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

CONTENTS

Annexes

SECTION A. General description of the project

A.1. Title of the project:

>>

Gathering of associated petroleum gas at Khokhryakovskoye field

Sectoral scope:

10. Fugitive emissions from fuels (solids, oil and gas).

Version: 03
Date: 31.03.2012

A.2. Description of the project:

>>

Khohryakovskaya group of fields is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous Okrug (Area) and includes: Khokhryakovskoye, Permyakovskoye, Koshilskoye and Kolik-Yoganskoye fields[1].
At the present time fields are being developed and exploited by JSC « Nizhnevartovskoye Oil and Gas Producing Enterprise » (further NNP), a division of TNK-BP, situated in Moscow.

The situation before the project
During the oil preparation at oil central collection point (CCP) of Khokhryakovskoye field the associated petroleum gas (APG) is released from crude oil, transported from mentioned fields of Khokhryakovskaya group. Before the project realization APG had been burnt in flares of Khokhryakovskoye CCP, as the Company had no economic incentive to efficiently utilize it.

Project purpose
The project aims at the useful utilization of associated petroleum gas (APG), which otherwise would have been burnt at CCP flares of Khokhryakovskoye field and, therefore, at reducing greenhouse gas emissions. The NNP 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
With a significant APG resource, company NNP takes action to increase its useful utilization level. To this end project provides construction of a compressor station (CS). CS is geographically located at Khokhryakovskoye field, but its projected capacity is designed for the transportation of gas from the whole Kokhryakovskaya group of fields. During the project implementation the compressor equipment

---

[1] A brief description of these fields, including the date of adoption and commissioning, orientation and distance from Nizhnevartovsk:

Khokhryakovskoye field – the field is opened in 1972 and put into development in 1985. All reservoirs are combined into one object of development. In administrative terms the field is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous district of Tyumenskaya area 165 km to the north-east from city of Nizhnevartovsk.

Permyakovskoye field – the fied is opened in 1972 and put into development in 1985. All reservoirs are combined into one object of development. In administrative terms the field is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous district of Tyumenskaya area 205 km to the north-east from city of Nizhnevartovsk.

Koshilskoye field – the field is opened in 1987 and put into development in 1992. All reservoirs are combined into one object of development. In administrative terms the field is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous district of Tyumenskaya area 210 km to the north-east from city of Nizhnevartovsk.

Kolik-Yoganskoye field is opened in 1971 put into development in 1997. All reservoirs are combined into one object of development. In administrative terms the field is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous district of Tyumenskaya area 180 km to the north-east from city of Nizhnevartovsk.

from the out-of-use gas lift compressor station CS-3 at Samotlor field was dismantled and installed at Khohryakovskoye field; and a 3 km gas pipeline with diameter of 325 mm to the main gas pipeline of AK «SIBUR» was constructed.

This new gas pipeline and CS provide the transportation of APG under high pressure to gas processing plants (GPPs): Beloozerniy and Nizhnevartovskiy, which are located outside the project boundary. At GPPs APG is processed with the yield of a dry gas and gas liquids (GLs). Further on, at GPPs output the dry gas is supplied under high pressure to the main gas pipeline JSC «Gazprom» «Parabel-Kuzbass» for delivery to consumers.

Thus, collecting, compressing and supplying APG to the gas pipeline will prevent APG flaring and allow, thus, to reduce greenhouse gas emissions, including CO_2 (carbon dioxide) and CH_4 (methane).

The gas pipeline constructed under the project and transporting APG to the infield pipeline network of «Sibur» is equipped with cranes and switching nodes of gas flows. Electricity for pipeline control valves is not consumed. Compressors at CS are activated by electric drives, which use electricity from the external grid. Compressors provide required pressure for APG transportation through gas pipelines up to GPPs.

Project history:
01 February, 2004 – Consideration of economic viability of various options of APG utilization including local power generation, injection and CS construction. The NPV of all options were negative.
16 February, 2004 - NNP Company made a decision to use JI mechanism of Kyoto Protocol for APG utilization from Khokhryakovskoye oil field through gathering and transportation of APG to GPPs.
June, 2005 – Construction works started
23.10.2006 - Cost estimate documentation for the project was approved.
On 31.10.2007 the project became operational.

Baseline scenario
Under the baseline scenario utilized under the project APG at the CPPs of Kokhryakovskoye 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
As a result of the project activity the APG that otherwise would be flared will be efficiently utilized: more than 1 bln. m3 of APG will be utilized in 2008-2012. That will result in a considerable amount of GHG emission reductions. Estimated GHG emission reductions are more than **3 105 001 tons of CO2 equivalent** during this period.

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)	"NNP" Joint Stock Company	No
Party B	-	-

Joint Stock Company "NNP":

JSC "Nizhnevartovskoe neftegazodobivayushee predpriyatie' (NNP) is developing ten fields, including:

Permyakovskoe, Khokhryakovskoe, Koshilskoe, Kolik-Yoganskoe, Ershovoe, Sorominskoe, Tul-Yoganskoe, Sabunskoe, Severo-Tarkhovskoe and Enitorskoe fields. Besides, Company exploring and developing three blocks, Malo-Siktorskoe, Vostochno-Kolikyoganskoe and Ermakovskoe fields under a service contract with JSC "Tumenneftegaz". At present the Company owns three consolidated oil fields, a maintenance base and a Center for scientific-engineering and manufacturing operations.

The Company is a successor of Nizhnevartovskneft, a managing unit of oil-producing enterprise that was founded in 1964 simultaneously with the opening of Samotolor field, a biggest oil field in USSR .

A.4. Technical description of the project:

A.4.1. Location of the project:

>>

A.4.1.1. Host Party(ies):

>>

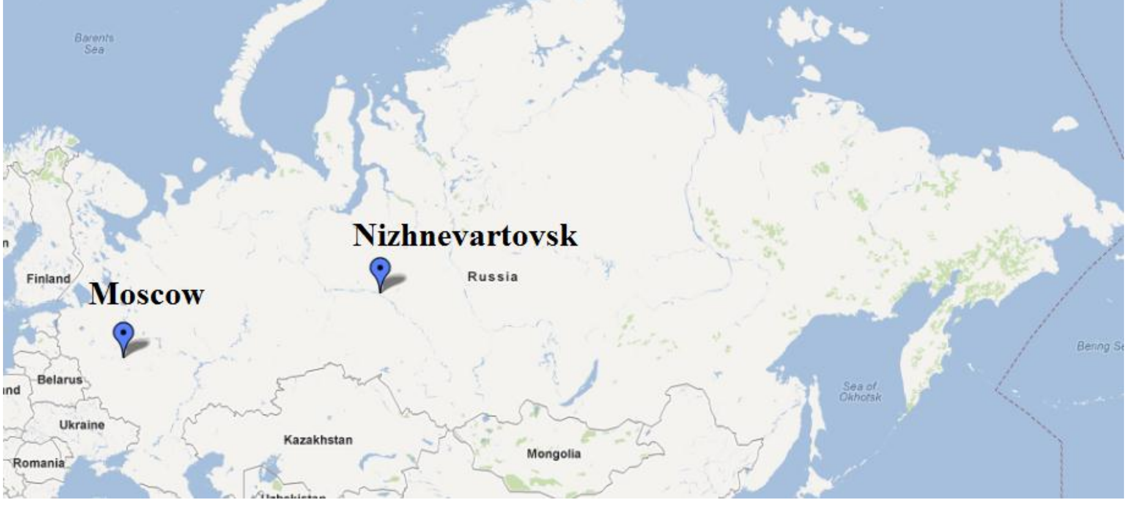
Russian Federation

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

>>

The project is being realized in Nizhnevartovskiy district, Khanty-Mansiyskiy Autonomous Okrug (KhMAO) Tyumen oblast, which is a subject of the Russian Federation.
Administrative center is the city of Khanty-Mansiysk. Major cities are Surgut, Nizhnevartovsk, Nefteyugansk. It borders Yamalo-Nenetskiy Autonomous Okrug, Krasnoyarskiy region, Tomskaya oblast, south of Tyumen oblast, Sverdlovskaya oblast and Komi Republic.
The population of KhMAO is 1 538 000 people.

Figure. A 4.1.2. Khanty-Mansiyskiy Autonomous Okrug on the map of Russian Federation



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

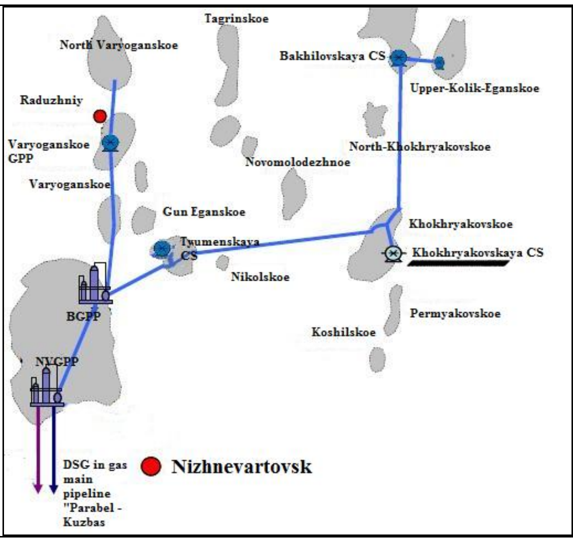
>>

Khokhryakovskoye field – the field is opened in 1972 and put into development in 1985. All reservoirs are combined into one object of development. In administrative terms the field is located in Nizhnevartovskiy region of Khanty-Mansiyskiy Autonomous district of Tyumenskaya oblast 165 km to the north-east from city of Nizhnevartovsk. 60°57′00″ N. 76°33′00″ E.

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



Project APG from the CCP outlet under separation pressure is directed for prior compression at a booster compressor station BCS and further transported to the main Khokhryakovskaya CS. From the exit of CS APG under high pressure is supplied to a new infield gas pipeline (total length of 3 km) for transport to the infield gas collection network of "Sibur".

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

>>

Process description

During the oil preparation at the central collection point (CCP) of Khokhryakovskoye field the high-pressure associated petroleum gas (APG) with the pressure of 3.2 atm is released from crude oil transported from the deposits of Kokhryakovskaya group. This gas from the first separation stage is directed to the main CS at once, while APG from the second stage of separation with the pressure of 0.5 atm is fed to the booster compressor station (DCS) to increase pressure to be transported the main CS Khokhryakovskaya. Being compressed at the pressure of 30 atm, the total APG flow is directed from CS into the built 3 km gas pipeline.

CS is geographically located at Khokhryakovskoye field, but its projected capacity is designed for the transportation of gas from the whole Kokhryakovskaya group of fields. During the project implementation the compressor equipment from the out-of-use gas lift compressor station CS-3 at Samotlor field was dismantled and installed at Khohryakovskoye field; and a 3 km gas pipeline with diameter of 325 mm to the main gas pipeline of AK «SIBUR» was constructed.

This new gas pipeline and CS provide the transportation of APG under high pressure to gas processing plants (GPPs): Beloozerniy and Nizhnevartovskiy, which are located outside the project boundary.

At GPPs APG is processed with the yield of a dry gas and gas liquids (GLs). Further on, at GPPs output the dry gas is supplied under high pressure to the main gas pipeline JSC «Gazprom» «Parabel-Kuzbass» for delivery to consumers. GLs are delivered for further processing at the Tobol Oil Chemical Works of SIBUR.

Thus, collecting, compressing and supplying APG to the gas pipeline will prevent APG flaring and allow, thus, to reduce greenhouse gas emissions, including CO_2 (carbon dioxide) and CH_4 (methane).

The gas pipeline constructed under the project and transporting APG to the infield pipeline network of «Sibur» is equipped with cranes and switching nodes of gas flows. Electricity for pipeline control valves is not consumed. Compressors at CS are activated by electric drives, which use electricity from the external grid. Compressors provide required pressure for APG transportation through gas pipelines up to GPPs.

