Reference temperature (0 deg C or any other suitable reference temperature with proper justification).

H_r - Average heat rate of the power plant where electricity is produced (1/efficiency) as calculated in equation 5 below;

The average heat rate of the power plant is given as:

$$H_r = \frac{\sum_{h=1}^{8760} \sum_{i=1}^{I} Q_{i,h} \cdot (Cp_i \cdot (t_{i,h} - t_{ref}) + NCV_i)}{EG_{tot,y}} \quad (5),$$

Where:

$Q_{i,h}$ - Amount of individual fuel (coke oven gas and coal) i consumed at the energy generation unit during hour h, (kg or m3);

C_{pi} - Specific Heat of individual fuel i (TJ/kg -deg C or TJ/ m3-deg C);

NCV_i - Net Calorific Value annual average for coke oven gas and coal consumed (TJ/kg or TJ/m3);

$t_{i,h}$ - The temperature of individual fuel (coke oven gas and coal) i consumed at the CHP boilers during hour h (deg C).

Coke oven gas, obtained in coke batteries, is cooled for further purification and distribution to consumers of the plant. Thus, to the CHP boilers this gas goes cooled. Coal that is delivered to the boilers has the ambient temperature. Therefore, the temperature drop, as shown in formulas (4) and (5), is neglected in view of smallness in comparison with the NCV of these fuels.

The results of the calculation of the f_{wcm} fraction are given in Table Ann.2.1. (Annex 2).

As to f_{cap} determination, to carry energy from primary WECM (heat of reaction (combustion) of coke oven gas) intermediate energy source (superheated steam) is used, which is finally used to generate the output energy in the final waste heat recovery equipment (PT-12 turbine). Thus, the project corresponds to the Case 2 of Method 3 for calculation of this fraction according to ACM0012 methodology. The following formula should be used:

$$f_{cap} = \frac{Q_{OE,BL}}{Q_{OE,y}} \quad (6),$$

where

$Q_{OE,BL}$ - output/intermediate energy that can be theoretically produced (in appropriate unit).

$Q_{OE,y}$ - quantity of actual output/intermediate energy during year y (in appropriate unit).

In equation (6) the f_{cap} will become more than 1 and will be automatically set to 1 as per the definition of fcap in ACM0012 (the ratio is 1 if the waste energy generated in project year *y* is same or less than that generated in base year).

Project scenario emissions

According to the project scenario, the use of the supplementary coal amount (as supplementary fuel, which is now used by the facility) is not anticipated for boilers. It also does not anticipate energy consumption for additional purification of coke oven gas before it is used in the boilers of the CHP plant in comparison with flaring. Hereby, greenhouse gas emissions in the framework of the project are absent.

Leakages

According to ACM0012 methodology, leakages are not considered for this project.

Emission Reductions

GHG emission reductions due to the project implementation are calculated according to ACM0012 methodology by the formula (13), stated in D.1.4.

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

The project boundaries shall include all sources, which will change GHG emissions resulting from project direct action. Project direct action will be realized in generation of electric power from waste energy sources, which would make the same GHG emissions in case of non-recovery use. Thus, the project implementation leads to reduction of energy production from the emission sources (electricity and CHP plants in the energy system of Ukraine). Hence, Ukrainian electricity grid will be the boundaries of the project (Fig. 10).

According to ACM0012 methodology, geographic extent project boundary shall include the following:

- The industrial facility where waste energy is generated, including the part of the industrial facility where the waste gas was utilized for generation of captive electricity prior to implementation of the project activity);
- The facility where process electricity is generated (generator of process electric power). Equipment providing auxiliary heat to the waste energy recovery process shall be included within the project boundary; and
- The facility(ies) where the process electricity is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable (National Energy System of Ukraine).

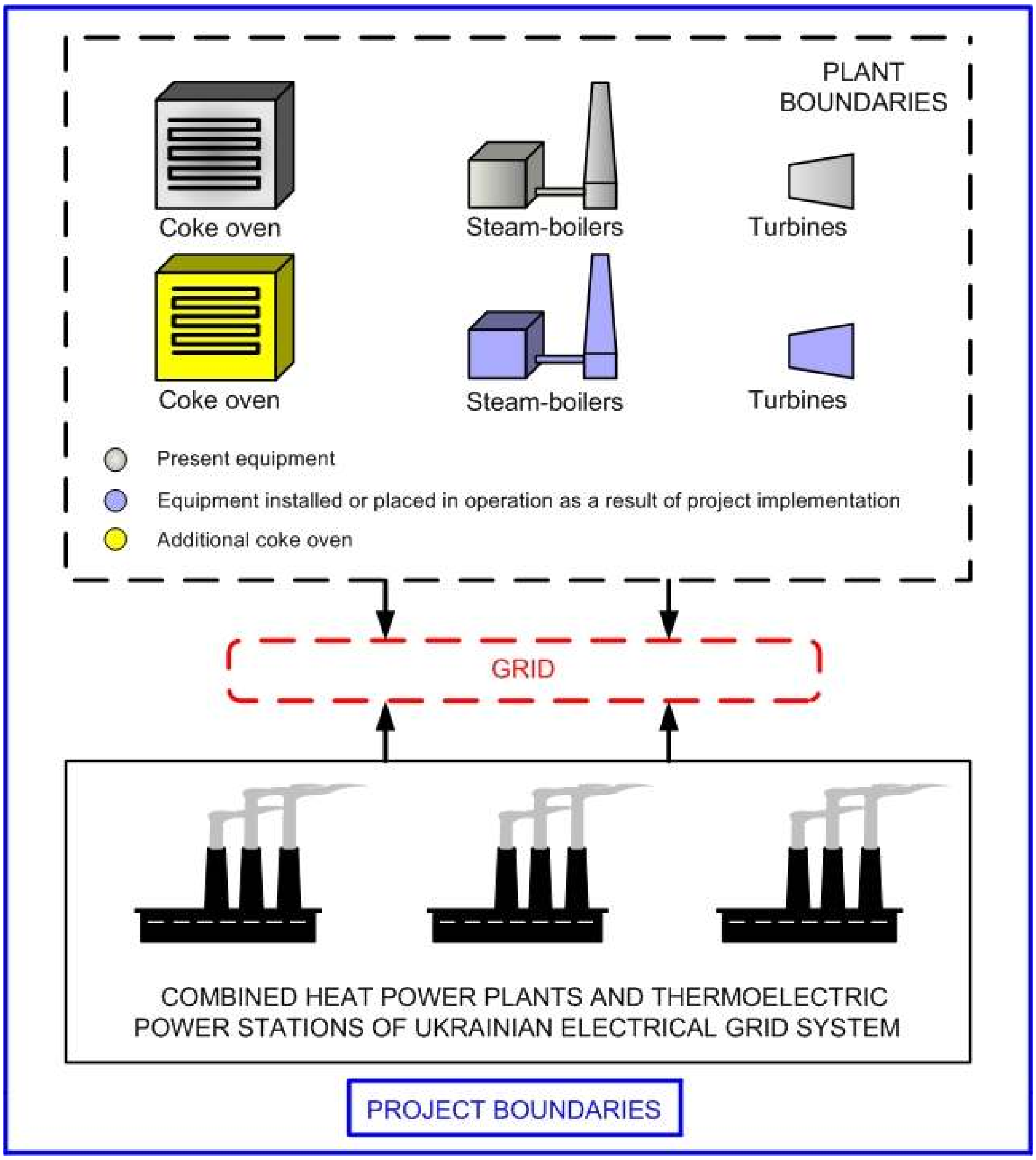

Figure 10. Project boundaries.

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

Date set for baseline emissions – 15.07.2009.
Name of a person (organization), responsible for baseline emissions definition:
Organization name: Environmental (Green) Investments Fund LTD
Address: 10B Sofii Perovskoi St., Kyiv 03680, Ukraine
Contact person:
Panchenko Georgiy Georgiyovych
Skybyk Sergiy Yaroslavovych
Position:
Inventory and project expert (Industrial processes section)
Inventory and project expert (Energy section)
Telephone/fax: (+38 044) 456-19-87

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sskybyk@gmail.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Beginning of the project investment stage – year 2004.
Exploitation stage 1 – year 2006.
Exploitation stage 2 – year 2012.

C.2. Expected operational lifetime of the project:

The operational lifetime of main project equipment is 25 years. Since the first PT-12 begin operation in 2006, and the second - in 2012, the project operational lifetime includes the years from 2006 to 2036, i.e. 31 years.

C.3. Length of the crediting period:

Crediting process consists of three following stages:

1. Early crediting in the years 2006-2007 – 2 years;
2. First stage obligation crediting under Kyoto Protocol in the years 2008-2012 – 5 years;
3. Late crediting in the years 2013-2036, 24 years.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

Monitoring plan is a system of requirements for carrying out monitoring as integral part of project documentation.

Monitoring plan for the current project is developed according to ACM0012 methodology.

The monitoring plan of version 1 was chosen to carry out the monitoring activity, It requires formulas using to calculate greenhouse gas (GHG) anthropogenic emissions according to the baseline and JI project scenario as well as emissions reductions defining as difference between them.

Reduced GHG emissions for any year are defined in accordance with results of monitoring.

