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

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

Efficient utilization of associated petroleum gas at Salym oilfields, Tumen oblast, Russian Federation

Sectoral scope:

1. Energy (renewable/non-renewable sources)
10. Fugitive emissions from fuels (solids, oil and gas).

Version: 03.2
Date: 18/07/2012

A.2. Description of the project:

The project is aimed at utilization of associated petroleum gas (APG) at a new gas-turbine power plant (GTPP) with reduction of flaring. The project is implemented at the production site of the West Salym oilfield operated by Salym Petroleum Development N.V. (SPD), Khanty-Mansi Autonomous Okrug (KMAO), Tyumen Region, Russia.

SPD is producing oil at three oilfields: Upper Salym, West Salym and Vadelyp. The well stream from all 3 oilfields is supplied to the Oil treatment station (OTP) located on the territory of the West Salym oilfield for gas separation, processing and further pumping of oil into the pressure manifold and further transferring to the Transneft system.

The situation before the project

Three-stage gas separation is used to separate APG from oil at OTP. Before the project only a small proportion of APG was used to cover the in-house needs (boiler plants and oil heaters) of the oilfield. The remaining associated petroleum gas was not utilized and was flared. Consumption of electric power for the auxiliaries is supplied from power stations of UPS Ural.

Project purpose
The project aims at the useful utilization of associated petroleum gas (APG), which otherwise would have been burnt at Oil Treatment Plant (OTP) flares of Salym field and substitution the power which otherwise would be generated by grid connected power plants with fossil fuels combustion, therefore, at reducing greenhouse gas emissions. The SPD N.V. Company expects that the sale of emission reduction units (ERU) under the Joint Implementation mechanism of the Kyoto Protocol will improve economic efficiency of the project.

Project description
The project is configured around the construction of a 60 MW gas-turbine power plant relying on APG in period 2008-2011 and DSG from 2012 as fuel. The GTPP is fitted with 4 Titan 130 PG gas-turbine units, 15 MW each and compressor station HAFI capacity 6600 nm^3/h and output pressure 3.6 MPa.By 2012 a gas processing plant (GPP) was constructed at West-Salym field. In 2008-2011

GTPP used APG, from 2012 APG will be supplied to GPP for processing into DSG and from 2012 DSG will be supplied to GTPP for electricity generation. Extracted AGP at an oilfield not all to be combusted at GTPP.

The GTPP is designed to generate power for the West Salym and Vadelyp facilities, to cover SPD's in-house needs. Implementation of the project will considerably reduce power supplies from the local energy producer, UPS Ural, and increase the level of beneficial utilization of APG.

Expected results of the projects are as follows:

- Utilization of up to 90 million m^3/year of APG in period 2008-2011 and complete APG utilization from 2012;
- Power consumption from the grid reduced by up to 350 GWh per year;
- Improvement of the environment in the oilfield area;

Total actual value of the gas-turbine power plant construction is around USD 96.7 million. Construction of the GTPP was financed from the Company's internal funds.

The decision to implement the project was taken on the basis of a potential to cover the expenses and to offset the risks by selling the achieved GHG emission reductions. As far back as 2005 SPD discussed the main options of APG utilization involving the Kyoto Protocol mechanisms[1], including the feasibility of the power plant construction. In 2005 there were no governmental documents regulating joint implementation projects at that time, preparation of the PDD was laid aside. Nevertheless the Company made a decision to initiate designing of the gas-turbine power plant construction, hoping that the appropriate procedures would be soon adopted.

Table A.2. Balance APG at the Salym fields

APG	Unit	**2008**	**2009**	**2010**	**2011**	**2012 (DSG)**
APG at GTPP (DSG in 2012)	ths. m3	57207	80660	78294	93293	171900
Flaring APG (DSG in 2012)	ths. m3	57207	80660	78294	93293	171900

Project history:
GTPP
15.08.2005 – Making decision on using Kyoto mechanisms [2] for GTPP construction project
07.04.2006-08.03.2008- Purchase and delivery of equipment
02.10.2006-10.03.2008-Construction work of 3 units
24.12.2007 – Making PDD "Utilization of associated petroleum gas at Salym Petroleum Development N.V., Russia"
09.01.2008-Commissioning. Order № SPD-SE0-R-080 007 of 09.01.2008
24.09.2010- startup of 4thunit turbine
From 2012 – GTPP began to use DSG[2]

[1] This is evidenced by internal corporate document "Kyoto Protocol Implications" dated 15.08.2005

[2] Dry stripped gas

Baseline scenario
Under the baseline scenario utilized under the project APG at the OTPs of Salym field would have been flared that would lead to considerable emissions of GHG gases including CO2 и CH4 (as a result of incomplete flare combustion). Continuation of flaring under this scenario is determined by the lack of sufficient incentives for APG utilization project, which is confirmed by the following facts:

- At the time of decision-making sectoral policies and legislation did not provide real mechanisms for efficient APG utilization;
- Considerable capital expenditures for establishing APG utilization infrastructure and low APG costs and hence,
- Lack of investment attractiveness of these project types.

Emission reductions
The project implementation will result in a reduction of APG flaring and associated with that reduction of greenhouse gas emissions in the amount of **1 175 575** tons of CO2 in 2008-2012.

A.3. Project participants:

Party involved	Legal entity project participants (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A - Russian Federation (Host party)	OJSC "Gazprom neft"	NO
Party B – Switzerland (Other party)	Vitol S.A.	NO

OJSC "Gazprom neft" acts as the applicant of project in accordance with the Joint Activities Agreement № GPN-11/23000/01457 from June 27 of 2011 between Salym Petroleum Development and OJSC "Gazprom neft" with the right realization of ERUs by SPD N.V.

A.4. Technical description of the project:

A.4.1. Location of the project:

A.4.1.1. Host Party(ies):

Russian Federation

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

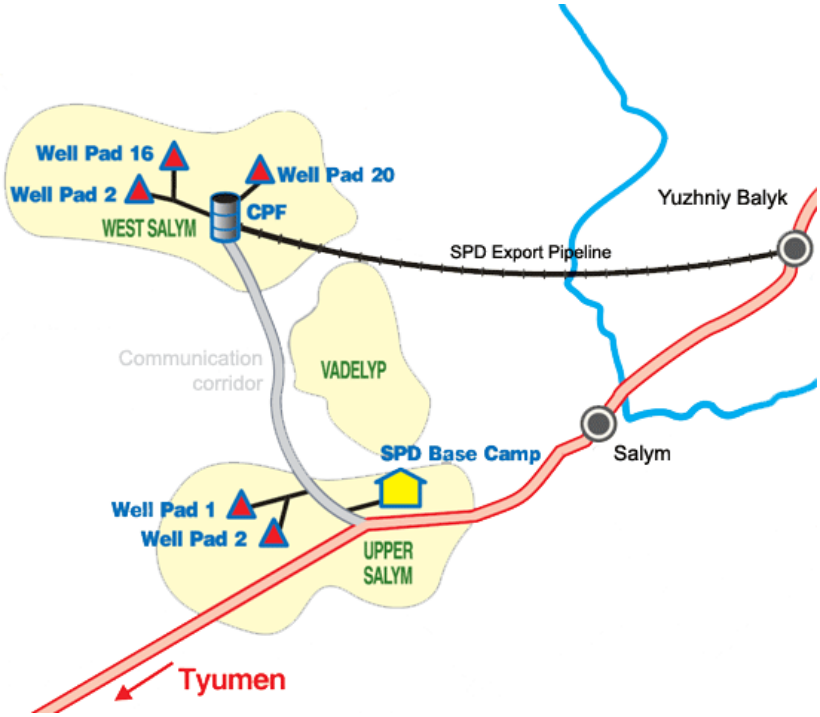
Tyumen oblast, Khanty-Mansiyskiy Autonomous Okrug (KhMAO), Nefteyuganskiy region.

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

Salym Vilage

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

Figure. A.4.1.4. Schematic diagram of the project activity



West Salym field is located in Nefteyugansk region, Khanty-Mansiyskiy Autonomous Okrug (KhMAO), Tumen oblast, 45 km to the southeast from the nearest village Salym.

Salym coordinates: latitude 60°09', longitude 71°29'. Local Time: GMT +5:00.

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

The project provides for construction of a new 60 MW gas-turbine power plant in the West Salym oil production field area. The following facilities and buildings are to be designed:

- Separator Facilities
- Glycol compressor and cooling facilities
- Gas pre-heating facility
- Gas-turbine power plant building
- Receiver facility
- Packaged transformer substation module
- Low voltage packaged device module etc.

The GTPP includes a gas treatment plant comprising a slug catcher, a compressor plant, receivers, filters, a gas heater and a shutoff system is provided to ensure the turbines operation on associated petroleum gas. The compressor plant is designed for compression of the fuel gas supplied from the OTP to the required feed pressure. Before APG is fed to a gas-turbine unit it passes through the electric heaters and the system of filters to ensure a specific temperature is maintained depending on the environmental conditions and gas composition.

The power plant comprises 4 units Titan 130 PG gas-turbine units, 15 MW each, supplied by Solar Turbines Company. Thus, the installed capacity of the GTPP amounts to 60 MW. In 2008-2011

GTPP used APG, In 2012 APG will be supplied to GPP for processing into DSG and from 2012 DSG will be supplied to GTPP for electricity generation.

The power plant includes also 3 compressor units (2 units are working and 1 unit is back-up) "HAFI" capacity 6600 nm^3/h and output pressure 3.6 MPa. Rated efficiency of a gas-turbine unit is 35.2%. Cable lines are used to connect the high voltage generators to the CS-10 kV indoor switchgear, SS 35/10 kV, bus bars via the specially equipped cubicles.

Operation mode of the GTPP is base-load, in parallel with the power grid. In the event of failure of power supply from the grid it can automatically change over to the off-line operation. Automatic step-wise partial load tripping takes place in order to prevent any overload of the generating sets in the event of generating capacity shortage.

A 10/0.4 kV packaged transformer substation, 2 x1600 kVA, will be installed at the power plant site to supply power to the gas-turbine power plant auxiliaries. Average load required by the auxiliaries of GTPP is around 1.4 MW.

Major auxiliary needs of GTPP are:

- Ventilation equipment of the GTPP building
- Electric lighting of the GTPP building
- Compressor plant "HAFI"
- Auxiliary equipment of gas-turbine units
- Gas fuel heaters
- Pipeline electrical tracing.

The power plant is furnished with the power supply control system which is designed to switch the power plant to operation in parallel with the grid, to automatically control the capacity of generator sets and to prevent any abnormal operation of the electric power system in both parallel and off-line modes of operation.

Thus, collecting and supplying APG (DSG) to the GTPP for generation of electricity power will prevent APG flaring and generation of power from UPS Ural and thus allow to reduce greenhouse gas emissions, including CO2 (carbon dioxide) and CH4 (methane).