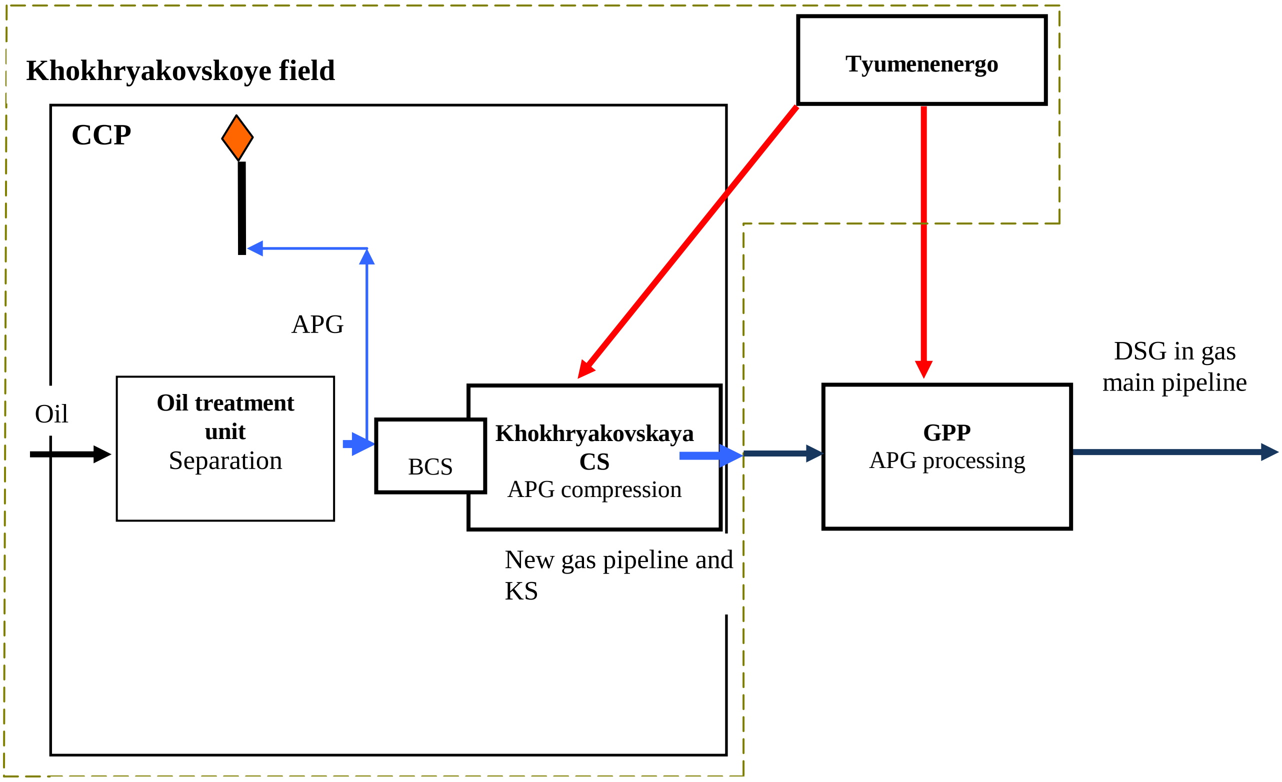
Technical personnel have been trained to operate compressor units and gas pipeline installations in a process of commissioning works.

01 February, 2004 – Consideration of economic viability of various options of APG utilization including local power generation, injection and CS construction. The NPV of all options were negative.
16 February, 2004 - NNP Company made a decision to use JI mechanism of Kyoto Protocol for APG utilization from Khokhryakovskoye oil field through gathering and transportation of APG to GPPs.
June, 2005 – Construction works started
23.10.2006 - Cost estimate documentation for the project was approved.
On 31.10.2007 the project became operational.

Table A 4.2. Technical specifications of the project activity

№	Item	Value
1.	Initial pressure of high-pressure APG at the output of Khokhryakovskoye field CCP, Fact	3,2 bar
2.	Outlet pressure at Kokhryakovskaya CS , Fact	30 bar
3.	Length of a new gas pipeline	3 km
4.	Pipeline diameter:	325 mm
5.	BCS capacity	3*400 kW (one is spare)
6.	CS capacity:	2*10000 kW (one is spare)

Figure A.4.2. APG utilization scheme



CCP – central collection point	CS – compressor station
APG – associated petroleum gas	GPP – gas processing plant
BCS – booster compressor station	DSG – dry stripped gas

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:

>>

Under the project activity the significant volume of extracted APG that was previously flared at Khokhryakovskoye CCP is efficiently used through compression and injection into the gas pipeline and further transportation to the GPPs for the treatment with the yield of the dry stripped gas and for compressing it into the main gas pipeline. This will prevent the CO2 and CH4 emissions, which would have been under the baseline scenario in the case of flaring this APG volume on the flare. The total emission reduction of GHG gases in 2008-2012 makes 3 105 001 tonnes of CO2 equivalent. For APG transportation a new 20 MW CS and a 3 km gas pipeline with diameter of 325 mm to the main gas pipeline of AK «SIBUR» was constructed. The capacity of CS allows to transport for utilization averagely 220 mln m3 of APG a year. Totally 1098 mln m3 is expected to be utilized in 2008-2012.

In the absence of the project activity it would be impossible to reach the mentioned reductions as the national sectoral policies and economic situation in the oil&gas industry do not ensure real mechanisms for efficient APG utilization:

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 flared. At the same time, the waste of the natural resource has to be compensated with environmental payments in the various budgets and with provision of polluting substances in surface layer of air below the maximum allowable concentration level. Even a 95% APG efficient utilization requirement introduced in some license agreements could not prevent its flaring. The oil companies are extremely reluctant to implement construction of APG collecting and transport infrastructure as due to huge financial expenditures, low APG prices, uncertainty and non-transparency with access to the gas transmission system such a kind of projects represent the considerable investment risk.

This argumentation provided in B section in the greater detail evidences that reduction of APG flaring and, hence, of GHG emissions is only possible under the proposed project activity.

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	**700 122**
2009	**612 252**
2010	**570 874**
2011	**535 760**
2012	**685 993**
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	**3 105 001**
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	**621 000**

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:

>>

The chosen baseline will be described and justified on the basis of the "Guidelines for users of the joint implementation project design document form" (Version 04) and in accordance with the "Guidance on criteria for baseline setting and monitoring" (Version 03) and Appendix B to Decision 9/CMP.1 using the following step-wise approach:

Step. 1. Indication and description of the approach chosen regarding the baseline setting.

Step. 2. Application of the approach chosen.

The following is a detailed presentation of the two steps:

Step. 1. Indication and Description of the Approach Chosen Regarding the Baseline Setting

The baseline is determined through considerations of various alternative scenarios with regard to the proposed project activity. As criteria for choosing the baseline scenario the key factors will be determined. All alternatives will be considered in terms of influence on them of these factors. The alternative scenario, which is the least negatively influenced by the key factors, will be chosen as the baseline.

Therefore, the following stages of determining the baseline scenarios are envisaged:

a) *Description of alternative scenarios.*
b) *Description of the key factors.*
c) *Choosing the most plausible alternative scenario.*

Step. 2. Application of the Scenario Chosen

As alternatives the following two scenarios are considered:
Alternative scenario 1. Continuation of common practice for utilization of APG, i.e. the combustion of the extracted APG in the flare of Khokhryakovskoye CCP

Alternative scenario 2. The project itself (without being registered as a JI activity) that is efficient utilization of APG, i.e. construction of the CS and new gas pipeline for compression and further gas supply to gas main pipeline.

None of the alternatives contradict the current legislation and may be discussed in the further analysis.

Analysis does not consider other options related to APG utilization such as on-site power generation, processing of APG at the Khohryakovskoye oilfield and the injection of APG for reservoir pressure maintenance. The realization of these options is impossible by the following reasons:
1. APG use for power generation at on-site gas turbine&piston power plants. The power transmission lines belong to Tumenenergo, a regional monopolistic power transmission and distribution company. This circumstance makes it impossible for NNP Company to deliver the surplus electricity to third-party consumers to repay investments . Therefore this option is economically unviable.

2. Processing of APG at the Khohryakovskoye oilfield. Project economics is negative due to huge capital expenditures on gas processing facilities and problems with the logistics as a nearest railway station is located in 200 km.
3. Injection of APG for reservoir pressure maintenance. Conditions of well stock and geology of the oilfield (poor permeability of reservoirs) do not allow injecting APG in reservoirs.

Besides all these options along with construction of CS at Khokhryakov oilfield were considered in Financial Memorandum dd. 01 February, 2004. The NPV of all options was negative. The least negative value had CS construction option.
Therefore these options rejected from further analysis.

a) *Description of alternative scenarios.*

Alternative scenario 1. Continuation of common practice for utilization of APG, i.e. the combustion of the extracted APG in the flare at CCP of the Khokhryakovskoye oilfield.

NNP Company is producing oil and gas at Khokhryakovskoye oilfield. In process of oil treatment at the CCP the associated petroleum gases are extracted from the crude oil, which is completely burnt at the CCP flare, which would lead to significant GHG into the atmosphere. The APG volumes that would be flared under this scenario are presented in the following table:

Table B.1.1. APG to be flared at CCP of Khokhryakovskoye oilfield in 2008-2012

Item	Unit	2008	2009	2010	2011	2012
CCP	ths. m^3	243659	219041	198284	190789	246686

Under environmental legislation an enterprise is required to calculate the quantities of polluting emissions including methane, carbon oxide, nitrogen oxides etc. and to make quarterly environmental payments according to norms set by Russian Government's Decree № 344 dd. 12/06/2003 and revised by Decree № 410 dd. 01/07/2005. The latest revision was made on 08.01.2009 with accepting Resolution N 7 that provides for increased penalties for APG flaring below the target indicator of 95% utilization rate. According to the Resolution the enhanced coefficient (4.5) shall be applied to the fee for the methane emissions from combustion of the APG volume, which is equal to difference between total APG and target indicator (considering 95% utilization rate) Remainder 5% shall be paid with normal fee.

Table B 1.2. Environmental payments for APG flaring at CCP of Khokhryakovskoye oilfield

Item	Unit	2008	2009	2010
Environmental Payments	ths rubles	2 982,10	2 651,67	2 374,01

Under scenario 1 approximately 2.7 mln. m3 of methane a year would be emitted in the atmosphere from 2012. In this case environmental payments would be about 2 million roubles a year or 19 million roubles for the period 2012-2020.
In below table the estimation of environmental payments to be made by NNP Company for APG flaring from 2012 on according Resolution # 7 is made.

Table B 1.3 Calculations of environmental payments for the APG flaring at CPS of Khokhryakovskoye oilfield.

	CH4 volume into the atmosphere as the result of the incomplete burning	Coefficient (governmental regulation № 7 8 January 2009)	Payment rate for above-limit CH4 emissions (governmental regulation №344 12 June 2009) [2]	Share of CH4 subject to application of coefficient and payment rate as per columns 3 and 4	Amount of environmental payments
1	*2*	*3*	*4*	*5*	*6*
	ths m3		*ruble/tonnes*	*%*	*mln rub/ year*
2012	3561	4,5	250	95	2,80
2013	3256				2,56
2014	2799				2,20
2015	2706				2,13
2016	2616				2,06
2017	2580				2,03
2018	2489				1,96
2019	2280				1,80
2020	2128				1,68
	24414				19,23

Alternative scenario 2. The project itself (without being registered as a JI activity) that is efficient utilization of APG, i.e. construction of CS and a new gas pipeline for compression and further gas supply to gas main pipeline.

Implementation of this Scenario prevents the CO2 and CH4 emissions, which would have been under the scenario 1 in the case of flaring this APG volume in the CCP flares. A newly-built gas pipeline and CS provide collecting and APG transportation from Khokhryakovskoye oilfield under high pressure for processing at GPPs, which are located outside the project boundary.

At GPPs (Nizhnevartovskiy, Beloozerniy) APG is processed with the yield of dry gas and gas liquids (GLs). Further dry gas is supplied under high pressure to the gas main Parabel-Kuzbass. GLs undergo through further deep processing with the subsequent delivery to consumers as target components.

Dry gas replaces fossil fuels consumption such as natural gas, fuel oil, petrol etc. Therefore, this project is resource-saving activities which will not lead to, but will avoid, the recovery and consumption of additional fossil fuel (conservatively of the natural gas as the least carbon-intensive fuel).