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

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

Classification number *(please use numbers to simplify cross-references to Ann.3.)*	Variable data	Data source	Unit	Measured (m), calculated (c), evaluated (e)	Registration frequency	Monitored data percentage	Data archiving method (on electronic/paper media)	Note
P1	Amount of coal combusted additionally with coke oven gas in CHP plant boilers as a result of implementing project activities, in the year *y*, $FF_{1,y}$	*Plant documents*	*kg*	*m*	*Monthly*	*100*	on electronic/paper media	*The scales are calibrated and verified according to Ukrainian regulations*
P2	Net calorific value of coal combusted additionally with	*Plant documents*	*TJ/kg*	*m*	*Annually*	*100*	on electronic/paper media	*Authorized organisation calorimeter*

	coke oven gas in a process of project activity implementation, NCV_1							
P3	Net calorific value of surplus coke oven gas, NCV_{WCM}	*Plant documents*	*TJ/kg*	*m*	*Monthly*	*100*	on electronic/paper media	*Plant's laboratory calorimeter*
P4	CO_2 emission factor for coal combusted additionally with coke oven gas in a process of project activity implementation is taken according to reliable local or national data, or a coefficient according to methods of Intergovernmental Panel on Climate Change (IPCC) is taken, EF_1	*Plant documents*	tCO_{2eq}/TJ	*e*	*Annually*	*100*	on electronic/paper media	*According to annual National GHG Inventory Report*
P5	Annual consumption of coal by CHP plant boilers after project implementation, FF_{A1y}	*Plant documents*	*t*	*m*	*Annually*	*100*	on electronic/paper media	
P6	Average annual consumption of coal by CHP plant boilers three years before	*Plant documents*	*t*	*c*	*Annually*	*100*	on electronic/paper media	

	project implementation, $FF_{A1,BL}$							
P7	Quantity of coke oven gas used for energy generation by CHP plant boilers during year y, $Q_{WCM,y}$	*Generators of energy*	m^3	*m*	*Monthly*	*100*	on electronic/paper media	*The meter is calibrated and verified according to Ukrainian regulations*

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

According to ACM0012 methodology when defining emissions using project scenario it is necessary to take the following into consideration:

- emissions from focil fuel used as supplementary fuel during coke oven gas combustion in order to produce energy;
- emissions from usage of electrical energy for additional (in comparison to alternative flaring on open flare) gas cleaning before combustion in boilers;
- emissions due to consumption of imported electricity that in the absence of project activity would have been supplied by captive electricity generated.

The formula (7) is used to calculate emissions according to project scenario.

$$PE_y = PE_{AF,y} + PE_{EL,y} + PE_{EL,\mathrm{Im}port,y}, \quad (7)$$

Where:

PE_y - project emissions due to project activity;

$PE_{AF,y}$ – project activity emissions from on-site consumption of fossil fuels by the CHP plant(s), in case they are used as supplementary fuels, due to non-availability of waste energy to the project activity or due to any other reason.

$PE_{EL,y}$ – project emissions from usage of electrical energy on gas cleaning equipment which is used for additional cleaning of coke gas before using it in boilers in comparison to alternative flaring on open flare. It is not used in this project, therefore emissions equal to zero.

$PE_{EL,\mathrm{Im}port,y}$ – project activity emissions from import of electricity replacing captive electricity generated in the absence of the project activity. It is not used in this project because possible substitution will be carried out by electrical energy produced by project turbo-units and is considered when calculating base line.

Project emissions due to auxiliary fossil fuel are calculated, as follows:

$$PE_{AF,y} = \sum FF_{i,y} \cdot NCV_i \cdot EF_{CO2_i}\ , \quad (8)$$

Where

$FF_{i,y}$ - amount of *i* type fossil fuel combusted supplementary with coke gas in CHP plant boilers as a result of project activities, in the year *y*;

NCV_i - net calorific value of the fossil fuel type i combusted as supplementary fuel during project activities;

EF_{CO2_i} - CO_2 emission factor for *i* type fossil fuel combusted as supplementary fuel during project activities. It is calculated according to reliable local or national data, or is taken according to methods of Intergovernmental Panel on Climate Change (IPCC). 98,27 t CO_2/TJ is accepted for coal in this project (National Inventory Report, 1990-2007).

For the project considered the amount of *i* type fossil fuel combusted supplementary with coke gas as a result of project activities in the year *y* is defined as difference between annual fuel consumption on the CHP plant after project implementation, and average annual fuel consumption on the CHP plant three years before implementing project activities, formula 9:

$$\sum FF_{i,y} = \sum FF_{A,i,y} - \sum FF_{A,i,BL} , \qquad (9)$$

Where

$FF_{A,i,y}$ - annual consumption of *i* type fossil fuel by CHP plant boilers after project implementation;

$FF_{A,i,BL}$ - average annual consumption of *i* type fossil fuel by heat generation plant boilers three years before project implementation.

Auxiliary fuel is not used during coke oven gas combustion at JSC «YCP» CHP plant. Fossil fuel can be used only as reserve fuel. The usage of reserved coal was provided for by the CHP plant boilers before implementing project activities too. Although the amount of reserved coal used annually was insignificant. Usage of additional amount of fossil fuel for project activity needs is not planned. Moreover, the amount of coal used at JSC «YCP» as reserve fuel after project implementation has been even reduced. Thus, during three years before the start of project activities an average of 1419 t of coal were combusted at CHP plant boilers, and an average of 1322 t of coal were combusted annually after the project implementation start. So the usage of coal as reserve fuel has reduced by 97 t per year after project activities implementation. This proves the fact that as a result of project activities the fossil fuel is not used at the CHP plant. So $PE_{AF,y}$ = 0.

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
Classification number *(please use numbers to simplify cross-references to Ann.3.)*	Variable data	Data source	Unit	Measured (m), calculated (c), evaluated (e)	Registration frequency	Monitored data percentage	Data archiving method (on electronic/paper media)	Note
B1	Energy generation by the enterprise's AR-6 generator 1 after project activity implementation, in the year y, $EG_{gen,1,y}$	Indications of electrical energy meter installed at AR-6	*MWh*	*m*	*Monthly*	*100*	on electronic/paper media	*The meters are calibrated and verified according to Ukrainian regulations*
B2	Energy generation by the enterprise's AR-6 generator 2 after project activity implementation, in the year y, $EG_{gen,2,y}$	Indications of electrical energy meter installed at AR-6	*MWh*	*m*	*Monthly*	*100*	on electronic/paper media	*The meters are calibrated and verified according to Ukrainian regulations*
B3	Energy generation by the enterprise's PT-12 generator 1 after project	Indications of electrical energy meters installed at PT-12	*MWh*	*m*	*Monthly*	*100*	on electronic/paper media	*The meters are calibrated and verified according to Ukrainian regulations*

	activity implementation, in the year $y, EG_{gen,3,y}$							
B4	Energy generation by the enterprise's PT-12 generator 2 after project activity implementation, in the year $y, EG_{gen,4,y}$	Indications of electrical energy meters installed at PT-12	*MWh*	*m*	*Monthly*	*100*	on electronic/paper media	*The meters are calibrated and verified according to Ukrainian regulations*
B5	Energy consumption for own needs of PT-12 generator 1 which is installed according to project activity, in the year $y, EG_{own1,y}$	*Plant data*	*MWh*	*c*	*Monthly*	*100*	on electronic/paper media	*Calculated according to in-plant instructions*
B6	Energy consumption for own needs of PT-12 generator 2 which is installed according to project activity, in the year	*Plant data*	*MWh*	*c*	*Monthly*	*100*	on electronic/paper media	*Calculated according to in-plant instructions*

	$y, EG_{own2,y}$							
B7	Electrical energy meter value of AR-6 turbines electricity ganaration measured before project activity implementation, in the year $y, EC_{PJ,\mathrm{Im}port,i,y}$ (measured)	*Plant data*	*MWh*	*c*	*Monthly*	*100*	on electronic/paper media	*Calculated according to in-plant instructions*
B8	CO_2 emission factor for electricity grid o Ukraine in case of electricity substitution by power generated as a result of project activity implementation, $EF_{Elec,produc}$	*Research data*	tCO_{2eq}/ *MWh*	*e*	*Annually*	*100*	on electronic/paper media	*Evaluated according to published researches*
B9	Share of electricity generated using coke oven gas as a result of project activity, in relation to the general amount of electricity	*Plant data*	*%*	*e*	*Monthly*	*100*	on electronic/paper media	*Evaluated according to in-plant instructions*

	produced as a result of implemented project activity, f_{wcm}							
B10	Share of electricity generated using surplus coke oven gas as a result of project activity, in relation to the amount of electricity that can be produced from theoretically possible amount of surplus coke oven gas, f_{cap}	*Plant data*	*%*	*e*	*Monthly*	*100*	on electronic/paper media	*Evaluated according to in-plant instructions*

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

The operation of AR-6 turbines of backpressure type depends on demand for thermal power. The amount of electrical power generated by these turbines is severely related to thermal power output in the form of process steam with parameters 0.5 MPa, 250ºC. When the demand for thermal energy is reduced during warm season, electrical power generation by the specified units is also reduced.

After the additional coke-oven battery putting into operation the produced coke oven gas surplus can be theoretically used to generate steam for the maximal loading of AR-6 turbines even during warm season. However in this case the enterprise will suffer large loss of thermal power (which is not consumed) and additional concomitant operating cost. So as an alternative to surplus coke oven gas combustion at AR-6, it can be flared at an open flare. Installed equipment produces maximum possible amount of power, considering wear of units and the enterprise's thermal supplying scheme features.

According to ACM0012 methodology it is necessary to show that the amount of electrical power produced at the enterprise to cover own needs as a result of utilizing some coke oven gas on the existing pre-project equipment has not reduced as a result of project implementation (in order to increase export of electric power produced within the project for additional profit). Before implementing project activity the power generation on the enterprise using existing equipment satisfied only some of its in-house needs. This part can be reduced after implementing project activity as a result of load redistribution and substituting it with power generated by project turbo-units. Thus there is a need to isolate amount of power which was generated on existing pre-project equipment from the general amount of power generated after project activity implementation. This will eliminate possibility of counting electrical power generated as a result of project implementation as exported, the amount of power generated on the enterprise using existing pre-project equipment. To define this amount of power during monitoring one must use the maximum value of:

- amount of electrical energy generated on the enterprise annually, according to three years period before the launch of production as a result of project activity;
- monitoring results for power generation by AR-6 turbo-units that existed before starting project activity, or;
- if it's impossible to carry out direct monitoring, calculation should be used instead.

