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:

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The utilization of associated petroleum gas of the Yarayner oilfield of JSC "Gazpromneft-Noyabrskneftegaz"

Sectoral scopes:

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

Version 04
Date: 14.12.2011

A.2. Description of the project:

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The Yarayner oilfield is located in Pur district in 115 km eastward from the city of Noyabrsk, the Yamal-Nenets Autonomous Okrug (Area), Western Siberia. The oil field has been under development since 1970. Commercial production started in 2000. Currently the field is being developed and operated by JSC "Gazpromneft-Noyabrskneftegaz" (GPN-NNG), a subsidiary company of Moscow-based JSC "Gazpromneft".

In process of oil treatment at the booster pump station (BPS) the associated petroleum gas (APG) is separated from the crude oil, which is prior the realization of the project has been burned at the flare of the BPS-1 as the Company had no economic incentive to efficiently utilize it.

Project purpose

The project is aimed at the efficient utilization of associated petroleum gas (APG) that otherwise would have been flared at the BPS # 1 of the Yarayner oilfield and hence at reduction of GHG emissions. GPN-NNG expects that the sales of emission reduction units (ERUs) under Joint Implementation mechanism of Kyoto Protocol will improve the economic efficiency of the project.

Project description

Having at disposal a considerable APG resource Gazpromneft-Noyabrskneftegaz Company undertakes activities for its efficient utilization. For this purpose, the project envisages construction of new 55 km field gas pipeline with a diameter of 530 mm from the BPS-1 to the Vyngapur compressor station. See detailed layout of the project facilities at the Figure 4.2.3 below.

This pipeline provides APG transportation under the separation pressure to the Vyngapur compressor station (CS) which is located outside the project boundary. At the Vyngapur compressor station APG is treated under low-temperature separation with the yield of the dry gas. Further on the dry gas is compressed and is injected under high pressure into the main gas pipeline «Urengoy-Chelyabinsk».

Thus, capturing and feeding APG help diminish APG flaring and prevent GHG emissions including CO_2 (carbon dioxide) and CH_4 (methane) emissions.

APG pipeline to the Vyngapur CS is equipped with electricity-driven valves and gas flow switching points. Electricity for managing the pipeline valves and gas flow switching points is imported from the power grid. The compressors at Vyngapur CS are activated with the gas turbines that use as a fuel the part of APG coming in from the Yarayner field. The compressors provide the necessary pressure for further APG transportation through the main gas pipeline.

Project history:

February 2007. Presentation had been prepared by the date of Meeting of Investment Committee of JSC "Gazpromneft" with the estimates of the economic efficiency for APG utilization projects at Yarayner and other oil fields. It showed that these projects are economically unprofitable, but due to considerable GHG emission reductions the purpose of using the earnings from ERUs sales for improving the economic efficiency of the projects was set. Therefore, by decision fixed in the Minutes of the Meeting of Investment Committee # 6 taking place at JSC "Gazpromneft" on 16.02.2007 it was determined to implement this project with applying the norms of the Kyoto Protocol.

April 2007. Cost estimate documentation for the project was approved.

May 2007. Construction works started.

August 2007. Commissioning of the project took place on 31.08.2007.

Baseline scenario

Under the baseline scenario all extracted APG at the BPS-1 of Yarayner oilfield would have been flared that would lead to considerable emissions of GHG gases including CO_2 и CH_4 (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: **488** mln. 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 **1242214** tons of CO_2 equivalent in the period 2008-2012.

A.3. Project participants:

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Party involved	**Legal entity project participant (as applicable)**	**Please indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Party A - Russian Federation (Host Party)	JSC Gazpromneft-Noyabrskneftegaz	No
Party B – no	-	-

A.4. Technical description of the project:

A.4.1. Location of the project:

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A.4.1.1. Host Party(ies):

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Russian Federation

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

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The project is being realized in Pur district, Yamal-Nenets Autonomous Okrug (YNAO), Tyumen oblast, which is a subject of the Russian Federation. YNAO is located in the Arctic zone of West-Siberian Plain and occupies a vast area of 769,250 square kilometres. The capital of YNAO is the city of Salekhard that is located 1976 km north-east from Moscow. The population of YNAO is 543,651 people. It is more than a half of YNAO is located behind the Polar Circle; a smaller part is situated at east side of Ural Mountains.

Figure A 4.1.2. Yamal Nenets Autonomous Okrug on the map of Russian Federation

Permafrost and proximity to the Kara sea determines the local climate that is characterized by lengthy winters (up to 8 months), short summers, strong winds and small depth of snow cover.
A main natural wealth of YNAO is the huge resource of hydrocarbons including gas, oil and condensate. YNAO is the world's largest gas province.

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

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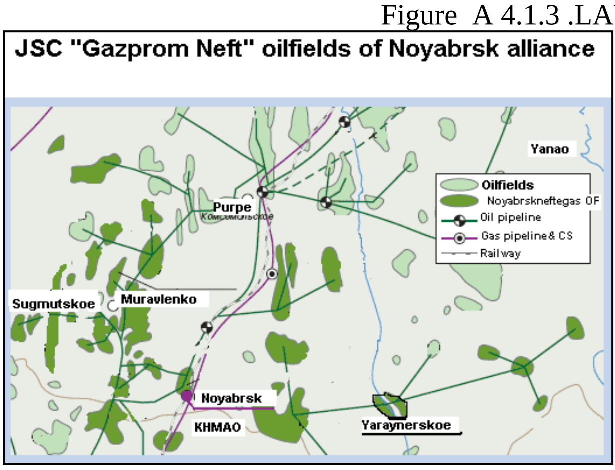
Figure A 4.1.3 .LAYOUT of PUR DISTRICT



Yarayner oilfield located in Pur district, YNAO, in 115 km eastward from the city of Noyabrsk. 90% of oil and 50% of gas is produced on the territory of the Pur district. Out of 175 gas, gas-condensate and oil fields explored in YNAO 114 fields are located on the territory of the Pur district.

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

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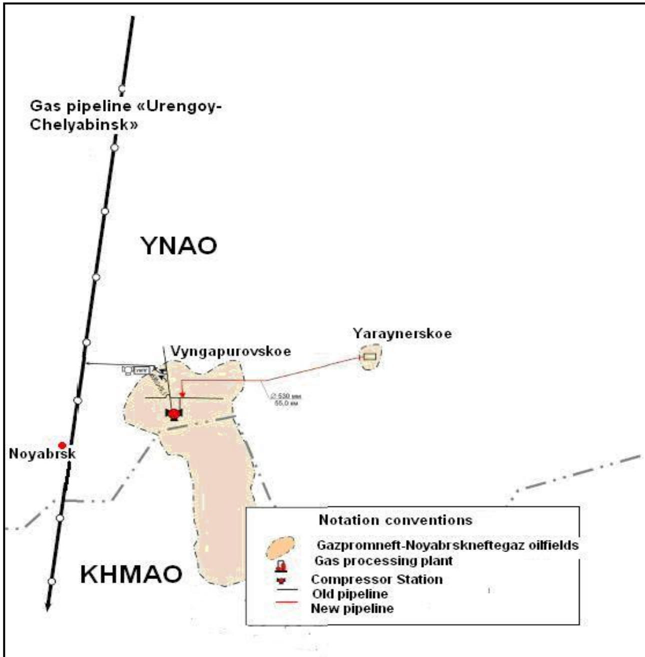
Figure. A.4.1.4. Schematic diagram of the project activity



APG from the exit from the BPS-1 under separation pressure (8atm.) is directed into new field gas pipeline (the total length of 55 km) and transported to the Vyngapur compressor station. Part of APG is flared at BPS-1.
Yarayner oilfield located in Pur district, YNAO, in 115 km eastward from the city of Noyabrsk.

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

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Process description

Project volume of APG at the exit from the BPS-1 under separation pressure (8 bar) feeds into the new 55 km field gas pipeline to the Vyngapur compressor station.

APG reaches the Vyngapur CS with the lower pressure (4.6 bar) where is mixed with APG coming in from the other fields. For subsequent transportation via the main pipeline APG needs treating and compressing.
The compression of the project's APG is carried out by the compressors activated by gas turbines that use the part of APG as a fuel. The treatment of APG is provided by the low-temperature separation method. After that the dry gas is fed into the main gas pipeline Urengoy-Chelyabinsk.

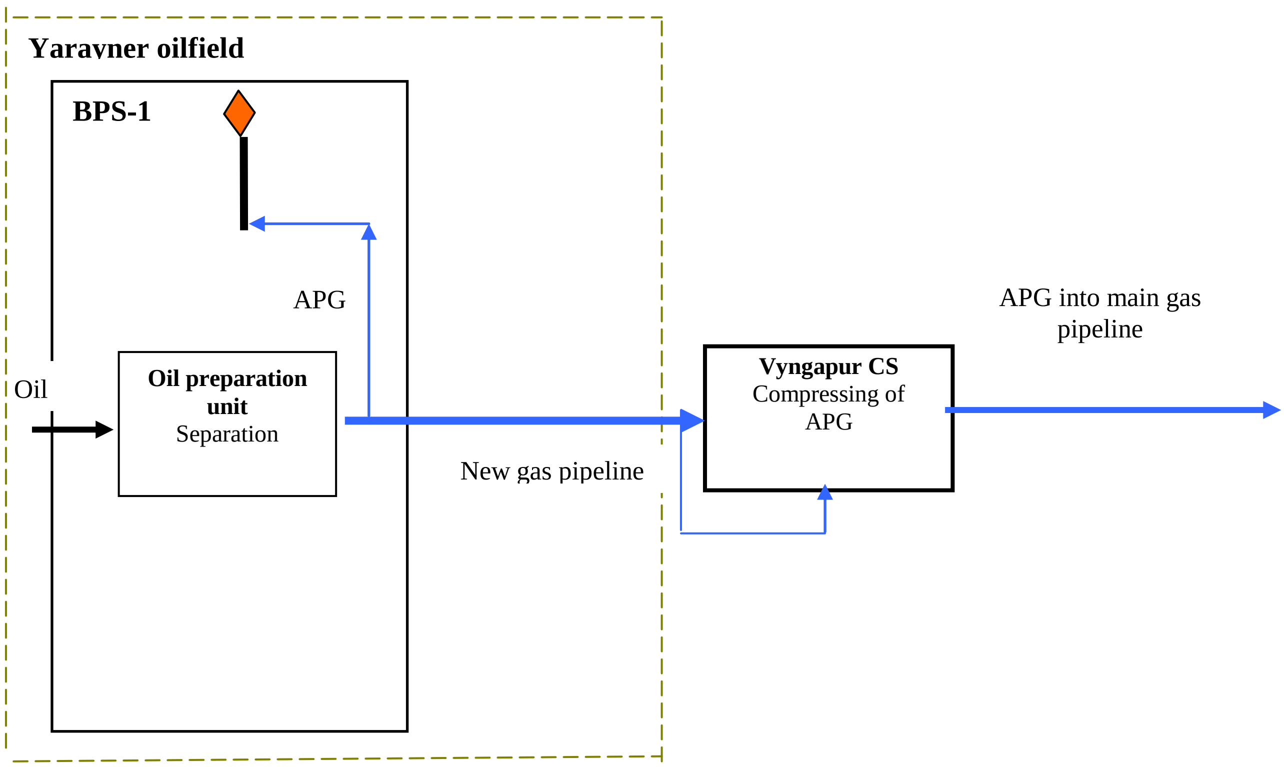
APG gas pipelines are equipped with electricity-driven valves and gas flow switching points. The electricity for managing the pipeline valves and gas flow switching points is imported from the regional power supplier, JSC «Tyumenenergo». Personnel passed training for operation of the gas pipeline installations in process of starting-up and adjustment works.