Figure. A.4.2. Technological scheme of AGP utilization for the period 2008-2011

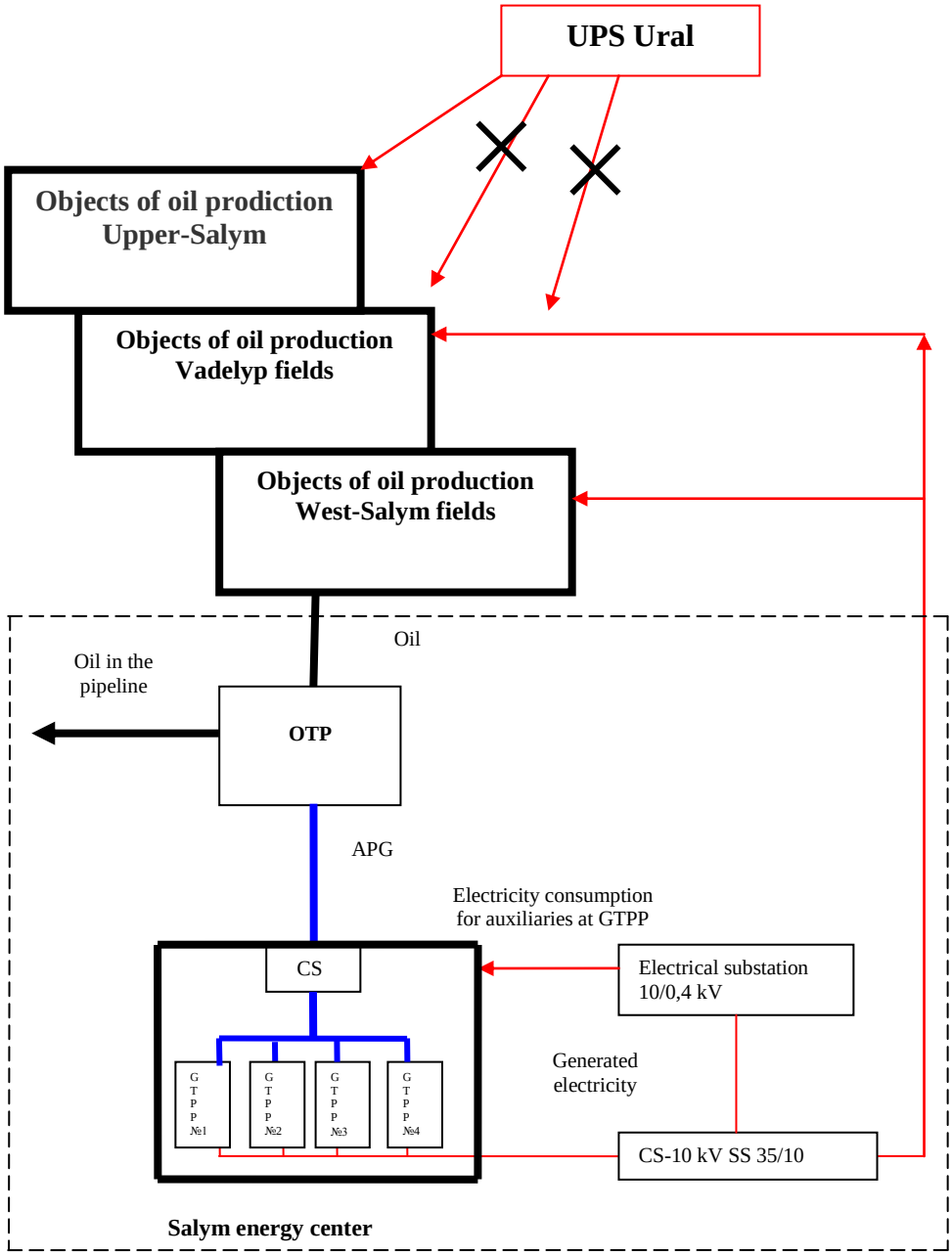
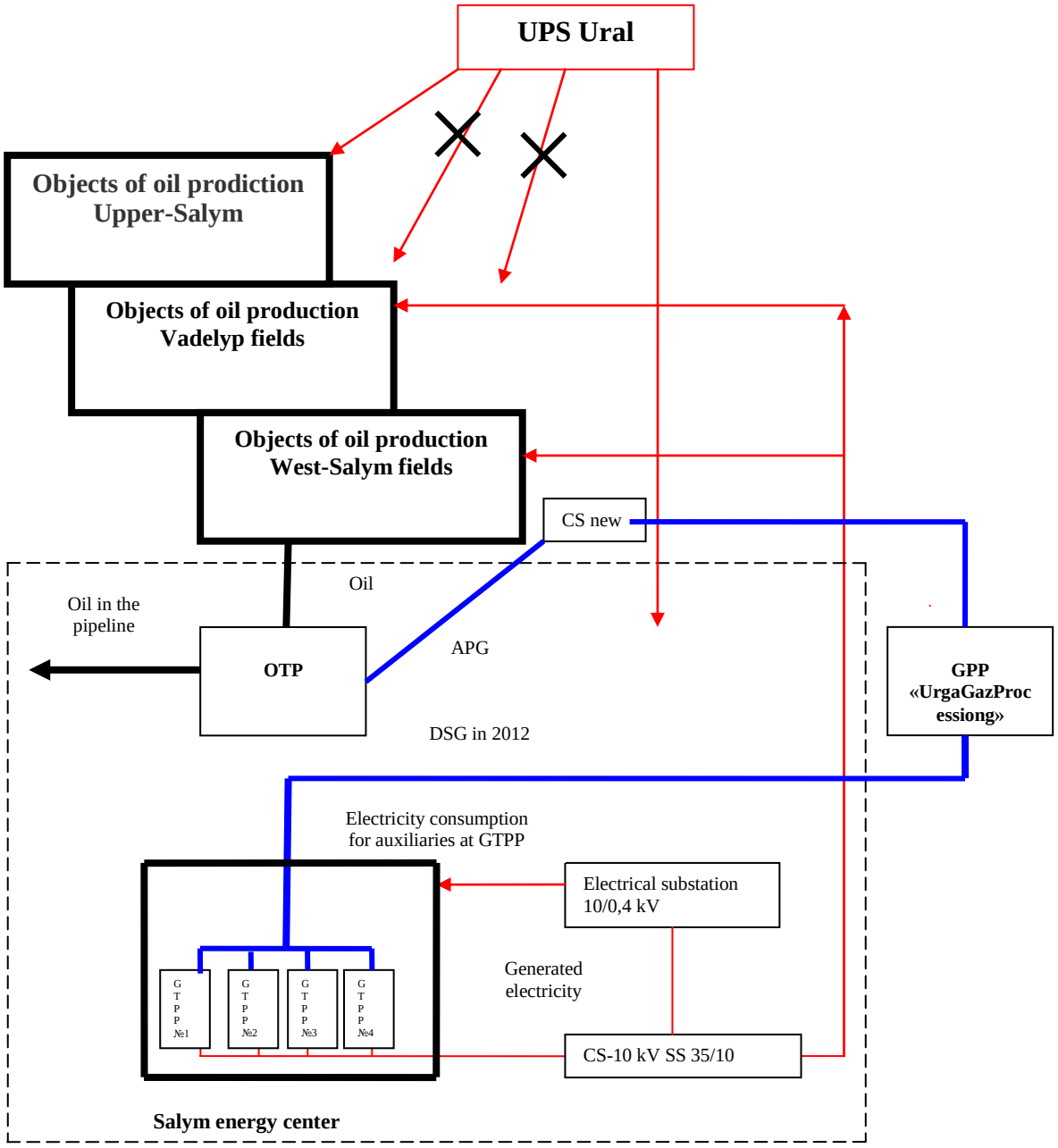


Figure. A.4.3. Technological scheme of AGP utilization at 2012



Project was implementation in accordance with following schedule:

GTPP
15.08.2005 – Making decision on using Kyoto mechanisms [2] for GTPP construction project
07.04.2006-08.03.2008- Purchase and delivery of equipment
02.10.2006-10.03.2008-Construction work of 3 units
24.12.2007 – Making PDD "Utilization of associated petroleum gas at Salym Petroleum Development N.V., Russia"
09.01.2008 - Commissioning. Order № SPD-SE0-R-080 007 of 09.01.2008
24.09.2010- startup of 4thunit turbine

From 2012 – GTPP began to use DSG[3]

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:

GHG emission reductions due to the project will be achieved through reduction of fossil fuel consumption for power generation by the electric power plants in the grid and abatement of APG flaring. CO_2 and CH_4 the main greenhouse gas released from fuel combustion. Emission of N_2O may be neglected.

Without the project, electric power to cover the in-house needs of the West Salym and Vadelyp oilfields would have to be supplied from the UPS Ural. Construction of GTPP enabled SPD N.V. to substitute up to 480 GWh/year (1 unit of Titan 130 PG gas-turbine generated up to 120 GWh at full load) from the grid by generating its own electric power. Given this, GTPP cannot fully meet SPD's power supply demand, therefore power supplies from UPS Ural will not be completely discontinued although reduced. Under such circumstances no provision is made for supplies of electric power generated by GTPP to the power grid.

It should also be noted that APG combustion in the chamber of the gas-turbine unit is more efficient as compared to flaring. The combustion efficiency of associated petroleum gas in a gas-turbine unit is close to 100% while the combustion efficiency of the flare can be conservatively assumed to be equal to 98%. In fact, the gas is frequently flared under suboptimal conditions and part of the gas is emitted in the form of methane and other volatile gases rather than oxidized. In 2008-2011 GTPP used APG, in 2012 it began to use DSG.

Without the project APG would be utilized only by the boiler plant and process heaters, which accounts for 10% to 20% of the total resources of associated petroleum gas. The rest would be flared. Due to construction of the gas-turbine power plant SPD will gradually bring the level of beneficial utilization of APG practically to 35%. Today flaring of huge volumes of APG is common practice for the majority of Russian oil companies because of the lack of incentives and due to considerable barriers which hinder implementation of APG utilization projects.

Until now there has been no stringent legal and regulatory framework in Russia to ensure that increased volumes of associated petroleum gas are processed and utilized. The amounts of penalties for APG flaring are incommensurable with the oil sale revenues. Besides sale of APG to external consumers is possible only if the appropriate infrastructure is available (by the way SPD does not have such). With the existing rates it is utterly unprofitable for the oil companies to develop their own gas transport system. Construction of oil field power plants running on associated petroleum gas is not always feasible either. The major risk is that construction of a power plant requires large capital expenditures. Generally, it is more economically reasonable for oil companies to invest the available funds in increasing their oil production.

In Russia, the laws and resolutions designed to regulate the APG use did not enforce oil companies to minimize flaring. In fact, if the utilization is economically infeasible APG may be uselessly

[3] Dry stripped gas

flared. At the same time, the negative of impact on the environment has to be compensated with environmental payments in the various budgets and with provision of polluting substances in surface layer of air below MAC-level.

Implementation of the project requires considerable capital investments, the return on which may be utterly low without selling emission reductions. The estimates show that it would be cheaper to buy all required electric power from UPS Ural. Joint implementation mechanism will help to partially offset capital expenditures related to implementation of the project. And this was the determining argument in favor of the decision on actual implementation of the project.

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

	Years
Length of the crediting period	5
Year	Estimate of annual emission reductions in tonnes of CO_2equivalent
2008	142759
2009	223078
2010	225442
2011	248810
2012	335486
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	**1 175 575**
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	**235 115**

A.5. Project approval by the Parties involved:

On September 15, 2011 the Chairman of the Russian Federation Government signed Resolution 780 "On measures for realization of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change". This document depicts a JI-project approval procedure in the Russian Federation.

According to item 4 of the Provision the approval of projects will be carried out by the Ministry of Economic Development of the Russian Federation based on consideration of submitted project proposals. Competitive selection of demands is carried out by the operator of carbon units (Sberbank of RF) according to the item 10 of the Government Decree of the Russian Federation № 780.
According to item 7 of the Provision the application structure includes «the positive expert opinion on the project design documentation prepared according to the international requirements by the accredited independent entity chosen by the applicant».

Thus, according to the legislation of the Russian Federation in the field of JI projects realization, the Project approval is possible after reception of the positive determination opinion from AIE.

SECTION B. Baseline

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

For this reason the project developer has developed his JI specific approach in compliance with "Guidance on criteria for baseline setting and monitoring" (Version 03). Everything concerning assessment of emissions is sufficiently described and justified.

During determination of alternative scenarios combined generation of heat and electricity is not considered due to limitations of heat consumers, which are already supplied with sufficient amount of heat by boiler houses running on APG. Heat demand of the consumers at the field is several times lower than the GTPP would have been able to produce had it been fitted with recovery boilers. It's evident that heat sales to the residential districts of Salym settlement are not feasible because of the long distance between the settlement and Upper Salym oilfield (50 km). Thus construction of a CHP in this case was not expedient.

Step 1. Determination of alternative scenarios

Realistic and most likely alternatives must be determined:

- for APG (DSG)[4] use;

- to show how electricity requirements would have been procured in the absence of the project .

Step 1a: Determination of alternative scenarios of APG use:

Alternative 1: Venting to the atmosphere at the site of the oil field processing facility;

Alternative 2: Continuation of gas flaring at the field processing facility;

Alternative 3: Gas injection to create underground gas storage;

Alternative 4: Supply of gas to the Gazprom pipeline network;

Alternative 5: Delivery of gas to the Yuzhny-Balyk Gas Processing Plant (GPP)

Alternative 6: Construction of a 60 MW gas-turbine power plant and APG supply to GPP from 2012 with fueling of GTPP with DSG (Project activity as not JI).

A 1. Venting to the atmosphere at the site of the oil field processing facility

This alternative is not acceptable because according to the safety requirements free venting of associated petroleum gas instead of its flaring is prohibited. Therefore, *this alternative is excluded from further consideration*.

A 2. Continuation of gas faring at the field processing facility

Flaring of APG is current practice at the Salym oil fields. Burning of APG doesn't assume any investment. The only cost is environmental payments that do not change in consequence of the fact that the volume of associated gas is not increased. At the time of decision making environmental payments were not taken into account. Volume of APG utilization is not significant, because GTPP consumes only a part of APG production.

[4] In 2012, at the power plant will be burning DSG coming from the GPP Salym.

*Thus, this alternative is consistent with the mandatory laws and regulations and a most plausible thus it is identified as the baseline scenario.*A 3: Gas injection to create underground gas storage

Inconco Company has carried out supplementary exploration in order to create underground gas storage inside the West Salym license area. Updated data of the seismic survey, that was conducted in 2004-2005, indicated that the vertical closure, which was supposed to be used for the underground gas storage, was only 1.2 m whilst according to the estimates of different experts it should not be less than 25 to 40 m to ensure reliable confinement of gas within the underground gas storage.

The design of producing wells drilled inside the license area and the producing well drilling and cementing specifications do not meet the requirements set forth in the Oil and Gas Safety Rules and Regulations for wells crossing gas reservoirs and underground gas storages. According to the unambiguous conclusion made by the Inconco Company and VNIIGAZ experts, operation of underground gas storages within SPD's license area is not feasible due to high geological and technological risks; *therefore, this alternative is excluded from further review*.

A 4: Supply of gas to the Gazprom pipeline network

APG cannot be supplied to the nearest gas main line because access to the Unified Gas Supply System is limited by Gazprom. The limitations are mainly associated with the fact that the quality of APG does not comply with the requirements of the gas transport system and with the lack of free capacity with the gas monopolist[5]. Such supply of APG to the main line requires rather considerable investments in construction of a compressor plant, an additional 60-km pipeline branch, and a packaged gas treatment facility. With the existing production volumes and low associated gas purchase prices it is unprofitable to invest in such projects.

Therefore, this alternative is excluded from further consideration.

A 5: Delivery of gas to the Yuzhny-Balyk Gas Processing Plant (GPP)

Earlier SPD has considered two possible options for delivery of associated petroleum gas to the SIBUR gas processing facilities:

1) through the Rosneft gathering pipeline which has access to the SIBUR gas infrastructure;
2) directly to the SIBUR Yuzhny-Balyk Gas Processing Plant.

Since Rosneft cannot offer any free capacity, the first gas utilization option was immediately discarded. The investment analysis showed that construction of a 180-km gas pipeline running directly to the Gas Processing Plant, including construction of a compressor station would cost around 160 million USD, and OPEX would amount to tens of millions of USD, which is absolutely unacceptable with the existing purchase prices for associated petroleum gas. It should be noted that the associated gas price amounts to around 400 rubles for 1000 cubic m of gas[6] at the time of making decision on GTPP construction. Besides, the Yuzhny-Balyk gas processing plant has a high workload and the issue of free gas processing capacities is very sensitive.

In view of the above mentioned circumstances *this alternative was also excluded from further consideration.*

A 6: Construction of a 60 MW gas-turbine power plant and APG supply to GPP from 2012 with fueling of GTPP with DSG (Project activity as not JI).

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5 http://www.expert.ru/printissues/siberia/2007/32/poputniy_gaz/

6 http://www.neftegaz.ru/analit/reviews.php?revs=0&id=126

For SPD power generation is not a core business. Implementation of the project will require investments of around 174.1 million USD. Based on the existing business environment of the world markets it would be cheaper for SPD to invest in increasing its oil production than in developing a non-core business.

Operating and maintenance costs of the Gas-Turbine Power Plant are expected at around 2.8 million USD, which at present exceeds all penalties imposed for APG flaring. As of to date the Russian Government does not impose any stringent requirements as to the associated gas utilization volumes. The existing requirements should be rather treated as requests.