To calculate emission according to baseline scenario for electricity amount generated as a result of project activity implementation in the year *y*, which, in the absence of project activity, would be generated by power plants within Ukrainian national energy system that operate using fossil fuel, the following formula is to be used:

$$EG_y = \sum_{i=1}^{4} EG_{gen,i,y} - EC_{PJ,\mathrm{Im}port,y} - EG_{own,y}, \qquad (10)$$

Where

$\sum_{i=1}^{4} EG_{gen,i,y}$ - general amount of electrical energy produced by the enterprise's generators after project activity implementing in the year *y*. To define $EG_{gen,i,y}$, monitoring data from meters installed at JSC «YCP» turbines should be used (fig. Ann.3.1, Ann. 3);

$EC_{PJ,\mathrm{Im}port,y}$ - amounts of electricity generated by existing equipment in the absence of project activity (defined by formula (11));

$EG_{own,y}$ - energy consumption for own needs by turbines that are installed according to project activity, in the year *y*.

$EC_{PJ,\mathrm{Im}port,y}$ value is defined annually as a maximum of three specified values:

$$EC_{PJ,\mathrm{Im}\,port,y} = \max\{EG_{captive,B}; EC_{PJ,\mathrm{Im}\,port\,i,y}(calculated); EC_{PJ,\mathrm{Im}\,port\,i,y}(measured)\}, \quad (11)$$

Where:

$EG_{captive,B}$ - maximum electricity production by AR-6 turbines during three years before the first PT-12 turbine was installed according to the project;

$EC_{PJ,\mathrm{Im}\,port,i,y}$ (*calculated*) – amount of electricity generated by AR-6 turbine before project activity implementation, in the year *y,* calculated, if direct measuring is impossible;

$EC_{PJ,\mathrm{Im}\,port,i,y}$ (*measured*) - measured by meter value of electricity generated by AR-6 turbine before project activity implementation, in the year *y*.

Energy consumption for own needs of turbines installed according to project activity, calculated using the following formula:

$$EG_{own,y} = EG_{own,y,1} + EG_{own,y,2}, \quad (12)$$

Where;

$EG_{own,y,1}, EG_{own,y,2}$ - amount of energy used to cover own needs of PT-12 project turbines in the year *y*, provided that the 1st and the 2nd project queues are implemented, accordingly.

To calculate emissions according to baseline scenario the formula (3) specified in section B.2 is used.

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

Not applied

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

Classification number *(please use numbers to simplify cross-references to section D.2.)*	Variable data	Data source	Unit	Measured (m), calculated (c), evaluated (e)	Registration frequency	Monitored data percentage	Data archiving method (on electronic/paper media)	Note
Not applied								

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

Not applied.

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

No leakage is applicable under the ACM0012 methodology.

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

Classification number *(please use numbers to simplify cross-references to section D.2.)*	Variable data	Data source	Unit	Measured (m), calculated (c), evaluated (e)	Registration frequency	Monitored data percentage	Data archiving method (on electronic/paper media)	Note
Not applied								

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

Not applied

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

Emission reduction resulted from project activity implementation in the year *y* are calculated according to the following formula:

$$ER_y = BE_y - PE_y, \tag{13}$$

where:

ER_y - general reduction of emissions resulted from project activity implementation in the year *y*;

BE_y - emissions according to baseline scenario;

PE_y - emissions due to project activity implementation.

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

Information about monitoring of GHG emissions according to baseline and project scenarios is archived and stored on electonic and paper medias at the disposal of the person authorized by JSC «YCP» chairman of board as responsible for project monitoring. This person also collects annual monitoring and emission reduction verification reports.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(please specify the table number and the classification number)*	data uncertainty level (high/medium/low)	Information on the specified data quality assurance and control procedure or explanation why these procedures are necessary
P1,P2, P5,P6	*l*	*Verification cross-checks of data on weighing coal according to accounting documents concerning transferring coal from the workshop to the CHP plant*
P3, P4	*l*	*Control analysis of coal, and coke gas calorific capacity in the laboratories of the Institute of Industrial Thermal Physics (NAS of Ukraine)*

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

Emission monitoring according to the project and baseline scenario for the current project (activity related to the collection and archiving data to evaluate or measure anthropogenic GHG emissions within project boundaries during the credit period) is carried out by the emission reductions owner according to the project – JSC «YCP».

Accounting of energy production

Reading of meters for the produced energy is conducted on unit-to-unit basis every 12 hours and is entered into the log book. The data is aggregated into the monthly and annual reports and is stored in paper and electronic formats.

Data collection is carried out by a *shift caretaker of the Main control board*. The responsible person for the collection and archiving of the data is the *head of the electricity area*.

Meters check is conducted according to the verification methodology certified by the Ukrainian state scientific-production center for standardization, metrology and certification (UkrCSM). The Electrotechnical laboratory of the enterprise is responsible for meeting the meters checks deadlines.

The amount of electricity consumed for the PT-12 own needs is determined by monthly calculations in consideration of the working auxiliary equipment load factor, as well as its capacity. The data is archived and stored in paper and electronic formats. The responsible person for the collection and archiving of the data is the *head of the electricity area*.

Accounting of coal consumption of CHP boilers

The amount of coal, consumed by the boilers, is determined when coal is supplied to the CHP by using the electro-mechanical scales. Data on the amount of coal is entered into the logbook. The responsible person is the *head of the production department*.

The NCV of coal supplied to the CHP and combusted in the boilers is determined according to the technical specifications У 10.1-23472138-161:2005 for coal sort G , belonging to which was established by state enterprise "Luganskstandardmetrology".

Accounting of the coke oven gas consumption in CHP boilers

Accounting of the coke oven gas consumption in CHP is determined by the meter on gas-flow inlet to the boiler house (pie chart). The pie chart readings is conducted manually every 24 hours by shift caretaker of Control, Measurement and Automation department and entered into logbooks and electronic data base.

The responsible person for the collection and archiving of the data is the *head of Control, Measurement and Automation department*.

Coke oven gas NCV is determined monthly by the Central plant laboratory. The results are entered into the logbook.

Employees responsible for the carrying out of the monitoring plan

The *vice-chief of heat and power sector of the plant* is responsible for the carrying out of the monitoring.

The *chief metrologist of the plant* is responsible for the timely conduction of the scheduled meters calibration.

Quality assurance of collected data that directs to the *vice-chief of heat and power sector of the plant* is conducted by *chief engineer of the CHP*.

Organisational chart of project monitoring is shown at the Fig. 10.

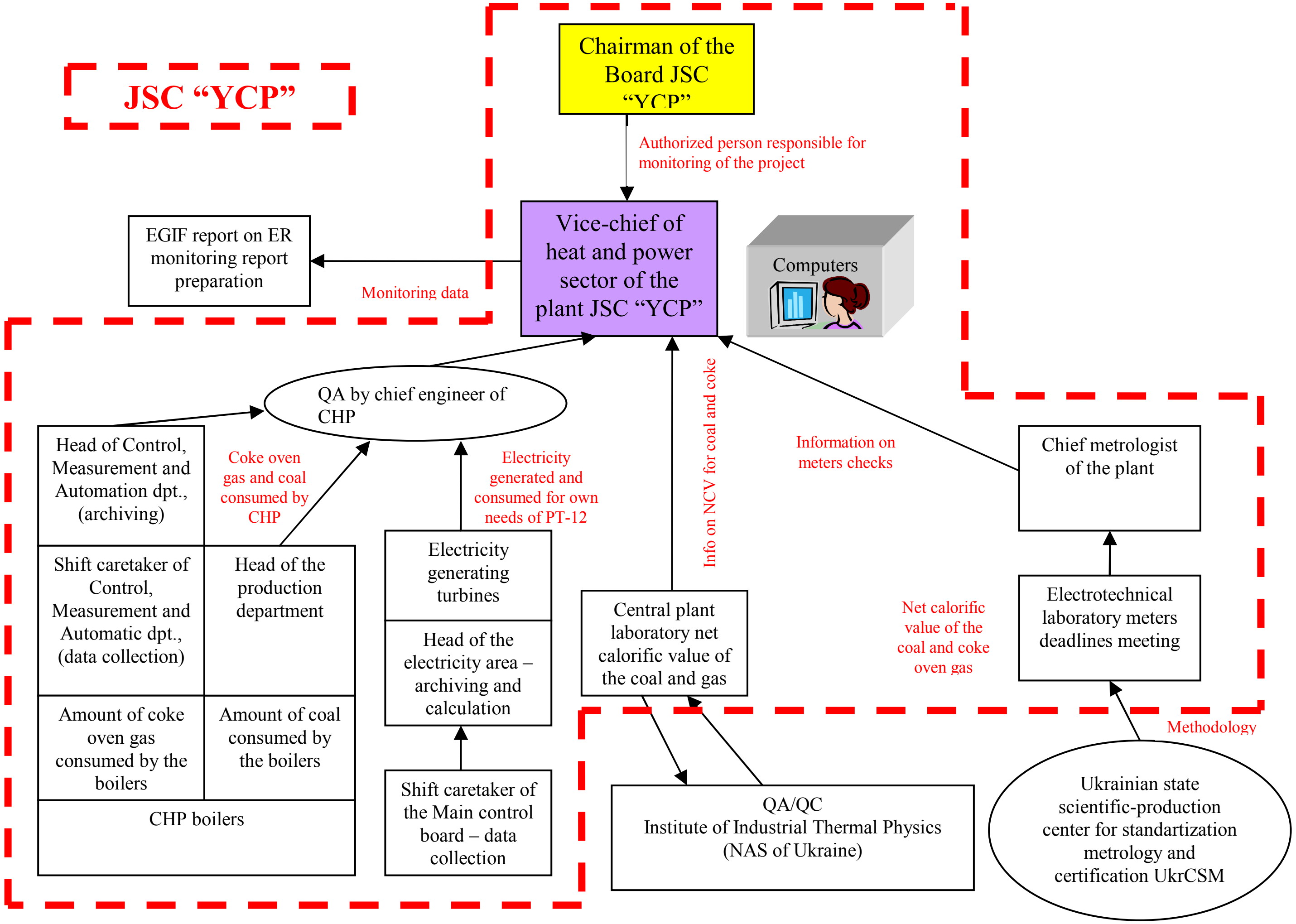

Figure 10. Organisational chart of project monitoring

At JSC "Yasynivskyi Coke Plant" was introduced and applied a quality management system ISO 9001:2000. This fact is evidenced by a certificate issued by TÜV CERT GmbH. The registration number is №78100061035. Audit of the processes of CHP quality management system conducts at the JSC «Yasynivskyi Coke Plant» with accordance to ISO 9001:2000.