Implementation schedule of the project.
April 2007. Cost estimate documentation for the project was approved.
May 2007. Construction works started.
August 2007. Commissioning of the project took place on 31.08.2007.

Table A 4.2. Technical characteristics the project activity

#	Item	Value
1.	APG density	0.886 kg/m^3
2.	Initial outlet pressure at BPS-1of Yarayner oilfield	8 bar
3.	Inlet pressure at Vyngapur CS	4.6 bar
4.	Total length of the new gas pipeline	55 km
5.	Pipeline diameter and wall thickness:	530*8mm
6.	Maximum throughput capacity of the new gas pipeline	442 mln.m^3/year

Figure. A.4.2. APG utilization process layout



BPS – boost pumping station
APG – associated petroleum gas
CS – compressor station

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:

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Under the project activity the main volume of extracted APG that was previously flared will be efficiently used through injection into the new gas pipeline and transportation to the Vyngapur CS for the treatment with the yield of the dry stripped gas and for compressing it into the main gas pipeline. This will prevent the CO_2

and CH_4 emissions, which would have been under the baseline scenario in the case of flaring this APG volume on the BPS-1 stack. 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. According to information provided in such reliable sources as *Vedomosti* and *Reuters*, in 2009 APG flaring in the Russian Federation rose up to 64.3%[1] as compared with 24.4%[2] in 2006. It testifies for the insufficient enforcement of this requirement that cannot motivate the oil company to utilize APG efficiently. 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 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:

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	Years
Length of the crediting period: 2008-2012	5
Year	Estimate of annual emission reductions in tonnes of CO_2equivalent
2008	542869
2009	358381
2010	48855
2011	78909
2012	213200
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	1242214
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	248443

A.5. Project approval by the Parties involved:

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On September 15, 2011 the Chairman of the Russian Federation Government, V. Putin, signed Resolution 740 “On measures for realization of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change”. This document depicts the JI-project approval procedure in the Russian Federation.

[1] http://www.lenta.ru/news/2010/03/22/gas/

[2] http://ru.reuters.com/article/idRUANT32989120080213

According to item 8 of the Provision the approval of projects will be carried out by the Ministry of Economic Development of the Russian Federation subject to results of competitive selection of applications submitted by proponents of potential JI-projects. Competitive selection of demands is carried out by the operator of carbon units (Sberbank of RF) according to the item 5 of the Government Decree of the Russian Federation № 843.
The order of Ministry of Economic Development «On approval of competitive selection rules submitted for the purpose of the approval of projects implemented according to the article 6 of the Kyoto Protocol to the UN Framework Convention on Climate Change» defines requirements to a structure and a content of the application. 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:

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Description and justification of the baseline chosen will be provided based on provisions of Guidelines for users of the JI PDD form (version 04) and in accordance with appendix B of the JI guidelines and the “Guidance on criteria for baseline setting and monitoring” using the following JI-specific 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) *Analysis of the influence of the key factors on the alternatives.*
d) *Choosing the most plausible alternative scenario.*

The alternative that passes all mentioned stages is regarded as the baseline 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 at BPS-1 at the Yarayner oilfield.*

Alternative scenario 2. The project itself (without being registered as a JI activity) that is efficient utilization of APG, i.e. construction of the new gas pipeline from the BPS-1 of the Yarayner oilfield to Vyngapur CS for further feeding into the main gas pipeline.

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

Analysis does not consider variants related to installation of APG-fuelled power generating capacities, f. e. gas turbine&piston power plants. There is no deficit of power at the Yarayner oilfield, the electricity is imported from the centralized grid of «Tyumenenergo» and distributed through the well-developed transformation and distribution system.

The analysis also not consider variants related to the injection of APG to reservoir pressure maintenance as GPN-NNG uses water for reservoir pressure maintenance on Yarayner oilfield.

The analysis also does not consider variants related to the primary processing of APG on the Yarayner oilfield and the production of methanol, due to lack of potential customers near Yarayner oilfield as well as a significant removal of transport (nearest railway station located more over in 120 km).

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 BPS-1 at the Yarayner oilfield.*

GPN-NNG Company is producing oil and gas at Yarayner oilfield. In process of oil treatment at the BPS-1 associated petroleum gases are extracted from the crude oil, which is completely burnt at the BPS-1 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 BPS-1 of Yarayner oilfield in 2008-2012

Item	Unit	2008	2009	2010	2011	2012
BPS-1	ths. m^3	287563	245677	140887	113453	95514

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[3] and by partially revised Decree № 410 dd. 01/07/2005[4]. In below table the environmental payments made by GPN-NNG Company for APG flaring over the previous years are presented.

Table B 1.2. Environmental payments for APG flaring at BPS-1 of Yarayner oilfield[5]

Item	Unit	2008	2009	2010
Environmental Payments	ths rubles	687	742	636

The Governmental Regulation № 7 of the 8 January 2009 "On measures to stimulate the reduction of air pollution products from the flaring of associated gas in flares"[6] introduces new rules for the calculation of environmental payments for polluting emissions. As per Regulation the payments for polluting emissions starting with January 1, 2012, caused by APG flaring in quantities exceeding 5% of total APG recovered will be calculated as for above-limit emissions with the application of supplementary coefficient of 4.5 .

Under scenario 1 approximately 0.7 mln. m^3 of methane a year would be emitted in the atmosphere from 2012. In this case environmental payments would be about 0,55 million roubles a year or 4.5 million roubles for the period 2012-2020.

[3] Resolution dd. 12.06.2003 # 344 «On norms of payments for the emissions in atmospheric air of the polluting substances by stationary and mobile sources, for discharge of polluting substances in surface and underground water objects, for disposal of production and consumption waste»
[4] «On alterations in annex # 1 to the Decree of the Government of Russian Federation dd 12/06/2003 # 344»

[5] Information was presented by the environmental department of Gazpromneft-Noyabrskneftegaz Company

[6] http://government.ru/gov/results/6475/

Table B 1.3 Calculations of environmental payments for the APG flaring at BPS-1 of Yarayner 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 CH_4 emissions (governmental regulation №344 12 June 2009)[7]	Share of CH_4 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	1513	4,5	250	95	1.19
2013	1131				0.9
2014	903				0.7
2015	621				0.48
2016	378				0.3
2017	350				0.27
2018	320				0.25
2019	297				0.23
2020	279				0.22
	5794				**4.5**

Alternative scenario 2. The project itself (without being registered as a JI activity) that is efficient utilization of APG, i.e. construction of the new gas pipeline from the BPS-1 of the Yarayner oilfield to Vyngapur CS for further feeding into the main gas pipeline.

Implementation of this Scenario prevents the CO_2 and CH_4 emissions, which would have been under the scenario 1 in the case of flared this APG volume on the BPS-1 flares. This pipeline provides APG transportation under the separation pressure to the Vyngapur compressor station (CS) which is located outside the project boundary. At the Vyngapur compressor station APG is treated under low-temperature separation with the yield of the dry gas. Further on the dry gas is compressed and is injected under high pressure into the main gas pipeline «Urengoy-Chelyabinsk». The dry gas substitutes the consumption of the organic fuels such as the natural gas, fuel oil, gasoline etc. Therefore, this project is the resource saving activity that will not lead to recovery and consumption of additional fossil fuels.
The balance of APG at the Yarayner oilfield is presented in the following table:

Table B 1.4 The balance of utilized APG at BPS-1 of Yarayner oilfield

Item	2008	2009	2010	2011	2012
APG use, ths. m^3	209744	141618	19350	30989	86502

For realization of this alternative the sum of 680 mln. Rubles is necessary to invest.

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.:

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

- 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 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 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. For example, in 2009 seven biggest oil companies flared 19,96 bcm of APG or 64,3% of the overall APG recovery[8]. 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 GPN-NNG 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,

[8] Source of information - http://www.lenta.ru/news/2010/03/22/gas/

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 meets 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 GPN-NNG Company had to build a new 55km gas pipeline 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 at the Yarayner oil field, 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 680 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 680 million rubles to construct the new gas pipeline, the project represents a considerable financial risk due to the low economical 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

Regulated prices for APG at the entry of the gas processing plants are too low to encourage development of new APG transport facilities. According to the Regulation issued by the Ministry of Economic Development of Russian Federation "On wholesale prices for petroleum (associated) gas to be realized for gas treatment plants for further processing" APG price ranged within 73 – 442 rubles per ths. m^3 depending on liquids content. The APG price used in the investment analysis made for this project is 231 rubles per ths. m^3, which is too low to return investments (see section B2). Break-even point may be achieved at 1100 rubles per ths. m^3, which is close to the natural gas price on the domestic market.