SPD purchase Monolit DSG for power generation at GTPP in 2012. The price of DSG by Monolit is more than the APG price by SPD. Maximal power generation on GTPP is impossible due to frequent breakdowns in the use of full load.

Therefore, this alternative was excluded from further consideration.

Step 1b: Determination of alternative scenarios of how electricity requirements would have been procured in the absence of the project:

E 1: Additional electricity supplies from "UPS Ural" by means of construction of additional power line;

E 2: Construction of a 60 MW gas-turbine power plant plus additional supplies of electric power from "UPS Ural" by means of construction of additional power in a later time period

E 1: Additional electricity supplies from "UPS Ural" by means of construction of additional power line

The local energy producer, UPS Ural, currently supplies electric power to the West Salym and Vadelyp oil fields via the power grid. Today the power transmitted via the grid amounts to some 20 MW for the West Salym field and 10 MW for the Vadelyp oil field. By 2011 SPD will need some 500 GWh per year to meet its in-house demand at the oil fields. Additional supply of electric power by UPS Ural might have increased the delivery of electric power to the oil fields.

A 100-km long additional overhead power line should have been built to increase the electric power supply to the processing facilities at the oil fields. The line should have been built in 2006-2007. According to SPD, construction of an overhead power transmission line could have cost to the company 21 million USD. This is 2.5 times less than the amount of investments (around 63 million USD) in construction of the gas-turbine power plant.

Thus, *this alternative is considered as most likely scenario of* how electricity requirements would have been procured in the absence of the project.

E 2: Construction of a 60 MW gas-turbine power plant plus additional supplies of electric power from UPS Ural.

The local energy producer, Tyumenergo, currently supplies electric power to the West Salym and Vadelyp oil fields via the power grid. Today the power transmitted via the grid amounts to some 20 MW for the West Salym field and 10 MW for the Vadelyp oil field. In 2011 SPD needed a 618 GWh to meet its in-house demand at the oil fields. Additional supply of electric power by UPS Ural might have increased the delivery of electric power to the oil fields.

Implementation of the GTPP project will require investments of around 174.1 million USD. The return on investments will be unacceptably low if extra funds are not generated through sales of emission reductions.

Despite the fact the electric power generated by the GTPP will allow saving considerable amounts of energy from the grid, the power plant will not be able to fully cover the oil field power demand in the view of expected drop in production after peak oil in 2009. Output of APG will decrease in proportion and the power plant will not be able to operate at full capacity. However, power demand will be reduced at a much lower rate due to the specifics of the oil production industry.

Based on the aforesaid *this alternative can hardly be the baseline scenario*.

Summarizing the above, alternative A 2 together with E 1 has been selected as the most likely baseline scenario, which envisages continued flaring of APG in conjunction with increased consumption of electric power from the power grid.

The key information and data used to establish the baseline:

Data/Parameter	Volume of APG (DSG) delivered to GTPP West-Salym field
Data unit	Ths.m3 (under normal conditions)
Description	The main source of baseline emissions. This APG (DSG[7]) would be burned at the flare under the baseline.
Time of determination/monitoring	Monthly
Source of data (to be) used	Technical report
Value of data applied (for ex-ante calculations/determinations)	**2008**: 57207; **2009**: 80660; **2010**: 78294; **2011**: 93293; **2012**: 171900
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measuring the amount of APG held by regularly calibrated measurement devices. The volume of DSG delivery at GTPP in 2012 is less than or equal to the volume of delivery of APG at GTP.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	

Data/Parameter	Volume of APG delivered to GPP
Data unit	Ths.m3 (under normal conditions)
Description	The main source of baseline emissions. This APG would be processed at GTP under the baseline.
Time of determination/monitoring	Monthly
Source of data (to be) used	Technical report
Value of data applied (for ex-ante calculations/determinations)	**2012**: 288 530
Justification of the choice of data or description of measurement	Measuring the amount of APG held by regularly calibrated measurement devices.

[7] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

methods and procedures (to be) applied	
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	

Data/Parameter	Composition of the APG on OTP West-Salym.	
Data unit	% (under normal conditions)	
Description	Necessary for calculating emissions when APG is flared at OTP	
Time of determination/monitoring	Monthly	
Source of data (to be) used	The chemical-analytical laboratory, a gas chromatograph.	
Value of data applied (for ex-ante calculations/determinations)	CO2	1,510%
	CH4	81,770%
	C2H6	2,670%
	C3H8	6,140%
	C4H10	1,510%
	C4H10	2,960%
	C5H12	0,450%
	C5H12	0,730%
	C6H14	0,950%
	C7H16	0,276%
	C8H18	0,001%
	H2S	0,000%
	N2	1,000%
	O2	0,000%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is measured by certified chemical-analytical laboratory. The Laboratory regularly passes certification.	
QC/QA procedures (to be) applied	Chemical and Analytical Laboratory provides measurements of the component composition of the oil and gas, and oil and gas after the separation process, the measurement of air in the area of oil and around the fuel gas used in GTPP and other necessary measurements. The laboratory is part of the Production Division report to the Manager SAP and UPN, the chief chemist of Metrological Department and Production Department SPD NV The laboratory is certified in accordance with Russian legislation and the requirements of relevant standards.	
Any comment	-	

Data/Parameter	Composition of the DSG on GPP
Data unit	% (under normal conditions)
Description	Necessary for calculating emissions when DSG is

	combustion at GTPP
Time of determination/monitoring	Monthly
Source of data (to be) used	The chemical-analytical laboratory, a gas chromatograph.
Value of data applied (for ex-ante calculations/determinations)	CH4 96,838% C2H6 3,162%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is measured by certified chemical-analytical laboratory. The Laboratory regularly passes certification.
QC/QA procedures (to be) applied	Chemical and Analytical Laboratory provides measurements of the component composition of the oil and gas, and oil and gas after the separation process, the measurement of air in the area of oil and around the fuel gas used in GTPP and other necessary measurements. The laboratory is part of the Production Division report to the Manager SAP and UPN, the chief chemist of Metrological Department and Production Department SPD NV The laboratory is certified in accordance with Russian legislation and the requirements of relevant standards.
Any comment	-

Data/Parameter	Electricity generation by GTPP
Data unit	MWh
Description	Volume of electricity generated at the energy center under the project
Time of determination/monitoring	Constantly
Source of data (to be) used	Technical reports
Value of data applied (for ex-ante calculations/determinations)	2008: 224291; 2009: 337125; 2010: 340617,9; 2011: 396484,2; 2012: 480309
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measurements are performed with regularly calibrated metering instruments.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	-

Data/Parameter	Consumption of electricity for auxiliaries of the project power plant
Data unit	MWh
Description	Volume of electricity consumption for auxiliaries of the project power plant
Time of determination/monitoring	Annual

Source of data (to be) used	Form 6-TP
Value of data applied (for ex-ante calculations/determinations)	2008: 13288,2; 2009: 5214,09; 2010: 4380; 2011: 27124,4; 2012: 7,906
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measurements are performed with regularly calibrated metering instruments.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	-

Data and parameters that are not monitored throughout the crediting period, but are determined only once:

Data/Parameter	ρ_{CH4}
Data unit	kg/m^3
Description	Density of methane at standard conditions
Time of determination/monitoring	Determined once during the preparation of project design document
Source of data (to be) used	Thermal calculation of boilers (Normative method), NPO CKTI, St. Petersburg, 1998
Value of data applied (for ex-ante calculations/determinations)	0.668
Justification of the choice of data or description of measurement methods and procedures (to be) applied	-The value is accepted by scientific society.
QC/QA procedures (to be) applied	Determined on the basis of the reference data
Any comment	

Data/Parameter	ρ_{CO2}
Data unit	Kg/m^3
Description	Density of CO_2 under normal conditions
Time of determination/monitoring	Once, during determination
Source of data (to be) used	State standard GOCT 8050-85 «Gaseous and liquid carbon dioxide» http://www.docload.ru/Basesdoc/10/10469/index.htm
Value of data applied (for ex-ante calculations/determinations)	1,839
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Officially published data
QC/QA procedures (to be)	-

applied	
Any comment	-

Data/Parameter	Efficiency of flaring of APG on the OTP West-Salym.
Data unit	%
Description	Efficiency of flaring of AGP (DSG[8]) is needed for the calculation of emissions from flaring of APG (DSG) in the OTP
Time of determination/monitoring	Determined once
Source of data (to be) used	2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, Section 4.2 "Fugitive emissions systems for oil and natural gas", the formula 4.2.4, str.4.45
Value of data applied (for ex-ante calculations/determinations)	98
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Determined by IPCC.
QC/QA procedures (to be) applied	-
Any comment	-

[8] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

Data/Parameter	Global Warming Potential of Methane (GWP CH_4)
Data unit	tCO_2e/tCH_4.
Description	GWP CH_4 is necessary to calculate the CH_4 emission factor due to APG (DSG[9]) flaring
Time of determination/monitoring	Once, during determination
Source of data (to be) used	Decision 2/CP.3 http://unfccc.int/resource/docs/cop3/07a01.pdf#page=31 Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22. http://unfccc.int/ghg_data/items/3825.php
Value of data applied (for ex-ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Determined by IPCC.
QC/QA procedures (to be) applied	-
Any comment	

Data/Parameter	**Nc**	
Data unit	unit	
Description	Quantity of carbon moles in a mole of a component of APG (DSG[9])	
Time of determination/monitoring	constant	
Source of data (to be) used	Chemical formulae	
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO2	1
	methane, CH4	1
	ethane, C2H6	2
	propane, C3H8	3
	i-butane, C4H10	4
	n-butane, C4H10	4
	i-pentane, C5H12	5
	c-pentane, C5H12	5
	n-pentane, C5H12	5
	hexane, C6H14	6

[9] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

		geptane, C7H16	7
		octane, C8H18	8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Reference data		
QC/QA procedures (to be) applied			
Any comment	-		

Data/Parameter	Grid emission factor
Data unit	tCO2/MWh
Description	Electricity grid emission factor
Time of determination/monitoring	Constant
Source of data (to be) used	Calculation of emission factor for UPS Ural, Annex 2
Value of data applied (for exante calculations/determinations)	**0,6334** for period 2008-2012
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Needed for emissions calculation from Electricity generation from UPS Ural
QC/QA procedures (to be) applied	Reference data
Any comment	-

Baseline emissions BE:

$$BEy = BEf,y + BEelec,y \quad (1)$$

BEy - baseline emissions in the year y tCO2
BEf,y - Emissions due to combustion of APG with underburning at flare in the year y, tCO2
BEelec,y - Emissions due to electricity consumption at Salym fields from grid in the year y, tCO2

Emissions due to combustion of AGP with underburning at flare of West-Salym filed BEf:

$$BEf,y = BE_{CO2,f,y} + BE_{CH4,f,y} \quad (2)$$

BEf ,y - Emissions due to combustion of APG with underburning at flare in the year y, tCO2;
$BE_{CO2,f,y}$ **-** Emissions due to combustion of APG at flare in the year y, tCO2
$BE_{CH4,f,y}$ **-** Emissions due to underburning of APG of flare in the year y, tCO2;

$$BE_{CO2,f,y} = FC_{i,f,,y} * EF_{CO2,i,f,,y} \quad (3)$$

$BE_{CO2,f,y}$ – Baseline emissions due to combustion of APG in the year y. tCO2

FC $_{i,f,y}$ – the amount of APG (or its components in DSG) utilized due to the project activity that otherwise would be flared in the year y., m3

APG volume of DSG consumed from 2012 shall not be more than the equal volume of APG components (methane + ethane) extracted in course of APG processing at GPP, ths.m3
EF $_{CO2,APG,f,y}$ – CO_2emission factor , tCO_2/ m^3

$$\mathbf{FC_{DSG,f,y} \leq FC_{APG,f,y} * (W_{CH4}+W_{C2H6})} \quad (4)$$

FC $_{DSG,f,y}$ – the volume of DSG consumed by GTPP, in the year y.m3
FC$_{APG,f,y}$– the volume of APG supplied to GPP, in the year y. m3
$W_{CH4}+W_{C2H6}$ - sum of volume fraction of methane and ethane in APG, %

$$\mathbf{EF_{CO2,APG\ 2008\text{-}2011} = (W_{CO2}+(Nc_{CH4} * W_{CH4}+Nc_{VOC} * W_{VOC}))*\rho CO2*OXID} \quad (5)$$

EF $_{CO2,APG,f,2008\text{-}2011}$ – CO_2 emission factor of CO_2 in 2008-2011, tCO_2/ m^3
$W_{CO2,}$ W_{CH4} W_{VOC} – average annual volume fractions of carbon, methane and volatile organic compounds (VOC) in APG at OTP West-Salym, %

$$\mathbf{EF_{CO2,APG\ 2012} = (Nc_{CH4} * W_{CH4\ DSG}+Nc_{VOC} * W_{VOC\ DSG})*\rho CO2*OXID} \quad (6)$$

EF $_{CO2,APG\ 2012}$– CO_2 emission factor of CO_2 from 2012, tCO_2/ m^3
$W_{CH4\ DSG}$ $W_{VOC\ DSG}$ – average annual volume fractions of methane and volatile organic compounds (VOC) in DSG at GPP West-Salym,%;
$Nc_{CH4,}$ Nc_{VOC} – number of moles of carbon in a methane mole and VOC respectively.
ρCO2 – density CO_2 at 0°C equal 1.839 kg/m^3
OXID –flaring efficiency of APG at flare is equal 0.98[10]

$$\mathbf{BE_{CH4,f,y} = FC_{i,f,y} * EF_{CH4,f,y}} \quad (7)$$

EF $_{CH4,f,y}$ – Emissions factor CH4 due to underburning of APG (or its components in DSG) at flare, converted to CO2, tCO2/ths.m3

Due to the incomplete combustion of APG (or its components in DSG in 2012) at flares a part of APG releases into the atmosphere not oxidized. 2006 IPCC Guidelines defines a combustion efficiency of 98%, hence 2% is not burned completely, which causes the emission of methane into the atmosphere. The emission factor of methane converted to CO 2-eq. determined by the following formula:

$$\mathbf{EF_{CH4,f\ 2008\text{-}2011} = W_{CH4} * \rho_{CH4} * (1\text{-}OXID) * GWP_{CH4}} \quad (8)$$
$$\mathbf{EF_{CH4,f\ 2012} = W_{CH4\ DSG} * \rho_{CH4} * (1\text{-}OXID) * GWP_{CH4}} \quad (9)$$

[10] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, the fugitive emissions str.4.49

$\mathbf{W_{CH4}}$–Volume fraction of methane in APG, %
$\mathbf{W_{CH4\ DSG}}$–Volume fraction of methane in DSG, %
$\mathbf{\rho_{CH4}}$ – methane CH4 density under standard conditions is equal 0.668 kg/m^3.