The balance of APG useful utilization at the Khokhryakovskaya CS is presented in the following table:

Table B 1.4 The balance of APG at Khokhryakovskaya CS

Item	2008	2009	2010	2011	2012
APG supplied to Khokhryakovskaya CS (and delivered to GPPs), ths. m3	243659	219041	198284	190789	246686

[2] http://government.consultant.ru/doc.asp?ID=17975&PSC=1&PT=1&Page=1

Yield of dry gas GPPs, %	86	86	86	86	86
Yield of dry gas from GPPs for further supply to the gas main pipeline, ths. m3	209547	188375	170524	164079	212150

To implement this alternative scenario it was required to invest 901 million rubles.

b) Description of the key factors

A baseline shall be established taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, legislation, the economic situation in the project sector etc. The following key factors that affect a baseline shall be taken into account, e.g.:

- Sectoral reform policies and legislation;
- Economic situation in oil&gas sector in terms of APG utilization;
- Availability of capital (including investment barrier);
- APG prices.

c) Analysis of the influence of the key factors on the alternatives

Further on the detailed consideration of each alternative taking into account the key factors is provided.

Sectoral reform policies and legislation

State sectoral policy in the field of APG utilization lacks clear balanced mechanisms allowing to implement, to monitor and to enforce APG efficient utilization requirements. Regulation of APG utilization issues is carried out by following normative –legal documents:

- Federal Law «On subsoils» # 2395 dd. 21.02. 1992.
- Resolution of Supreme Council of Russian Federation # 3314.1 dd. 15.06.1992 “On procedure of introduction into operation of Regulation on subsoil licensing procedure”.
- Law of Khanty Mansi autonomous okrug (KhMAO) # 15.03 dd. 18.04.1996“On subsoil use”.
- Resolution of the Government of Russian Federation dd. 12.06.2003 # 344 “On norms of payments for polluting emissions into the atmosphere by stationary and mobile sources, for discharges of polluting substances in surface and subsurface water objects and for disposal of production and consumption wastes”.
- Resolution of the Government of Russian Federation dd. 01.06.2005 # 410 “On introduction of deviations in the appendix 1” of Resolution dd. 12.06.2003 # 344 ”.
- Resolution of the Government of Russian Federation dd. 08.01.2009 # 7 “On measures on stimulation of polluting atmosphere air reduction by products of associated petroleum gas combustion at flare stacks”.

All these legislative documents do not enforce companies to minimize gas flaring. They define environmental payments for consumption of natural resources and the sanitary quality norm of atmosphere air expressed through maximum allowable concentration (MAC) of polluting substance in the ambient air. In fact, the real point of these documents is that if utilization is economically infeasible APG may be uselessly 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.

It should also be noted that in some regions (particularly in KhMAO) regional authorities supervising subsoil management include in license agreements to be signed with oil companies the condition of 95% APG utilization. Nevertheless this measure could not prevent flaring neither in KhMAO nor in YaNAO. It can be explained that the condition is not enforced, i.e. non-fulfillment of the condition can not be resulted in cancellation of the right of use of the oil field; otherwise the APG flaring level would be at 5%. Therefore this condition is inessential and cannot be a reason to motivate a company to start APG utilization project.

Thus, neither sectoral reforms nor legislation make the Company directly reduce APG flaring and do not motivate to utilize APG. The level of environmental payments for APG flaring the Company has to pay is incomparably low against investments in APG utilization. Even the increase of the level of those payments, which the Company will have to pay under the regulation # 7 dd. 08.01.2009 from 2012 till 2020, is lower by an order of magnitude than the sum of investment in this project. Appropriately, the key factor favors continuation of APG flaring under Scenario 1. On the contrary, implementation of Scenario 2 is not provided under the influence of this factor.

Economic situation in the oil&gas sector in terms of APG utilization

Efficient utilization of APG has always been a burden for oil companies in Russia because there have been many uncertainties and problems on this way that turned realization of this resource saving activity into the difficult-to-implement task.

First of all, many oil companies face with the premature fall of long-run recovery forecasts due to imperfection of reliable geological forecasting and of instrumental metering of resources to be recovered. That creates uncertainty with regard to how much oil and APG will be extracted and used in the near term.

Secondly, the facilities for the utilization of the APG are usually not integrated in the oil field production schemes. As a rule, there is no developed APG treatment and transportation infrastructure in areas of hydrocarbon recovery. APG utilization is carried out relatively well on sites with infrastructure that was built in the Soviet era of 70s-80s of the last century and was financed from the state budget. Therefore, APG utilization projects may imply a construction of the new infrastructure for collection, treatment, and transport of the APG and require high investment costs that may bring inadequate returns for the oil companies. This is due to low APG prices for remote oil fields with long distances to the gas processing facilities or consumption markets.

Thirdly, the oil companies also face structural barriers such as limited access to the existing gas processing and transmission infrastructure. The Russian market of gas transportation and processing is highly monopolized by JSC “Gazprom” and JSC “Sibur”. When organizing access to trunk gas pipeline system the natural gas is getting a priority over APG. This is due to the fact that the gas market is formed under the influence of the natural gas as it requires lesser (comparatively with APG) recovery and connection-to-pipeline costs. Besides, low marketability of APG is explained by the quality of its treatment as the stripped gas does not always meet the gas pipeline acceptance standards. This situation hampers the equal access for the oil companies coming in with APG to trunk gas pipeline system and gas processing plants. Neither Gazprom nor Sibur are economically accountable to the State and the oil companies for groundless refusal in accepting APG for processing and transmission or for breach of obligation for reporting APG at recovery, processing and transmission. This circumstance do not favors the fulfillment of APG utilization requirement as stipulated in the license agreement.

The adverse conditions of APG utilization described above are also applicable to Scenario 2. The NNP Company had to build a new 3 km gas pipeline and CS investing considerable capital funds. Too low APG price which the Company has to sell it for cannot provide the profitability for this project as NPV is negative (see B2 section). The Company expects that ERUs sales could help improving project economics.

Therefore, this factor unfavorably effects realization of Scenario 2, i.e. on APG utilization project from the Khokhryakov fields group, making thus Scenario 1 be a most plausible alternative for the baseline.

Availability of capital (including investment barrier)

For Scenario 1 no investment capital is required. Nevertheless, APG flaring necessitates making environmental payments in amount approximately 2600 thousand rubles a year. The source of funding for these payments is included in the production cost of oil recovered under the routine activity of the Company.

Despite the Company raised the large financial resources in amount of 901 million rubles to construct the new gas pipeline and CS, the project represents a considerable financial risk due to the low economic efficiency (see Section B2 for details). In common typical investment practice the funds are available for a profitable commercial activity but not for the projects with negative NPV. Therefore the obvious investment barrier exists for Scenario 2.

APG prices

Price APG applied in investment analysis for this project is about 500 rubles / thousand. m3 in the first years, and almost 1,500 rubles / thousand. m3 in the next, which is equal to the price of natural gas, and that not all the same provides a return on investment (see section B2).

As the project's profitability depends on the APG price the Scenario 2 is highly vulnerable to the influence of this factor.

d) Choosing the most plausible alternative scenario.

To summarize considerations above the influence of the factors on each scenario is expressed through the factor analysis in the following table.

Table B.1.5. Factor analysis

№	Factor	Scenario 1	Scenario 2
1.	Sectoral reform policies and legislation	Favors to implementation	Does not provide implementation
2.	Economic situation in the oil&gas sector in terms of APG utilization	Makes this scenario the most plausible candidate for baseline	Unfavorably effects on its realization
3.	Availability of capital (including investment barrier)	No influence	Represents investment barrier for this scenario
4.	APG prices	No influence	Makes the project unprofitable due to low APG price

Based on the conducted analysis it is quite obvious that the key factors favor the implementation of Scenario 1 and affect negatively Scenario 2. Therefore, Scenario 1, that is *Continuation of common* *practice for utilization of APG, i.e. the combustion of the extracted APG in the flare at CCP of the Khokhryakovskoye oilfield* is the baseline scenario.

The key information and data used to establish the baseline:

Fixed values determined once at the stage of verification and are available throughout the entire period 2008-2012

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 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	**GWP CH_4 is necessary to calculate the CH_4 emission factor due to APG flaring**
QC/QA procedures (to be) applied	-
Any comment	

Data/Parameter	ρ_{CO2}
Data unit	Kg/m^3
Description	Density of CO_2 under standard conditions
Time of determination/monitoring	Once, during determination
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)	1.842
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CO_2 is needed to calculate the CO_2 emission factor due to APG flaring
QC/QA procedures (to be) applied	-
Any comment	-

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	-
QC/QA procedures (to be) applied	Determined on the basis of the reference data
Any comment	

Data/Parameter	**Nc**
Data unit	unit
Description	Quantity of carbon moles in a mole of a component of APG
Time of determination/monitoring	constant
Source of data (to be) used	Chemical formulae
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO_2: 1 methane, CH_4: 1 ethane, C_2H_6: 2 propane, C_3H_8: 3 i-butane, C_4H_{10}: 4 n-butane, C_4H_{10}: 4 i-pentane, C_5H_{12}: 5 c-pentane, C_5H_{12}: 5 n-pentane, C_5H_{12}: 5 hexane, C_6H_{14}: 6 geptane, C_7H_{16}: 7 octane, C_8H_{18}: 8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Quantity of carbon moles in a mole of a component of APG is needed to calculate the CO_2 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	ε
Data unit	Fractions
Description	Unburned carbon factor for soot combustion of APG in flare units
Time of determination/monitoring	Annual
Source of data (to be) used	"Guidelines for Calculation of Air Pollutant Emission from APG Flaring" developed by the Scientific Research Institute for

	Atmospheric Air Protection in Saint-Petersburg, 1998
Value of data applied (for ex ante calculations/determinations)	0.035 (3.5%)
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The value is prescribed by the calculation guidelines. If U_{flow}< 0.2 U_{sound}, then the soot discharges that demonstrating incomplete burning of APG. In this case, under-firing coefficient equal to 0,035.
QA/QC procedures (to be) applied	Based on reference data
Any comment	-

The parameters monitored directly

Data/Parameter	V_{APG_PJ}
Data unit	Ths.m3 (under standard conditions)
Description	The main source of baseline emissions. This APG would be burned at the flare under the baseline,.
Time of determination/monitoring	Monthly
Source of data (to be) used	Gas meter GM868
Value of data applied (for ex ante calculations/determinations)	see table below
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Data of 2008-2011 is actual, 2012 is planning.
QA/QC procedures (to be) applied	The main measuring instruments are calibrated and verified by "Tyumen Center for Standardization, Metrology and Certification"
Any comment	Using a sum of monthly volume APG as the annuals does not lead to a distortion of the result.

2008	**2009**	**2010**	**2011**	**2012**
243659	219041	198284	190789	246686

Data/Parameter	W_{CO2}, W_{CH4} W_{VOC}
Data unit	%
Description	Necessary for calculating emissions when APG is flared at CCP
Time of determination/monitoring	Monthly
Source of data (to be) used	Flow Gas Chromatograph
Value of data applied (for ex ante calculations/determinations)	see table below

	2008	**2009**	**2010**	**2011-2012**
CO2	1,551%	1,362%	1,348%	1,344%
CH4	63,448%	65,293%	59,001%	60,509%
C2H6	7,058%	8,602%	13,618%	13,705%

	C3H8	17,603%	15,404%	17,256%	16,051%
	C4H10	3,004%	2,662%	2,731%	2,524%
	C4H10	4,855%	4,389%	4,215%	4,070%
	C5H12	0,000%	0,000%	0,000%	0,000%
	C5H12	0,374%	0,369%	0,214%	0,232%
	C5H12	0,254%	0,274%	0,146%	0,166%
	C6H14	0,000%	0,097%	0,001%	0,001%
	C7H16	0,000%	0,000%	0,000%	0,000%
	C8H18	0,000%	0,000%	0,000%	0,000%
	C9H20	0,000%	0,000%	0,000%	0,000%
	C10H22	0,000%	0,000%	0,000%	0,000%
	C11H24	0,000%	0,000%	0,000%	0,000%
	H2S	0,000%	0,000%	0,000%	0,000%
	N2	1,885%	1,622%	1,466%	1,387%
	O2	1,551%	0,000%	0,000%	0,000%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The parameter values for 2008-2011 are based on actual data. The values for 2012 are based on average annual values of 2008-2011.				
QA/QC procedures (to be) applied	The instrument is calibrated and verified by "Tyumen Center for Standardization, Metrology and Certification"				
Any comment	Using the average of APG composition for the year does not lead to a distortion of the result.				