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 B1.5. 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 BPS-1 of the Yarayner 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 2008-2010

Data/Parameter	ρ_{CH4}
Data unit	kg/m^3
Description	CH_4 density at standard conditions (temperature of 20 °C (293.15 K, 68 °F) and an absolute pressure of 101.325 kPa (14.696 psi, 1 atm).
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	Thermal Design of Boilers (Norm-based method), NPO CKTI, SPb, 1998
Value of data applied (for exante calculations/determinations)	0.668
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CH_4 density is necessary to calculate the emission factor for APG flaring
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	ρ_{CO2}
Data unit	kg/m^3
Description	CO_2 density at standard conditions (temperature of 20 °C (293.15 K, 68 °F) and an absolute pressure of 101.325 kPa (14.696 psi, 1 atm).
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	Thermal Design of Boilers (Norm-based method), NPO CKTI, SPb, 1998
Value of data applied (for exante calculations/determinations)	1.842
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CO_2 density is necessary to calculate the emission factor for APG flaring
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	**GWP_{CH4}**
Data unit	tCO_2/tCH_4.
Description	Global Warming Potential of methane required for the calculation of CH_4 emission factor from APG flaring at BPS-1,2,3,3A
Time of determination/monitoring	Constant
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 exante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Global Warming Potential of methane is needed to calculate the CH_4 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	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	Natural science
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO2: 1 methane, CH4: 1 ethane, C2H6: 2 propane, C3H8: 3 i-butane, C4H10: 4 n-butane, C4H10: 4 i-pentane, C5H12: 5 c-pentane, C5H12: 5 n-pentane, C5H12: 5 hexane, C6H14: 6 geptane, C7H16: 7 octane, C8H18: 8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Quantity of carbon moles in a mole of a component of APG is needed to calculate the CO2 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	Determined once at the PDD development stage
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
QA/QC procedures (to be) applied	Based on reference data and real data of flare stacks and shoot calculation
Any comment	-

Data/Parameter	NCV_{NG}
Data unit	Kcal/m3
Description	Net calorific value of the natural gas recommended of GOST
Time of determination/monitoring	Constant
Source of data (to be) used	(GOST 5542-87)
Value of data applied (for exante calculations/determinations)	7600
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Used data are verified information from the official source of the GOST.
QC/QA procedures (to be) applied	Used data are verified information from the official source of the GOST
Any comment	-

Data/Parameter	**SECp**
Data unit	kWt/ths.m3
Description	Average energy consumption to gas compressing&processing at oil&gas treatment plant of Sibur with standart efficiency
Time of determination/monitoring	Annual
Source of data (to be) used	Annual technical documentation at GPP
Value of data applied (for exante calculations/determinations)	**2008**: 475; **2009**: 475; **2010**: 475; **2011**: 475; **2012**: 475
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Necessary to calculate the electricity consumption at GPP. The chemical composition to 2008-2010 based on real measured data at CS. Data to 2011-2012 based on average annual data from real period 2008-2010
QC/QA procedures (to be) applied	Based on measurements carried out by the GPP. All measurements are conducted with instruments calibrated and attorneys' Tyumen center of standardization, metrology and certification ".
Any comment	-

The parameters to be directly monitored

Data/Parameter	**FC**$_{APG,PJ}$				
Data unit	Ths.m^3 (under standard conditions)				
Description	The volume of transported APG *at* BPS-1 of the Yarayner oilfield to Vyngapur CS The main source of baseline emissions. Transported APG in the baseline would be burned in flares				
Time of determination/monitoring	Monthly				
Source of data (to be) used	Calculated parameter based on measured at flare stacks and oilfield boiler house				
Value of data applied (for exante calculations/determinations)	**2008**	**2009**	**2010**	**2011**	**2012**
	209744	141618	19350	30989	86502
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all transported APG is needed for baseline emissions calculation.				
QC/QA procedures (to be) applied	Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”				
Any comment	-				

Data/Parameter	**FC**$_{APG,All}$				
Data unit	Ths.m^3 (under standard conditions)				
Description	All volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield				
Time of determination/monitoring	Monthly				
Source of data (to be) used	Metran 350				
Value of data applied (for exante calculations/determinations)	**2008**	**2009**	**2010**	**2011**	**2012**
	287563	245677	140887	113453	95514
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all high pressure APG is needed for emissions reduction calculation.				
QC/QA procedures (to be) applied	Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”				
Any comment	-				

Data/Parameter	**FC**$_{APG,F}$
Data unit	Ths.m^3 (under standard conditions)

<table>
<tr><td>Description</td><td>Volume of high pressure APG from 1^{st} stage of separation on BPS-1 of Yarayner oilfield delivered to flare</td></tr>
<tr><td>Time of determination/monitoring</td><td>Monthly</td></tr>
<tr><td>Source of data (to be) used</td><td>Metran 350</td></tr>
<tr><td>Value of data applied (for exante calculations/determinations)</td><td><table><tr><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr><tr><td>77819</td><td>104059</td><td>121537</td><td>82464</td><td>9012</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>The volume of high pressure APG delivered to flare is needed for emissions reduction calculation.</td></tr>
<tr><td>QC/QA procedures (to be) applied</td><td>Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameter</td><td>$\mathbf{FC}_{APG,boier\ house}$</td></tr>
<tr><td>Data unit</td><td>Ths.m^3 (under standard conditions)</td></tr>
<tr><td>Description</td><td>Volume of high pressure APG from 1^{st} stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house</td></tr>
<tr><td>Time of determination/monitoring</td><td>Monthly</td></tr>
<tr><td>Source of data (to be) used</td><td>Jumo dtrans p02</td></tr>
<tr><td>Value of data applied (for exante calculations/determinations)</td><td><table><tr><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr><tr><td>0,000</td><td>0,000</td><td>5000</td><td>0,000</td><td>0,000</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>The volume of high pressure APG delivered to boiler house is needed for emissions reduction calculation.</td></tr>
<tr><td>QC/QA procedures (to be) applied</td><td>Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameter</td><td>Chemical composition of APG at BPS-1</td></tr>
<tr><td>Data unit</td><td>%</td></tr>
<tr><td>Description</td><td>Chemical composition (under standard conditions) of APG required for the calculation of emissions factor from flaring at BPS-1</td></tr>
<tr><td>Time of determination/monitoring</td><td>Mountly</td></tr>
<tr><td>Source of data (to be) used</td><td>Gas chromatograph Crystallux 4000M Color 800</td></tr>
<tr><td>Value of data applied (for exante calculations/determinations)</td><td><table><tr><th colspan="2">2008</th><th>2009</th><th>2010</th><th>2011-2012</th></tr><tr><td>Carbon dioxide, CO2</td><td>0,746%</td><td>0,745%</td><td>1,089%</td><td>0,86%</td></tr><tr><td>methane, CH4</td><td>81,480%</td><td>80,954%</td><td>82,351%</td><td>81,59%</td></tr></table></td></tr>
</table>

	ethane, C2H6	6,147%	5,869%	4,264%	5,43%
	propane, C3H8	5,105%	5,071%	4,246%	4,81%
	i-butane, C4H10	1,512%	1,518%	1,903%	1,64%
	n-butane, C4H10	2,060%	1,950%	1,537%	1,85%
	neo-pentane C5H12	0,002%	0,000%	0,000%	0,00%
	i-pentane, C5H12	0,674%	0,716	0,866%	0,75%
	n-pentane, C5H12	0,678%	0,856%	1,162%	0,90%
	hexane, C6H14	0,542%	1,348%	0,860%	0,92%
	geptane, C7H16	,000%	0,000%	0,000%	0,00%
	octane, C8H18	0,000%	0 000%	0,000%	0,00%
	Nonane C9H20	0,000%	0,000%	0,000%	0,00%
	Decan C10H22	0,000%	0,000%	0,000%	0,00%
	u-decan C11H24	0,000%	0,000%	0,000%	0,00%
	hydrog n sulfide, H2S	0,000%	0,000% 0,000%	0,000% 1,585%	0,00% 0,85%
	nitrogen, N2	0,955%	0,897%	0,009%	0,30%
	oxygen, O2	0,008%	0,028%		
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The chemical composition is needed to identify the volume fraction of carbon, methane and VOC and calculate the GHG emission rates due to the combustion of the given gas. Data from 2008-2010 are real measured, data to 2011-12 are annual average data based on 2008-2010				
QC/QA procedures (to be) applied	Equipment are verified and calibrated "Tyumen center for standardization, metrology and certification				
Any comment	-				

Data/Parameter	Global Warming Potential of methane
Data unit	tCO_2/tCH_4.
Description	Global Warming Potential of methane required for the calculation of CH4 emissions factor from APG flaring at BPS-1
Time of determination/monitoring	Constant
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 exante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Global Warming Potential of methane is needed to calculate the CH_4 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	-
Any comment	-

<table>
<tr><td>Data/Parameter</td><td>Methane emission factor by APG flaring at BPS-1</td></tr>
<tr><td>Data unit</td><td>tCO_2e/ths. m^3</td></tr>
<tr><td>Description</td><td>Methane emission factor is needed to calculate the GHG emission rates due to the flaring of APG at BPS-1</td></tr>
<tr><td>Time of determination/monitoring</td><td>Monthly</td></tr>
<tr><td>Source of data (to be) used</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2, Energy, Chapter 4 (Subsection 4.2. “Fugitive emissions from oil and natural gas systems”, adapted equations 4.2.4 page 4.45).</td></tr>
<tr><td>Value of data applied (for exante calculations/determinations)</td><td><table><tr><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr><tr><td>0,400</td><td>0,397</td><td>0,404</td><td>0,401</td><td>0,401</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>Methane emission factor is needed to calculate the GHG emission rates due to the flaring of APG.</td></tr>
<tr><td>QC/QA procedures (to be) applied</td><td>-</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameter</td><td>SFCgt</td></tr>
<tr><td>Data unit</td><td>m3/m3</td></tr>
<tr><td>Description</td><td>Specific fuel consumption at Vyngapur CS for compression of the APG supplied under project activity</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annual</td></tr>
<tr><td>Source of data (to be) used</td><td>Technical documentation at Vyngapur CS. To be monitored because the amount of gas pumped gas affects the value of specific fuel consumption of the compressor station.</td></tr>
<tr><td>Value of data applied (for exante calculations/determinations)</td><td><table><tr><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr><tr><td>0,0662</td><td>0,0824</td><td>0,0786</td><td>0,0757</td><td>0,0757</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>Necessary to calculate the fuel consumption at Vyngapur CS</td></tr>
<tr><td>QC/QA procedures (to be) applied</td><td>Based on measurements carried out by the CS. All measurements are conducted with instruments calibrated and attorneys' Tyumen center of standardization, metrology and certification ".</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

Data/Parameter	Chemical composition of pumped APG at Vyngapur CS
Data unit	%
Description	Chemical composition of pumped APG at Vyngapur CS

Time of determination/monitoring	Monthly
Source of data (to be) used	Gas chromatograph Crystallux 4000M Report on the composition of gas from an accredited chemical-analytical laboratory. Ltd." The Noyabrskiy GPP. "
Value of data applied (for exante calculations/determinations)	see table below
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The chemical composition is needed to identify the volume fraction of carbon, methane and VOC and calculate the GHG emission rates due to the combustion of the gas (APG). Data from 2008-2010 are real measured, data to 2011-12 are annual average data based on 2008-2010
QC/QA procedures (to be) applied	Equipment are verified and calibrated «Tyumen center for standardization, metrology and certification»
Any comment	-

	2008	2009	2010	2011-2012
Carbon dioxide, CO2	0,283%	0,215%	0,108%	0,202%
methane, CH4	76,224%	76,441%	76,123%	76,263%
ethane, C2H6	7,768%	8,034%	8,198%	8,000%
propane, C3H8	8,235%	8,196%	8,453%	8,294%
i-butane, C4H10	1,710%	1,673%	1,630%	1,671%
n-butane, C4H10	2,430%	2,427%	2,470%	2,442%
neo-pentane C5H12	0,000%	0,000%	0,000%	0,000%
i-pentane, C5H12	0,538%	0,483%	0,468%	0,496%
n-pentane, C5H12	0,489%	0,429%	0,415%	0,444%
hexane, C6H14	0,378%	0,345%	0,326%	0,350%
geptane, C7H16	0,000%	0,000%	0,000%	0,000%
octane, C8H18	0,000%	0,000%	0,000%	0,000%
Nonane C9H20	0,000%	0,000%	0,000%	0,000%
Decan C10H22	0,000%	0,000%	0,000%	0,000%
u-decan C11H24	0,000%	0,000%	0,000%	0,000%
hydrogen sulfide, H2S	0,000%	0,000%	0,000%	0,000%
nitrogen, N2	1,839%	0,000%	1,728%	1,189%
oxygen, O2	0,113%	1,714%	0,090%	0,639%

Data/Parameter	Eproc
Data unit	%
Description	Loss coefficient of methane from the preparation and compressing of APG at Vyngapur CS
Time of determination/monitoring	Annual
Source of data (to be) used	Annual technical documentation at Vyngapur CS
Value of data applied (for exante calculations/determinations)	see table below
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Necessary to leakage calculate at processing operations at Vyngapur CS

2008	2009	2010	2011	2012
0,60%	1,41%	0,79%	0,70%	0,70%

QC/QA procedures (to be) applied	Based on measurements carried out by the CS. All measurements are conducted with instruments calibrated and attorneys' Tyumen center of standardization, metrology and certification ".
Any comment	-

Baseline emissions from APG flaring (taking into account incomplete burning) at BPS-1 of Yarayner oilfield

$$\mathbf{BE = FC}_{APG,PJ} \mathbf{* (\sum av\ EF_{CO2,APG} + \sum av\ EF_{CH4,F})} \qquad (1)$$

BE – baseline emission from APG flaring, tCO_2.