OXID – APG flaring efficiency is equal 0,98[11]

$\mathbf{GWP_{CH4}}$ – Global Warming Potential, equal to 21 tCO_2/tCH_4, if the compliance to soot combustion criteria is assured.

Emissions due to electricity consumption at Salym fields from grid BE_{elec} :

$$\mathbf{BEelec = (EGgtpp - ECgtpp\ tech)*EF_{CO2,ELEC}} \quad (10)$$

EGgtpp–Electricity generate at GTPP, kWh
ECgtpp tech-Electricity consumption at GTPP auxiliaries (including electricity consumption at CS), kWh
$\mathbf{EF_{CO2,ELEC}}$–CO2 emission factor due to generation of electricity at grid Ural, tCO2

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:

The analysis provided in subsection B.1. clearly demonstrates that the proposed project is not a baseline.

A JI-specific approach is chosen for justification of additionality. Presently there are no approved methodologies for CDM projects which could cover utilization of associated petroleum gas in gas-turbine power plants. For this reason the project developer has developed his own approach in compliance with the requirements set forth with purpose provision a) is chosen defined in paragraph 2 of the annex I to the Guidance on criteria for baseline setting and monitoring version 03. 1, i.e: (a) Provision of traceable and transparent information showing that the baseline was identified on the basis of conservative assumptions, that the project scenario is not part of the identified baseline scenario and that the project will lead to reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs.

This section demonstrates that the project provides reductions in emissions by sources that are additional to any that would otherwise occur, using the following step-wise approach:

Step 1. Indication and description of the approach applied.

Step 2. Application of the approach chosen.

Step 3. Provision of additionality proofs.

In conclusion, an explanation is provided on how the reductions of greenhouse gas emissions are achieved.

[11] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, the fugitive emissions str.4.49

The following is a detailed exposition of this approach.

Step 1. Indication and description of the approach applied.

A JI-specific approach is based on an explanation that the project activity would not have occurred anyway due to existence of *the financial barrier and that this project is not a common practice.*

Financial barrier is justified further through the investment analysis.

Step 2. Application of the approach chosen.

Financial barrier

Financial barrier is justified through the investment analysis and includes the evaluation of the project's financial efficiency. If the results of the analysis show that the project is financially unattractive without being registered as JI-activity than it will be a clear evidence of the project's additionality.

The investment analysis result is quantitative definition of such an economic efficiency indicator as net present value (NPV). Estimation of investment attractiveness of the project was made by specialists of SPD with the involvement of the central office of Company "SPD N.V.".

Capital investment amounts to 174 100 thousand dollars. This value was spent for construction of the new gas turbine power plant with installed capacity of 60 MW.

The project started in 2005. The lifetime of the project is 25 years. Construction works has been carried out during the period of 2006-2010.

The level of APG price for the moment of decision making is not allowed to realize the project at the break-even point. The results of evaluations are presented below.

Table B2. The outcomes of the estimations of the project's efficiency

NPV:	-37 650 thousand dollars
Payback period:	the project does not payback

Conclusion:

1. At APG sale price that was effective on the date of the project start the project is absolutely unattractive from investor's point of view.

Sensitivity analysis

The sensitivity analysis is made with the use of the economical spreadsheet model developed by SPD N.V. specialists for the presentation of this project on the Investment Committee. Sensitivity of the project NPV to deviation of such factors as the investment cost, APG (DSG) volume and operational costs were assessed. The results of the analysis are presented in the table below.

The results of the analysis are presented below.

Results of sensitivity analysis:

1. The level of CAPEX

(+10%) NPV = -52 230 thousand dollars,

(-10%) NPV = -19 510 thousand dollars,

2. The level of OPEX

(+10%) NPV = -42 180 thousand dollars,

(-10%) NPV = -33 130 thousand dollars,a

> Thus, even considerable deviations (from -10% till +10%) of above mentioned factors cannot make enhance the project NPV. This demonstrates that the project stays economically inefficient even if the economic factors will considerably improve.

Analysis of common practice

This stage supplements the argumentation provided above with the analysis of prevalence of APG utilization activities, particularly, through the construction of gas transportation infrastructure in the oil&gas sector, which represents the *criteria of additionality* for the project activity.

Description of common situation in the industry

To explain the reasons of flaring of such considerable gas amounts the various aspects related to APG utilization are to be addressed:

From legislatorial point of view there is the package of resolutions, laws and other documents which is to regulate APG utilization issues. But the lack of real mechanisms allowing to monitor and to enforce implementation of APG utilization makes little progress in this regard. As a striking example of such a regulation is a 95% utilization requirement included in some license agreements. Particularly this practice is widespread in Khanty-Mansiysk Autonomous Okrug. Nevertheless this measure could not prevent the rise of APG flaring in 2009 as oil companies cannot mostly implement APG utilization activities due to economic and structural reasons. As far as the above-said requirement is not enforced its non-fulfillment does not lead to the cancellation of the right to develop the oil field. Therefore this requirement cannot force or motivate the oil company to utilize APG.

It should be noted that APG utilization (particularly through combustion in gas turbine power station for energy generation) requires substantial material expenditures. Therefore, in most cases

such projects are not economically efficient for the companies having oil fields. The factors negatively influence on the APG utilization efficiency:

• Substantially lower gas debits of oil wells as compared with the gas well debits;
• Presence of considerable amounts of hydrocarbon liquids in APG;
•Construction of compressor station for delivering of APG in gas turbine power plant is needed;
• Requirement for expensive facilities.
• No possibility of selling electricity to the other customer due to high distance from the nearest customer

Conclusion:

All the aspects considered demonstrate that APG utilization (particularly through combustion in GTPP) has not become a common practice in Russian Federation. Statistical data show APG flaring increase in 2006-2010. Despite the existence of the relevant legislatorial documents APG utilization is not duly monitored and enforced. On the other hand, the oil companies are extremely reluctant to implement construction of APG collecting and delivering in GTPP, such a kind of projects represent the considerable investment risk.
In Russia these projects are implemented only as a JI.

These considerations are fully applicable for the proposed project, which is economically inefficient due to high capital expenditures for establishing APG transport infrastructure.

Therefore

- This proposed project activity is not a result of state policy for the encouragement of oil companies to utilize APG.

- Project activity is not widely spread in the oil&gas industry of Russia.

Thus, the project activity is not a common practice that means it is *additional*.

Step 3. Provision of additionality proofs

The information to support above documentation is contained in the following documents:

- License agreement №KhMN10695 for the development of Salym oilfield.
- Ability to project power plant construction with the assistance of the Kyoto mechanisms

Explanations on how GHG gases emission reductions are achieved

Baseline emissions
Under the baseline scenario APGused at Salym oilfield GTPP in the project would be flared. At that GHG gases including carbon dioxide CO2 and methane CH4 would be emitted. Flare stack is not able to provide complete combustion and non-oxidized hydrocarbons including methane contained in APG are partially released to the atmosphere. For the estimate of incompleteness of APG

combustion at flare stacks, the efficiency of underburning as 2% is assumed. CO2 emissions and CH4 emissions (in terms of CO2 equivalent) are determined as product of APG amount used in the project and the appropriate GHG emission factor.

Project emissions
Under the project activity APG will be efficiently used at the GTPP and in 2012 APG will be supplied to GTP. Within the project activities the physical leaks of methane will take place during APG compression at Slaym GTPP, which is also significant.

GHG emission reductions
Emission reduction is determined through deduction of the project emissions effect from the baseline emissions.

Detailed calculations are presented in the section E.

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

The project boundary embraces GHG emission sources attributed to the project activity. It is only those sources are taken into account emissions from which are above (1%) in the overall quantity of GHG emissions. In the following table the emission sources and GHG types are considered as to including them in the baseline or project boundary.

Table B 3.1. GHG emission sources

Scenario	Source	GHG type	Included / not included	Comment
Baseline	APG flaring	CO_2	Included	Main baseline emission source
		N2O	Not included	Negligibly small [12]
		CH_4	Included	Incomplete burning (2% on the amount of flaring APG in the flare)
	The use of electricity from the grid Ural	CO_2	Included	Main baseline emission source
		N_2O	Not included	Negligibly small
		CH_4	Not included	Negligibly small
Project	APG (DSG)[9] combustion at GTPP for electricity generation	CO_2	Included	Main baseline emission source
		N_2O	Not included	Negligibly small
		CH_4	Not included	Negligibly small
	Methane emissions during APG transportation from OTP to GTPP in period 2008-2011, methane emissions during DSG transportation from GPP to GTPP in 2012	CO_2	Not included	Negligibly small
		N_2O	Not included	Negligibly small
		CH_4	Included	Main project emission source

Schematically, the boundaries of the project include OTP West Salym oil fields including the new energy center.

Figure B.3.1. The boundaries of the Project at period 2008-2011

[12] The calculation is provided in the format of Excel: Salym calculation

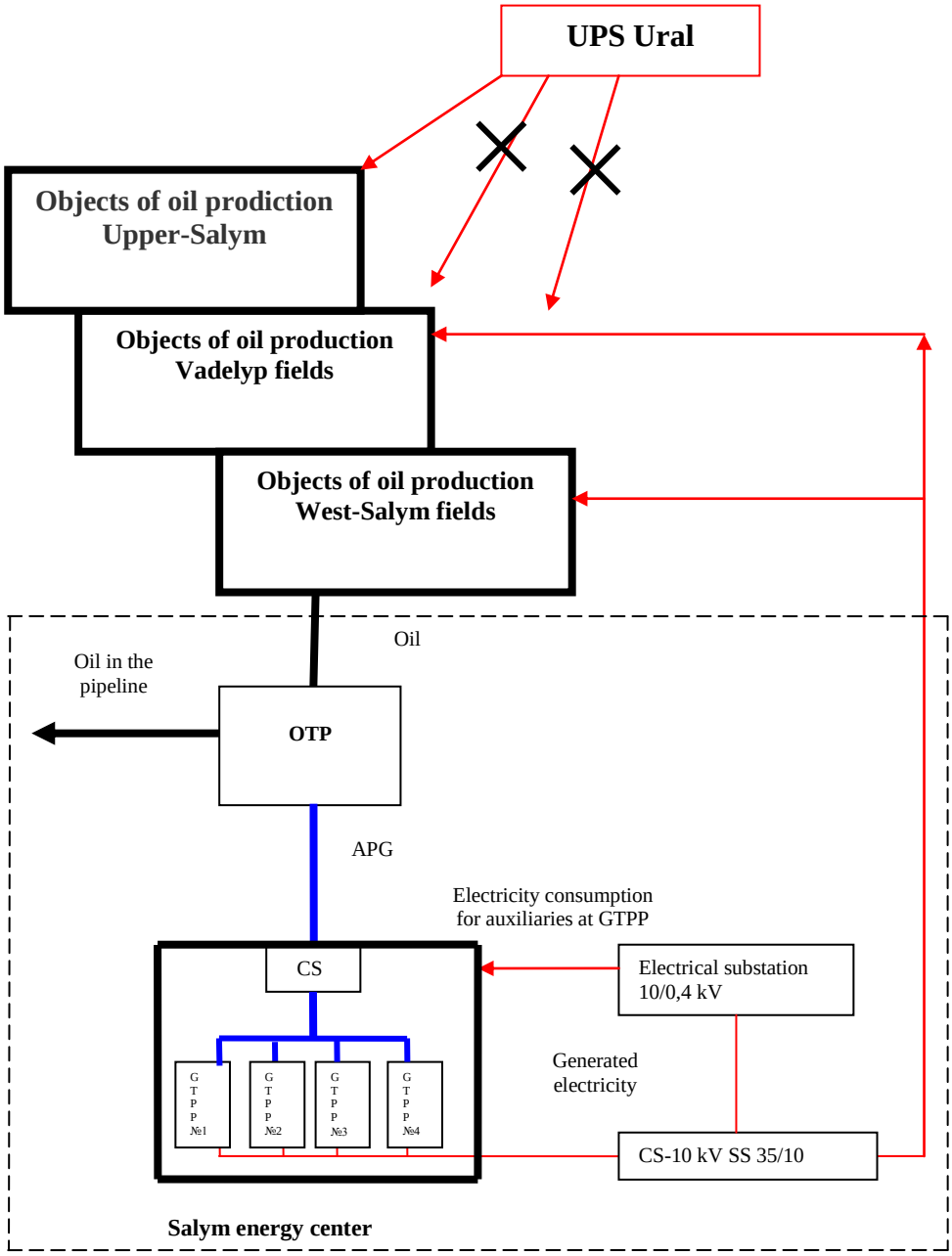
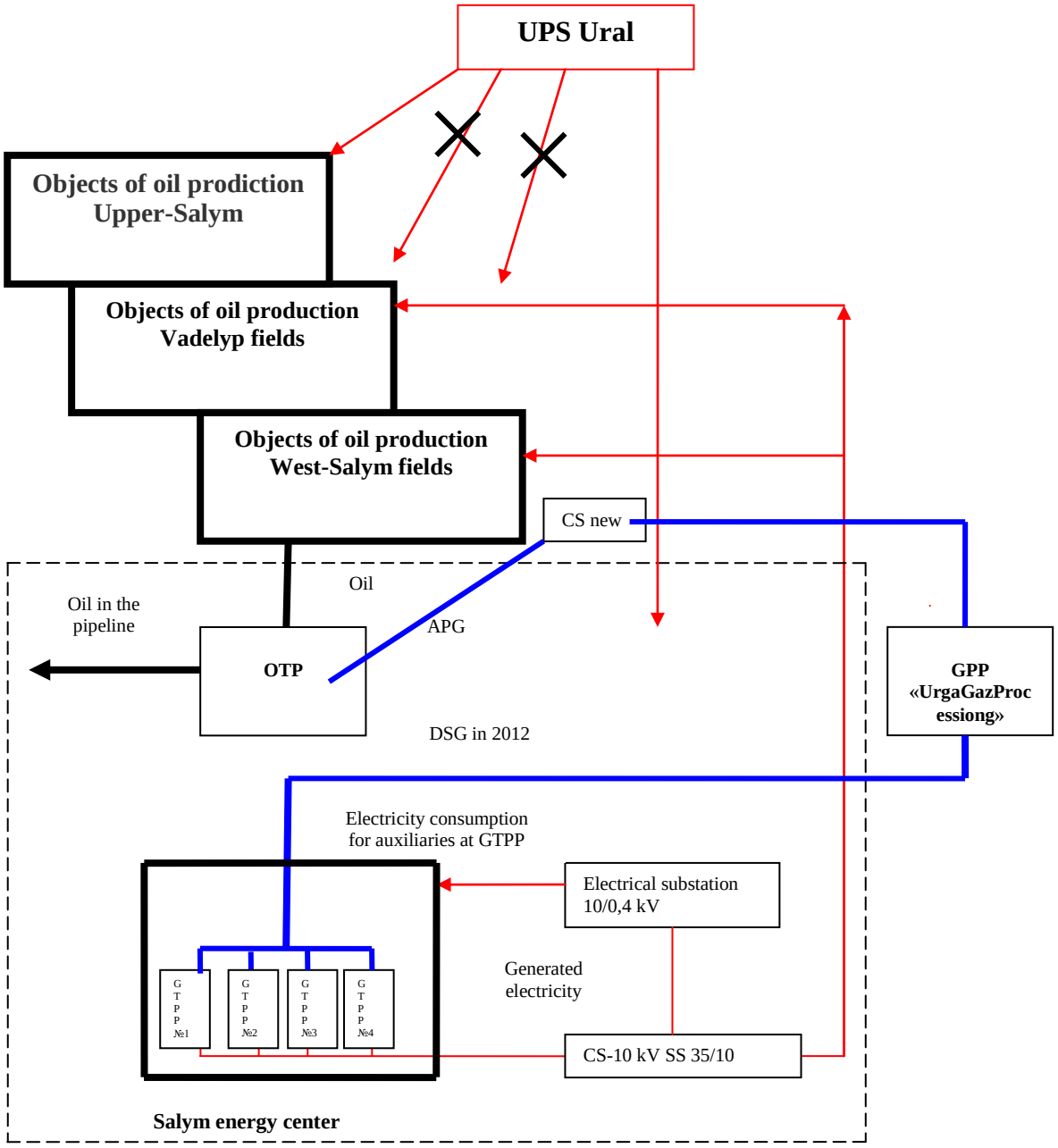