In case any inconsistencies among the data are identified, the source of them will be investigated in collaboration with the specialists of "Environmental (Green) Investments Fund". If any inappropriateness of monitored data is revealed, corrective measures will be conducted either on the monitoring system for the item specified above. In such case, monitored data will be corrected in a conservative manner. All the information of corrective measures taken on the monitoring system and monitored data itself will be archived along with original monitored data for future verification of emission reductions. Responsibility and scheme of the monitoring is presented above.

Employees of the metrological service of JSC «Yasynivskyi Coke Plant» were passed through Refresher trainings. Education was held in Kievan Research and Training Centre of Standardization, Certification and Quality of Gospotrebstandart of Ukraine.

Monitoring report and corresponding calculations are carried out by the specialists of "Environmental (Green) Investments Fund" based on data received from the central office of JSC «YCP».

QA/QC procedures for coke oven gas and coal NCV

State enterprise "Ukrniiugleobogaschenie" – quality assurance/control procedures providing for net calorific value of the auxiliary fossil fuel (coal).

The laboratory of the Institute of Industrial Thermal Physics (NAS of Ukraine) - quality assurance/control procedures providing for net calorific value of coke oven gas.

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

Organization name: Environmental (Green) Investments Fund LTD
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Contact persons:
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Panchenko Georgy Georgiyovich,
Skybyk Sergiy Yaroslavovych,
Butrym Oksana Volodymyrivna.
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Inventory and project expert (Industrial processes sector)
Inventory and project expert (Energy sector)
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SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Proposed project GHG emissions are equal to zero

E.2. Estimated leakage:

No leakage is applicable under ACM0012 methodology

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

In correspondence with explanations, given in E.1. and E.2. subsections, the sum of E.1. and E.2 indices are equal to zero.

E.4. Estimated baseline emissions:

This Section describes estimated baseline emissions, calculated by formula 4, separately for early credits (2006-2007) and for the first period of commitments under Kyoto Protocol (2008-2012).

Table 6. Greenhouse gas emissions for different crediting periods, tons of CO_2-equivalent

Early credits (2 years)	
2006	36425
2007	62673
First period of commitments under Kyoto Protocol (5 years)	
2008	61841
2009	63261
2010	63261
2011	63261
2012	102390

Provide an estimation of baseline emission for late credits (2013-2036), calculated by formula 4 under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged, Table 7.

Table 7. Greenhouse gas emissions for late crediting period under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged

Late credits (24years)	
2013	102287
2014	102287
2015	105651
2016	105651
2017	105651
2018	105651
2019	105651
2020	105651
2021	108911
2022	108911
2023	108911
2024	108911
2025	108911
2026	118693
2027	118693

2028	118693
2029	118693
2030	118693
2031	79565
2032	63261
2033	63261
2034	63261
2035	63261
2036	63261

Primary data for calculating baseline emissions is presented in Table Ann.2.1 Annex 2.

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

Greenhouse gas emission reductions for two crediting periods as a result of JI project implementation at JSC "YCP" are presented in Table 8.

Table 8. Estimated annual emission reductions for two crediting periods, tons of CO2-equivalent

Early credits (2 years)	
Year	Estimated annual emission reductions for early credits, tons of CO2-equivalent
2006	36425
2007	62673
Total estimated level of emission reductions during crediting period, tons of CO2-equivalent	99098
Average annual calculation for emissions reduction level for early crediting period, tons of CO2-equivalent	49549
First period of commitments under Kyoto Protocol (5 years)	
2008	61841
2009	63261
2010	63261
2011	63261
2012	102390
Total estimated level of emission reductions during crediting period, tons of CO2-equivalent	354014
Average annual calculation for emissions reduction level for the first period of commitments under Kyoto Protocol, tons of CO2-equivalent	70802,8

Greenhouse gas emission reductions for late credits (2013-2036) as a result of JI project implementation at JSC "YCP", under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged, are presented in Table 9.

Table 8. Estimated annual emission reductions for late credits (2013-2036) under the assumption that after 2012 $EF_{Elec,produc}$ remain unchanged, tons of CO2-equivalent

Late credits (24years)	
2013	102287
2014	102287
2015	105651

2016	105651
2017	105651
2018	105651
2019	105651
2020	105651
2021	108911
2022	108911
2023	108911
2024	108911
2025	108911
2026	118693
2027	118693
2028	118693
2029	118693
2030	118693
2031	79565
2032	63261
2033	63261
2034	63261
2035	63261
2036	63261
Total estimated level of emission reductions during crediting period, tons of CO2-equivalent	2372370
Average annual calculation for emissions reduction level for late crediting period, tons of CO2-equivalent	98848,7

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

Presented in section E.5

Risks and uncertainties

Risk factors that can lead to the loss or revision (decreasing) of the expected amount of emission reduction units in the crediting period:

- technologic risks;
- performance risks.

Technologic risks

The type of equipment installed in the result of project implementation (condensing turbines) differs from the existing equipment at the start of the project (back pressure turbines). To mitigate this risk there were conducted appropriate trainings among technical staff of power plant. The conducting of major overhaul intends the application of specialists from corresponding specialized organizations.

Operational activity risks

Operational activity include a risk of drop in demand for the end product of JSC “YCP” in terms of economic crisis, and as a result there is a risk of similar level – volume decrease in coke oven gas production. Thereupon while developing JI project the review of economic analytic data was made to clarify the economic stability of the enterprise. It was defined that JSC “YCP” is one of the leading coke and by-product coking producers in Ukraine. The company is a part of Donetskstal vertical integrated group, which is one of the leaders in coal mining and metallurgical industries of Ukraine. The stocks of JSC “YCP” meet the demands of mid and long term investment. According to the study conducted by an independent financial and analytics company, "YCP" is one of 5 most attractive ukrainian enterprises for investment[7]. The study took into account enterprise's liquidity indicators, volume of trade operations and historic profitability.

An important advantage of the company is complete provision with raw materials; parent company "Donetskstal" possesses coal resources in Ukraine as well as abroad. Coal production volumes not only cover the needs of JSC "YCP" in raw material but enable as well being an exporter of coal at the Ukrainian market. JSC "YCP" has well organized sales and distribution network. The main part of the products is supplied to enterprises being part of Donetskstal group and "MMK im. Illicha" (Metallurgical plant named after Illich, city Mariupol, Ukraine).

SECTION F. Environmental impacts

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

The installation of PT-12 turbine will secure more reliable work of power plant in whole. Reliability consists in more rational exploitation of the installed equipment taking into account seasonable changes in heat loadings and the possibility of stable electric power production for complete provision of JSC "YCP" needs in electric power.

The analysis of the environmental impacts of the project in the places where project objects are situated and the territories adjoined to them, at JSC "YCP" at the site of installation of turbine PT-12 and generator T-12-2U3 was made in accordance wit acting guidelines, regulations, procedures and state standards including demands for fire and explosion safety and secures safe exploitation of buildings ad constructions on condition that project measures are followed.

The work is done in accordance with demands of normative documents:

- DBN A.2.2-1-2003 «Structure and contents of materials on the analysis of the environmental impacts (AEI) during design and construction of enterprises, buildings and edifices. General design regulations »;
- OND-86 «Calculation methodology of air concentration of hazardous substances contained in the emissions of enterprises », Derzhkomgidromet, Leningrad, 1987;
- GDK 34.02.305-2002 «Pollutants emissions to atmosphere made by power plants ».
- «State sanitary rules of planning and building of settlements», approved by the Decree of Ministry of Health Protection of 19.06.1996, №173.
- DSP 201-97. State sanitary rules of air protection in settlements (from polluting with chemical and biological substances);
- RD 52.04.52-85. Correction of emissions in case of unfavorable meteorological conditions. Methodic directives.

The study of materials on the analysis of the environmental impacts (AEI) is conducted under the order of JSC "YCP" (letter № 1019/08 of17.02.04). Designer and conductor of AEI is JSC "DniproVNDPIenergoprom » (Dnipropetrovsk, Ukraine).

Among factors of potentially negative environmental impacts of the project there are:

- Emissions of pollutants into atmosphere;
- Water consumption and draining;
- Noise impact of turbogenerator;
- Other factors such as electromagnetic and ionizing radiation, ultrasound, etc. are absent.

Thus, environmental impact turned out to the impact, permitted by sanitary standards. Unforeseen consequences or contingencies are not expected under condition of following the safety regulations. The objects of protected nature fund in the area of the impact of power plant are absent.

[7] http://www.art-capital.com.ua/ru/home.html

It's necessary to mention that in the area of potential impact there are no populations and/or individual representatives of flora and fauna that are disappearing or being put in the Red Book. Besides, JSC "YCP" is responsible for environmental impacts by performance of steam power plant in connection with installation of turbogenerator.

Project impact on social state of local community

Project implementation helps deciding the problem of autonomous electric power supply of JSC "YCP". Establishing economic source of electric power production on the base of acting power plant will allow to receive electric power with lower cost price in comparison to the existing tariffs and, accordingly, to lower the cost price of production at the enterprise, to increase the reliability of electric power supply, to exclude potential losses and shortfall in production. Besides, the project implementation will result in mitigating the acuteness of social problems by conservation of existing work places and creation of new ones. Resuming the above mentioned it is possible to define the following impacts on social state of local community as a result of JI project at JSC "YCP":

- Dependency on electric power purchases will decrease substantially;
- The possibility of getting profit from sales of surplus electric power will appear;
- The reliability of electric power supply in the settlement of Khimik, Donetsk region will increase;
- The number of work places will increase during construction and exploitation, as well in the contiguous industrial sectors;
- The implementation of projects on energy infrastructure modernization will be simplified;
- The experience of designing and implementation of the projects in accordance with demands of JI standards will be received.