$\mathbf{FC}_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

$$\mathbf{FC}_{APG,PJ} = \mathbf{FC}_{APG,All} - \mathbf{FC}_{APG,F} - \mathbf{FC}_{APG,boier\ house} \qquad (2)$$

$\mathbf{FC}_{APG,All}$ – all volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield, ths.m3

$\mathbf{FC}_{APG,F}$ – volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to flare, ths.m3

$\mathbf{FC}_{APG,boier\ house}$ - volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house, ths.m3

$\sum$**av** $\mathbf{EF_{CO2,APG}}$ – annual average CO_2 emission factor by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2/ths. m^3

$\sum$**av** $\mathbf{EF_{CH4,F}}$ – annual average CH_4 emission factor (in terms of CO2 equivalent) by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2e/ths. m^3

$$\mathbf{\sum av\ EF_{CO2,APG} = \sum cp(y_{CO2} + (Nc_{CH4} * y_{CH4} +} \sum j Nc_{VOCj} \mathbf{*} y_{VOC\ i}\mathbf{)) * \rho_{CO2} * FE_f} \qquad (3)$$

y_{CO2}, y_{CH4} y_{VOC} – annual average volumetric fractions of carbon, methane and volatile organic compounds VOC in APG at BPS-1 Yarayner oilfield bases on monthly data of APG (methane) composition at BPS-1, (information source – gas test protocol).

Nc_{CH4}, $\sum$**j**Nc_{VOCj} – quantity of carbon moles in a mole of methane and VOC accordingly ($\sum$**j**Nc_{VOCj} where j is the singular volatile hydrocarbon component.)

ρCO2 – CO_2 density at 20°C is taken equal to 1.842 kg/m3.

FEf –efficiency of APG combustion in a flare is taken equal to 0.965

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

$$\mathbf{\sum avEF_{CH4,F} = \sum_{cp} y_{CH4} * \rho_{CH4} * (1-FE) * GWP_{CH4}} \qquad (4)$$

$\mathbf{y_{CH4}}$– annual average volumetric fractions of methane in APG at BPS-1 Yarayner oilfield bases on monthly data of methane composition at BPS, (information source – gas test protocol at standard conditions).

$\mathbf{\rho_{CH4}}$– the density of methane CH4 under standard conditions, equal to 0.668 kg/m^3

FE - APG flaring efficiency, equal to 0,965

$\mathbf{GWP_{CH4}}$ – global warming potential for methane, equal to 21 tCO_2/tCH_4

Emissions outside the project boundary associated with the baseline come from the following sources:

Leakage effect is determined as net change of antropogenic emissions outside the project boundary:

$$\mathbf{LE = LE_{BL} - L} \qquad (5)$$

Where:
$\mathbf{LE_{BL}}$ -is the emissions outside the project boundary that would have occurred without project activity
L - is the emissions outside the project boundary occur due to the project.

Total emissions outside the project boundary that would have occurred without project activity:

$$\mathbf{LE_{BL} = LE_{NG,rec} + LE_{NG\ GT}} \qquad (6)$$

<u>Emissions due to production of the natural gas at gas fields</u>

The emissions are determined by the following formula:

$$\mathbf{LE_{NG,rec} = FC_{APG\_PJ} * EF_{NG\ prod} * GWP_{CH4}} \qquad (7)$$

$\mathbf{FC_{APG,PJ}}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

$\mathbf{EF_{NG\ prod}}$ –coefficient of losses from natural gas production operations provided by annual GAZPROM ENVIRONMENTAL REPORT, %

$\mathbf{GWP_{CH4}}$ – is the global warming potential for methane, equal to 21tCO_2/tCH_4.

Leakage due to combustion of the natural gas in gas turbines at gas treatment plants

$$\mathbf{LE_{NG\ GT} = (SFC_{GT} * FC_{APG\_PJ} * EF_{CO2,GT})/l_{com}} \qquad (8)$$

$\mathbf{SFC_{GT}}$ is a specific fuel consumption (natural gas) in modern gas turbines for compressing and processing of natural gas supplied to a gas treatment plant, in m3 NG combusted/ths.m3 NG compressed, calculated parameter :

$$\mathbf{SFC_{GT} = ((SEC_p * C)/\acute{\varepsilon}_{modern\ GT})/NCV_{NG}} \qquad (9)$$

$\mathbf{SEC_p}$ is average energy consumption to gas compressing&processing at oil&gas treatment plant of Sibur with standart efficiently, kWh/ths.m3

C is coefficient of conversion from kWh to cal, 1kWh=0,86*10^6 cal

$\mathbf{\acute{\varepsilon}_{modern\ GT}}$ is a efficiency of modern gas turbine, taken =34% (this value is close to the equivalent thermal efficiency of electric grid Ural with emission factor 0,606 tCO2/MWh)

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

$\mathbf{EF_{CO2,GT}}$ – CO_2 emission factor due to the natural gas combustion in gas turbine drives at gas treatment plant, tCO_2/ths. m^3

$$\mathbf{EF_{CO2,GT} = (y_{CO2\ ng} + (Nc_{CH4} * y_{CH4\ NG} + \sum Nc_{VOC} * y_{VOC\ NG})) * \rho_{CO2} * FE_{GT}} \qquad (10)$$

$y_{CO2\ NG}$, $y_{CH4\ NG}$, $y_{VOC\ NG}$ – volume fraction of carbon, methane and VOC of natural gas in a plant for processing gas[9];

Nc_{CH4}, $\sum Nc_{VOC}$ – number of moles of carbon in methane and VOC accordingly. ($\sum Nc_{VOC}$ where j is the singular volatile hydrocarbon component)

ρ_{CO2} – density of CO_2 at 20°C is assumed to be 1.842 кг/м^3.

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

$\mathbf{l_{com}}$ is a specific coefficient of correction at first pressure at gas turbine work (average natural gas pressure at wells is 50ata-APG from 1st stage of separation-7ata), calculated parameter

$$\mathbf{l_{com} = ((P_{2\,p}/P_{1\,ng})\wedge((1{,}31-1)/1{,}31))-1\ ) / ((P_{2\,p}/P_{1apg})\wedge((1{,}31-1)/1{,}31))-1)} \qquad \mathbf{(11)}$$

1,31 – adiabat of methane (CH4)

$\mathbf{P_{2\,p}}$- pressure inlet at gas pipeline, 75 ata (Gazprom pressure standard of gas transport)

$\mathbf{P_{1\,ng}}$ – average pressure of natural gas at main gas well of Urengoy region, calculated parameter (50 ata at 2008 year)[10]

$\mathbf{P_{1\,apg}}$– average pressure of APG at 1 stage of separation of BPS-1 of Yarayner oilfield, project parameter (8 ata)[11].

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 02. 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

[9] Typical composition of the natural gas is as follows: 91,9% CH4, 0,58% CO2, 0,68% N2 and 6,84% non-methane hydrocarbons by volume). Information source: IPCC 2006 Volume 2 Chapter 4, p. 4.58, Table. 4.2.4.

[10] http://www.indpg.ru/nefteservis/2008/04/20007.html. Table 1-Текущее устьевое давление, ата

[11] Technical information of project pipeline and BPS, ата

Finally, the explanations are presented on how GHG gases emission reductions are achieved

Below this approach is provided in the greater detail.

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 a economic efficiency indicator as net present value (NPV). Estimation of investment attractiveness of the project was made by specialists of JSC GPN-NNG with the involvement of the central office of JSC Gazprom neft.

For estimation capital investments of 680 million rubles (less VAT) spent for construction of the new gas pipeline from Yarayner oilfield to Vyngapur CS were taken into account. The project starts in 2008 and ends in 2020 with 207 million m^3 of APG utilized in 2008 at maximum with a decline to minimal value of 80,6 million m^3 in 2020. As per order of Ministry of Economic Development of Russian Federation the APG sale price is 231 rubles per thousand m^3 which is the base price[12]. Also further calculations were provided to evaluate the project's efficiency at the two-fold increased APG price and to find the project's break-even point. Discount rate is 15%.

The outcomes of the estimations are presented in the following table:

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

APG sale price	NPV
231 rubles/ths m^3 Base price	-602,2 mln rubles
462 rubles/ths m^3	-425,8 mln rubles
1100 rubles/ths m^3	0 mln rubles

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.
2. Even two-fold increase of APG sale price cannot provide the positive value of the project' NPV.

[12] Order of the Ministry of Economic Development and Trade dd. 30/04/2002 # 117

3. Break-even point (when NPV = 0) may be reached at APG sale price equal to 1100 rubles/ths m^3. But this price is beyond of APG price span set by the Ministry; therefore it cannot be applicable for the estimations.

Sensitivity analysis

The sensitivity analysis is made with the use of the economical spreadsheet model developed by GPN 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 price and operational costs were assessed. The results of the analysis are presented in the table below.

Table B 2.1. Results of sensitivity analysis

Deviation	Investment	APG price	Opex
-50%	-240 181	-602 203	-577 754
-40%	-310 452	-602 203	-582 644
-30%	-381 035	-602 203	-587 534
-20%	-454 163	-602 203	-592 423
-10%	-528 183	-602 203	-597 313
0%	-602 203	-602 203	-602 203
10%	-676 223	-602 203	-607 093
20%	-750 243	-602 203	-611 982
30%	-824 263	-602 203	-616 872
40%	-898 283	-602 203	-621 762
50%	-972 303	-602 203	-626 652

Thus, even considerable deviations (from -50% till +50%) 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 m^3 in 2006[13] till 19,96 m^3 in 2009[14]. Simultaneously, APG recovery dropped from 57,9 bln m^3 in 2006 to 31 bln m^3 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

[13] http://ru.reuters.com/article/idRUANT32989120080213

[14] Source of information - http://www.lenta.ru/news/2010/03/22/gas/

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;
- 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 2006-2009. 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.