Figure B.3.2. The boundaries of the Project in 2012



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

Date of baseline setting: 28.03.2011

The baseline has been designed by:
National Carbon Sequestration Foundation – (NCSF, Moscow).

Contact person:
Timofey Besedovskiy, Lead expert of Project Development Department;

Tel +7 499 788 78 35 ext. 108
Fax +7 499 788 78 35 ext. 107
E-mail: BesedovskiyTN@ncsf.ru

Nikolay Trofimov, Expert of the Project Development Department;
Tel +7 499 788 78 35 ext. 111
Fax +7 499 788 78 35 ext. 107
E-mail: TrofimovN@ncsf.ru

National Carbon Sequestration Foundation is not a participant of the Project.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

The project start date is – 15.08.2005. This is evidenced by internal corporate document "Kyoto Protocol Implications" dated 15.08.2005

C.2. Expected operational lifetime of the project:

>>

The expected project life is 25 years or 300 months: from 09/01/2008 to 09/01/2033.

C.3. Length of the crediting period:

Crediting period corresponds to the budget period of Kyoto Protocol and is 4 years, 11 months and 22 days or 59 months and 22 days: from 09.01.2008 through 31.12.2012.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The monitoring plan is described throughout a section D in accordance with paragraph 30 of the Guidance on criteria for baseline setting and monitoring. Project developer applies a JI specific approach for monitoring plan in accordance with paragraph 9 (a) of the Guidance on criteria for baseline setting and monitoring (Version 03), and other applicable JI guidelines. The JI-approach includes consideration of the following steps:

Step. 1. Indication and description of the approach chosen regarding monitoring.
Step. 2. Application of the approach chosen.

Below the approach is presented in more detail.

Step. 1. Indication and description of the approach chosen regarding monitoring

Under the baseline scenario all associated petroleum gas that is allocated to the OTP West-Salym have been burned at flares, that would lead to significant emissions of GHG such as CO2 and CH4. Atmospheric emissions of methane occur as a result of incomplete combustion flare. For evaluating of the incomplete combustion of APG flaring the IPCC 2006 Guidelines recommends to use the value of the combustion efficiency - 98%. As part of the project activity most of the produced APG is efficiently utilized by using it in the gas turbines of the 60 MW West Salym energy center for electricity generation.

GHG emission sources

For the purpose of monitoring, the following data will be measured and calculated:

1. not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD:

- Number of moles of carbon in methane and NMVOC respectively
- CO2 emission factor due to generation of electricity at grid Ural
- Density of CO_2 at 0°C equal 1.839 kg/m^3
- Density pf methane CH4 under standard conditions is equal 0.668 kg/m^3

- OXID – APG (or its components in DSG) flaring efficiency is equal 0.98[13]
- IPCC losses factor for gas transmission operations is equal 0.0011 GgCH4/ mln. m3
- Global Warming Potential of methane is equal 21 tCO2/tCH4

2. not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD:

   -there is no such data

3. monitored throughout the crediting period:

1. Volume of APG and DSG consumption at the GTPP of West-Salym field;
2. Quantity of the electricity generated;
3. Volume of electricity consumed for auxiliary needs.
4. Composition of APG and DSG delivered to the GTPP of West-Salym field;
5. Volume of APG delivering to GPP from 2012;
6. Composition of APG delivered to the GPP in 2012.

Key emission factors

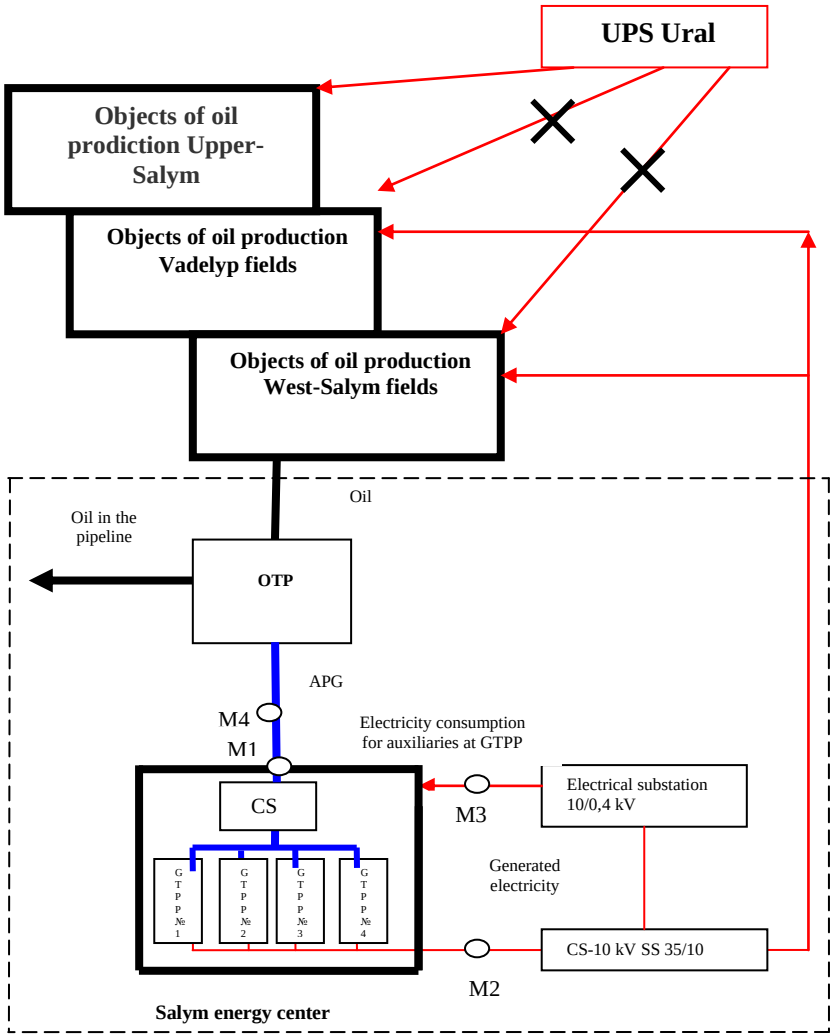
CO_2 and CH_4 emission factors for defining emissions from APG flaring are variable parameters depending on APG chemical composition. For calculation of these factors the approaches proposed in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Subchapter 4.2. Fugitive emissions from oil and natural gas systems) are applied.

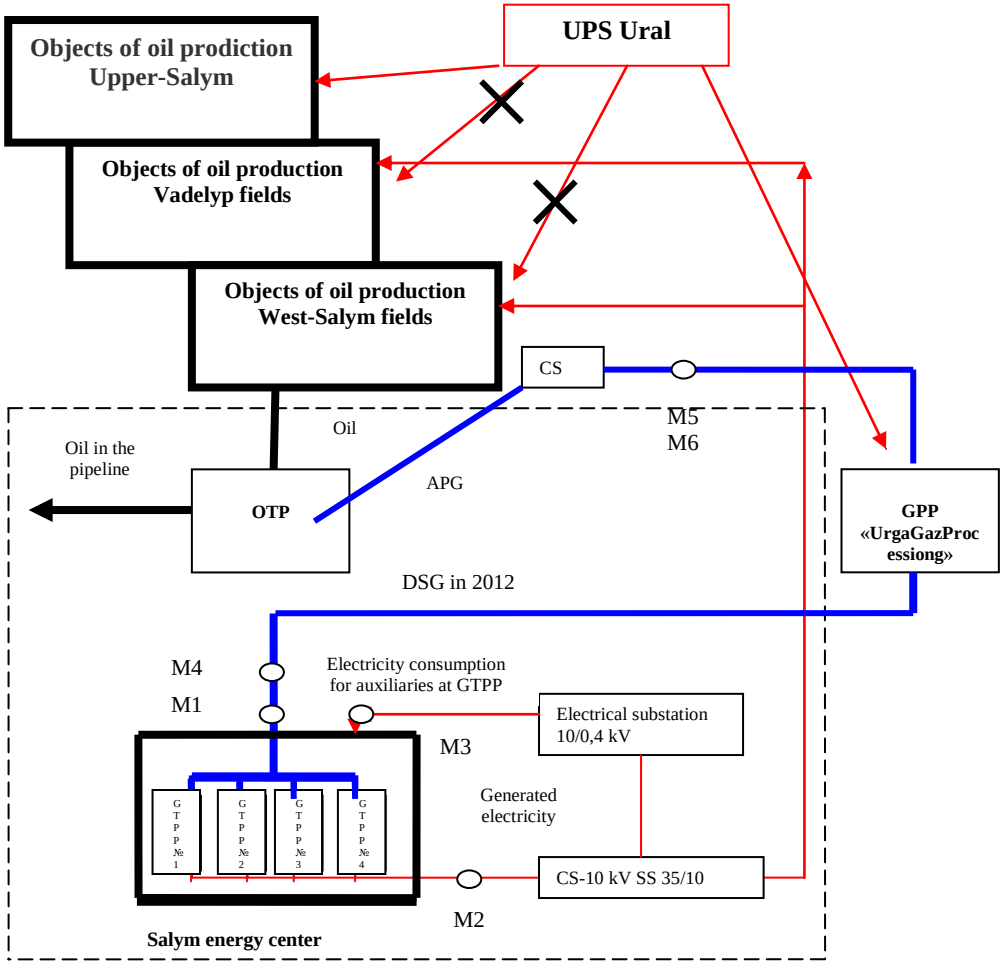
Monitoring points and variable parameters for monitoring at period 2008-2012

Figure D.1.1. Monitoring points at period 2008-2011

Figure D.1.2. Monitoring points in 2012

[13] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 2, the stationary fuel combustion, page 2.14


UPS Ural
Objects of oil prodiction Upper-Salym
Objects of oil production Vadelyp fields
Objects of oil production West-Salym fields
Oil
Oil in the pipeline
OTP
APG
M4
M1
Electricity consumption for auxiliaries at GTPP
CS
GTPP №1
GTPP №2
GTPP №3
GTPP №4
M3
Electrical substation 10/0,4 kV
Generated electricity
CS-10 kV SS 35/10
M2
Salym energy center


Objects of oil prodiction Upper-Salym
UPS Ural
Objects of oil production Vadelyp fields
Objects of oil production West-Salym fields
CS
M5
M6
Oil
Oil in the pipeline
OTP
APG
GPP «UrgaGazProcessiong»
DSG in 2012
M4
M1
Electricity consumption for auxiliaries at GTPP
Electrical substation 10/0,4 kV
M3
GTPP №1
GTPP №2
GTPP №3
GTPP №4
Generated electricity
CS-10 kV SS 35/10
M2
Salym energy center

Symbols

◯	Monitoring points
GTPP	Gas turbine power plant
OTP	Oil treatment plant
CS	Compressor station

Monitoring points

M1	M2	M3	M4	M5	M6
Volume of APG and DSG consumption at the GTPP of West-Salym field;	Quantity of electricity generated	Volume of electricity consumed by auxiliary needs	Composition of APG and DSG delivered to the GTPP of West-Salym field;	Volume of APG delivering to GPP from 2012	Composition of APG delivered to the GPP in 2012

Step. 2. Application of the approach chosen.