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

According to the task on AEI documentation development and review of project documentation, the conclusion was made that the main component at the analysis of the potential environmental impact would be air. Among other components of the environment potentially impacted by the planned activities under the condition of failing to execute approved project decisions and measures on securing the normative state of the environment there are: aquatic environment, soils, and physical factors of the environmental impact and recycling.

Air

According to the methodology GDLK 34.02.305-2002 "Pollutants emitted to the atmosphere by power plants", electric power plant at JSC "YCP" working on coke oven gas emits to the atmosphere nitric, sulphur, carbon oxides, methane and mercury. Properly speaking, the emission sources are steam boilers. Emissions by electric power plant may increase from 1,75 to 2,446-2,915 ths. t/year; maximum surface concentrations at adjoining housing areas varies from 0,23 to 0,34 GDK for nitric dioxide, from 0,14 to 0,2-0,22 GDK for sulphur dioxide. Maximum concentrations for other pollutants won't exceed 0,05 GDK.

In cases of unfavorable meteorological conditions in connection with the fact that significant pollutant emissions are not expected, additional measures under conditions of the existing project are not anticipated.

In cases of contingencies with negative consequences for the environment, e.g. fire in the power plant building and/or generator hall, additional measures are foreseen. Significant negative environmental impact could be caused by fire in the power plant building. As a result of this fire significant volumes of combustion products could appear in the atmosphere and in the soils as well. If cables are inflamed apart from ordinary combustion products toxic substances contained in cable isolation also appear in the atmosphere.

For localization and fast liquidation of the centers of fire at the electric power plant there are fire alarm system, internal and external water firefighting system, fire passages and approaches for firefighting vehicles. Besides in the power plant building and at its territory there are fire posts for disposition of individual firefighting appliances (fire extinguishers, fire hooks, shovels, fire pails, boxes with sand etc.) in number that meets requirements of fire safety.

The execution of repair and construction works is severely regulated by work orders with the execution of all instructions to avoid damage to the equipment of power plant and fuel supply and appearance of fire. When exploiting the equipment the control is secured on following the exploitation instructions, safety and preventive firefighting regulations by highly skilled staff.

Aquatic environment (Water)

The installation of turbogenerator PT-12/13-3,4/1,0-1 doesn't lead to discharge of untreated waste water to basins.

Extension of electric power plant at JSC "YCP" specifies the development of existing firefighting water supply systems and production sewerage on the basis of technical conditions in accordance with acting normative documentation, types of water consumption.

The source of firefighting water supply for turbine section of existing head building is the internal system. When extending power plant it was foreseen:

- Extension of actual system of firefighting water supply system by installation of additional fire cocks with 5 l/sec output;
- Water supply with manual control to cooling system of turbine's oil box, with 6 l/sec output;
- Water supply to fire cocks for connection of fire hoses to fight fire at generator;
- Water supply to sprinkler cock for floor washout with 0,13 m^3/day; there is a counter SKZ/15 on the water branch pipe to sprinkler cock.

The extension of potable water supply is not expected as no additional sanitary technical devices are planned to be installed. Portable water consumption for everyday needs will increase by 0,3m^3/day because of the attraction of additional 12 personnel employees.

Waste waters containing oils and suspended particles as a result of floor washout in amount of 0,15 m^3/day come to the production sewerage system. The regime is periodical. Collection of production waste waters take place to canals from where with a help of manual pump they are transported to acting sewerage system. Waste waters consist of:

- suspended particles – 150 mg/l;
- oils, oil products – up to 10 mg/l.

Draining of rainfall run-offs from roof of finished part of turbine sector of the power plant in the amount of 2,65 l/sec is executed by internal water drains to production rainfall sewerage system.

Physical factors of the environmental impact

Sources of noise environmental impact are turbogenerator, pumps, ventilators, transport environment in pipelines and boxes of gas and air pipes, exhaust pipelines and air inlets.

To decrease noise level to normative parameters in the places of constant and temporary staing of service and repair staff and its spreading to adjoined terrirtories the following measures are foreseen:

- use of equipment (pumps, ventilators and other mechanic equipment) with low noise characteristicsm that not exceed the level of 85 dBa (verge according to sanitary guidelines for technological equipment);
- disposition of work places for service staff at maximum possible distance from equipment-sources of noise, in special premises with noise absorbing barriers;
- application of noise absorbing isolation at pipelines and equipmet-sources of noise;
- installation of immovable piers at pipelines, which secure resistance of pipelines to vibration.

Other factors such as electromagnetic and ionizing radiation, ultrasound, etc. are absent.

Recycling

In the process of the exploitation of power plant and turbogenerator there being formed wastes that need recycling or warehouse storage, Table 9.

Table 9. List and quantity of wastes

Wastes type	Amount, tons/year	Danger class	Utilization or recycling activity
Lamps containing mercury	up to 20 pieces	1	Handover to "Nikitrtut»
Waste oil	1-3	3	Is subject to be passed to specialized organization for conservation
Rubbish	1	4	Is sublect to be disposed at waste landfill

Used lamps, containing mercury must be kept in producer's package, in metallic boxes, oiles – in metallic containers. Collected rubbish should be put to metallic containers.

Soils

The site for extension and reconstruction of electric power plant is situated at watershed plateau, complicated by beams. The surface relief is comparatively plane with insignificant incline to the South-West. Absoulte elevation marks vary in 265,55-265,53 m under Baltic altitude system. By the character of flow of surface melt and rain waters the terrirtory is weakly run-off territory. Among unfavorable physiographic processes and factors it is possible to identify weak plane washing-off and comparatively high location of the fisrt level from the surface of water-bearing horizon. Dangerous geodynamic processes of tectonil and shift character at the site and adjoined territories are not detected. According to data on seismic division into districs the district has 6 grades seismic activity.

On the basis of the analysis of variability of structure, state and physical-mechanical properties of soils (exploration to the depth of 18,0 м) taking into account age, genesis and nomenclature type open cast mass has 7 engineering-geological elements (EGE):

- EGE-1 – filled soils: grey, brown-grey, with heterogeneous substance and density. Main mass is is loamy soil with supplements of slag, crushed rock and building rubbish;
- EGE-1a – soil-plant soils grey, dark-grey, loamy soil, low humus with alkaline reaction to soil solution.
- EGE-2 – loamy forest soils grey-yellow, yellow-brown, yellow, poor-porous, unsubsident.
- EGE-2a – loamy forest soils as EGE-2, but tight plastic.
- EGE-3 – loamy soils brown, yellow-brown with red tint, poor-porous, mainly semisolid, aqueous soils.
- EGE-4 – loamy soils mid Quaternary, red-brown, heavy, solid, poor-porous, heterogeneous with carbonate veins.
- EGE-5 – clays low Quaternary, brown, red-brown, solid. Poor-porous, solid with carbonate veins.

Confining layer is EGE-5 clays at the depth of 10,6-12,7 m. To avois project impacts on geological environment the following measures are foreseen:

- Installation of waterproof stone riprap not less that 1,5 m by the building perimeter;
- Corrosion preventing measures on protecting concrete constructions;
- Horizontal and vertical hydroisolation of side surfaces of foundations and brick walls.

After the construction was completed planting of greenery and adjoined territories improvement were conducted.

SECTION G. Stakeholders' comments

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

Implementation of the first stage of the project on surpluse coke oven gas utilization at JSC "YCP", i.e. installation and start of the turbine PT-12 were preceded by informing of the community on all project aspects. In particular, there was conducted a meeting of Executive Committee of Makiyivka City Council under the direction of city head Maltsev O.M with the appropriate Decision №306/2. At the meeting an issue on giving permission to JSC "YCP" to design and construct a complex of turbine PT-12 at industrial site of the plant at Kirovskiy district of the city.

After consideration of materials presented by Head department of city planning and architecture of the City Council on designing and construction of the object at the territory of the city, on the grounds of articles 4, 5, 7, 12, 14, 16 Law of Ukraine «On principles of city planning », art. 31 p. 2 and art. 59 p. 6 Law of Ukraine «On local self-government» and art. 62 of Regulations of territorial community of the city of Makiyivka, the Executive Committee decided to permit JSC "YCP" to design and construct a complex of turbine PT-12 at industrial site of the plant at Kirovskiy district of the city, at the land site given by decision of Makiyivka City Council of 27.07.2004 № 22/50.

Apart from the meeting of the Executive Committee of Makiyivka City Council, the idea of project implementation was probated in media and core scientific editions:

1. Babak N.Y., Lykhvar N.V., Mediantsev S.A.., Rogovoy M.I., Starovoyt A.G., Filatov Y.V., Shubenko A.L. Solution of energy saving issues at coke-chemical enterprises after the example of power unit extension at Yasyniv Coke-chemical Plant. / Problemy mashinostroeniya, – 2007, T. 10, № 1, p. 4-12.
2. Mediantsev S.A. Provision with own energy at JSC "Yasyniv Coke-chemical Plant" / Uglekhimicheskiy Zhurnal" Magazine, № 5-6, 2008, p. 69-72.

The collection of stakeholders' comments will be continued during publication of this project documentation in Internet within the frame of determination procedure.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE INFORMATION

This annex contains data on the forecast of emissions reduction during first period of commitments under Kioto protocol.