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

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 №CLX 11768 NE from 01.10.2003 for the development of Yarayner oilfield.
- Protocol of investment committee № 6 of Gazprom-Neft, Moscow, dated 16.02.2007.
- Presentation to investment committee № 6 of Gazprom-Neft, Moscow

Explanations on how GHG gases emission reductions are achieved

Baseline emissions

Under the baseline scenario extracted APG at BPS-1 of Yarayner oilfield (and which is used in the project) would be flared. At that GHG gases including carbon dioxide CO_2 and methane CH_4 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 3.5% is not burned completely, which causes methane emissions to the atmosphere. CO_2 emissions and CH_4 emissions (in terms of CO_2 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 injection into the field gas pipeline and transportation to Vyngapur CS with further delivery to the main gas transmission system.
Calculation of the emissions that occur in the outside power system to supply the electricity for managing the pipeline valves are not taken into account because these are negligibly small (less than 1% of project emissions)[15].
Under the project activity APG will be efficiently used through injection into the field's gas pipeline system and transportation to the gas processing plant (GPP). Therefore, CH4 physical leaks from APG transportation into new gas pipeline to Vyngapur CS are taken place in this situation. The quantitative assessment provided shows that these emissions are significant (higher than 2000 tCO2 a year), and hence must be taken into account for CO2 emission reductions calculation.)

Leakage

Leakage effect is estimated as the net change in GHG emissions occurred outside the project boundary.

Emission sources outside the project boundary attributable to the project activity

Project

However, there will be emissions outside the project boundary (leakage) from the combustions of the small part of utilized APG at the Vyngapur CS (in the gas turbine engines) needed for APG compressing to the main gas transmission pipeline.
APG amount for combustion is determined by multiplying APG used in the project by the specific APG consumption coefficient. CO_2 emissions outside the project boundary (leakage) are determined as a product of the APG fuel combustion for compressing and the value of CO_2 emission factor.

*Emissions outside the project boundary attributable to the Baselin*e

Baseline consumers put the volume of natural gas energy equivalent is equal to the volume of associated gas project useful utilization by injection into the gas main pipeline.

[15] See Yarayner APG utilization_model.xls

Accordingly, the extraction of natural gas will emit in the form of physical loss of methane. Also, emissions will occur during the preparation of natural gas at stations of gas treatment in the form of combustion of the gas by the fuel at gas turbine compressors gear.

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 [16]
		CH_4	Included	Incomplete burning (3.5% of APG volume to be flared)
Project	Methane emissions that occur during transportation of APG through new pipeline to Vyngapur CS	CO_2	not included	Negligibly small
		CH_4	Include	Main project emission source
		N_2O	not included	Negligibly small

[16] See Sugmut APG utilization_model.xls

Scenario	Source	GHG type	Included/ not included	Comment
Emission sources outside the project boundary attributable to the project activity	Energy production (that is APG combustion in the gas turbines) for the compression of the APG coming in under project activity	CO2	Include	Main leakage source
	Methane (CH4) physical leaks during APG processing at Vyngapur CS;	CH_4	Include	Main leakage source (physical leaks)
	Methane (CH4) physical leaks during transportation of the stripped dry gas through the trunk gas pipeline.	CH_4	not included	Negligibly small
Emissions outside the project boundary attributable to the Baseline	NG production (well losses)	CO_2	not included	Negligibly small
		N_2O	not included	Negligibly small
		CH_4	Included	Main leakage source
	NG processing (burning of fuel gas at gas turbine gear of gas treatment plant)	CO_2	Included	Main leakage 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 02) 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.[17] The project provides for APG consumption at Vyngapur CS as a result of the compression and treatment of APG coming in under project activity, and hence CO2 emissions. The main emissions potentially attributable to leakage in the context of the project are emissions arising from:

1. APG combustion in the gas turbines for the compression of the APG coming in under project activity The quantitative assessment provided shows that these emissions are significant (higher than 2000 tCO_2 a year), and therefore must be taken into account for GHG emission reductions calculation.

2. Methane (CH_4) physical leaks during APG compression and treatment at CS. The quantitative assessment provided shows that these are negligibly small (less than 2000 tCO_2) [18], and hence they are neglected.

3. Methane (CH_4) physical leaks during transportation of the stripped dry gas through the trunk gas pipeline. The dry gas will displace an equivalent quantity of the natural gas by end customers that would be otherwise used. As the equivalent amount of natural gas would be transported under the baseline, the leaks in the both scenarios are equal, which do not lead to additional emissions. Therefore these emissions can be neglected.

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

- Methane (CH4) leaks due to production of natural gas at gas fields.
- Emissions due to combustion of the natural gas in gas turbines at gas treatment plants.

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

4. The project provides for the decrease of NG consumption at the end-users that commercial APG will displace an equivalent quantity of the natural gas delivered otherwise to end customers, therefore to reduce emissions from natural gas production and processing. 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.

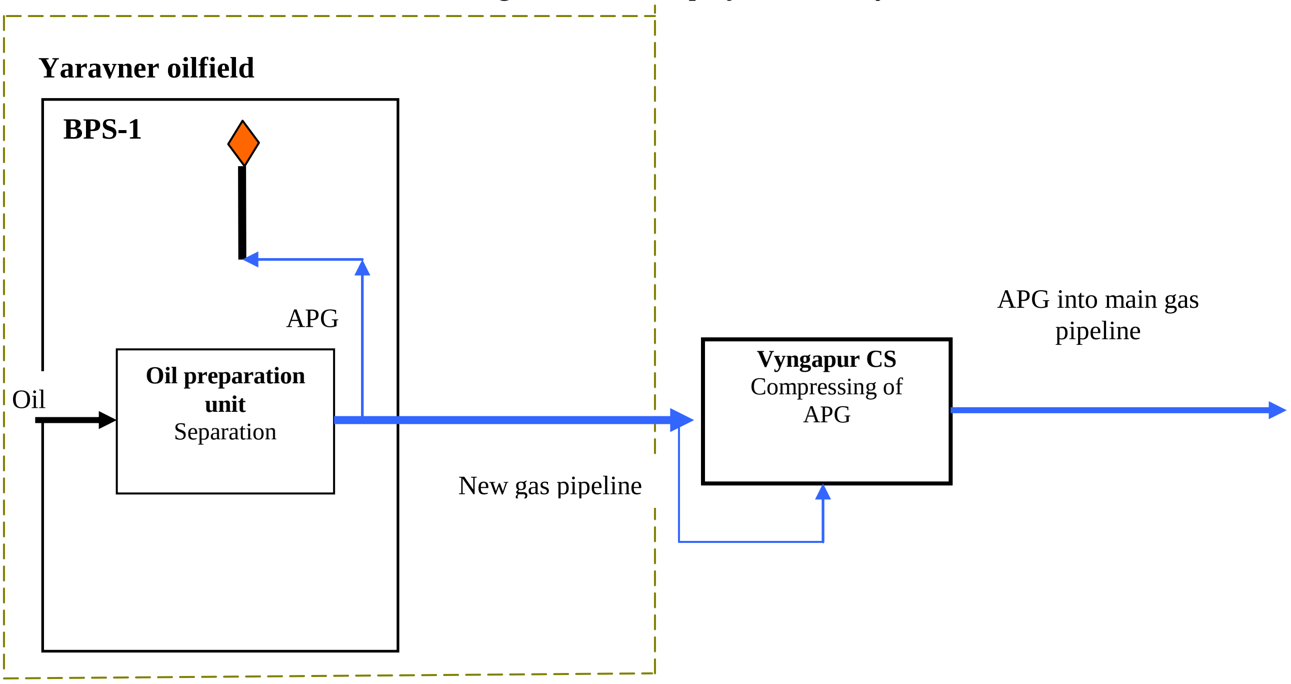
5. Commercial APG will displace an equivalent quantity of the natural gas delivered otherwise to end customers. As the equivalent amount of natural gas would be transported under the baseline, the leaks in the both scenarios are equal, which do not lead to additional emissions. Therefore these emissions can be neglected.

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

[18] See Yarayner APG utilization_model.xls

Schematically the project boundary embrace BPS -1 of Yarayner oilfield including new gas pipeline.

Figure B.3.1. The project boundary



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

>>

Date of baseline setting: 20.10.2010.

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

Contact persons:

Marat Latypov
Head of Project Development Department
Tel +7 499 788 78 35 ext 103
E-mail: LatypovMF@ncsf.ru

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

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's starting date is 01.05.2007. This date corresponds to the beginning of the gas pipeline construction works.

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

Expected operational lifetime of the project is 14 years or 168 months: from 01.05.2007 till 01.05.2020

C.3. Length of the crediting period:

>>

Crediting period is determined within the budget period of Kyoto Protocol from 01.01.2008 till 31 December 2012 and making 5 years or 60 months.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

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For description and justification of the monitoring plan it is a JI specific approach is used for this project. This approach is based on the provisions of the Section D (Monitoring Plan) of JI guidelines on baseline setting and monitoring and includes the following steps:

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

Step 2. Application of the approach chosen

Below the approach chosen is provided in a greater detailed.

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

GHG emission sources

Baseline emissions

Under the baseline scenario the extracted APG at the BPS-1 of Yarayner oilfield would have been flared that would lead to considerable emissions of GHG gases including CO_2 и CH_4. Atmospheric CH_4 emissions occur due to incomplete combustion of APG at the flare. Due to incomplete combustion of APG flaring part of APG extracted to the atmosphere is not oxidizing. NII Atmosphere methodic determines the efficiency of underburning 3.5% is not burned completely, which causes methane emissions to the atmosphere.

Project emissions

Physical leaks of methane through the pipeline walls are taken into account because the quantitative assessment provided shows that these emissions are significant (higher than 2000 tCO2 a year), and hence must be taken into account for CO2 emission reductions calculation.

Emissions outside the project boundary occur due to the project

Energy for the compression and treatment of APG at Vyngapur CS also leads to GHG emissions at Vyngapur CS, because they are resulted from the APG combustion in gas turbine engines. As these emissions are considerable, therefore they are considered for calculations. At Vyngapur CS the project's APG is treated with the yield of the dry gas, which is compressed and under high pressure is fed into the main gas pipeline «Urengoy-Chelyabinsk».

Emissions outside the project boundary associated with the baseline

Losses for natural gas production are recommended for use in annual Gasprom environmental reported for period 2008-2010[19] .
To determine the emissions during preparation of natural gas we use conservative value of consumption of fuel gas at gas processing plants is based on the energy equivalent of fuel gas of modern gas turbine with an efficiency of 34%, based on PS-90 with a recently installed in the fields of Gazprom as the main fund of gas wells located in the compressor operating mode, ie, there is a need to compress the gas before it enters the pipeline since the wellhead pressure in main gas fields is not enough[20]
Furthermore, because of conservatism for the fuel gas flow rate reduction factor is applied as an adjustment to the pressure difference, unnecessarily gas turbines require less compressed natural gas to a final pressure of 75 atmospheres, since the average wellhead pressure at the wells of natural gas is much greater than the pressure in PNG first stages of separation. Hence the work done by the gas turbine to the end of compression will be less.