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:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
M1	*APG (DSG[11]) consumption at GTPP for electricity generation*	*Technical report*	*m3*	*m*	*Once per month*	*100%*	electronic/paper	
M4	*Chemical composition of APG (DSG[14]) delivered to GTPP of West-Salym filed*	*Laboratory analysis Gas chromatograph*	*% mol*	*m*	*Once per month*	*100%*	paper	*The analysis is performed directly at the Chemical laboratory*
M5	*Volume of APG delivering at GPP from 2012*	*Technical report*	*m3*	*m*	*Once per month*	*100%*	electronic/paper	
M6	Composition of APG delivered to the GPP in 2012	*Laboratory analysis Gas chromatograph*	*% mol*	*m*	*Once per month*	*100%*	paper/electronic	*The analysis is performed directly at the Chemical laboratory*
Data and parameters that are not monitored throughout the crediting period, but are determined only once								
$NC_{CH4,} \sum jNC_{VOCj}$	*Number of moles of carbon in methane and NM_{VOC} respectively*	*IPCC Guidelines for National Greenhouse Gas Inventories,*	*Moles*	*e*	*Once*	*100%*	*Electronic*	$n_{C,CH4} = 1;$ $n_{C,C2H6} = 2;$ $n_{C,C3H8} = 3;$ $n_{C,C4H10} = 4;$ $n_{C,C5H12} = 5;$

[14] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

		2006 – Volume 2: Energy, Chapter 4: Fugitive Emissions, p. 4.45						$n_{C,C6H14} = 6;$ $n_{C,CO2} = 1;$ $n_{C,N2} = 0;$ $n_{C,O2} = 0;$ $n_{C,He} = 0.$
LOSS	*IPCC losses factor for gas transmission operations*	*Losses factor is presented in 2006 IPCC Guidelines For National Greenhouse Gas Inventories, volume 2, chapter 4, table 4.2.5.*	*GgCH4/ mln. m3*	*e*	*Determined once*	*100%*	*Electronic*	*0,0011 GgCH4/ mln. m3*
GWP_{CH4}	*Global Warming Potential of methane*	*Decision 2/CP.3 http://unfccc.int/resource/docs/cop3/07a01.pdf#page=31 Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22. http://unfccc.int/ghg_data/items/3825.php*	*tCO2/tCH4*	*e*	*Once*	*100%*	*Electronic*	*21 tCO2/tCH4*

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

Emissions due to combustion APG (DSG) in GTPP of energy center PE:

$$PE = FC_{i,y,el} * EF_{CO2,APG,el\,y} + (LOSS * FC_{i,y,el} * 1000 * W_{CH4} * GWP_{CH4}) \quad (1)$$

$FC_{i,y,el}$ – APG (DSG) consumption at GTPP for electricity generation (the volume of DSG delivery at GTPP in 2012 is less than or equal to the volume of delivery of APG ($FC_{APG\,GPP}$) at GPP), mln.m3

$EF_{CO2,APG,el\,y}$ – emission factor from electricity generation at GTPP, tCO2/ m3

LOSS – IPCC losses factor for gas transmission operations (emission value is presented in 2006 IPCC Guidelines For National Greenhouse Gas Inventories, volume 2, chapter 4, table 4.2.5.), GgCH4/ mln. m3;

W_{CH4} – average annual volume fractions of methane in APG at Salym field (information source – gas analysis protocol);

GWP_{CH4} – Global Warming Potential for methane 21 tCO_2/tCH_4;

$$FC_{DSG\,el,y} \leq FC_{AGP,el,y} * (W_{CH4} + W_{C2H6}) \quad (2)$$

$W_{CH4}+W_{C2H6}$ - sum of volume fraction of methane and ethane in APG

$FC_{DSG,el,y}$ - volume of DSG consume by GTPP in year (y), m3

$FC_{AGP,el,y}$ – Volume of APG supplied to GPP in the year (y), m3

$$EF_{CO2,APG,el,\,2008\text{-}2011} = (W_{CO2} + (Nc_{CH4} * W_{CH4} + Nc_{VOC} * W_{VOC})) * \rho CO2 * OXID \quad (3)$$

$EF_{CO2,APG,el,\,2008\text{-}2011}$ – CO_2 emission factor of CO_2 in 2008-2011, tCO_2/m^3

W_{CO2}, **W_{CH4}** W_{VOC} – average annual volume fractions of carbon, methane and volatile organic compounds (VOC) in APG at OTP West-Salym, fixed parameter (information source – gas analysis protocol);

$$EF_{CO2,APG,el,\,2012} = (Nc_{CH4} * W_{CH4\,DSG} + Nc_{VOC} * W_{VOC\,DSG}) * \rho CO2 * OXID \quad (4)$$

$EF_{CO2,APG,el,\,2012}$ – CO_2 emission factor of CO_2 from 2012, tCO_2/m^3

$W_{CH4\ DSG}$ $W_{VOC\ DSG}$ – average annual volume fractions of methane and volatile organic compounds (VOC) in DSG at GPP West-Salym,;
$Nc_{CH4,}$ Nc_{VOC} – number of moles of carbon in a methane mole and VOC respectively.
ρCO2 – density CO_2 at 0°C equal 1.839 kg/m^3
OXID –flaring efficiency of APG at flare is equal 0.98[15]

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:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
M1	*APG (DSG[11]) consumption at GTPP for electricity generation*	*Technical report*	*m3/kWh*	*m*	*Once per month*	*100%*	electronic/paper	
M2	*Electricity generation at GTPP*	*power meter reading*	*kWh*	*m*	*Constantly*	*100%*	electronic/paper	
M3	*Electricity consumption at GTPP for owned need (Including electricity consumption at CS in period 2008-2011)*	*power meter reading*	*kWh*	*m*	*Constantly*	*100%*	electronic/paper	

[15] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, the fugitive emissions str.4.49

M4	*Chemical composition of APG (DSG[16]) delivering at GTPP of West-Salym filed*	*Laboratory analysis Gas chromatograph*	*% mol*	*m*	*Once at month*	*100%*	paper	*The analysis is performed directly on the Chemical laboratory*
M5	*Volume of APG delivering at GPP from 2012*	*Technical report*	*m3*	*m*	*Once per month*	*100%*	electronic/paper	
Data and parameters that are not monitored throughout the crediting period, but are determined only once								
$W_{CH4,} \sum W_{NMVOC}$	*Number of moles of carbon in methane and NMVOC respectively*	*IPCC Guidelines for National Greenhouse Gas Inventories, 2006 – Volume 2: Energy, Chapter 4: Fugitive Emissions, p. 4.45*	*Moles*	*e*	*Once*	*100%*	*Electronic*	$n_{C,CH4} = 1;$ $n_{C,C2H6} = 2;$ $n_{C,C3H8} = 3;$ $n_{C,C4H10} = 4;$ $n_{C,C5H12} = 5;$ $n_{C,C6H14} = 6;$ $n_{C,CO2} = 1;$ $n_{C,N2} = 0;$ $n_{C,O2} = 0;$ $n_{C,He} = 0.$
$\boldsymbol{EF_{CO2,ELEC}}$	*CO2 emission factor due to generation of electricity at grid Ural*	*In accordance with Calculation of emission factor for UPS Ural(Annex 2)*	*tCO2/MWh*	*e*	*Once*	*100%*	*Paper*	*0.6334 tCO2/MWh*

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

$$\mathbf{BEy = BEf,y + BEelec,y} \qquad (5)$$

BEy - baseline emissions in the year y tCO2

[16] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

BEf,y - Emissions due to combustion of APG with underburning at flare in the year y, tCO2
BEelec,y - Emissions due to electricity consumption at Salym fields from grid in the year y, tCO2

Emissions due to combustion of AGP with underburning at flare of West-Salym filed BEf:

$$\mathbf{BEf,y = BE_{CO2,f,y} + BE_{CH4,f,y}} \quad (6)$$

BEf ,y - Emissions due to combustion of APG with underburning at flare in the year y, tCO2;
$\mathbf{BE_{CO2,f,y}}$ **-** Emissions due to combustion of APG at flare in the year y, tCO2
$\mathbf{BE_{CH4,f,y}}$ **-** Emissions due to underburning of APG of flare in the year y, tCO2;

$$\mathbf{BE_{CO2,f,y} = FC_{i,f,,y} * EF_{CO2,i,f,,y}} \quad (7)$$

$\mathbf{BE_{CO2,f,y}}$ – Baseline emissions due to combustion of APG in the year y.
$\mathbf{FC_{i,f,y}}$ – the amount of APG (or its components in DSG) utilized due to the project activity that otherwise would be flared in the year y.

APG volume of DSG consumed from 2012 shall not be more than the equal volume of APG components (methane + ethane) extracted in course of APG processing at GPP, ths.m3
$\mathbf{EF_{CO2,APG,f,y}}$ – CO_2emission factor , tCO_2/ m^3

$$\mathbf{FC_{DSG,f,y} \leq FC_{APG,f,y} * (W_{CH4}+W_{C2H6})} \quad \mathbf{(8)}$$

$\mathbf{FC_{DSG,f,y}}$ – the volume of DSG consumed by GTPP, in the year y.
$\mathbf{FC_{APG,f,y}}$ – the volume of APG supplied to GPP, in the year y.
$\mathbf{W_{CH4}+W_{C2H6}}$ - sum of volume fraction of methane and ethane in APG

$$\mathbf{EF_{CO2,APG\ 2008\text{-}2011} = (}W_{CO2}\mathbf{+(Nc_{CH4}*}\ W_{CH4}\mathbf{+Nc_{VOC}*}\ W_{VOC}\mathbf{))*\rho CO2*OXID} \quad (9)$$

$\mathbf{EF_{CO2,APG,f,\ 2008\text{-}2011}}$ – CO_2 emission factor of CO_2 in 2008-2011, tCO_2/ m^3

$W_{CO2,}$**W_{CH4}** W_{VOC} – average annual volume fractions of carbon, methane and volatile organic compounds (VOC) in APG at OTP West-Salym, fixed parameter (information source – gas analysis protocol);

$$\mathbf{EF_{CO2,APG\ 2012} = (Nc_{CH4} * W_{CH4\ DSG} + Nc_{VOC} * W_{VOC\ DSG}) * \rho CO2 * OXID} \quad (10)$$

$EF_{CO2,APG\ 2012}$ – CO_2 emission factor of CO_2 from 2012, tCO_2/m^3

$W_{CH4\ DSG}$ $W_{VOC\ DSG}$ – average annual volume fractions of methane and volatile organic compounds (VOC) in DSG at GPP West-Salym,;

$Nc_{CH4,}$ Nc_{VOC} – number of moles of carbon in a methane mole and VOC respectively.

ρCO2 – density CO_2 at 0°C equal 1.839 kg/m^3

OXID –flaring efficiency of APG at flare is equal 0.98[17]

$$\mathbf{BE_{CH4,\ f,y} = FC_{i,f,y} * EF_{CH4,f,y}} \quad (11)$$

$EF_{CH4,\ f,y}$ – Emissions factor CH4 due to underburning of APG (or its components in DSG) at flare, converted to CO2, tCO2/ths.m3

Due to the incomplete combustion of APG (or its components in DSG in 2012) at flares a part of APG releases into the atmosphere not oxidized. 2006 IPCC Guidelines defines a combustion efficiency of 98%, hence 2% is not burned completely, which causes the emission of methane into the atmosphere. The emission factor of methane converted to CO 2-eq. determined by the following formula:

$$\mathbf{EF_{CH4,f\ 2008\text{-}2011} = W_{CH4} * \rho_{CH4} * (1\text{-}OXID) * GWP_{CH4}} \quad (12)$$

$$\mathbf{EF_{CH4,f\ 2012} = W_{CH4\ DSG} * \rho_{CH4} * (1\text{-}OXID) * GWP_{CH4}} \quad (13)$$

W_{CH4}–Volume fraction of methane in APG

$W_{CH4\ DSG}$–Volume fraction of methane in DSG

ρ_{CH4} – methane CH4 density under standard conditions is equal 0.668 kg/m^3.

[17] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, the fugitive emissions str.4.49

OXID – APG flaring efficiency is equal 0,98[18]

GWP_{CH4} – Global Warming Potential, equal to 21 tCO_2/tCH_4, if the compliance to soot combustion criteria is assured.

Emissions due to electricity consumption at Salym fields from grid BE_{elec}:

$$\mathbf{BEelec = (EGgtpp - ECgtpp\ tech)*EF_{CO2,ELEC}} \qquad (14)$$

EGgtpp–Electricity generate at GTPP, kWh
ECgtpp tech-Electricity consumption at GTPP auxiliaries (including electricity consumption at CS), kWh
$EF_{CO2,ELEC}$–CO2 emission factor due to generation of electricity at grid Ural, tCO2/MWh. (Annex 2)

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

This option is not used.

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

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

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):

[18] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, the fugitive emissions str.4.49

Not applicable.

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

Leakage of the monitoring plan does not provide, since all emissions are included in the scope of the project.
Leakage of during processing is not considered because they are included in the project "Utilization of Associated Petroleum Gas from Zapadno-Salymskoe and Nizhne-Shapshinskoe oilfields, Khanty-Mansiysk Yugra autonomous district Region, Russia"

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

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

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

Not applicable.

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

$$ER = BE - PE \qquad (15)$$

ER – CO_2 emission reduction due Project realization, t CO_2
BE – CO_2 baseline emissions, tCO_2
PE – CO_2 project emissions, tCO_2

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 on Project influence on environment will be presented in accordance with legislation of Russian Federation [19].
According to legislation in environment protection, company must control emissions of pollutants, wastewater discharges, organise and provide management of waste production and consumption, provide established accountability to the authorized state agencies (The Federal Service for Ecological, Technological and Nuclear Supervision). In Salym Petroleum work on environmental protection is organized by Department of Labor, Department of industrial safety, Department of Environment Protection, Department of Civil Defense and Emergencies, in particular by Department of Environmental Protection of Salym Petroleum, Department on schedule prepares and presents to authorized state agencies official statistical reports and forms, including:

- 2-TP (air) - data on air protection, including information about the number of trapped and neutralized pollutants, detailed information about emissions of particular pollutants, number of emission sources, measures to reduce emissions and emissions from particular groups of pollution sources;
- 2-TP (water resources) - data on water usage, including information about water consumption from natural sources, wastewater discharges and content of pollutants in water, water capacity and etc. sewage treatment plants;
- 2-TP (waste products) – data on generation, use, neutralization, transportation and disposal of waste production and consumption, including annual balance of wastes separately by its types and hazard category.