Baseline emissions due to APG flaring (in view of incomplete combustion) at CCP of Khokhryakovskoye oilfield

$$\mathbf{BE = V_{APG\_PJ}*(EF_{CO2,APG} + EF_{CH4,F})} \qquad (1)$$

BE – baseline emissions, tCO_2.
$\mathbf{V_{APG\_PJ}}$ **–** APG utilized under the project, i.e. transported to GPPs from CS, ths. m^3

$\mathbf{EF_{CO2,APG}}$ –annual emission factor CO_2 due to APG burning at Khokhryakovskoye oilfield CCP, calculated using monthly data of the APG composition (methane), tCO2/ths. m^3;
$\mathbf{EF_{CH4,\ F}}$ – annual emission factor CH4 due to APG burning at Khokhryakovskoye oilfield CCP, calculated using monthly data on the composition of APG (methane), tCO2e/ths. m^3;

$$\mathbf{EF_{CO2,APG} = (W_{CO2} + (Nc_{CH4}*W_{CH4} +} \sum jNc_{VOCj} *W_{VOC\ i}\mathbf{))*\rho_{CO2}*OXID} \qquad (2)$$

W_{CO2}, W_{CH4} W_{VOC} – average volume fraction of carbon, methane and volatile organic compounds (VOC) in APG at Khokhryakovskoye CCP, determined on the monthly values of the chemical composition of APG (methane) (source of information - the analysis protocol of the gas at the CS outlet).
Nc_{CH4}, $\sum jNc_{VOCj}$ – number of moles of carbon in a mole of methane and VOC respectively ($\sum jNc_{VOCj}$ where j specific component of VOC.)
ρCO2 – CO_2 density at 20°C equal to 1.842 kg/m3.
OXID - APG flaring efficiency is equal 0.965, if the soot combustion criterion is met, calculated as $1-\varepsilon$

ε – Unburned carbon factor for soot combustion of APG in flare units, 3,5%, if the soot combustion criterion is met.

Due to incomplete combustion (underburning) a part of APG flared emits in the atmosphere without being oxidized. NII Atmosphere methodic estimates the efficiency of underburning as 3.5%, which causes methane emissions to the atmosphere. Methane emission factor in terms of CO2 equivalent is determined as follows:

$$EF_{CH4,F,av} = W_{CH4\ av}*\rho_{CH4}*(1-OXID)*GWP_{CH4} \qquad (3)$$

$\mathbf{W_{CH4}}$– annual average volumetric fractions of methane in APG at CCP based on monthly data of methane composition in APG (information source – gas testing chromatograph readings).
$\boldsymbol{\rho_{CH4}}$ – the density of methane CH4 under standard conditions, equals to 0.668 kg/m3

OXID – APG flaring efficiency, equal to 0,965, if the soot combustion criterion is met

$\mathbf{GWP_{CH4}}$ – global warming potential for methane, equal to 21 tCO2/tCH4.

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. For this 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.

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 NNP with the involvement of the central office of JSC "TNK-BP Management".

For estimation the capital investments of 33 581 thousand dollars spent for construction of Khokhryakovskaya CS and of the new gas pipeline from CS to Sibur gas collection network is taken into account.

In order to assess capital expenditure were taken into account in the amount of 33 581thousand dollars to build a pipeline from the COP and the COP to the gas collection pipeline of Sibur. The project started in 2004 and completed in 2017, taking into account the evidence of costs and revenues in 2004 - 2011. and projected from 2012 to 2017. Part of the lifetime of the equipment (CS) was beyond the scope of the project (CS dismounting from another field, where there was a sometime). The discount rate adopted in the company of 12% and operated at the project start date. Price APG date of sale attached the relevant decisions of the planning and investment committees.

The results of evaluations are presented below.

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

NPV:	-16 838 thousand dollars
Payback period:	the project does not pay

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 NNP 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 volume and operational costs were assessed. The results of the analysis are presented in the table below.

The results of the analysis are presented in the table below.

Table B 2.1. Results of sensitivity analysis

1. Gas volume

(+10%) NPV = -15441,09 thousand dollars,

(-10%) NPV = -18235,55 thousand dollars,

2. The level of CAPEX

(+10%) NPV = -19171,66 thousand dollars,

(-10%) NPV = -14506 thousand dollars,

3. The level of OPEX

(+10%) NPV = -18556,38 thousand dollars,

(-10%) NPV = -15120,25 thousand dollars,

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

The level of APG flared has increased over a three-year period of 2006-2009 from 14,1 bln m3 in 2006 till 19,96 m3 in 2009 . Thereby, a share of APG flaring in 2006 was at 24,4% and by 2010 it rose up to 64,3%.

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 (see the list of these documents in the subsection B1) 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 feeding into trunk gas pipeline system) requires substantial material expenditures for establishing transport and treatment infrastructure. Therefore, in most cases such projects are not economically efficient for the companies having oil fields located remotely from gas transport system. Among the factors to negatively influence the APG utilization efficiency are:

- Substantially lower gas debits of oil wells as compared with the gas well debits;
- Considerably lower APG pressure; as a consequence the need for compression to supply to a considerable distance
- Presence of considerable amounts of hydrocarbon liquids in APG;
- Need for construction of branching field gas collecting pipelines due to substantial remoteness of the oil fields from gas transport system;
- Low APG sale price to cover expenditures due to implementation of utilization activities.

Besides, the structural aspect impedes efficient APG utilization. The existing trunk gas transmission system (GTS) is unable to provide APG transportation from locations of major APG recovery and delivery to consumers because of too busy schedule. Vast majority of the gas pumped through the trunk gas pipeline system makes the natural gas come from the senoman gas fields of Yamal-Nenets Autonomous Okrug (YaNAO) and, hence, the natural gas has a priority over APG when providing access to the GTS. The access to the GTS of independent APG producers is limited and is allowed if the spare capacity is available. Besides, it is extremely difficult to confirm the availability or the lack of the spare capacity, which is making the problem of access non-transparent and difficult-to-do issue. Another problem arisen hereof is the absence of long-term contracts for gas transportation signed with the private companies that making situation with APG utilization unpredictable.

Conclusion:

All the aspects considered demonstrate that APG utilization (particularly through pumping into GTS) 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 transport infrastructure as due to huge financial expenditures, low APG prices, uncertainty and non-transparency with access to GTS 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 №KhMN01133 for the development of Khokhryakovskoye oilfield.
- Protocol of TNK-BP Kyoto solutions.

Explanations on how GHG gases emission reductions are achieved

Baseline emissions
Under the baseline scenario extracted APG at Khokhryakovskoye oilfield CCP (and which is used 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 estimates of incompleteness of APG combustion at flare stacks, NII Atmosphere methodic determines the efficiency of underburning as 3.5%. 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 main part of extracted APG will be efficiently used through APG compression and transportation to GPPs for further supplying to the gas transmission system. Emissions that will occur in the outer grid during power generation to support the work of CS and BCS are taken into account as they constitute more than 1% of the project emissions. Within the project activities the physical leaks of methane will take place during APG compression at Khokhryakovskaya CS, which is also significant. Also, there will be physical leaks of methane during APG transportation over a new gas pipeline from CS to gas pipeline system Sibur.

Leakage

Leakage due to project implementation
However, there will be emissions outside the project boundary (leakage) that will occur in the outer grid during power generation to support the GPP work to process APG project volume. Also emissions will take place (physical methane losses) during processing operations at the GPPs themselves.

Leakage associated with the baseline
Under the baseline consumers would use the natural gas in quantity that is equal to the energy equivalent of the associated petroleum gas supplied in the main gas pipeline under the project.
Accordingly, methane emissions would occur during the recovery of natural gas and processing at complex gas processing units. Besides, the natural gas would be used as a fuel in gas turbines.

GHG emission reductions
Emission reduction is determined through deduction of the project emissions and leakage 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	Include/Do not include	Comment
Baseline	APG flaring	CO_2	Included	Main baseline emission source
		N_2O	Not included	Negligibly small
		CH_4	Included	Incomplete burning (3.5% of APG volume to be flared)
Project	The use of electricity from the grid for the technological needs of CS and BCS	CO_2	Included	Main baseline emission source
		N_2O	Not included	Negligibly small
		CH_4	Not included	Negligibly small
	Methane emissions during APG compression at CS	CO_2	Not included	Negligibly small
		CH_4	Incuded	Main baseline emission source
		N_2O	Not included	Negligibly small
	Methane emissions during APG transportation from CS to the Sibur GPP	CO_2	Not included	Negligibly small
		N_2O	Not included	Negligibly small
		CH_4	Included	Main baseline emission source

Scenario	Source	GHG type	Included/ not included	Comment
Leakage due to project activities	The use of electricity from the grid for the technological needs of GPP	CO2	Included	Main emission source
	Methane physical leaks (CH4) during APG processing at GPP	CH_4	Not included	Main emission source
	Methane physical leaks (CH4) during APG transportation at the GPP	CH_4	Not included	Negligibly small
Leaks associated with the baseline	Natural gas losses during its production (from wells)	CO_2	Not included	Negligibly small
		N_2O	Not included	Negligibly small
		CH_4	Included	Main emission source
	Burning of fuel gas in gas turbines of CGPU during natural gas processing	CO_2	Included	Main emission source
		N_2O	Not included	Negligibly small
		CH_4	Not included	Negligibly small

Leakage assessment

In accordance with "Guidance on criteria for baseline setting and monitoring", (Version 03) the leakage is determined as "the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project." In case the potential leakage is determined the project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected[3]. The project provides for APG consumption at GPP as a result of APG processing coming in under project activity. The main emissions potentially attributable to leakage in the context of the project are emissions arising from:

1. Electricity production in the outer grid for processing of the APG supplied within the project activity to GPPs. Quantitative evaluation shows that these emissions are significant and should therefore be taken into account for calculation of the reductions.

[3] In accordance with the paragraph 18 of the Guidance on criteria for baseline setting and monitoring (Version 02).

2. Methane physical leaks (CH_4) during processing and preparing of APG at GPPs. Quantitative evaluation shows that these emissions are significant and should therefore be taken into account for calculation of the reductions.

The main emissions potentially attributable to leakage in the context of the baseline are emissions arising from:

- during the production of natural gas at the gas fields;
- using natural gas as a fuel in gas turbines at CGPU.

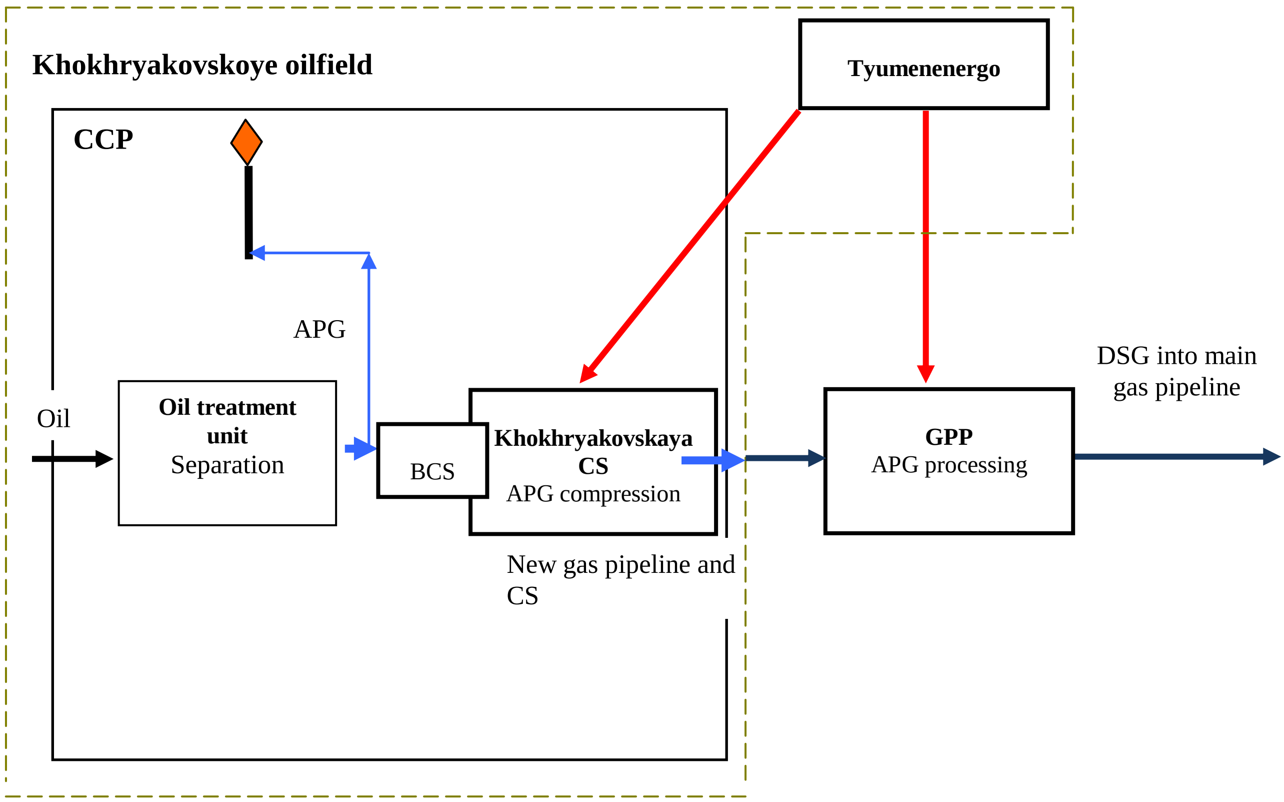
Below, explanations on considering or not considering each leakage source for calculations of emission reductions are provided:

3. The project provides for the decrease of natural gas consumption by the end-users as commercial APG will displace an equivalent quantity of the natural gas delivered otherwise to end customers. Therefore reduction of methane emissions due to natural gas production and processing are taken place. The quantitative assessment provided shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for CO2 emission reductions calculation. As the equivalent amount of natural gas would be transported under the baseline, the leaks during transportation are equal in both scenarios, which will not lead to additional emissions. Therefore these emissions can be neglected.

Leakage is calculated in accordance with formulas in section D.1.3.1.

Project boundaries schematically embrace Khokhryakovskoye oilfield CCP, including new gas pipeline and CS.

Figure B.3.1. Project boundaries



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

>>

Date of baseline setting: 20.10.2010.

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 01/06/2005. The date corresponds to the earliest date of construction and installation works at CS

C.2. Expected operational lifetime of the project:

>>

The expected project life is 14 years or 168 months: from 01/11/2007 to 01/11/2017.

C.3. Length of the crediting period:

>>

Crediting period corresponds to the budget period of Kyoto Protocol and is 5 years or 60 months: from 01.01.2008 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

GHG emission sources

Baseline emissions

Under the baseline scenario the extracted APG at Khokhryakovskoye oilfield CCP (in quantity equal to that of utilized 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 estimates of incompleteness of APG combustion at flare stacks, NII Atmosphere methodic determines the efficiency of underburning as 3.5%:

Soot combustion criterion compliance test:

This test determines combustion efficiency of the APG flaring. The formulae used:

1. The condition of non-black firing:

$if\ U_{flow} > 0,2\ U_{sound}$

then the soot does not discharges from the stack's pipe, the APG burning is complete.

$if\ U_{flow} < 0.2\ U_{sound}$,

the soot discharges that demonstrating incomplete burning of APG. In this case, under-firing coefficient equal to 0,035 must be taken into account in further calculations:

2. APG's discharge flow velocity, m/sec (U_{flow}):

$$U_{flow} = 4*W_v / (\pi*d^2) \quad (1)$$

V_{APG_PJ} – APG volumetric flow, m^3/s;

d – stack's diameter is equal to 0,5 m;

3. Sound velocity in APG flared, m/sec (U_{sound}):

$$U_{sound}=91.5*(K*(T_{APG}+273)/\mu_{APG})^{0.5} \quad (2)$$

K_{APG} - adiabatic index of APG

$$K_{APG} =\sum 0.01* V_i * k_i; \quad (3)$$

Wi, - volumetric concentration i-component in APG, % vol;

ki – adiabatic index of i-component in APG;

T_{APG} – temperature of APG, °C;

μ_{APG} – molecular mass of APG, kg/mole.

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.

Methane emission factor is defined on the results of gas analysis taking into account the volume fractions of components in APG at CS of Khokhryakovskoye oilfield.

Project emissions
Being considerable the physical methane losses through a built gas pipeline' walls are taken into account well as methane losses during APG compression at the CS itself. Also emissions occur in the external grid when electric power is generated for CS and BCS needs at compression.

<u>Leakage</u>
Emissions outside the project boundary occur due to the project
CO2 emissions occur due to the grid-source electric power consumption at the gas processing plant (GPP) during processing of the APG project volume. Also methane emissions occur due to physical losses at GPP during processing of the APG project volume.

Emissions outside the project boundary associated with the baseline
The values of the natural gas losses recommended to the use are presented in ecological reports JSC «Gazprom» in 2008-2012[4].
To determine the emissions during preparation of natural gas a conservative value of consumption of fuel gas at gas processing plants is used taking into account a 34% efficiency of a modern gas turbine. Due to the fact that a wellhead pressure in main gas fields is not enough[5] there is a need to compress the natural gas before it enters the pipeline.

For taking into account the difference in pressures needed to compress APG and the natural gas up 75 ata to supply in the gas pipeline a correlation coefficient is used as lesser work is needed for compressing the natural gas than for compressing APG after the first separation stage.

<u>Key emission factors</u>
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.

To define emissions at electricity consumption from mains to provide gas pipeline work and GPZ, the approach is used emission factor for regional power system of Ural:
2008-0.631 tCO2/MWh
2009-0.631 tCO2/MWh
2010-0.638 tCO2/MWh
2011-0.668 tCO2/MWh

[4] http://gazprom.ru/interactive-reports/report2010/ru/

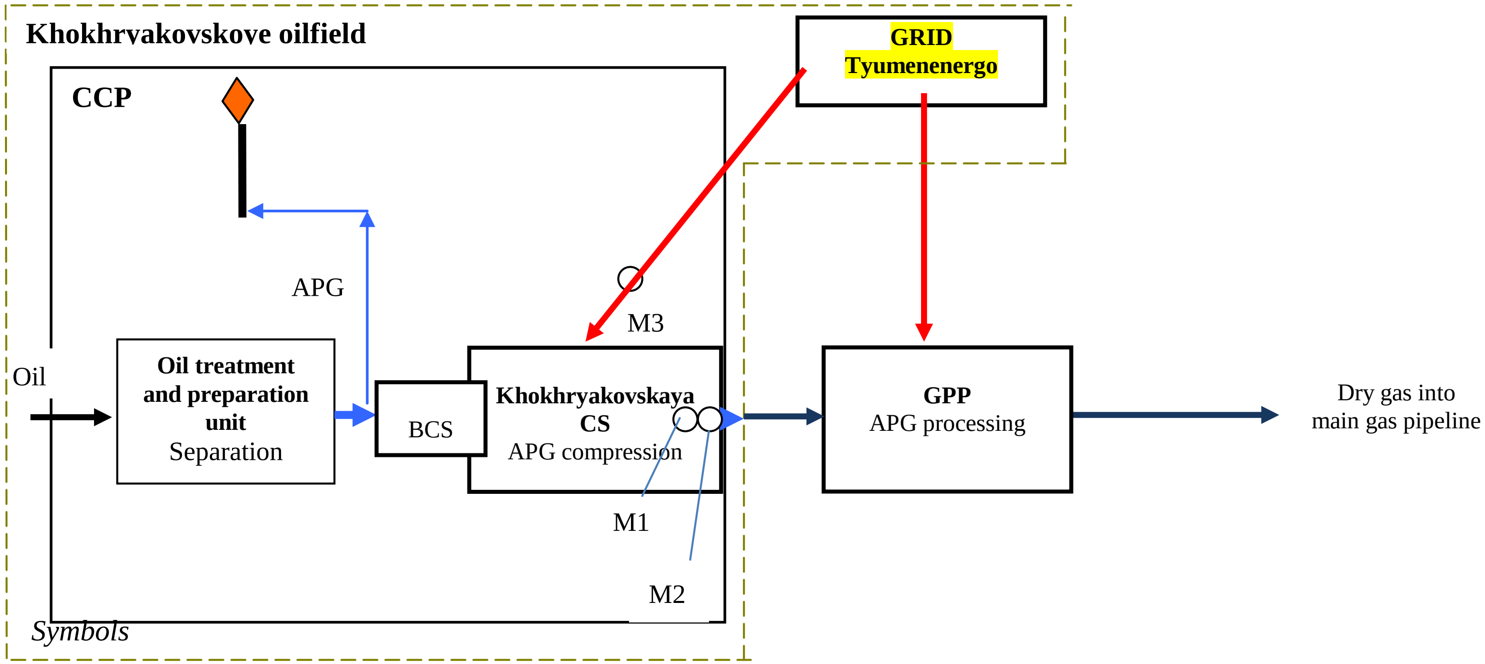
2012-0.712 tCO_2/MWh

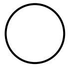
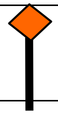
Monitoring points and variable parameters for monitoring

Monitoring point M1 – APG volume supplied from Khokhryakovskaya CS to GPP
Monitoring point M2 – APG chemical composition supplied from Khokhryakovskaya CS to GPP
Monitoring point M3 – Electric power consumption at Khokhryakovskaya CS for APG compression

Monitoring points for determining these parameters are presented on the following figure.

Figure D.1.1. Monitoring points



	Monitoring points		Crude oil flow
	APG flaring		APG flow on new gas pipeline
CS	Compressor station		
CCP	Central collection point		

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 volume supplied from Khokhryakov CS to GPP*	*Line №1 Flow gas meter GM868 Line №2, Flow gas meter GM868 (Reserv)*	*Ths.m3*	*m*	*monthly*	*100%*	*Electronic and paper*	*In the case when Line 1 is under repair, then AGP volume is supplied from Khokhryakov CS to GGP through Line 2*
M2	*Chemical composition of APG supplied from Khokhryakov CS to GPP*	*Gas chromatograph*	*% vol.*	*m*	*monthly*	*100%*	*electronic*	*The analysis is performed directly on the site.*
M3	*Electricity consumption at Khokhryakov CS during APG compression*	*Electricity meter SET-4TM03*	*kWh*	*m*	*monthly*	*100%*	*Electronic*	
Data and parameters that are not monitored throughout the crediting period, but are determined only once								
GWP_{CH4}	*Global Warming Potential of methane*	*Decision 2/CP.3 http://unfccc.int/resource/docs/cop3/07a01.pdf*	tCO_2/tCH_4	*e*	*Once*	*100%*	*Electronic*	*21* tCO_2/tCH_4

		#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						
EF_{grid}	*Emission factor for electric power plant of the ESD Ural*	*According to calculations made by Lahmeyer International: "Assessment of the Grid Emission Factor Calculation Model for Russia" http://www.ebrd.com/downloads/sector/eecc/Baseline_Study_Russia.pdf (page 5.3, table 5.2); http://www.ebrd.com/downloads/s*	*tCO2/MWh*	*E*	*Determined once*	*100%*	*Electronic/Paper*	*2008-0,631; 2009-0,631; 2010-0,638; 2011-0,668; 2012-0,712.*

		ector/eecc/Validation_report_Russia.pdf						
E_{tr}	*IPCC 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*	*e*	*Determined once*	*100%*	*Electronic*	*0,0011 GgCH4/ mln. m3*
E_p	*IPCC factor for processing 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*	*E*	*Determined once*	*100#*	*Electronic*	*0,0011 GgCH4/ mln. m3*

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

>>

Project GHG emissions due to electricity consumption at Khokhryakovskaya CS and due to methane physical losses during APG compression and transportation

$$PE=(E_{tr}*V_{APG\_PJ}*1000*W_{CH4,av}*GWP_{CH4})+(E_p*FC_{APG\_PJ}*1000*W_{CH4,av}*GWP_{CH4})+((EC_c*EFgrid) \quad (4)$$