Key emission factors

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

Project emissions from electricity consumption for pipeline tech needs calculated by an approach based on the determination of emissions as the product of coefficient of consumed electricity on tech needs and fixed grid emission factor provided in approved project documentation "Installation GTPP-400 at the Surgut GRES-2, OGK-4, Tyumen region, Russia", version 04, Annex 2.

We used the value of grid emission factor from approved PDD "Installation two GTPP-400 at the Surgut GRES-2, OGK-4, Tyumen region, Russia" in order to be conservative. As a matter of fact this PDD provides emission factors for period 2008-2010 that are really bigger than the factor provided in Operational Guidelines for Project Design Documents of Joint Implementation Projects and proposed by Ministry of Economic Affairs of the Netherlands, May 2004 and Baseline study 2010 made by Lahmeyer Int. in April 2010:
-emission factor calculated for the exact energy system -0,606 tCO2/MWh
-emission factors from Netherlands study (table 2)-0,557 tCO2/MWh
-emission factors from Baseline study 2010 made by Lahmeyer Int. for Ural region -0,582 tCO2/MWh

Monitoring points and variables to be monitored

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

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

Monitoring point M1 - Volume of extracted APG at BPS-1

Monitoring point M2 - Composition of extracted APG at BPS-1

Monitoring point M3 - Volume of APG to be flared at BPS-1

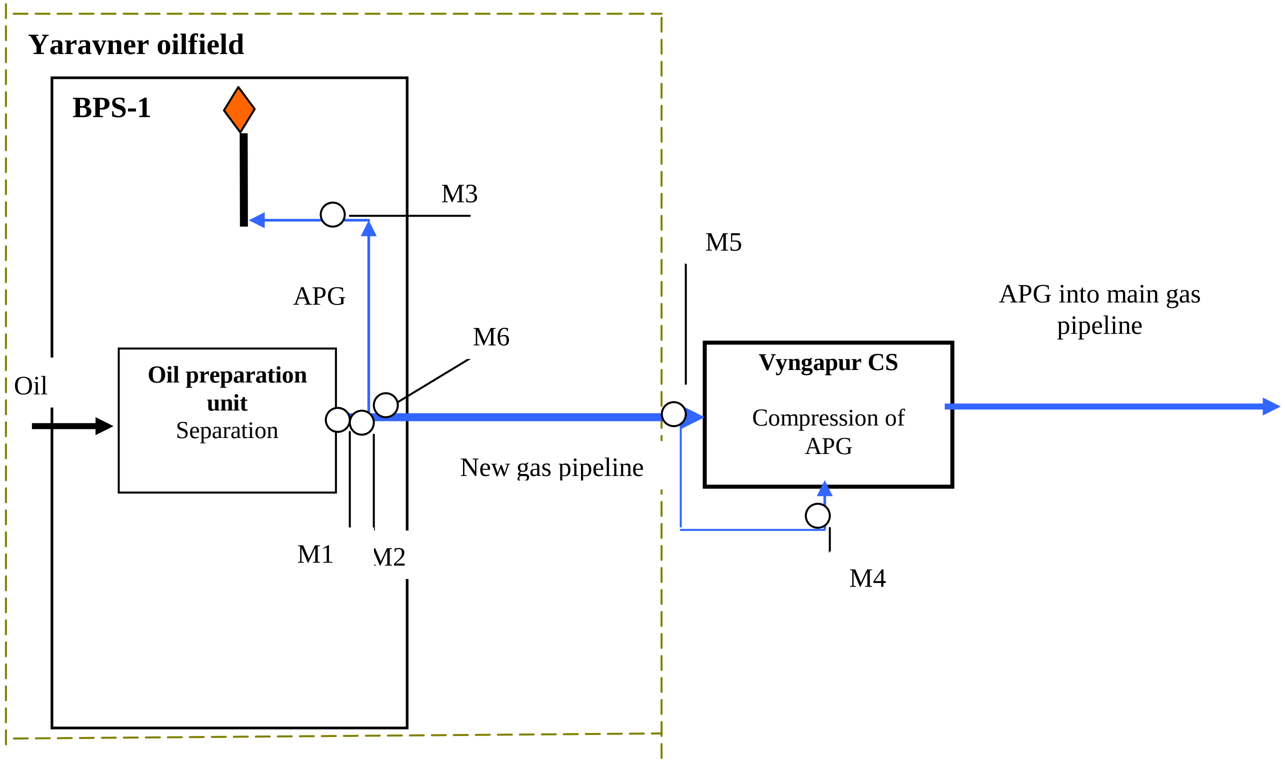
Monitoring point M6 - Volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house

Monitoring point M4 - Specific fuel consumption at Vyngapur CS for compression of the APG supplied under project activity

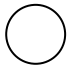
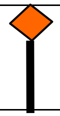
Monitoring point M5 - Composition of APG at Vyngapur CS

For determining the GHG emissions the following monitoring points will be used:

Figure D.1.1. Monitoring points



Legend

	Monitoring points		Stream of crude oil
	APG flaring		Stream of APG for new pipeline
CS	Compressor station		
BPS	Boost pump station		

Step 2. Application of the approach chosen

See the following subsections.

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
M2	*Chemical composition of APG at BPS-1*	*Gas chromatograph Crystallux 4000M Color 800*	*% vol.*	*m*	*monthly*	*100%*	*Paper*	*Analysis is made in the chemical –analytic laboratory*
M3	*Volume of APG to be flared at BPS-1*	*Flow meter CPG - 763*	*Ths.*m^3	*m*	*mountly*	*100%*	*electronically*	-
M1	*Volume of extracted APG*	*Flow meter CPG - 763*	*Ths.m3*	*m*	*mountly*	*100%*	*electronically*	-
M6	*Volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler*	*Flow meter CPG - 763*	*Ths.m3*	*m*	*mountly*	*100%*	*electronically*	-

	house							

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 emissions from APG transport operation throughout at new pipeline at BPS-1 of Yarayner oilfield to Vyngapur CS:

$$PE = E_{tr} * FC_{APG\_PJ} * 1000 * \sum cpy_{CH4} * \rho_{CH4} * GWP_{CH4} \quad (1)$$

PE – project emission from APG transport operations, tCO2

$FC_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

E_{tr} – IPCC specific coefficient from gas transport operations (Default carbon emission factors listed in the 2006 IPCC Guidelines on National GHG Inventories (transportation of the natural gas) volume 2 Chapter 4, table 4.2.5)

$\sum cpy_{CH4}$– annual average volumetric fractions of methane in APG at BPS-1 of Yarayner oilfield, (information source – gas test protocol at standard conditions).

ρ_{CH4}– the density of methane CH4 under standard conditions, equal to 0.668 kg/m^3

GWP_{CH4} – global warming potential for methane, equal to 21 tCO_2/tCH_4

$FC_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

$$FC_{APG,PJ} = FC_{APG,All} - FC_{APG,F} - FC_{APG,boier\ house} \quad (2)$$

$FC_{APG,All}$ – all volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield, ths.m3

$FC_{APG,F}$ – volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to flare, ths.m3

$FC_{APG,boier\ house}$ - volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house, ths.m3

$\sum av\ EF_{CO2,APG}$ – annual average CO_2 emission factor by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2/ths. m^3

$\sum av\ EF_{CH4,F}$ – annual average CH_4 emission factor (in terms of CO2 equivalent) by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2e/ths. m^3

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
M2	*Chemical composition of APG at BPS-1*	*Gas chromatograph Crystallux 4000M Color 800*	*% vol.*	*M*	*monthly*	*100%*	*Paper*	*Analysis is made in the chemical – analytic laboratory*
M3	*Volume of APG to be flared at BPS-1*	*Flow meter CPG - 763*	*Ths.m^3*	*M*	*mountly*	*100%*	*electronically*	
M1	*Volume of extracted APG*	*Flow meter CPG - 763*	*Ths.m3*	*m*	*mountly*	*100%*	*electronically*	
M6	*Volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house*	*Flow meter CPG - 763*	*Ths.m3*	*m*	*mountly*	*100%*	*electronically*	

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

>>

Calculation formulae of the baseline emission from APG flaring at BPS-1 of Yarayner oilfield

$$\mathbf{BE} = \mathbf{FC}_{APG,PJ} * (\sum \mathbf{av\ EF}_{\mathbf{CO2,APG}} + \sum \mathbf{av\ EF}_{\mathbf{CH4,\ F}}) \qquad (3)$$

ER' – CO2 emission reductions due to the project activities (without considering leakage), tCO_2.

FC$_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

$$\mathbf{FC}_{APG,PJ} = \mathbf{FC}_{APG,All} - \mathbf{FC}_{APG,F} - \mathbf{FC}_{APG,boier\ house} \qquad (4)$$

FC$_{APG,All}$ – all volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield, ths.m3

FC$_{APG,F}$ – volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to flare, ths.m3

FC$_{APG,boier\ house}$ - volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house, ths.m3

$\sum$**av EF**$_{\mathbf{CO2,APG}}$ – annual average CO_2 emission factor by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2/ths. m^3

$\sum$**av EF**$_{\mathbf{CH4,\ F}}$ – annual average CH_4 emission factor (in terms of CO2 equivalent) by APG flaring at BPS-1 bases on monthly data of APG (methane) composition at BPS-1, tCO2e/ths. m^3

$$\sum \mathbf{av\ EF}_{\mathbf{CO2,APG}} = \sum \mathbf{cp}(\mathbf{y}_{\mathbf{CO2}} + (\mathbf{Nc}_{\mathbf{CH4}} * \mathbf{y}_{\mathbf{CH4}} + \sum j Nc_{VOCj} * y_{VOC\ i})) * \boldsymbol{\rho}_{\mathbf{CO2}} * \mathbf{FE}_{\mathbf{f}} \qquad (5)$$

y_{CO2}, y_{CH4} y_{VOC} – annual average volumetric fractions of carbon, methane and volatile organic compounds VOC in APG at BPS-1 Yarayner oilfield bases on monthly data of APG (methane) composition at BPS-1, (information source – gas test protocol).

Nc_{CH4}, $\sum jNc_{VOCj}$ – quantity of carbon moles in a mole of methane and VOC accordingly ($\sum jNc_{VOCj}$ where j is the singular volatile hydrocarbon component.)

ρCO_2 – CO_2 density at 20°C is taken equal to 1.842 kg/m3.

FEf –efficiency of APG combustion in a flare is taken equal to 0.965

Due to incomplete combustion of APG flaring part of APG extracted to the atmosphere is not oxidizing. NII Atmosphere methodic determines the efficiency of burning 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:

$$\sum avEF_{CH4,F} = \sum_{cp} y_{CH4} * \rho_{CH4} * (1-FE) * GWP_{CH4} \qquad (6)$$

y_{CH4}– annual average volumetric fractions of methane in APG at BPS-1 Yarayner oilfield bases on monthly data of methane composition at BPS, (information source – gas test protocol at standard conditions).