At the design stage sources and types of impact were considered, assessment of the current state of pollution was made, preliminary forecast was performed and measures on protection of the environment were scheduled. Herewith assessment of the impact on the environment and assessment of the damage, taking into account environmental protection measures provided by the project is given to the following components of the environment:

- ground;
- atmospheric air;
- geotechnical conditions;
- geomorphological conditions;
- landscape complexes;
- soils;
- animal world

[19] *Federal law " On Air Protection "* (4 May 1999. N 96-*FL).*

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
M1, M2, M3, M4, M5, M6 table D.1.1.1, table D.1.3.1	low	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification». Electricity meters are calibrated every 8 years, other measurement instruments are calibrated every 1-2 years.

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

The structure of the monitoring plan for project implementation is adapted to the existing system of accounting and reporting in "SPD N.V."
Procedure for metering, collection and storage of APG / fuel gas used for powering of the PGP at the technological site of CPF of West Salym oilfield is based on the following normative documents:

- "Provision for Metrology Service of Salym Petroleum N.V." (Internal normative document in accordance with PR50-732-93 "Standard Statute on Metrological Service of Governmental Control Bodies of the Russian Federation and Commercial Legal Entities");
- "Methodology for metering of gas volumes using averaging vessel metering devices ANNUBAR/EMERSON", approved by the Metrological Service of GosStandard of the Russian Federation MI2667-2004;
- "PGP running procedure: Fuel Gas Plant, Including HAFI gas compressors Trains #1-#3" (Regulated Design Document SAL-SALW-D22-00017-00);
- Other legislation documents and industrial regulatory norms;
- The law "On the Unity of measurement» N 102-FZ of 26.06.2008.

Roles and responsibilities of persons, departments and organizations providing such a monitoring are presented in the following table:

№№	Organizations	Position/subdivision	Objectives	Comments
1.	CJSC «NCSF», Moscow	Project Development Department	Calculations of actual emission reductions according to the formulas of section D. Preparing Monitoring Report	Submission of Monitoring Report to the Department of Marketing and sale of gas for approval
2.	OJSC “Gazprom neft”	Department of marketing and gas sales	Submission of data for calculation and preparation of Monitoring Report to Project Development Department of CJSC “NCSF”	Adoption of the Monitoring Report Transfer approved MR to the AIE for verification. Submission of verification report to the SPD Company.
3.	Company “Salym Petroleum Development N.V.”	Chief Power Engineer	Preparation and submission of annual production data	Data transfer to the Department of Marketing and sale of gas, of Gazprom Neft for further submission to the CJSC "NCSF"
4.	Company “Salym Petroleum Development N.V.”	Chief Power Engineer	Analysis of data on the company during the reporting period and the preparation of technical reports	The transfer of data to calculate the reductions in the Department of Marketing and sale of gas OJSC "Gazprom neft".
5.	Company “Salym Petroleum Development N.V.”	Chief Power Engineer, Chief of UPN	Preparation of monthly data for technical reports	The technical report includes the following information • Electricity generation at power plant • Consumption of APG (DSG) at power plant • Consumption of electricity for own needs GTPS
6.	Company “Salym Petroleum Development N.V.”	Chemical and Analytical Laboratory	Providing data for component composition and NCV of APG	The transfer of data processing departments in the collection and delivery of gas.
7.	Company “Salym	Replacement power	Data collection for the development and	The data are entered in a secure page

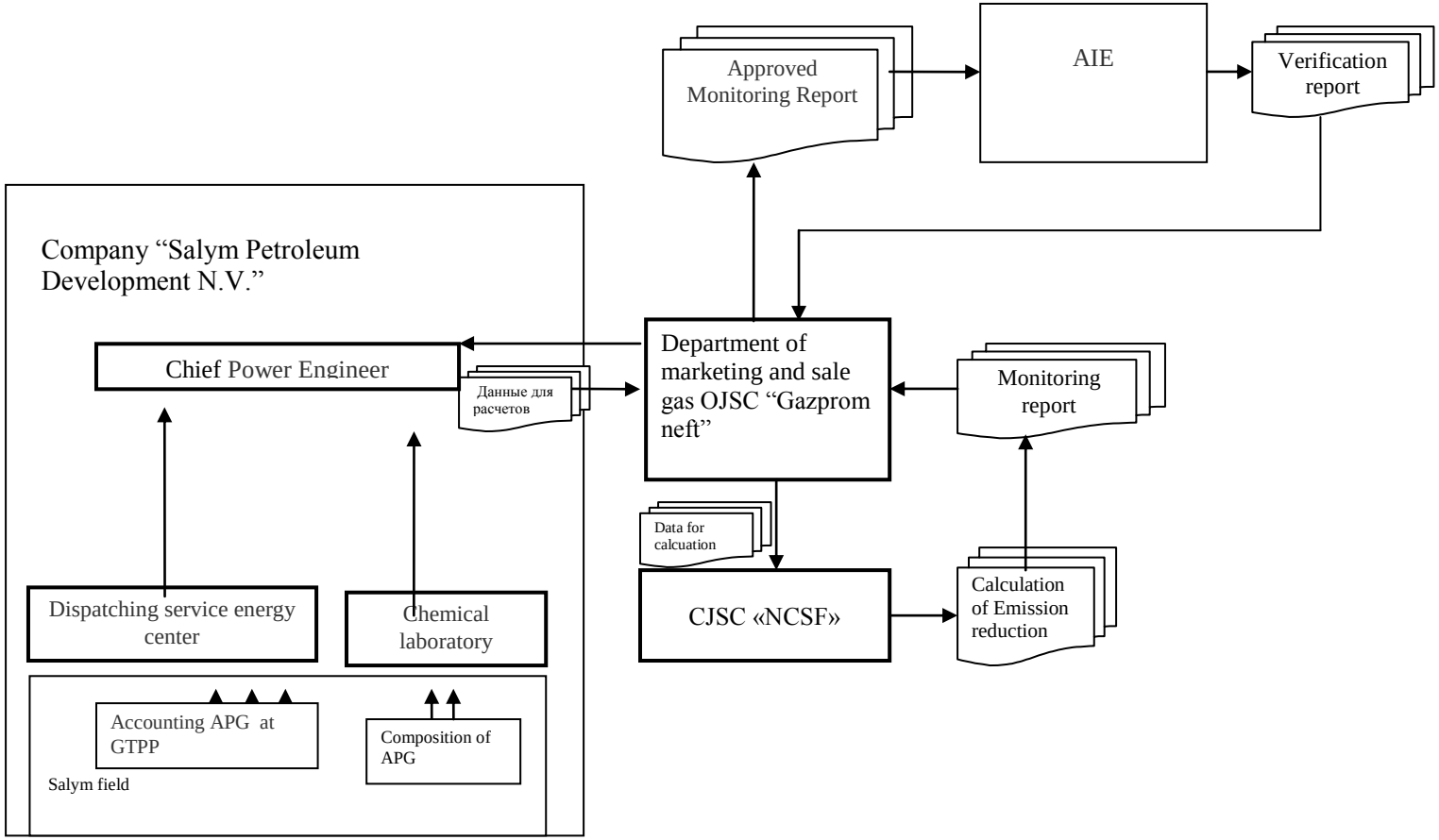
	Petroleum Development N.V.”	engineer of GTPP, replacement engineer of GTPP	consumption of electricity for own needs at power plant.	and sent for processing in the OPF dispatch service

Necessary information to calculate the emission reductions of greenhouse gas emissions is collected as usually done in the field of production in "SPD NV", so monitoring does not require any other additional information as compared with the already collected. All necessary data are being monitored, which is a common, everyday practice: data from sensors monitoring the checkpoints, except data on the composition of associated gas, are transferred to automated meters and time is automatically recorded in an electronic database of APM and are reflected from the operator of gas turbine power center.
Data on the composition of APG are in the chemical-analytical laboratory that provides the required accuracy class. Calculation of GHG emission reductions is carried out on the basis of annual consumption APG at GTPP and electricity supply according to the SPD Company at the Salym field.
Completed and signed the technical report documentation that reflects the values specified in the monitoring data provided in the financial department of SPD. This department conducts an internal audit to eliminate inadequacy and erroneous information.

Each year, this department provides an annual summary of the balance of the gas, together with data on the composition of gas in the project development department of CJSC "NCSF" for the annual calculation of GHG emission reductions and preparing the monitoring reports (MR).

Annual MRs are sent by e-mail to the finance department of SPD for approval. Approved the annual report submitted to the independent expert company for the annual verification of emission reductions achieved.
Storage of data reporting on the use of raw materials and energy in SPD kept is in electronic form on the enterprise network resources. Data on the composition of gases stored in paper form and within 5 years.

Scheme D 3. Operational and management structure for monitoring the project activities



All relevant data for monitoring will be stored during two years after the last transfer of ERUs under this Project.

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

The monitoring plan was established by National Carbon Sequestration Foundation – (NCSF, Moscow);

Contact persons:

Timofey Besedovskiy,
Lead expert of Project Development Department;
Tel +7 499 788 78 35 ext. 108
Fax +7 499 788 78 35 ext. 107
E-mail: BesedovskiyTN@ncsf.ru

Nikolay Trofimov, Expert of the Project Development Department;
Tel +7 499 788 78 35 ext. 111
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E-mail: TrofimovN@ncsf.ru

National Carbon Sequestration Foundation is not a participant of the Project.

SECTION E. Estimation of greenhouse gas emission reductions

For estimating GHG emissions resulting from implementation of the project the formulas presented in section D are used.

E.1. Estimated project emissions:

Table E 1.1. Project emissions for period 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
Consumption of APG at GTPP for electricity generation	$FC_{APG\ el}$	ths. m3	57207	80660	78294	93293	171900
Emission factor CO2 due combustion APG at GTPP	$EF_{CO2\ GT}$	tCO2/ths.m3	2,55	2,55	2,55	2,55	1,90
CO2 emissions due to electricity generation	PE_{GT}	tCO2	145665	205383	199358	237550	326120
CH4 emissions factor	***LOSS***	GgCH4/ mln. m3	0,0011	0,0011	0,0011	0,0011	0,0011
CH4 emissions (in terms of CO2) during transportation of APG (DSG in 2012) into GTPP	PE_{losses}	tCO2	1 080	1 523	1 478	1 762	3 845
Emissions CO2 under project	**PE**	**tCO2**	**146746**	**206906**	**200837**	**239312**	**329965**

E.2. Estimated leakage:

Not applicable.

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

Table D 3.1. The sum of project emissions and leakage difference in 2008-2012.

Item	Index	Unit	2008	2009	2010	2011	2012
Total emission CO2 under project activities	**PE**	tCO2	**146746**	**206906**	**200837**	**239312**	**329965**

E.4. Estimated baseline emissions:

Table E 4.1. Emissions CO2 due combustion of APG at flare of Salym filed at period 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
APG volume combustion at flare	$FC_{APG\ bl}$	ths.m3	57207	80660	78294	93293	171900
Emission Factor CO2	EFCO2,F	tCO2/ths. m3	2,50	2,50	2,50	2,50	1,86
Emissions due combustion APG at flare	**$BE_{CO2,F}$**	tCO2	**142752**	**201275**	**195371**	**232799**	**319598**
APG volume combustion at flare	$FC_{APG\ bl}$	ths.m3	57207	80 660	78 294	93 293	171 900
CH_4 emissions (in CO_2 equivalent) due to APG flaring under the baseline	$EF_{CH4,F}$	tCO2/ths. m3	0,229	0,229	0,229	0,229	0,271
Emission of methane due underburning combustion at flare	**$BE_{CH4,F}$**	**tCO2eq**	**13104**	**18477**	**17935**	**21371**	**46633**
Total emissions CO2 due flare at flaring	**BE,f**	**tCO2**	**155856**	**219752**	**213306**	**254170**	**366231**

Table E 4.2. Emissions due electricity generation at UPS Ural at period 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
Power generation at GTPP at Salym field	**EG_{GT}**	MWh	224291	337125	340617,9	396484,2	480309
Electricity consumption at GTPP auxiliaries	**$EC_{GT\ aux}$**	MWh	13288,2	5214,09	4380	27124,4	7,906
Emission factor for UPS Ural	**$EF_{CO2,ELEC}$**	tCO2/ MWh	0,6334	0,6334	0,6334	0,6334	0,6334
Total emissions due power generation at UPS Ural	**BE el**	tCO2	**133649**	**210232**	**212973**	**233952**	**299220**

Table E 4.3. Emissions under baseline at period 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
Emissions CO2 due flare at flaring	**BE,f**	tCO2	155856	219752	213306	254170	366231
Emissions CO2 due power generation at UPS Ural	**BE el**	tCO2	133649	210232	212973	233952	299220
Total emissions CO2 under baseline	**BE**	тCO2	**289505**	**429984**	**426279**	**488122**	**665451**

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

Emission reductions resulting from implementation of the project are calculated by the formula 10) in section D

	2008	2009	2010	2011	2012
tCO_2	142 759	223 078	225 442	248 810	335 486
Total (2008-2012)	**1175575**				

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

Years	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2008	146 746		289 505	**142759**
2009	206 906		429 984	**223078**
2010	200 837		426 279	**225442**
2011	239 312		488 122	**248810**
2012	329 965		665 451	**335486**
Total (tonnes of CO2 equivalent)	**1 123 766**		**2 299 341**	**1 175 575**

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 project envisages utilization of previously flared APG in a new 60 MW GTPP.

The design documentation for GTPP includes the report "Environmental Impact Assessment", developed in compliance with the environmental regulation of the Russian Federation, requirements of normative and methodical documents, instructions, standards, GOSTs related to environmental protection during construction and operation of facilities.

Provided all environmental protection measures included in the design, the impact of construction and operation of the project on surface and underground waters, flora and fauna will be minimized. The cost of environmental actions under the project amount to around 4.06 million RUR in process of the 4^{th} quarter of 2006.

At the same time, implementation of the project will result in significant mitigation of environmental impact in the area of the oil field due to reduction of APG flaring up to 80 million m^3 per year.

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:

As negative environmental impacts are not considered significant, this section is not needed.