PE – project emissions during electricity consumption at Khokhryakovskaya CS and due to methane physical losses during APG compression and transportation, tCO2;
V_{APG_PJ} – APG volume utilized in the project, i.e. supplied from CS to GPP, ths. m^3
E_{tr} – IPCC 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;
E_p – IPCC factor for processing 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;
$W_{CH4,av}$– average annual value of methane volume fraction in APG at Khokhryakovskoye oilfield CCP (based on the protocols of gas analysis);
GWP_{CH4} – Global Warming Potential for methane 21 tCO_2/tCH_4;
EC_c– rate of energy consumption during APG compression at Khokhryakovskaya CS, kWh;
EFgrid– emission factor during electricity consumption from the grid of Urals, tCO2/ MWh

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 volume supplied from Khokhryakov CS to GPP*	*Flow gas meter GM868*	*Ths.m^3*	*m*	*monthly*	*100%*	*Paper and electronic*	
M2	*APG chemical composition supplied from Khokhryakov CS to GPP*	*Gas chromatograph*	*% vol.*	*m*	*monthly*	*100%*	*electronic*	*The analysis is performed directly on site.*

OXID	*APG flaring efficiency*	*«Methods of calculating emissions of polluting substances into the atmosphere due to APG burning at flares», developed by the Scientific-Research Institute of Atmospheric Air Protection of St. Petersburg, 1998.*	*%*	*e*	*Annual*	*100%*	*Electronic*	*is assumed to be 96.5%*
Data and parameters that are not monitored throughout the crediting period, but are determined only once								
ρ_{CH4}	*Density of methane* CH_4 *under standard conditions*	*Thermal calculation of boilers (Normative method), NPO CKTI, St. Petersburg, 1998*	kg/m^3	*e*	*Once*	*100%*	*Electronic*	$0.668\ kg/m^3$

GWP_{CH4}	*Global Warming Potential of methane*	*Decision 2/CP.3 <u>http://unfccc.int/resource/docs/cop3/07a01.pdf#page=31</u> Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22. <u>http://unfccc.int/ghg_data/items/3825.php</u>*	*tCO_2/tCH_4*	*e*	*Once*	*100%*	*Electronic*	*21 tCO_2/tCH_4*
$W_{CH4}, \sum W_{NMVOC}$	*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*	*$n_{C,CH4} = 1$; $n_{C,C2H6} = 2$; $n_{C,C3H8} = 3$; $n_{C,C4H10} = 4$; $n_{C,C5H12} = 5$; $n_{C,C6H14} = 6$; $n_{C,CO2} = 1$; $n_{C,N2} = 0$; $n_{C,O2} = 0$; $n_{C,He} = 0$.*

ρ_{CO2}	*Density of CO_2 under standard conditions*	*Thermal calculation of boilers (Normative method), NPO CKTI, St. Petersburg, 1998*	*kg/m^3*	*e*	*Once*	*100%*	*Electronic*	*equals to 1.842 kg/m^3*

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

>>

GHG baseline emissions due APG flaring at Khokhryakovskoye oilfield CCP

$$\mathbf{BE = V_{APG\_PJ}*(EF_{CO2,APG} + EF_{CH4,F})} \qquad (5)$$

BE – baseline emissions, tCO_2.
$\mathbf{V_{APG\_PJ}}$ **–** APG utilized in the project, i.e. supplied from Khokhryakovskaya CS to GPP, ths. m^3

$\mathbf{EF_{CO2,APG,}}$ – annual CO_2 emission factor during APG flaring at CPP, tCO2/ths. m^3;
$\mathbf{EF_{CH4,\,F}}$ – annual CH_4 emission factor during APG flaring at CPP, tCO2/ths. m^3;

$$\mathbf{EF_{CO2,APG} = (W_{CO2} +(NC_{CH4}*W_{CH4}+ \sum jNC_{VOCj} *W_{VOC\,i}))*\rho_{CO2}*OXID} \qquad (6)$$

$W_{CO2,}$**W**y_{CH4} W_{VOC} – average annual volume fractions of carbon, methane and volatile organic compounds (VOC) in APG at Khokhryakovskaya CCP (information source – gas analysis protocol);
$NC_{CH4,}$ $\sum jNC_{VOCj}$ – number of moles of carbon in a methane mole and VOC respectively ($\sum jNc_{VOCj}$ where j - specific VOC component);
ρCO_2 – density CO_2 at 20°C equal 1.842 kg/m^3;
OXID - APG flaring efficiency is equal 0.965, if the soot combustion criterion is met, calculated as 1-ε
ε - Unburned carbon factor for soot combustion of APG in flare units, 3,5%, if the soot combustion criterion is met.

Due to incomplete combustion when APG is flared a part of APG extracted to the atmosphere is not oxidizing. NII Atmosphere methodic determines the efficiency of flaring as 96.5%, then 3.5% is not burned completely, which causes methane emissions to the atmosphere. Methane emission factor in terms of CO2-eq. determined as follows:

$$EF_{CH4,F} = W_{CH4,av} * \rho_{CH4} * (1-OXID) * GWP_{CH4} \quad (7)$$

W_{CH4} – average annual volume methane fraction in APG at Khokhryakov CCP (source information – gas analysis protocol);
ρ_{CH4} – methane CH4 density under standard conditions is equal 0.668 kg/m^3.

OXID – APG flaring efficiency is equal 0,965

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

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):

>>
Not applicable.

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

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
M1	*APG volume supplied from Khokhryakov CS to GPP*	*Flow gas meter GM868*	*Ths.m^3*	*m*	*monthly*	*100%*	*Paper and electronic*	
M2	*APG chemical composition supplied from Khokhryakov CS to GPP*	*Gas chromatograph*	*% vol.*	*m*	*monthly*	*100%*	*electronic*	*The analysis is performed directly on site.*
Data and parameters that are not monitored throughout the crediting period, but are determined only once								
$V_{GPP\ APG}$	*Yield of dry gas from APG processing at GPP*	*Technical reports data of GPP (Nizhnevartovskoye /Beloozernoye)*	*%*	*e*	*Determined once*	*100%*	*in a hard copy*	
EF_{grid}	*Emission factor for electric power plant of the ESD Ural*	*According to calculations made by Lahmeyer International: "Assessment of the Grid Emission Factor Calculation Model for*	*tCO2/MWh*	*e*	*Determined once*	*100%*	*Electronic/Paper*	*2008-0,631; 2009-0,631; 2010-0,638; 2011-0,668; 2012-0,712.*

		Russia" http://www.ebrd.com/downloads/sector/eecc/Baseline_Study_Russia.pdf (page 5.3, table 5.2); http://www.ebrd.com/downloads/sector/eecc/Validation_report_Russia.pdf						
SEC_{gpp}	*Maximal specific electricity consumption factor during APG processing at GPP*	*This parameter is presented annually by request to Yugragazprocessing*	*kWh/ths.m*^{3}	*e*	*Determined once*	*100%*	*Paper*	*265.6 kWh/ths.m*^{3} *– is maximal parameter*
E_{proc}	*Maximal loss factor during processing of APG at GPP*	*This parameter is presented annually by request to Yugragazprocessing*	*%*	*e*	*Determined once*	*100%*	*Paper*	*1.18 % – is maximal parameter*
ρ_{CH4}	*Density of methane* CH_4 *under standard conditions*	*Thermal calculation of boilers (Normative method), NPO CKTI, St. Petersburg, 1998*	*kg/m*^{3}	*e*	*Determined once*	*100%*	*Electronic*	*0.668 kg/m*^{3}
ρ_{CO2}	*Density of* CO_2 *under standard conditions*	*Thermal calculation of boilers (Normative*	*kg/m*^{3}	*e*	*Determined once*	*100%*	*Electronic*	*equals to 1.842 kg/m*^{3}

		method), NPO CKTI, St. Petersburg, 1998							
$EF_{NG\ prod}$	*loss factor of natural gas during its production presented in the annual environmental report of JSC Gazprom*	*Annual report of JSC Gazprom*	*%*	*e*	*Determined once*	*100%*	*Electronic*	$EF_{NG\ prod\ 2008}$ – 0.00070 $EF_{NG\ prod\ 2009}$ – 0.00052 $EF_{NG\ prod\ 2010}$ – 0.00029 $EF_{NG\ prod\ 2011}$ – 0.00029 $EF_{NG\ prod\ 2012}$ – 0.00029	
SEC_p	*Specific electricity consumption to gas compressing&processing at oil&gas treatment plant of Sibur with standart efficiently*	*Determinated at the Yarayner PDD*	*kW/ths.m3*	*e*	*Determined once*	*100%*	*Electronic/paper*	*475 kW/ths.m3*	
NCV_{NG}	*net calorific value of the natural gas*	*GOST 5542-87*	*kcal /m^3*	*e*	*Determined once*	*100%*	*Electronic*	*7600 kcal /m^3*	

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

>>

Leakage effect is defined as net change of anthropogenic emissions outside the project boundary:

$$\mathbf{LE = LE_{BL} - L} \qquad (8)$$

LE_{BL} – is the emissions outside the project boundary that would have occurred in the absence of the project activity, tCO2e;
L – is the emissions outside the project boundary occur due to the project activity, tCO2e.

All leakage due to project activity are calculated by the following formula:

$$L = L_{gpp\ ec} + L_{p} \qquad (9)$$

Leakage associated with the electricity consumption at GPZ during processing operations over APG project volume:

$$Lgpp\ ec = SEC_{gpp} * V_{APG\_PJ} * EFgrid \qquad (10)$$

V_{APG_PJ} – APG volume utilized in project i.e. supplied from CS to GPP, ths. m^3;
SEC_{gpp} – maximal specific electricity consumption factor during APG processing at GPP, kWh/ths.m^3. Determined once – 265.6 kWh/ths.m^3;
EFgrid – emission factor for electricity consumption from the grid, tCO2/ MWh.

Leakage related to methane physical losses during processing of APG project volume at GPP:

$$Lproc = E_{proc} * V_{APG\_PJ} * 1000 * W_{CH4,av} * \rho_{CH4} * GWP_{CH4} \qquad (11)$$

V_{APG_PJ} – APG volume utilized in project i.e. supplied from CS to GPP, ths m^3;
E_{proc} – maximal loss factor during processing of APG at GPP, %; Determined once – 1.18 %
$W_{CH4,av}$ – average volume methane fraction in APG at Khokhryakovskaya CS, gas analysis protocol;
ρCH4– methane CH4 density under standard conditions is assumed to be 0,668 кг/$м^3$;
GWPCH4 – methane global warming rate is assumed to be 21 t.CO_2/t.CH_4.

Total leakage associated with the baseline at standard conditions:

$$LE_{BL} = LE_{NG,rec} + LE_{NG\ GT} \qquad (12)$$

$LE_{NG,rec}$ – emissions due natural gas recovery at the gas fields;

$LE_{NG\ GT}$ – emissions due to combustion of the natural gas in gas turbines at complex gas processing units (CGPU) during preparation of an equivalent volume of natural gas for transportation, tCO2.

Emissions due to recovery of the natural gas

$$LE_{NG,rec} = V_{APG\_PJ} * V_{GPP\ APG} * EF_{NG\ prod} * GWP_{CH4} \qquad (13)$$

V_{APG_PJ} - APG utilized under the project, i.e. transported to GPPs from CS, ths. m^3;

$V_{GPP\ APG}$ – a dry gas-from-APG- yield rate at from GPP, %

$EF_{NG\ prod}$ – loss factor of natural gas during its production presented in the annual environmental report of JSC Gazprom, %

Leakage during natural gas combustion in gas turbines at CGPU

$$LE_{NG\ GT} = (SFC_{GT} * FC_{APG\_PJ} * V GPP\ APG * EF_{CO2,GT})/lcom \qquad (14)$$

SFC_{GT} specific consumption of natural gas in modern gas turbines for natural gas compression and processing at CGPU, m3/ths m3:

$$SFC_{GT} = ((SEC_p * C)/ έ\ modern\ GT)/NCV_{NG} \qquad (15)$$

C - kWh- to- calorie conversion factor, 1kWh=0,86*10^6 cal;

$έ_{modern\ GT}$ efficiency of a modern gas turbine assumed to be 34% (this value is close to the equivalent thermal efficiency of power plants of the Urals grid with an annual emission at 2008-2012 tCO2/MWh);

NCV_{NG} - net calorific value of the natural gas (according to the GOST 5542-87), kcal /m^3;

$\mathbf{EF_{CO2,GT}}$ – CO_2emission factor due to the natural gas combustion in gas turbines at CGPU, tCO_2/ths. m^3

$\mathbf{SEC_p}$ – Specific electricity consumption to gas compressing&processing at oil&gas treatment plant of Sibur with standard efficiently, kW/ths.m^3

$$\mathbf{EF_{CO2,GT} = (W_{CO2\ ng} + (Nc_{CH4} * W_{CH4\ NG} + \sum Nc_{VOC} * W_{VOC\ NG})) * \rho_{CO2} * FE_{GT}} \quad (16)$$

$W_{CO2\ NG}$, $W_{CH4\ NG}$, $W_{VOC\ NG}$ – volume fractions of carbon, methane and VOC of the natural gas during processing at CGPU[6] ;

Nc_{CH4}, $\sum jNc_{VOCj}$ – number of moles of carbon in a mole of methane and VOC respectively ($\sum jW_{VOCj}$ where j specific VOC component.)