ρ_{CH4}– the density of methane CH4 under standard conditions, equal to 0.668 kg/m^3

FE - APG flaring efficiency, equal to 0,965

GWP_{CH4} – global warming potential for methane, equal to 21 tCO_2/tCH_4

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

The 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):

The option is not used.

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
M4	*Specific fuel consumption at Vyngapur CS for compression of the APG supplied under project activity*	*Technical documentation at Vyngapur CS*	*m3/m3*	*c*	*annually*	*100%*	*electronically*	*This informa-tion is reques-ted from Vygapur CS*
M5	*Chemical composition of pumped APG at Vyngapur CS*	*Gas chromatograph*	*% vol.*	*m*	*monthly*	*100%*	*Paper*	*Analysis is made by the chemical – analytic laboratory*

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 determined as net change of antropogenic emissions outside the project boundary:

$$LE = LE_{BL} - L \qquad (7)$$

Where:

LE_{BL} is the emissions outside the project boundary that would have occurred without project activity

L is the emissions outside the project boundary occur due to the project

Emissions outside the project boundary associated with the project activity come from the following sources:

$$\mathbf{L = L_{cs} + L_{proc}} \qquad (8)$$

CO_2 emissions outside the project boundary occur due to the project associated with combustion of APG in gas turbine gear for energy generation at Vyngapur CS for the compression and treatment of the APG supplied under project activity are calculated according to the formulae:

$$\mathbf{Lcs = SFC_{GT}*FC_{APG,PJ}*EF_{CO2,GT}} \qquad (9)$$

SFC_{GT} – specific fuel consumption at Vyngapur CS for compression of the APG supplied under project activity, m^3/m^3[21]. This parameter is available annually on request at the Vyngapur CS.
$EF_{CO2,GT}$ – CO_2 emission factor of APG combustion in the gas turbines of Vyngapur CS, tCO_2/ths. m^3

$$\mathbf{EF_{CO2,GT} = (y_{CO2} + (Nc_{CH4}*y_{CH4}+Nc_{VOC}*y_{VOC}))*\rho_{CO2}*FE_{GT}} \qquad (10)$$

$y_{CO2,}$ y_{CH4} y_{VOC} – volumetric fractions of carbon, methane and volatile organic compounds VOC[1] in pumped APG at Vyngapur CS, (information source – gas test protocol).
$Nc_{CH4,}$ Nc_{VOC} – quantity of carbon moles in a mole of methane and VOC accordingly.
ρ_{CO2} – CO_2 density at 20°C is taken equal to 1.829 kg/m3.
FE_{GT} –efficiency of APG combustion in the gas turbines is taken equal to 1.

As APG incoming from various fields is mixed at the Vyngapur CS, the component composition of the APG to be compressed is determined at the inlet of the commercial metering station. This parameter is determined monthly and is available on request in LLC «Noyabrskiy GPC» of JSC «Sibur Holding». However, for preliminary leakage calculations the APG composition from BPS-1 of Yarayner oilfield was adopted.

Leakage, i.e. emissions associated with methane (CH_4) physical leaks during APG processing at Vyngapur CS are calculated according to the following formula:

$$\mathbf{L_{proc} = E_{proc}* FC_{APG\_PJ}*1000* \sum cp\,y_{CH4}*\rho_{CH4} * GWP_{CH4}} \qquad (11)$$

---

[21] Standard parameter provided by LLC «Noyabrskiy GPC» JSC «Sibur Holding» for Vyngapur CS. For 2009, the coefficient of rate of gas flow to the volume of pumped APG (amounted to 0,0824 M3/M3. In 2010- 0,0789 m^3/m^3.

$\mathbf{FC}_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3
$\mathbf{E}_{proc}$ – specific losses coefficient from processing operations at Vyngapur CS.

$\sum \mathbf{cpy}_{CH4}$– annual average volumetric fractions of methane in APG at BPS-1 of Yarayner oilfield oilfield, (information source – gas test protocol at standard conditions).

$\boldsymbol{\rho}_{CH4}$– the density of methane CH4 under standard conditions, equal to 0.668 kg/m^3
$\mathbf{GWP}_{CH4}$ – global warming potential for methane, equal to 21 tCO_2/tCH_4

Emissions outside the project boundary associated with the baseline come from the following sources:

Total GHG leakage emissions associated with the baseline:

$$\mathbf{LE}_{BL} = \mathbf{LE}_{NG,rec} + \mathbf{LE}_{NG\ GT} \qquad (12)$$

<u>Emissions due to production of the natural gas at gas fields</u>

The emissions are determined by the following formula:

$$\mathbf{LE}_{NG,rec} = \mathbf{FC}_{APG\_PJ} * \mathbf{E}_{NG\ prod} * \mathbf{GWP}_{CH4} \qquad (13)$$

$\mathbf{FC}_{APG,PJ}$ – APG volume utilized in the project, i.e. transported to Vyngapur CS through the new gas pipeline, calculated parameter, ths m^3

$\mathbf{EF}_{NG\ prod}$ –coefficient of losses from natural gas production operations provided by annual GAZPROM ENVIRONMENTAL REPORT, %

$\mathbf{GWP}_{CH4}$ – is the global warming potential for methane, equal to $21tCO_2/tCH_4$.

Leakage due to combustion of the natural gas in gas turbines at gas treatment plants

$$\mathbf{LE}_{NG\ GT} = (\mathbf{SFC}_{GT} * \mathbf{FC}_{APG\_PJ} * \mathbf{EF}_{CO2,GT}) / \mathbf{l}_{com} \qquad (14)$$

$\mathbf{SFC_{GT}}$ is a specific fuel consumption (natural gas) in modern gas turbines for compressing and processing of natural gas supplied to a gas treatment plant, in m3 NG combusted/ths.m3 NG compressed, calculated parameter :

$$\mathbf{SFC_{GT} = ((SEC_p *C)/ \acute{\varepsilon}_{\,modern\ GT})/NCV_{NG}} \qquad (15)$$

$\mathbf{SEC_p}$ is average energy consumption to gas compressing&processing at oil&gas treatment plant of Sibur with standart efficiently, kWh/ths.m3

C is coefficient of conversion from kWh to cal, 1kWh=0,86*10^6 cal

$\mathbf{\acute{\varepsilon}_{modern\ GT}}$ is a efficiency of modern gas turbine, taken =34% (this value is close to the equivalent thermal efficiency of electric grid Ural with emission factor 0,606 tCO2/MWh)

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

$\mathbf{EF_{CO2,GT}}$ – CO_2 emission factor due to the natural gas combustion in gas turbine drives at gas treatment plant, tCO_2/ths. m^3

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

$y_{CO2\ NG}$, $y_{CH4\ NG}$, $y_{VOC\ NG}$ – volume fraction of carbon, methane and VOC of natural gas in a plant for processing gas[22] ;

Nc_{CH4}, $\sum Nc_{VOC}$ – number of moles of carbon in methane and VOC accordingly. ($\sum Nc_{VOC}$ where j is the singular volatile hydrocarbon component)

ρ_{CO2} – density of CO_2 at 20°C is assumed to be 1.842 кг/м^3.

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

$\mathbf{l_{com}}$ is a specific coefficient of correction at first pressure at gas turbine work (average natural gas pressure at wells is 50ata-APG from 1st stage of separation-7ata), calculated parameter

$$\mathbf{l_{com} = ((P_{2\,p}/P_{1\,ng})\verb|^|((1,31-1)/1,31))-1\ ) / ((P_{2\,p}/P_{1apg})\verb|^|((1,31-1)/1,31))-1)} \qquad \mathbf{(17)}$$

1,31 – adiabat of methane (CH4)

[22] Typical composition of the natural gas is as follows: 91,9% CH4, 0,58% CO2, 0,68% N2 and 6,84% non-methane hydrocarbons by volume). Information source: IPCC 2006 Volume 2 Chapter 4, p. 4.58, Table. 4.2.4.

P_{2p}- pressure inlet at gas pipeline, 75 ata (Gazprom pressure standard of gas transport)

P_{1ng} – average pressure of natural gas at main gas well of Urengoy region, calculated parameter (50 ata at 2008 year)[23]

P_{1apg}– average pressure of APG at 1 stage of separation of BPS-1 of Yarayner oilfield, project parameter (8 ata)[24].

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):

>>

$$ER = BE - PE - LE \quad (13)$$

ER – CO_2 emission reductions due to the project, tCO_2
BE - Baseline emission, tCO_2
PE - Project emission, 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 concerning the environmental impact will be presented according to Russian legislation[25].

According to the environmental legislation the company should control emissions of pollutants, waste water release, create and supply the wastes management system and should provide reports in authorized state person (Federal service on ecological, technological and nuclear supervising). In JSC «Gazpromneft-Noyabrskneftegas» work on environmental protection is managed by Department of Environmental Safety and Environmental Protection "Management of protection of labour, industrial and fire safety."

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[23] http://www.indpg.ru/nefteservis/2008/04/20007.html. Table 1-Текущее устьевое давление, ата

[24] Technical information of project pipeline and BPS, ата

[25] THE FEDERAL LAW "ABOUT PROTECTION OF ATMOSPHERIC AIR" (ON MAY, 4TH 1999 Г N 96-FZ)

JSC «Gazpromneft-Noyabrskneftegas» in stipulated dates provides official statistical reports and forms to legal state bodies including:

- 2-TP (air) – data on air protection including the information on number of captured and neutralized pollutants, detailed information on particular emissions of pollutants, number of emission sources, measures on emission reductions in atmosphere and emissions of separate groups of emission sources;
- 2-TP (water resources) – data on water usage including the information on water consumption from natural sources, waste water releases and concentration of pollutants in water, water capacity etc. waste water treatment facilities;
- 2-TP (wastes) – data on originating, usage, deactivation, transport and storage of wastes, including annual balance of wastes separated according their types and classes of danger.

On feasibility stage sources and kinds of impact were analyzed, evaluation of modern condition of pollution was carried out, preliminary forecast of condition was done and environmental protection measures were planned. In process of environmental impact evaluation the following components of environment were taken into account:

- earth;
- air;
- engineering and geological conditions;
- geomorphologic conditions;
- landscape complexes;
- soil;
- fauna;

According to the results of environmental studies and preliminary assessment of the impact on the environment of the proposed project activity, location of the planned facility "Construction Yarayner oilfield. Gas pipeline BPS-1 Yarayner oilfield – Vyngapur CS" does not entail irreversible processes. A preliminary environmental impact is assessed as a local, short-term and reversible.

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
M2, M1, M3, M6 table D.1.1.1 and table D.1.1.3	low	Equipment are verified and calibrated by“Tyumen center for standardization, metrology and certification”and. "IMC" Gospoverka State Standard ». Ltd. Corporation
M4, M5 table D.1.3.1	low	Vyngapur CS equipment are verified and calibrated regularly by the competent authorities according to the technological instructions.