SECTION G. Stakeholders' comments

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

The legislation of Khanty-Mansiysk Autonomous Area within the Russian Federation does not contain any requirement to hold public hearings for any industrial infrastructure projects. Nevertheless, the industrial projects undergo extensive review by public expert organizations, authorized by the Government to perform such reviews. These reviews are mandatory and the results of such reviews are summarized in the Protocol of Joint Expertise (copy provided). This Joint expertise includes the experts from environmental protection agencies (including water bodies, fishery, forest protection authorities, etc), sanitation control authorities, social-economic audit, industrial safety audit, fire prevention control expertise, etc. These agencies provide their opinion and comments in the text of the Protocol, which, per se, is a reflection of position of local authorities and controlling agencies towards the project.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

Calculation of emission factor for UPS Ural

Emission factor for UPS Ural is determined in according with own approach which consists of several steps:

Step 1. Determined of energy system board:
UPS Ural isn't closed energy system, as evidence by data on the flow of electricity from other power systems of Russia.

Table 1. Import of electricity in the UPS Ural from energy systems of Russian and near abroad, % of total electricity generation. [20]

Energy system / year	2005	2006	2007	2008	2009	Average for 2005-2009
UPS Center	0,1%	0,0%	0,3%	0,2%	0,1%	0,1%
UPS Middle Volga	3,9%	2,8%	3,9%	3,2%	3,7%	3,5%
Kazakhstan	0,0%	0,5%	0,0%	0,0%	0,0%	0,1%

The boundaries of project energy system includes electricity import from energy systems with the share more than 1% of total generation of UPS Ural. In accordance with data that provided in Table 1. UPS Middle Volga is only energy system with the share of import more than 1% from total generation.

Step 2. Description of methodology for calculation of emission factor EF_{grid} for UPS Ural:

Emission factor for UPS Ural is calculated for the project leading to the release of electrical power from UPS Ural. Under the rules of the electricity market and in accordance with Regulations operational dispatch control mode electric power facilities management UPS of Russia "(item 6.5), the system operator when a more efficient capacity appears or decreasing of electricity consumption carry out redistributes the load among thermal power plants of UPS Ural, reducing their load in condensing mode rated price proposal. Thus, the most expensive, inefficient capacities are unloaded. Under the principle of conservatism the calculation includes all power stations of UPS "Ural", generating electricity in condensing cycle, including high-efficiency GRES, not only thermal power plants of UPS "Ural", working in condensing mode. Also the import of electricity from UPS "Middle Volga", which value is 3.5% of the total electricity generation UPS "Ural" is took into account.

$EF_{grid\ Ural}$ – emission factor for UPS Ural (t CO_2/MWh)

$$EF_{grid\ Ural} = [EF_{Ural} \times (1-I_{el})] + [EF_{grid\ Volga} \times I_{el}] \quad \text{(Formula 1)}$$

Where:
EF_{Ural} - emission factor for the condensing power generation form UPS Ural, tCO2/MWh
$EF_{grid\ Volga}$ - emission factor for UPS Middle Volga, tCO2/MWh

[20] См. расчет excel

I_{el} –middle share of import electricity energy from UPS Middle Volga, %

EF_{Ural} is calculated as average weighed emission factor of CO_2 per unit of electricity generated from all electrical station of UPS Ural, that generate electricity in condensing cycle.
Data of specific fuel consumption at UPS Ural, volume of electricity output in condensing cycle and structure of fuel for the period 2004-2008 are used for calculation. These data are taken from official reports of power plants, that were directing until 2008 to the Engineering Center of RAO UES - ORGRES. Data for calculation were presented by LLC "NPK ORGRES."

EF_{Ural} is calculated by the formula:

$$EF_{Ural,} = \frac{\sum SFC_{y,m} \text{ x } EF_{CO2,y}}{\sum_m EO_{m,y}} \qquad \text{(Formula 2)}$$

where :

SFC –specific fuel consumption for electricity output in condensing cycle (t.e.f/MWh)
EF_{CO2} – average weighed emission factor for UPS Ural in accordance with structure of fuel (tCO2/t.e.f)
EO –electricity output in condensing cycle (MW)
y – year
m –electricity station of UPS Ural

$$EF_{CO2,y,} = \frac{\sum w_{g,m,y} \text{ x } EF_g + w_{l,m,y} \text{ x } EF_l + w_{c,m,y} \text{ x } EF_c}{\sum_m EO_{m,y}} \qquad \text{(Formula 3)}$$

$w_{g,m,y}$ - share of combusted gas fuel at station m at year y, %
$w_{l,m,y}$ - share of combustion liquid fuel at station m at year y, %
$w_{c,m,y}$ - % share of combustion solid fuel at station m at year y, %
EF_g –emission factor of gas fuel (tCO2/t.e.f)
EF_l - emission factor of liquid fuel (tCO2/t.e.f)
EF_c - emission factor of solid fuel (tCO2/t.e.f)

Calculation of $EF_{g,l,c}$:

	Gas fuel	liquid fuel	Solid fuel
$EF_{CO2\ IPCC}$ (tCO_2/TJ)	56,1	77,4	94,6
NCV t.e.f (TJ/t.e.f)	0,02931		
EF (t CO_2/t.e.f)	1,64	2,27	2,77

Step 3. Calculation of $EF_{grid\ for}$ UPS Ural:

	2004	2005	2006	2007	2008

SFC - average specific fuel consumption for electricity output in condensing cycle, y.e.f/MWh	0,340	0,341	0,341	0,344	0,343
EF_{CO2}- Average emission factor (in accordance with structure of fuel) tCO2/t.e.f	1,85	1,84	1,87	1,85	1,87
EF_{grid} (t CO_2/MWh)	0,629	0,629	0,637	0,637	0,641
Electricity output in condensing cycle	145072784	153209994	164447838	157228276	176034475
EF_{Ural} average weighed emission factor for electricity station of UPS Ural (tCO2/MWh)	0,635				
I_{el} –average share of import electricity form UPS Middle Volga,%	3,5%				
$EF_{grid\ Volga}$- emission factor for UPS Middle Volga (tCO2/MWh)	0,591*				
$EF_{grid\ Ural}$ (t CO_2/MWh)	**0,6334**				

*The study "Development of grid GHG emission factors for power systems of Russia" commissioned by "Carbon Trade and Finance" in 2008. This work is passed the verification procedure by an independent company CJSC "Bureau Veritas Certification."

Emission Factor is determined once and determined for the credit period.
Detailed calculation is presented in excel file "EFgrid UPS Urals."

The key information and data used to establish the baseline:

Data/Parameter	Volume of APG (DSG) delivered to GTPP West-Salym field				
Data unit	Ths.m3 (under normal conditions)				
Description	The main source of baseline emissions. This APG (DSG[21]) would be burned at the flare under the baseline.				
Time of determination/monitoring	Monthly				
Source of data (to be) used	Technical report				
Value of data applied (for ex-ante calculations/determinations)	**2008**	**2009**	**2010**	**2011**	**2012**
	57207	80660	78294	93293	171900
Justification of the choice of data or description of measurement	Measuring the amount of APG held by regularly calibrated measurement devices.				

[21] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

methods and procedures (to be) applied	The volume of DSG delivery at GTPP in 2012 is less than or equal to the volume of delivery of APG at GTP.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	

Data/Parameter	Volume of APG delivered to GPP
Data unit	Ths.m3 (under normal conditions)
Description	The main source of baseline emissions. This APG would be processed at GTP under the baseline.
Time of determination/monitoring	Monthly
Source of data (to be) used	Technical report
Value of data applied (for ex-ante calculations/determinations)	**2012**: 288 530
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measuring the amount of APG held by regularly calibrated measurement devices.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	

Data/Parameter	Composition of the APG on OTP West-Salym.	
Data unit	% (under normal conditions)	
Description	Necessary for calculating emissions when APG is flared at OTP	
Time of determination/monitoring	Monthly	
Source of data (to be) used	The chemical-analytical laboratory, a gas chromatograph.	
Value of data applied (for ex-ante calculations/determinations)	CO2	1,510%
	CH4	81,770%
	C2H6	2,670%
	C3H8	6,140%
	C4H10	1,510%
	C4H10	2,960%
	C5H12	0,450%
	C5H12	0,730%
	C6H14	0,950%
	C7H16	0,276%
	C8H18	0,001%
	H2S	0,000%
	N2	1,000%

	O2 0,000%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is measured by certified chemical-analytical laboratory. The Laboratory regularly passes certification.
QC/QA procedures (to be) applied	Chemical and Analytical Laboratory provides measurements of the component composition of the oil and gas, and oil and gas after the separation process, the measurement of air in the area of oil and around the fuel gas used in GTPP and other necessary measurements. The laboratory is part of the Production Division report to the Manager SAP and UPN, the chief chemist of Metrological Department and Production Department SPD NV The laboratory is certified in accordance with Russian legislation and the requirements of relevant standards.
Any comment	-

Data/Parameter	Composition of the DSG on GPP
Data unit	% (under normal conditions)
Description	Necessary for calculating emissions when DSG is combustion at GTPP
Time of determination/monitoring	Monthly
Source of data (to be) used	The chemical-analytical laboratory, a gas chromatograph.
Value of data applied (for ex-ante calculations/determinations)	CH4 96,838% C2H6 3,162%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is measured by certified chemical-analytical laboratory. The Laboratory regularly passes certification.
QC/QA procedures (to be) applied	Chemical and Analytical Laboratory provides measurements of the component composition of the oil and gas, and oil and gas after the separation process, the measurement of air in the area of oil and around the fuel gas used in GTPP and other necessary measurements. The laboratory is part of the Production Division report to the Manager SAP and UPN, the chief chemist of Metrological Department and Production Department SPD NV The laboratory is certified in accordance with Russian legislation and the requirements of relevant standards.
Any comment	-

Data/Parameter	Electricity generation by GTPP
Data unit	MWh
Description	Volume of electricity generated at the energy center under the project
Time of determination/monitoring	Constantly
Source of data (to be) used	Technical reports

Value of data applied (for ex-ante calculations/determinations)	2008: 224291; 2009: 337125; 2010: 340617,9; 2011: 396484,2; 2012: 480309
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measurements are performed with regularly calibrated metering instruments.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	-

Data/Parameter	Consumption of electricity for auxiliaries of the project power plant
Data unit	MWh
Description	Volume of electricity consumption for auxiliaries of the project power plant
Time of determination/monitoring	Annual
Source of data (to be) used	Form 6-TP
Value of data applied (for ex-ante calculations/determinations)	2008: 13288,2; 2009: 5214,09; 2010: 4380; 2011: 27124,4; 2012: 7,906
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measurements are performed with regularly calibrated metering instruments.
QC/QA procedures (to be) applied	Calibration of measuring devices is carried out by Corporation «IMS» Ltd. Gospoverka Gos. Standard, the city of Tyumen, as well as FGU *«Tyumen center* for standardization, metrology and certification».
Any comment	-

Data and parameters that are not monitored throughout the crediting period, but are determined only once:

Data/Parameter	ρ_{CH4}
Data unit	kg/m^3
Description	Density of methane at standard conditions
Time of determination/monitoring	Determined once during the preparation of project design document
Source of data (to be) used	Thermal calculation of boilers (Normative method), NPO CKTI, St. Petersburg, 1998
Value of data applied (for ex-ante calculations/determinations)	0.668
Justification of the choice of data or description of measurement methods and procedures (to be) applied	-The value is accepted by scientific society.
QC/QA procedures (to be) applied	Determined on the basis of the reference data
Any comment	

Data/Parameter	ρ_{CO2}
Data unit	Kg/m^3
Description	Density of CO_2 under normal conditions
Time of determination/monitoring	Once, during determination
Source of data (to be) used	State standard GOCT 8050-85 «Gaseous and liquid carbon dioxide» http://www.docload.ru/Basesdoc/10/10469/index.htm
Value of data applied (for ex-ante calculations/determinations)	1,839
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Officially published data
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	Efficiency of flaring of APG on the OTP West-Salym.
Data unit	%
Description	Efficiency of flaring of AGP (DSG[22]) is needed for the calculation of emissions from flaring of APG (DSG) in the OTP
Time of determination/monitoring	Determined once
Source of data (to be) used	2006 IPCC Guidelines, Volume 2, Energy, Chapter 4, Section 4.2 "Fugitive emissions systems for oil and natural gas", the formula 4.2.4, str.4.45
Value of data applied (for ex-ante calculations/determinations)	98
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Determined by IPCC.
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	Global Warming Potential of Methane (GWP CH_4)
Data unit	tCO_2e/tCH_4.
Description	GWP CH_4 is necessary to calculate the CH_4 emission factor due to APG (DSG[9]) flaring
Time of determination/monitoring	Once, during determination
Source of data (to be) used	Decision 2/CP.3 http://unfccc.int/resource/docs/cop3/07a01.pdf#page=31 Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22. http://unfccc.int/ghg_data/items/3825.php
Value of data applied (for ex-ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Determined by IPCC.
QC/QA procedures (to be) applied	-
Any comment	

Data/Parameter	**Nc**

[22] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

Data unit	unit
Description	Quantity of carbon moles in a mole of a component of APG (DSG[23])
Time of determination/monitoring	constant
Source of data (to be) used	Chemical formulae
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO2: 1 methane, CH4: 1 ethane, C2H6: 2 propane, C3H8: 3 i-butane, C4H10: 4 n-butane, C4H10: 4 i-pentane, C5H12: 5 c-pentane, C5H12: 5 n-pentane, C5H12: 5 hexane, C6H14: 6 geptane, C7H16: 7 octane, C8H18: 8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Reference data
QC/QA procedures (to be) applied	
Any comment	-

Data/Parameter	Grid emission factor
Data unit	tCO2/MWh
Description	Electricity grid emission factor
Time of determination/monitoring	Constant
Source of data (to be) used	Calculation of emission factor for UPS Ural, Annex 2
Value of data applied (for exante calculations/determinations)	**0,6334** for period 2008-2012
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Needed for emissions calculation from Electricity generation from UPS Ural

[23] In 2012, at the power plant will be burning DSG coming from the GPP Salym, respectively, DSG will be flared at the flaring.

QC/QA procedures (to be) applied	Reference data
Any comment	-

Annex 3

Monitoring plane

(see section D.)