Table Ann.2.1. Indicators of emissions reduction forecast

Parameter name	Data unit	Parameter value						
		2006	2007	2008	2009	2010	2011	2012
Total electric power production	MWh/ year	87020	126719	122999	122999	122999	122999	176071
Project electric power production	MWh/ year	52064	84770	88454	88454	88454	88454	52064
Electric power consumption for the needs of project turbogenerators	MWh/ year	4672	6795	8764	6991	6991	6991	4672
Coke oven gas consumption by CHP boilers	mln. m^3	225,6	262,4	253,9	253,9	253,9	253,9	253,9
Coke oven gas *NCV*	MJ/m^3	17,44	17,81	18,15	18,15	18,15	18,15	18,15
The maximum amount of captive electricity generated in the 3 years prior to implementation of the project activity	MWh/ year	36985	36985	36985	36985	36985	36985	36985
Fraction of total electricity generated with the use of coke oven gas in the framework of the project from the general amount of electricity, generated during implementation of the project activity	fraction	0,995	0,996	0,992	0,992	0,992	0,992	0,992
Ukraine's electricity grid carbon dioxide emission factor	t CO_2/ MWh	0,807	0,807	0,807	0,807	0,807	0,807	0,807
Emission reduction units (ERU)	t CO_2	36425	626731	61841	63261	63261	63261	102390

The maximum amount of captive electricity generated prior to implementation of the project activity used for the baseline emissions determination, was on data of captive electricity generated on JSC "JCP" CHP plant in the 3 years prior to implementation of the project activity defiened (Table Ann.2.2.):

Table Ann.2.2. Amount of captive electricity generated on JSC “JCP” CHP plant in 2003-2005, ths. kWh.

	Years		
	2003	2004	2005
Amount of captive electricity generated on JSC “JCP” CHP plant	35421,0	36005,0	36985,0

Annex 3

MONITORING PLAN

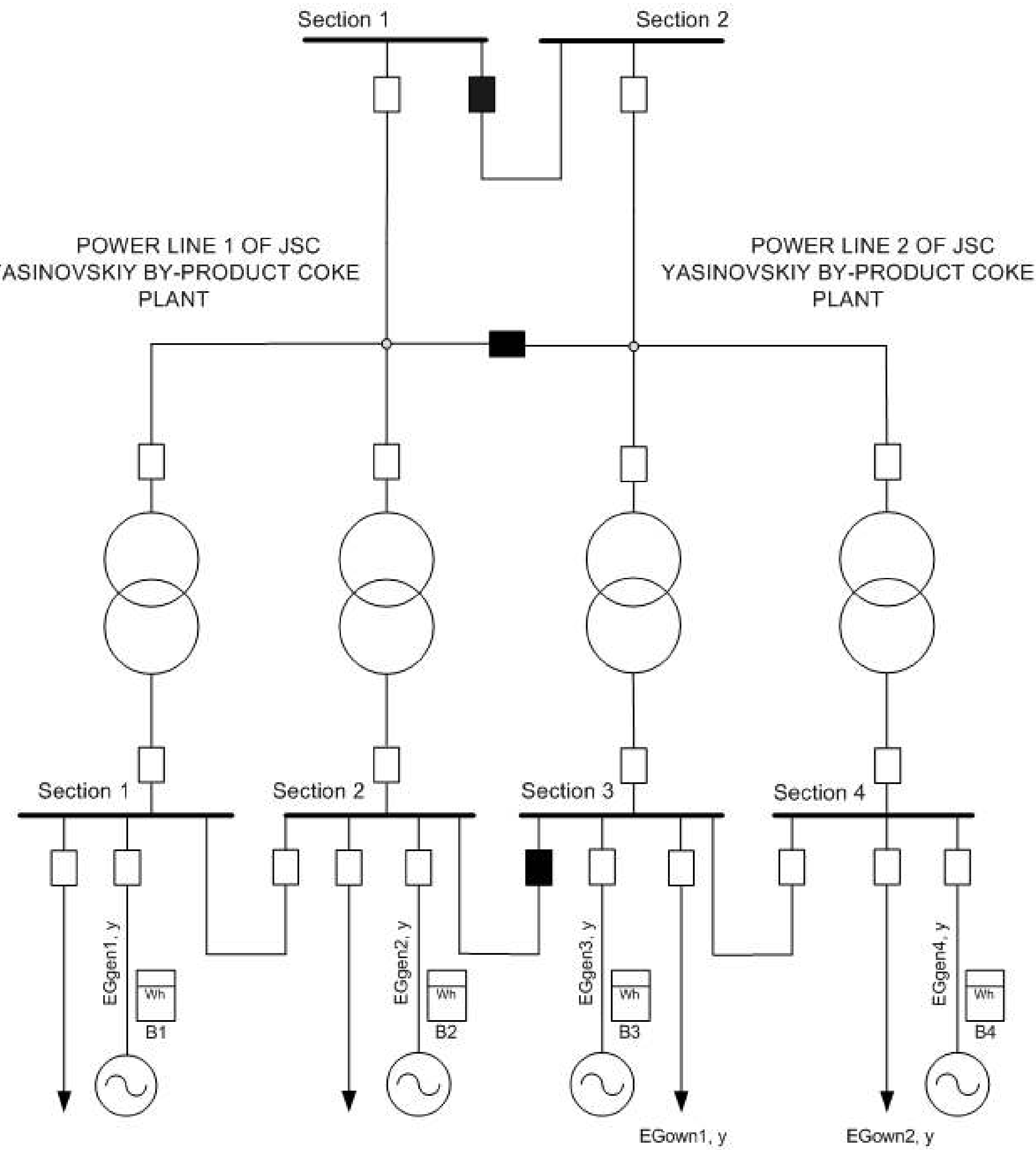

Figure Ann. 3.1. Monitoring scheme for electrical power generation at JSC «YCP» project

Annex 4

PROJECT FINANCING

In accordance with the Annex to the Methodological Tool "Tool for the demonstration and assessment of additionality" 5.2. (p.6) Financial analyses was based on values valid at the time of the investment decision taken by the PP. Indicators of project financial analysis which confirms the additionality of the project are stated in Table Ann.4.1.

Table Ann.4.1. Financial indicators of JI project

Data name	Data Unit	Data Value	Comment
Cost of equipment and construction and assembly works, total	UAH, ths	80980,00	
Including the first stage of the project	UAH, ths	15980,00	
- the second stage of the project	UAH, ths	65000,00	
Purchasing price for electric power	UAH/MWh	124,20	Prices are lower than actual market prices, because purchase-sale is realized withing local energy market
Selling price of electric power	UAH/MWh	91,00	
Income tax	%	25	
Net Present Value of the project without sales of emission reduction units (ERU)	UAH, ths	-5999,76	Without sales of ERU the project is unprofitable
Internal Rate of Return without sales of ERU	%	9,69	
Selling price for ERU, for ton of CO_2-equivalent	EUR/t CO2-equivalent	4,60	
Exchange rate	UAH/EUR	5,83	
Net Present Value of the project with sales of ERU in 2006-2012.	UAH, ths	25,46	With sales of ERU in 2006-2012, the project is profitable
Internal Rate of Return for profitability with sales of ERU in 2006-2012.	%	12,41	

In 2003 the enterprise decided to implement the project on utilization of surpluse coke oven gas with production of electric power and with partial covering of project implementation expenses by financing in accordance with flexible mecanisms of the Kyoto Protokol (selling of the emission reduction units). Surpluse coke oven gas is created as a result of coke oven batteries modernization (coke oven battery № 1 in 2006 and coke oven battery № 4 in 2012). The projest is implemented by two stages with installation of two 12 MW turbogenerators in 2006 and 2012. A service life of these turbogenerators makes 25 years. Accordingly, ERU are created during years 2006-2036.

Money received from selling ERU starting in 2006 is planned to use for the second stage project implementation. The analysis of the estimated financial indicators of the project allows to make a conclusion that without selling ERU the project is unprofitable. Thre project becomes economically efficient only in the case of selling ERU, received in 2006-2012.

Annex 5

JUSTIFICATION OF PROJECT ADDITIONALITY

The description of the project additionality is a requirement of ACM 0012 methodology. Project additionality is measured according to the steps outlined in "Tool for the demonstration and assessment of additionality (5.2.)" document (February 2007)

Step 1: ***Identification of alternatives to the project activity consistent with current laws and regulations***

Sub-Step 1a: Defining alternatives for project activity

On the base of technological and economic aspects of coke oven gas possible use analysis, it is possible to define the following scenarios of waste coke oven gas use:
Scenario 1 – surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid.
Scenario 2 – chemical products production development within the own plant using surplus coke oven gas, absence of electricity export and purchase of electricity from the grid.
Scenario 3 – surplus coke oven gas exports to other industrial facilities for the purpose of energy generation using waste energy, absence of electricity export and purchase from the grid.
Scenario 4 – surplus coke oven gas sales to municipal enterprises for the purpose of heat generation, absence of electricity export and purchase of electricity from the grid.
Scenario 5 – combustion of surplus coke oven gas in boilers of JSC «YCP» CHP plant for steam production with further electricity generation to cover the plant own needs and possible sales of extra energy to other consumers without it being registered as a JI Project.
The advantages and disadvantages for each of the proposed scenarios are provided below. Scenario 1 is most common use practice in the home industry. The advantages of the scenario 1 are:

- It does not require any additional spending
- Does not carry any risks linked with implementation and usage of the complex technological equipment

The most important disadvantage of this scenario is a surplus of burning coke oven gas.

The chemical production development within the own plant using surplus coke oven gas under the scenario (2) requires productive capacity increase. Such variant makes disadvantages such as difficulties due to the necessity to ensure the additional construction territory for building additional facilities. In addition, coke oven gas used by JSC «YCP» for the chemical production is just 2-4 % from the total amount of own produced coke oven gas. The amount of coke oven gas produced after modernization of coke oven battery № 4 exceeds the demand of the chemical production facility in several times, and possibility to implement this scenario is limited by the lack of demand for additional chemical products that might have been produced from surplus coke oven gas until its full utilization.

The possibility of selling of coke oven gas surplus to other companies as outlined in Scenario (3) is also exhausted. The main coke oven gas consumer – Makiyivsky Metallurgical Plant (MMP) in 2008 ceased buying even those small amounts of coke oven gas it used to buy before. Partly this is because the plant switched suppliers to buy gas from a producers that belongs to the same owner as MMP and partly because of the high hydrogen sulphide content in the coke oven gas. All attempts to find other coke oven gas consumers were unsuccessful. Therefore scenario 2 cannot be considered practical scenario.