ρ_{CO2} – CO_2 density at 20°C equals 1.842 kg/m^3;

FE_{GT} – efficiency of gas combustion in gas turbines is equal to 1.

lcom - correlation coefficient at first pressure created when operating a gas turbine (medium pressure of natural gas at the well head is 30 ata – APG medium pressure on the first separation step is 3.2 ata)

$$\mathbf{l_{com} = (((P2_{apg}/P1_{apg})^{\wedge((1,31-1)/1,31))} - 1)/(P_{2\ ng}/P_{1\ ng})^{\wedge((1,31-1)/1,31))} - 1\ )} \quad (17)$$

lcom is a correlation coefficient, which represents a ratio of a work to compress (i.e. increasing pressure from P1 to P2) APG at CS of Khokhryakovskoye oilfield for transportation to Sibur gas pipeline a work to compress natural gas at a complex gas processing unit (CGPU) of Gazprom to transport natural gas to the main gas pipeline.

Where

1,31 – adiabata methane (CH4) (Determine once)

P2 apg – is the pressure at the outlet of CS, equal to 30 ata;
P1apg – is the pressure at the inlet of CS, equals to 3,2 ata;

$\mathbf{P_2\ ng}$ **-** pressure at the inlet of a gas pipeline, 75 ata (standard value of pressure during gas transmission in JSC Gazprom)

---

[6] A typical composition of natural gas: 91,9% CH4, 0,58% CO2, 0,68% N2 and 6,84% VOC). Source of information: IPCC 2006 Volume 2, Chapter 4, p. 4.58, table. 4.2.4.

P_1 ng – medium pressure of natural gas in gas wells fields of Bolshoy Urengoy (50 ata)[7]

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):

>>

$$ER = BE - PE - LE \quad (18)$$

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
LE – leakage, 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 [8].

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 NNP 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 NNP, 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;

[7] http://www.indpg.ru/nefteservis/2008/04/20007.html,

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

– 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

According to the results of environmental studies and preliminary assessment of the impact on the environment of the planned economic activity, placement of the planned object «Construction of compression station «Khokhryakovskaya» for APG transportation with supply pipelines» doesn't entail irreversible processes. A preliminary environmental impact is estimated as a local, short-term and acceptable.

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 table D.1.1.1 and table D.1.1.3, D1.3.1	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». Measured by a set of instruments which are calibrated every 1-3 years

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

>>

The operational and management structure for the monitoring of emission reductions for the project will be adapted to the management system existing in NNP Company. The Monitoring plan is based on the national standard GOST R "State system for ensuring the uniformity of measurements. System for measuring of quantity and parameters of free oil gas. General metrological and technical requirements" and corporate automated program "Gas quality measurement system" and "System of collection and processing of information"

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. Reporting on monitoring	Monitoring report transferring to the Department of regulation and tariff setting of JSC "TNK-BP Management
2.	JSC «TNK-BP Management», Moscow	Department of regulation and tariff setting of JSC "TNK-BP Management"	Coordination of works on monitoring reports preparation between NCSF and NNP	Approval of monitoring reports Transfer of approved report on monitoring to the company-verifier. Transfer of verification report to NNP and JSC «TNK-BP Management»
3.	JSC «Yugragasprocessing», (Company Sibur Holding), Noyabrsk	Management	Preparation and submission of annual production data	Transferring data to calculate the leakage in NNP and JSC "TNK-BP Management"
4.	NNP	Department for the preparation and transfer of oil and gas (PPN)	Preparation and approval of data for monthly production reports on APG usage	Production report includes the following information • APG volume supplied by YuGP from Khokhryakovskaya CS to GPP
5.	NNP	Dispatching service and workstation (data from the flow gas-measuring unit)	Collection of daily data on APG balance	Transferring data for processing in PPN department
6.	NNP	On-duty operators of Khokhryakovskoye field CCP	Collection of daily data on the use of APG and its composition	The data are entered in a regime sheet and sent for processing to the dispatching service and workstation

Information required for calculation of GHG emission reductions is gathered as it is usually done on production site in JSC «Nizhnevartovskoye oil and gas enterprise» (NNP), therefore monitoring doesn't require any other additional information compared to already gathered.

All necessary data are under the supervision, which is a common, everyday practice: data from sensors of monitoring checkpoints, including data on APG composition, are transferred to automated meters and at the same time automatically fixed in electronic data base of workstation and are reflected at the central dispatching office of NNP.

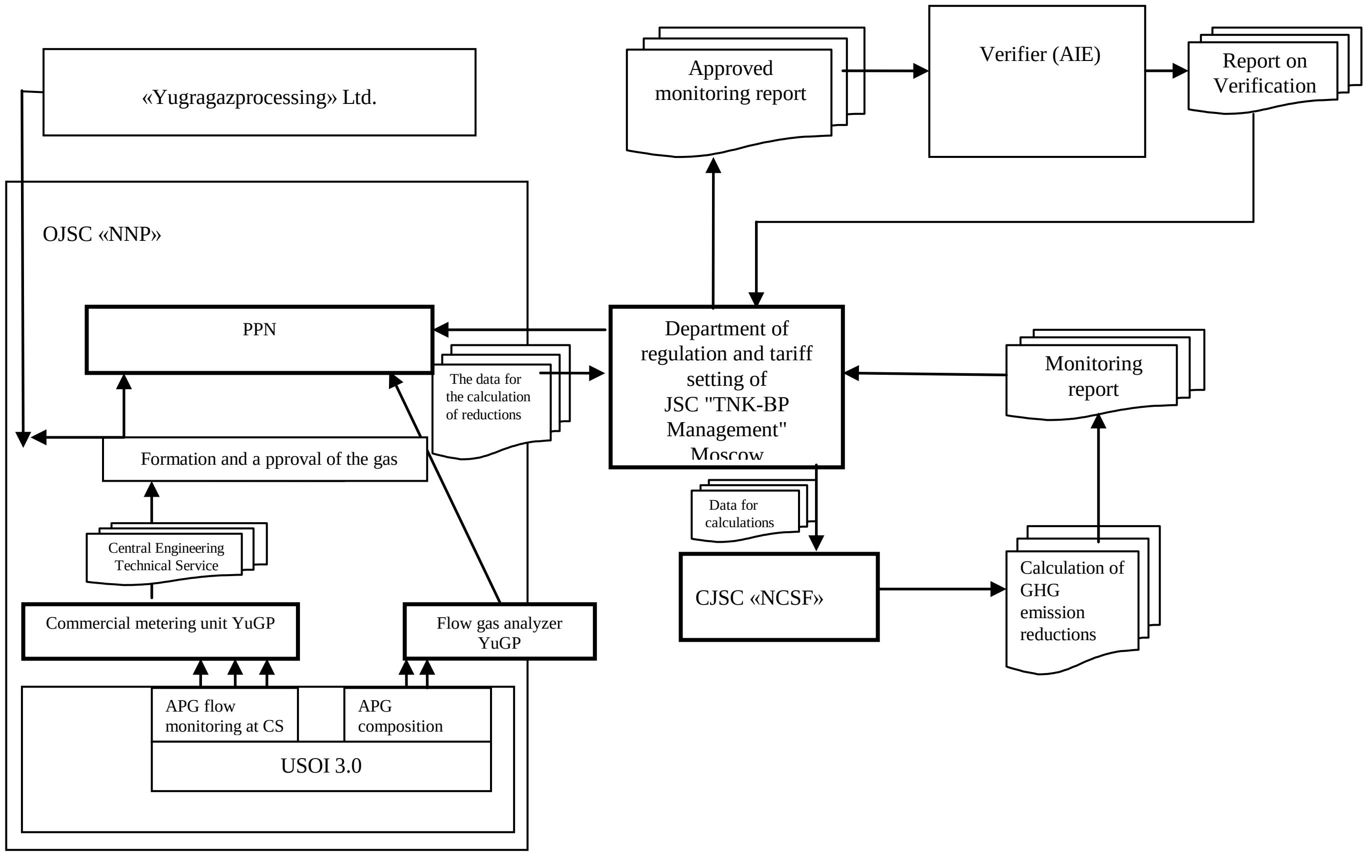
Data on APG composition is received directly on CS through the measurement with the flow gas analyzer, which provides the required accuracy class. Based on two- hour statistic data the daily and monthly APG production data are formed.

Calculation of GHG emission reductions is conducted based on monthly production reports on gas supply according to the NNP activity on Khokhryakovskoye field, as well as data on manufacturing activity of «YuGP» Ltd. at Beloozerniy and Nizhnevartovskiy gas processing plants. Completed and signed monthly production reports reflecting values of specified data in monitoring, except APG composition, are provided by request to Department of regulation and tariff setting of JSC "TNK-BP Management" Moscow. This department conducts internal audits of presented data with a view to an incorrect compiling and presence of errors.

Annually this department provides annual summary based on monthly gas production reports along with monthly data on the gas composition from CS Khokhryakovskoye field, as well as other annual data from «YuGP» Ltd. to Project Development Department of CJSC «NCSF» for the calculation of annual GHG emission reductions and the monitoring report.

Annual monitoring report on GHG emissions is sent via e-mail to Department of regulation and tariff setting of JSC "TNK-BP Management" for approval. Approved annual report is supplied to AIE for the annual verification of achieved emission reductions. Graphically, the structure of the monitored reductions in the project is as follows.

Scheme D 3. Operational and management structure for monitoring of 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
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 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 due to methane (CH_4) physical leaks during APG compression at Khokhryakov CS in 2008-2012

Item	Designation	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Emission factor for fugitive emissions from gas operations	Epr	GgCH4/mln m^3	0,0011	0,0011	0,0011	0,0011	0,0011
APG utilized under the project	V_{APG_PJ}	mln m^3	244	219	198	191	247
Global Warming Potential	GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	21
Project emissions during APG compression	PEpr	tCO2	**5629**	**5060**	**4580**	**4407**	**5698**

Table E1.2. Project emissions due to methane (CH_4) physical leaks during APG transportation from Khokhryakov CS to gas collection network of Sibur in 2008-2012

Item	Designation	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Emission factor for fugitive emissions from gas transportation (2006 IPCC)	Et	GgCH4/mln m^3	0,0011	0,0011	0,0011	0,0011	0,0011
APG utilized under the project	V_{APG_PJ}	mln m^3	244	219	198	191	247
Global Warming Potential for methane	GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	21
Project emissions during APG transportation	PEt	tCO_2	**5629**	**5060**	**4580**	**4407**	**5698**

Table D 1.3. CO2 emissions due to consumption of electricity from the grid at Khokhryakovskaya CS during compression of APG in 2008-2012

Item	Designation	Units	2008	2009	2010	2011	2012
Electricity consumption at CS	EC_{cs}	Ths.kWh	48653	44502	43534	45823,3	60191
Grid emission factor	EFgrid	tCO_2/MWh	0,631	0,631	0,638	0,668	0,712

Project emissions due to consumption of electricity at Khokhryakovskaya CS	PEcs	tCO_2	**30700**	**28081**	**27775**	**30610**	**42856**

Table E 1.5. Total project emissions in 2008-2012

Total project emissions	PE	tCO2e	**41957**	**38200**	**36935**	**39424**	**54253**

E.2. Estimated leakage:

>>

Leakage due to the project activity

Table E 2.1. $CO_{2экв}$ emissions due to electricity consupmtion from the grid at GPP during APG project volume processing in 2008-2012

Item	Designation	Units	2008	2009	2010	2011	2012
Specific elec consumption per ths cubic meter of processing APG on the GPP	SECgpp	kWh/ths m3	265,6	265,6	265,6	265,6	265,6
APG used in the project	FCcs p apg	ths.m3	243659	219041	198284	190789	246686
Grid CO2 emission factor	EF grid	tCO2/MWh	0,631	0,631	0,638	0,668	0,712
GHG emissions from energy consumption in GPP during project APG processing	Lgpp	tCO2	**40836**	**36710**	**33600**	**33850**	**46650**

Table E 2.2. CO_{2eq} emissions due to physical gas losses during processing operations at GPP over APG project volume in 2008-2012

Item	Designation	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Gas loss share during processing at GPP	Eproc	%	1,18	1,18	1,18	1,18	1,18
APG used under the project	V_{APG_PJ}	ths. m^3	243659	219041	198284	190789	246686
Global Warming	GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	21

Potential							
CO_{2eq} emissions due to physical gas losses during processing operations at GPP	LEproc	tCO2e	**25590**	**23674**	**19365**	**19110**	**25343**

Table E 2.3. Total leakage due to the project activity

Total leakage due to the project activity	LE	tCO2e	**66426**	**60384**	**52965**	**52960**	**71993**

Leakage associated with the baseline

Table E 2.4. CO2eq emissions due physical methane leaks during natural gas recovery in 2008-2012.