The implementation of scenario (4) would face considerable obstacles:

- Open institutional issues with cross-sector implementation, including spread of non-payment for consumed energy in municipal service and public utility sectors
- Seasonal demand for gas consumption for heating. In Ukraine, the heating season lasts 197 days, and most of the time heat generating plants don't work at full load because of the air

temperature fluctuation. Therefore, public utility power plants can only consume about 50% of available coke oven gas. Also, because of the high hydrogen sulphide content in the coke oven gas, it can't be used as consumer gas cooking source, as it would be dangerous for the general public

The conclusion based on the provided scenarios review is that the scenario 1 - the flaring the surplus of coke oven gas using gas-ejecting flaring device, no energy is exported from the facility and no purchasing from the grid would be the only possible realistic basic scenario.

Sub-step 1b. Compliance with mandatory laws and regulations

All alternatives that were reviewed above are in compliance with existing laws. The utilization of coke oven gas surplus is not mandated under existing Ukrainian laws and regulations.

The actions of the enterprises that emit gases to the air are described in the Law of Ukraine "On protection of atmospheric air" (№ 2556-III from 24.10.2002). The mention law does not provide specific restriction for permanent sources of emissions; however, the law mentions that such restrictions must be set. Such restrictions are set by degree of Ministry of Environmental Protection of Ukraine "On setting norms for limits for pollute discharge from permanent sources" № 309 from 01.08.2006.

The project meets requirements of the existing environmental protection regulations (Law of Ukraine «On protection of natural environment» from 25.06.1991 №1264-XII, Law of Ukraine "On energy saving" from 01.07.1994 № 74/94-BP, "On electrical power" 16.10.1997 № 575/97-BP).

Accordingly to the requirements of "Safety rules on coke and chemical plants in gas industry" (introduced by the order of State Committee in Industrial Safety, labour protection and mining inspection Of Ukraine № 61 from 27.03.2007) the surplus of coke oven gas is burned using gas-ejecting flaring device. The requirements are follow context outlined in the documents mentioned above.

Step 2. Investment Analysis

According to Methodological Tool "Toll for the demonstration and assessment of additionality" (version 05.2) the Analysis is conducted to determine whether the proposed project activity is not:

- financially attractive; or
- financially feasible without the revenue from sale of certified emission reductions.

Sub-Step 2a. Determination appropriate analysis method

Proceeded on specifics of the basic scenario (scenario 1), comparative method of analysis with benchmarks – option 3 from Methodological Tool "Toll for the demonstration and assessment of additionality" (version 05.2) – was selected for investment analysis.

Simple analysis of expenses (option 1) is not applicable in this case, because project implementation would provide additional benefits besides investments from JI project implementation. Investment comparison analysis (option 2) is not applicable in this case, because flaring of surplus coke oven gas does not require investments.

Sub-step 2b – Option 1. Simple expense analysis

Not applicable

Sub-step 2b – Option II. Comparative analysis of investments

Not applicable

Sub-step 2b. – Option III. Apply benchmark analysis

The discount rate which used for comparison analysis of investment projects in Ukraine, was chosen as benchmark for comparison with Internal Rate of Return (IRR) for the proposed project with and without involving JI mechanism. Considering current Ukrainian bank loan rates for businesses and other materials for the moment of investment decision the selected discount rate is 12,4% .

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to Options II and III):

In accordance with the Annex to the Methodological Tool "Tool for the demonstration and assessment of additionality" 5.2. (p.6) the Financial analyses based on financial indicators values valid at the time of the investment decision taken by the project proponent. Data for that time were presented by JSK "YCP".

The analysis of these results gives the possibility to draw the conclusion that the implementation of the project without taking into account the advantages of the JI mechanism. Only in the case proposed project with ERU the IRR exceeds benchmark and NPV is positive. The project is not financially attractive without additional income, and becomes financially attractive with additional revenues from emissions trading.

To confirm the additionality of the project it is necessary to perform a sensitivity analysis.

Sub-step 2d. Sensitivity analysis (only applicable to Options II and III):

The analysis of the sensitivity of the IRR indicator to the electricity price which is being supplied from the grid, the sale price and prime price for electric energy produced under the framework of the project was carried out in order to establish the additionality of the project. .

Sensitivity analysis was carried out in accordance with the Annex to the Methodological Tool "Tool for the demonstration and assessment of additionality" 5.2. The changes in NPV and IRR separately for capex, opex and electricity production deviations within + 10% - 10%. were determined. The calculation results show that the values of IRR for project without ERU selling do not exceed the benchmark equal to 12,4%.

A sensitivity analysis of the proposed project has been carried out, showing the influence of the three main factors of influence: investment (capex), operating costs (opex) and electricity production on the IRR. The factors have been varied in a range of "+ 10 %" and "– 10 %".

Table Ann.5.1. IRR and NPV indicators values during sensitivity analysis of the project

Name of Value	IRR, %	NPV, ths UAH
Base case without ERU	9,69	-5999,8
capex + 10 % (without ERU)	8,42	-9904,3
opex + 10 % (without ERU)	8,82	-8010,1
electricity production + 10 % (without ERU)	11,59	-1750,9
capex - 10 % (without ERU)	10,04	-4924,5
opex - 10 % (without ERU)	7,62	-15678,5
electricity production - 10 % (without ERU)	6,97	-13006,9
with ERU selling, 4,60 euro per ton	12,41	25,5

The project is not financially attractive without additional income from emissions trading, the IRR does not exceed benchmark and NPV is negative even under conditions of factors changes. But project becomes financially attractive with additional revenues from ERUs starting with price of 4,60 Euro.

Thus, the results of the sensitivity analysis give the possibility to draw the conclusion that the planned project meets the additionality requirements of the JI projects.

Project scenario emissions. In accordance with the project scenario of the use of additional quantity of coal (as reserve fuel, which is currently being used at the enterprise) for the launch of the turbine generator or under emergency conditions is not anticipated. It is also not anticipated to use the additional flow of heat to the coke oven gas at the entrance to the gas oxide flare. Thus, under the project scenario, GHG emissions are absent.

Baseline scenario emissions.

The baseline scenario represents the situation where the surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid. To define baseline emissions sstandardized carbon dioxide emission factor was used, which performed in accordance with «Standardized emission factors for the Ukrainian electricity grid» research, developed by «Global Carbon B.V.» for the period of 2006-2012. The document specifies emission factors for baseline emission estimation for JI projects in Ukraine, according to which electricity generates and exports to the grid, as well as the generated electricity uses for own needs (Table Ann 2.1 in Annex 2).

Step 3: Barrier analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed JI project activity:
The analysis of realistic and credible obstacles (barriers) that would prevent the implementation of the proposed project activity (utilization of excessive coke oven gas with production of electric energy at JSC "YCP") is given below.

Investment barrier. Other than economic/financial barrier in Step 2 above.
No private capital was available from domestic or international capital markets due to real risks associated with investment in Ukraine on the moment of investment decision 2003, April.
Analysis of the investment climate in Ukraine at the time of the project given below demonstrates this fact.
The project was carried out against the background of the general negative situation in the country at the time of preelection contesting (2004 president elections), time of intention to carry out constitutional reform. According to many international institutions of the country was on the verge of enormous change. Political instability associated with the upcoming 2004 presidential elections, as well as serious weaknesses in the Ukrainian legislation created a very negative investment climate. The share of direct investment in Ukraine's GDP in 2003 totaled 2,6% in 2004 2,4% and in absolute terms, respectively, amounted to 1,3 and 1,6 billion dollars High inflation rate (8% in 2003, 15% in 2004 and 25% in 2005). And as a consequence of expensive domestic borrowing significantly influenced the decision on investment projects. Ukraine's sovereign ratings assigned by the rating agency Standard & Poor's prior to May 2003 were in the "negative", and from May to October 2003 "stable".
In addition to macroeconomic instability, innovation active enterprises have to overcome many administrative barriers related to permitting, licensing and other documentation prior to launching the project. According to numerous international studies major obstacles to innovation activities in Ukraine are:
- Instability and complexity of public administration
- Uncertainty of economic environment
- Uncertainty in the law
- High level of corruption
- Tax burden
- Problems with VAT refunds

Current conditions for banking operations were formed against the background of the introduction, in December 2002, FATF to strengthen monitoring and limiting transactions with Ukraine. Canada, Germany and the United Kingdom in accordance with the recommendations of the FATF imposed sanctions against Ukraine.

Technological barrier.

Risk of technological failure: the technology failure risk in the local circumstances is significantly greater than for other technologies; the particular technology used in the proposed project activity is not available in the relevant region. Scenarios 2-4 and the project scenario are characterized with this barrier. Scenario 5 is recognized as first of its kind for Ukraine for 2003.

The influence of the barriers determined within sub-stage 3a on the implementation of the all defined alternative scenarios of the project for the use of the surplus coke oven gas is presented in Table 1.

Table Ann.5.2. Influence of the barriers on the development of the alternative scenarios.

Alternative scenarios	Barriers	
	Investment	Technological
№ 1	Does not exist	Does not exist
№ 2	Does not exist	Exists
№ 3	Does not exist	Exists
№ 4	Does not exist	Exists
№ 5	Exists	Exists

Conclusion: The one of above-stated barriers prevent the implementation of alternatives 2-4. Scenario 5, proposed project activity, has two barriers. In spite of both existing investment and technological barriers, the JSC «YCP» took the decision to implement combustion of surplus coke oven gas in boilers of JSC «YCP» CHP plant for steam production with further electricity generation to cover the plant own needs and possible sales of extra energy to other consumers with consideration of the saving of electric power from the power grid of Ukraine. This will lead to reductions in greenhouse gas emissions from the power plants of Ukraine.

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

None of the barriers presented in Table Ann.5.2. has any significant influence on the development of alternative scenario 1 representing the surplus coke oven gas flaring, absence of electricity export and purchase of electricity from the grid.
Conclusion: Therefore, this alternative is the Baseline scenario.

Explanation of how registration of the Project as a JI (Joint Implementation) project will reduce the effect of the barriers that prevent the Project being implemented in the absence of the use of the JI mechanism.
An analysis of the barriers demonstrated the existence of significant investment and technological barriers to the implementation of the Project activity including those related to financial expenditures to overcome them. Therefore, the registration of the Project as a JI project and attracting investments due to the sales of emission reduction units (ERU) will help to overcome the said barriers and to improve the attractiveness for the Project activity.

A cost-benefit analysis of the Project is based on the assumption that its implementation will provide electric power savings versus the Baseline scenario and the use of the JI mechanism will make it possible to attract additional revenue for the Project - ERU sales.

ERU sales at a price of 4.6 Euro/t CO_2 will provide a rate of profit 12.41% that is more than benchmark IRR 12.4% in contrary to the project without the ERU sales which provides a rate 9.69%. Consequently, the JI mechanism will assist in overcoming the financial barrier stated above (Step 2).

Investment barrier overcoming.
The project at the time of decision making was not investment attractive for the financial institutions, thought taking into account Kyoto protocol mechanisms it became possible to arouse some interest in those investors, who mind ecological factor. This had initiated search of alternative ways of financing, including opportunities of Kyoto Protocol flexible mechanisms, particularly joint implementation mechanism in order to increase investment attraction of the project and reduction implementation risks.

Technological barrier overcoming.
1) necessity of CHP extension (to install new electricity production facilities);
2) necessity of electricity scheme changing.
The CHP extension requires a number of additional inputs of finance, time and resources. Inputs caused by the need to find areas within the territory of existing enterprise, as well as study and development of architectural design decisions on the location of additional facilities reflecting the recruitment of additional equipment. The addition area is not necessary for other alternatives of the projects activity for coke own gas that were considered above.
The same situation arises with necessity of electricity scheme changing. The additional voltage transformers for the conditions of the proposed project activity only are needed. It takes the additional financial and human resources for the purchase of equipment and documentation updating.
Overcoming of this barrier becomes possible with getting of additional finance received from sale of GHG emissions reduction units, which are the result of the proposed project activity.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity.
Similar activities are not widely observed and commonly carried out in Ukraine and other countries of former USSR.
All attempts to implement such kind of projects are carried out only in case of the application of flexible mechanisms of the Kyoto Protocol.
The implementation of similar projects after the invest decision making and implementation of YCP project has started since 2005: JSC "Avdeyevskiy KHZ" and JSC "Bagliykos" (City of Dniprodzerzhynsk). As similar also may be viewed the project for utilization of excessive waste gases at the metallurgical enterprise «Substitution of electric energy production from fossil fuels in the electric power grid by implementation of a gas turbine combined system at Alchevsk Metallurgical Plant". Under the framework of this project it is expected to install a gas turbine system of combined cycle, which uses as fuel coke oven, blast-furnace and converter gas. This project is registered as a JI project under the framework of the Kyoto Protocol and is placed on the web-site of UNFCCC[8].
No cases save other JI project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) that are not to be included in this analysis are observed in modern Ukrain.

Sub-step 4b: Discuss any similar Options that are occurring:
In the period of stable economic development in the USSR at the «YCP» an innovative project was implemented which was involved with the installation of two turbines AR-6 backpressure type. The purpose of the installation of these turbines was not the utilization of surplus coke oven gas as such, but the technological steam receiving with required parameters. This also may be viewed as similar activity.

[8] http://ji.unfccc.int/JI_Parties/DB/E6OJWRL8OP3UCSQ2FVQZX7TT3CL1PV/viewDFP

There are serious changes in circumstances under which the proposed JI project activity will be implemented when compared to circumstances under which above mentioned project was carried out within planned economy in former USSR long before its collapse. New barriers have arisen, promotional policies have ended, leading to a situation in which the proposed project activity can not be implemented without the incentive provided by the JI.
Besides, as it has been mentioned before, the traditional way in Ukraine to dispose of coke oven gas, which has a little lower net calorific value then natural gas, is its simple combustion on a gas oxide flare. Successful implementation of the JI project at JSC «YCP» promote popularization of the use of flexible mechanisms of Kyoto Protocol at the other enterprises of industrial sector, which has lead to significant reductions in emissions of greenhouse gases.
Conclusion: the project activity is additional.

Annex 6

DISCUSSION MATERIALS

The Annex contains a translation of the publication in "Uglekhimicheskiy Zhurnal" Magazine, № 5-6, 2008. (Coal-chemical Magazine)

The Board of Editors of "Uglekhimicheskiy Zhurnal" congratulates the famous workers of Yasyniv Coke-chemical Plant with its 55th anniversary and wishes the jubilees happiness, success and new achievements in their hard but respected trade.

"Uglekhimicheskiy Zhurnal" № 5-6, 2008

3. in the course of the use of the compressor, the specialists of Yasynivskiy Coke Plant have made certain constructive improvements, providing for higher reliability of its separate parts.
4. the microprocessor control system excluded the need for the constant presence of the operator near the working equipment.

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Provision of own energy at JSC "YCP" (Yasyniv Coke-chemical Plant)

2008, S.A. Mediantsev (JSC "Donetskstal" – MZ)

This article is devoted to the history of establishment, the technical specifications of equipment and the economic efficiency of the use of the new turbine at the Heat Power Plant of JSC Yasyniv Coke-chemical Plant.

Key words: electric energy, HPP, turbo unit, economic effect.

At the beginning of the construction of the turbine the supply of electric energy to the plant was carried out via high-voltage lines LEP-1 and LEP-2 (35 kW) from the supply station Yasynovataya-110 through reduction transformers, and partially from two existing anti-pressure turbines AR-6-6. The share of own energy on the balance of the enterprise amounted to 33-36%, which was explained by the dependence of production of energy by the turbine generators of the HPP on the level of consumption of heat energy by the plant. In order to provide for energy independence of the enterprise, increase the reliability of energy supplies and reduce the expenditures cause by the purchase of energy from JSC "Service-Invest" (under the condition of growing tariffs), the management of the plant took the decision to build additional power-generating capacities, which would give the possibility to generate electric energy regardless of the heat consumption of the enterprise.

At the technical meeting (minutes of 23.05.2003) was approved the option of improvement of energy supply at the enterprise through the construction of the condensation turbine PT-12 under conditions of operating HPP.

Based on the results of the tender, JSC DneprVNIPIEnergoprom (City of Dnipropetrovsk) has been selected as the general designer of the turbine construction complex, and NTK IPMashNANU has been selected as the primary contractor (City of Kharkiv).

At the enterprise it is believed that the construction started on 18.04.2005 – the day when the construction ground was blessed by the Archpriest Luka.

The construction was completed on 04.03.2006, when the turbine generator was first launched for balancing and commissioning. This day became a real holiday for all the employees of JSC Yasyniv Coke-chemical Plant. According to the established tradition, in presence of honorable guests and the municipal authorities of the City of Makeyevka was held a solemn public prayer and a festive meeting, during which the participants of the construction received awards. The commissioning of the turbine generator with output of electric energy into the power grid took place on 20.04.2006.

The implementation of this idea during this short period of time became possible with the help of the clear investment plan of JSC "Donetskstal" – Metallurgical plant".

Now we would like to tell about the technical specifications of the equipment installed at JSC Yasyniv Coke-chemical Plant.

Turbine PT-12/13-3,4/1,0-1 (manufactured by JSC "Kaluga Turbine Factory") equipped with a modern automatic control system "SVID", which gives the possibility to use the unit in economy and accident-free mode.

Generator TU-12-2У3 (manufactured by JSC "Electroprivod", City of Lysva, Russia) turbine generator, equipped with a brushless drive circuit, giving the possibility to bear the load of 12-12.5 MW.

The recycle cycle of technical water supply (manufactured by Real Ltd., City of Kyiv) includes:

- a jet-free cooler with a special sprayer system, which gives the possibility to reduce the temperature of the coolant water to 10°C.
- a pump station with three pump units having the capacity of 1600 m^3/h.

The implementation of the project required a change in the energy supply scheme of the enterprise. Namely, the decision was taken to construct the additional section #4 of the main distribution device GRU-6 kW HPP, as the transit capacity of the section #3 of GRU-6 kW was insufficient to accept 12

MW. After a detailed analysis of the cabling system the supply conductors to the main internal substations and GRU-6 kW HPP.

It is worth noting separately, that when selecting the type of equipment the management of the enterprise and the investor tried to meet the needs of the specialists of the enterprise’s energy services. The focus was placed on high-end technology in the field of commutation equipment, cables and conductors, and relay protection microprocessors.

GRU-6 kW № 4 – this section is equipped with high-voltage units KRU KU10S, KU-6S of one-sided maintenance (for the first time) of the Rivne factory with protection terminals of the Finnish company ABB. High-voltage cables from stitched polyethylene (manufactured in Germany and in Ukraine) have securely connected the turbine generators of the HPP with the high-voltage electrical lines of JSC “Service-Invest”.

The training of workers in using the new equipment went rather smoothly, as at the stag of installation and testing of the main and auxiliary equipment were used the workers of the HPP, the electrical energy unit and other units of the plant. In the service contracts signed with the contractors were included trainings in use and repairs of the energy equipment. The specialists in electronics mastered the “SVID” automatic system at the manufacturing plant in the City of Saransk in Russia.

In April 2007 the new turbine generator will be decommissioned for its first prophylactic repairs after the first year of work (manufacturer’s requirement), thus, it is possible to sum up the results of the commissioning of the turbine PT-12/13-3,4/1,0-1 at our plant:

1. complete own energy supply to the plant with the sale of excess energy into the energy system based on a non-regulated tariff.
2. implemented stable heat supply of the steam distillation shop, necessary parameters for the industrial withdrawal of the turbine.
3. increased reliability of the energy supply of the plant.

Finally, we would like to quote the economic efficiency indicators of the new turbine for the period from April 2006 to April 2007 (inclusive):

- expenditures for the construction of the turbine generator complex – UAH 31236.7 thousand;
- electric energy production – 65087640 kWh;
- sold to JSC “Service-Invest” – 3648999kWh;
- cost effectiveness – UAH 6463.5 thousand