Item	Designation	Units	2008	2009	2010	2011	2012
APG utilized under the project	$FC_{APG,PJ}$	ths. m^3	243659	219041	198284	190789	246686
Yield of dry gas during APG project volume processing, which is pumped into the main gas pipeline	Vgpp	%	86	86	86	86	86
Gas losses share from the wells at Gazprom fields	%	-	0,00070	0,00052	0,00029	0,00029	0,00029
Global Warming Potential for methane	GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	21
CO2eq emissions	$\mathbf{LE_{NG,rec}}$	tCO2eq	**3074**	**2042**	**1056**	**1065**	**1439**

due physical methane leaks during natural gas recovery							

Table E 2.5. CO2eq emissions due natural gas (fuel gas) burning at CGTU in 2008-2012.

Rate	Designation	2008	2009	2010	2011	2012
Specific gas consumption atGazprom's CGTU during natural gas processing and compression (modern gas turbines, 34% efficiency)	m3/ths. m3	158	158	158	158	158
CO2 emission factor for combustion natural gas in gas turbine (standard chemical composition, IPCC 2006)	tCO2/ths. m3	2,106	2,106	2,106	2,106	2,106
APG utilized under the project	ths. m^3	243659	219041	198284	190789	246686
Yield of dry gas at GPP during APG project volume processing, which is pumped into the main gas pipeline	%	86	86	86	86	86
Pressure correlation coefficient	-	7,1	7,1	7,1	7,1	7,1
CO2eq emissions due natural gas (fuel gas) burning at CGTU	tCO2eq	**8393**	**7545**	**6830**	**6572**	**8497**

Table E 2.6. Total leakage associated with the baseline in 2008-2012.

Designation	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Total leakage associated with baseline	tCO_2e	**11466**	**9587**	**7886**	**7636**	**9936**

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	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Sum	tCO_2e	96917	88997	82015	84748	116310

E.4. Estimated baseline emissions:

>>

Table E 4.1. CO2eq emissions due to APG flaring under the baseline at Khokhryakovskoye field CCP in 2008-2012.

Item	Designation	Units	2008	2009	2010	2011	2012
APG flaring under the baseline	$V_{APG,Flare,BL}$	ths. m^3	243659	219041	198284	190789	246686
CO_2 emission factor at flaring	$EF_{CO2,Flare}$	tCO_2/ths. m^3	2,96	2,88	3,00	2,95	2,95
CO_2 emissions due to APG flaring under the baseline	$BE_{CO2,Flare}$	tCO_2	**721135**	**631030**	**595449**	**562371**	**727134**
APG flaring under the baseline	$V_{APG,Flare,BL}$	ths. m^3	243659	219041	198284	190789	246686
CH_4 emission factor (in CO_2 equivalent)	$EF_{CH4,Flare}$	tCO_2e/ths.m^3	0,312	0,321	0,290	0,305	0,305
CH_4 emissions (in CO_2 equivalent) due to APG flaring under the baseline	$BE_{CH4,Flare}$	tCO_2e	**75904**	**70219**	**57440**	**58136**	**75169**
Total baseline emissions	BE	tCO2	**797039**	**701250**	**652889**	**620508**	**802303**

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 18) in section D

Table E.5.1

	2008	2009	2010	2011	2012
tCO_2	700122	612252	570874	535760	685993
Total (2008-2012)	**3 105 001**				

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	41 957	54 960	797 039	700 122
2009	38 200	50 797	701 250	612 252
2010	36 935	45 079	652 889	570 874
2011	39 424	45 323	620 508	535 760
2012	54 253	62 057	802 303	685 993
Total (tonnes of CO2 equivalent)	**210 771**	**258 216**	**3 573 988**	**3 105 001**

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:

>>

In accordance with the Resolution of the State Committee on Ecology and Natural Resources of Russian Federation from 15.04.2000 № 372 «On approval of regulations to implement the planned economic and other activities and their impact on the environment» developers should include environmental impact assessment in project documentation.

Section "Environmental protection" is included in the technical documentation of the project. Technical project documentation was prepared in 2005 (volume №8 of the technical documentation «Construction of the compressor station «Khokhryakovskaya» for APG transportation with the supply pipelines ». JSC NIC «Neftegas»).

Rostechnadzor permission №150-10 from 07.10.2010 on emission of pollutants in the air from stationary sources valid for the period of 01.07.2010 – 31.12.2014[9] was obtained by project activity.

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:

>>

A positive state examination resolution № 875 issued by the Rostechnadzor of KhMAO-Yugra dd. 05.06.2006 was issued for the project «Construction of compressor station «Khokhryakovskaya» for APG transportation with supplying pipelines».

Environmental impact does not exceed the permissible limits after project implementation.

SECTION G. Stakeholders' comments

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

>>

The project was gone through examination with a main stakeholder, Rostechnadzor of KhMAO-Yugra, which is a Russian governmental organization to control implementation of activities in all industrial and energy sectors in the Russian Federation. After examination the project was awarded with the positive conclusion.

1. JSC «NNP» rents the plot, where Khokhryakovskoye oilfield is located, from the local government. Before the beginning of field development company undertook the necessary consultations with the local population to discuss environmental issues that may arise in connection with the company's activity.
2. The site of the area that hosts the project is rented out of the water protection zones, pastures and migration routes of reindeers. This site does not apply to categories of land with priority environmental management.
3. The project improves ecological environment as it's realisation decreases pollution by toxic substances in terms of APG flaring.

There is no any change in the social environment during the project implementation.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	Joint-stock company «Nizhnevartovskoye oil and gas enterprise»
Street/P.O.Box:	Lenina
Building:	17/P
City:	Nizhnevartovsk
State/Region:	Tyumen oblast, Khanty-Mansiysky autonomous okrug - Yugra
Postal code:	628616
Country:	Russia
Phone:	8 (3466) 62-35-53; 62-30-13
Fax:	8 (3466) 62-32-00
E-mail:	nvnnpodo@tnk-bp.com
URL:	www.tnk-bp.com
Represented by:	Head of Gas Projects JSC «Varyoganneftegas»
Title:	-
Salutation:	Mr.
Last name:	Zagaynov
Middle name:	-
First name:	Denis
Department:	Block of long-term planning and production development
Phone (direct):	-
Fax (direct):	-
Mobile:	--
Personal e-mail:	

Annex 2

BASELINE INFORMATION

Fixed values determined once at the stage of verification and are available throughout the entire period 2008-2012

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 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	**GWP CH_4 is necessary to calculate the CH_4emission factor due to APG flaring**
QC/QA procedures (to be) applied	-
Any comment	

Data/Parameter	ρ_{CO2}
Data unit	Kg/m^3
Description	Density of CO_2 under standard conditions
Time of determination/monitoring	Once, during determination
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)	1.842
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CO_2 is needed to calculate the CO_2 emission factor due to APG flaring
QC/QA procedures (to be) applied	-
Any comment	-

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	-
QC/QA procedures (to be) applied	Determined on the basis of the reference data
Any comment	

Data/Parameter	**Nc**
Data unit	unit
Description	Quantity of carbon moles in a mole of a component of APG
Time of determination/monitoring	constant
Source of data (to be) used	Chemical formulae
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO_2: 1 methane, CH_4: 1 ethane, C_2H_6: 2 propane, C_3H_8: 3 i-butane, C_4H_{10}: 4 n-butane, C_4H_{10}: 4 i-pentane, C_5H_{12}: 5 c-pentane, C_5H_{12}: 5 n-pentane, C_5H_{12}: 5 hexane, C_6H_{14}: 6 geptane, C_7H_{16}: 7 octane, C_8H_{18}: 8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Quantity of carbon moles in a mole of a component of APG is needed to calculate the CO_2 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	ε
Data unit	Fractions
Description	Unburned carbon factor for soot combustion of APG in flare units
Time of determination/monitoring	Annual
Source of data (to be) used	"Guidelines for Calculation of Air Pollutant Emission from APG Flaring" developed by the Scientific Research Institute for

	Atmospheric Air Protection in Saint-Petersburg, 1998
Value of data applied (for ex ante calculations/determinations)	0.035 (3.5%)
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The value is prescribed by the calculation guidelines. If U_{flow}< 0.2 U_{sound}, then the soot discharges that demonstrating incomplete burning of APG. In this case, under-firing coefficient equal to 0,035.
QA/QC procedures (to be) applied	Based on reference data
Any comment	-

The parameters monitored directly

Data/Parameter	V_{APG_PJ}
Data unit	Ths.m3 (under standard conditions)
Description	The main source of baseline emissions. This APG would be burned at the flare under the baseline,.
Time of determination/monitoring	Monthly
Source of data (to be) used	Gas meter GM868
Value of data applied (for ex ante calculations/determinations)	**2008**: 243659; **2009**: 219041; **2010**: 198284; **2011**: 190789; **2012**: 246686
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Data of 2008-2011 is actual, 2012 is planning.
QA/QC procedures (to be) applied	The main measuring instruments are calibrated and verified by "Tyumen Center for Standardization, Metrology and Certification"
Any comment	Using a sum of monthly volume APG as the annuals does not lead to a distortion of the result.

Data/Parameter	$W_{CO2,}$ W_{CH4} W_{VOC}
Data unit	%
Description	Necessary for calculating emissions when APG is flared at CCP
Time of determination/monitoring	Monthly
Source of data (to be) used	Flow Gas Chromatograph
Value of data applied (for ex ante calculations/determinations)	see table below

	2008	2009	2010	2011-2012
CO2	1,551%	1,362%	1,348%	1,344%
CH4	63,448%	65,293%	59,001%	60,509%
C2H6	7,058%	8,602%	13,618%	13,705%

	C3H8	17,603%	15,404%	17,256%	16,051%
	C4H10	3,004%	2,662%	2,731%	2,524%
	C4H10	4,855%	4,389%	4,215%	4,070%
	C5H12	0,000%	0,000%	0,000%	0,000%
	C5H12	0,374%	0,369%	0,214%	0,232%
	C5H12	0,254%	0,274%	0,146%	0,166%
	C6H14	0,000%	0,097%	0,001%	0,001%
	C7H16	0,000%	0,000%	0,000%	0,000%
	C8H18	0,000%	0,000%	0,000%	0,000%
	C9H20	0,000%	0,000%	0,000%	0,000%
	C10H22	0,000%	0,000%	0,000%	0,000%
	C11H24	0,000%	0,000%	0,000%	0,000%
	H2S	0,000%	0,000%	0,000%	0,000%
	N2	1,885%	1,622%	1,466%	1,387%
	O2	1,551%	0,000%	0,000%	0,000%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The parameter values for 2008-2011 are based on actual data. The values for 2012 are based on average annual values of 2008-2011.				
QA/QC procedures (to be) applied	The instrument is calibrated and verified by "Tyumen Center for Standardization, Metrology and Certification"				
Any comment	Using the average of APG composition for the year does not lead to a distortion of the result.				

Annex 3

MONITORING PLAN

- - - - -