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 Gazpromneft-Noyabrskneftegas Company. All measurements, were carried out as part of monitoring, are in accordance with the law "On uniformity of measurements" N 102-FZ dated 26/06/2008[26].

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

№№	Organizations	Position/Department	Tasks	Comments
1.	NCSF, Moscow	Project Development Department	Calculates factual emission reductions in accordance with formulas presented in the section D. Prepares the Monitoring Reports	Submits a Monitoring Reports to Gas & liquid hydrocarbons marketing department (G&LHMD)of Gazpromneft Company
2.	Gazpromneft, Moscow	Gas & liquid hydrocarbons marketing department (G&LHMD)	Coordination of works for preparation of the MR between NCSF, and GH-NNG	Approves of MRs Submits a MRs for verification. Submits a verified MRs to Gazpromneft-Noyabrskneftegas
3.	Noyabrskiy GPC (Sibur holding company), Noyabrsk	Administration	Preparation and submission of annual production data needed for leakage calculation	Submits annual production data for leakage calculations to G&LHMD (Moscow)
4.	Gazpromneft-Noyabrskneftegas, Noyabrsk	Deputy general director of oil &gas preparation and delivery department	Approval of the balance of gas production	Submits annual production data for emission reduction calculations to G&LHMD, Moscow
5.	Gazpromneft-	Oil &gas preparation and	Analysis of data on the company's activities	Submits the balance of gas production

[26] http://www.rsk-k.ru/zak.html

	Noyabrskneftegas, Noyabrsk	delivery department	during the reporting period and preparation the balance of gas production	for approval to deputy general director of oil &gas preparation and delivery department
6.	Gazpromneft-Noyabrskneftegas, Noyabrsk	Gas collection and delivery department	Collection of daily data for monthly APG balance	Provides data for the gas balance for analysis in oil &gas preparation and delivery department The balance includes the following information • Gas Resources • Gas production • The volume of gas burned in flares • The volume of gas used for tech needs, including Technological losses • The volume of utilization gas
7.	Gazpromneft-Noyabrskneftegas, Noyabrsk	Chemical-analytical laboratory	Preparation of monthly gas test results on APG composition (BPS-1)	Submits tests results for analyses to the Gas collection and delivery department
8.	Gazpromneft-Noyabrskneftegas, Noyabrsk	Central Dispatching Office	Collection of daily data	Submits daily data for analyses to the Gas collection and delivery department
9.	Gazpromneft-Noyabrskneftegas, Noyabrsk	Shift operators at BPS-1 Yarayner oilfield	Collection of daily data	Data is fixed in a mode log and is submitted to the production-dispatching office

Necessary data for the calculation of greenhouse gas emission reductions are collected as it is usually carried out at GPN-NNG, so monitoring does not require any other additional information as compared with already collected under routine activities. All quantitative data are on-line monitored, which is a usual, everyday practice: data from the monitoring checkpoints sensors, except data on APG composition, are transferred to the automated metering devices and are simultaneously registered with the electronic workstation database and displayed no the screens of the operator of BPS-1, Yarayner oilfield. All gas tests data are carried out by the certified Chemical-Analytical Laboratory that provides the necessary accuracy class. Based on daily statistics monthly gas production balances are generated.

The completed and signed monthly gas production balance, reflecting values specified in the monitoring plan, is submitted to the G&LHMD of Gazprom neft, Moscow. The department conducts internal audits of the data for the purpose of the wrong formulation and errors. Annually this department requests Noyabrskiy GPC to provide the annual operational data at Vyngapur CS needed for leakage calculation. Annually, this department provides the annual summary of the gas production balance along with monthly data of APG composition from BPS-1 of Yarayner oilfield as well as annual data of specific fuel consumption of APG at the Vyngapur CS to the Project Development Department of NCSF for the annual GHG emissions reductions calculation and preparation of the monitoring report.

NCSF prepares the annual monitoring report and sends it back to G&LHMD for approval. The approved annual monitoring report is submitted to accredited independent entity for verification of achieved emission reductions.

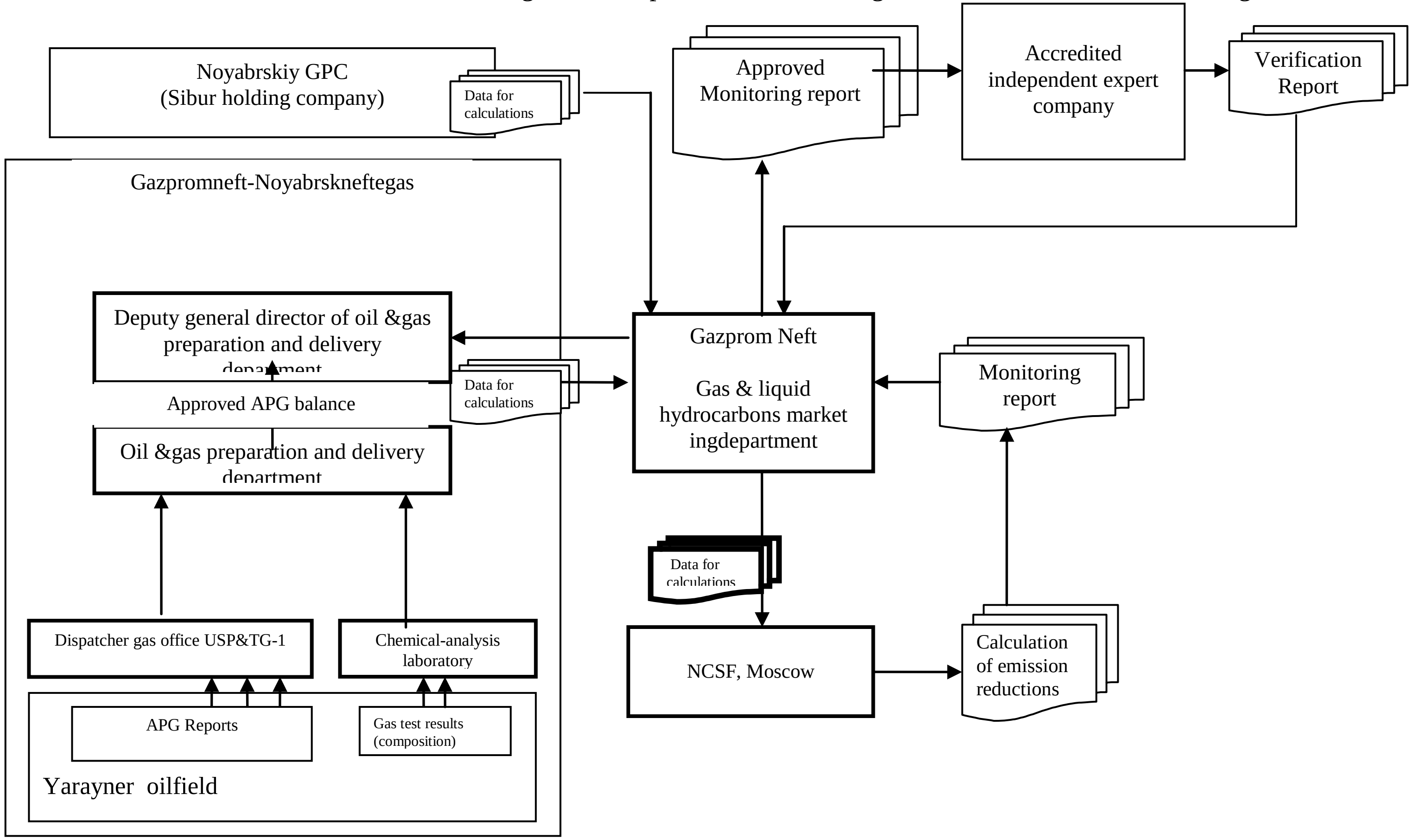
Storage of monitoring data in G&LHMD carried out in electronic form on the network resources. Shelf life -5 years. Data of the APG composition stored in paper form- 5 years. All monitored data (for period 2008-2012) carried out in electronic form and paper form 5 years after the last transfer of ERUs.

Specify procedures to be followed if the expected data are unavailable, for instance in case of gas flow meter failure or the unavailability of bi-annual data of APG composition:

all units (inc. flow meter and gas test units) under the monitoring plan of duplication. However, if the backup device fails, then the calculation is carried out according to the APG adopted in GPN-NNG instructions for determining the gas factor and the amount of dissolved gas, extracted from the subsoil (RD39-0147035-225-88 dated 31.12.87)

Schematically, the monitoring structure looks as follows:

Figure D.3. Operational and management structure of the monitoring



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

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. Calculation of project emission in 2008-2012 from methane (CH_4) physical leaks during transportation of the project APG through the new pipeline to Vyngapur CS

Item	Index	Unit	**2008**	**2009**	**2010**	**2011**	**2012**
IPCC CH4 coefficient for gas transporting operations	Etr	%	0,0011	0,0011	0,0011	0,0011	0,0011
APG used in the project	FC_{APG_PJ}	ths.m^3	209744	141618	19350	30989	86502
Global warming potential for methane	GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	21
Project Emissions from APG transport operations to CS	PE	tCO2	**3948**	**2648**	**368**	**580**	**1618**

E.2. Estimated leakage:

>

Emissions outside the project boundary occur due to the project

Table E 2.1. Calculation of emissions in 2008-2012 from Energy production (that is APG combustion in the gas turbines) for the compression of the APG coming in under project activity

Item	Index	Unit	2008	2009	2010	2011	2012
Specific fuel consumption per cubic meter of pumped APG at gas turbines	SFC_{GT}	m^3/ m^3	**0,0662**	**0,0824**	**0,0786**	**0,0757**	**0,0757**
APG used in the project	$FC_{APG,PJ}$	ths. m^3	**209744**	**141618**	**19350**	**30989**	**86502**
CO2 emission factor	$EF_{CO2,APG,GT}$	tCO_2/ths. m^3	2,592	2,585	2,593	2,59	2,59
Emissions from APG combustion in gas turbines (leakage)	**LE**	**tCO_2**	**35989**	**30166**	**3943**	**6078**	**16967**

Table E 2.2. Calculation of emissions in 2008-2012 from Methane (CH4) physical leaks during APG compression and treatment at CS

Item	**Index**	**Unit**	**2008**	**2009**	**2010**	**2011**	**2012**
The volume of the project APG transportation	FCapg PJ	ths.m3	209744	141618	19350	30989	86502

to CS							
% losses	Epross	%	0,60%	1,41%	0,79%	0,70%	0,70%
Emission due to processing and compressing of the project apg volume	Lproc	tCO2e	**13436**	**21380**	**1630**	**3017**	**15511**

Table E 2.3. Calculation of total emissions outside the project boundary occur due to the project in 2008-2012

Total emissions outside the project boundary occur due to the project in 2008-2012	L	tCO2e	49425	51546	5573	9095	32478

Emissions outside the project boundary associated with the baseline come from the following sources:

Table E 2.4. Calculation of emissions due to production of the natural gas at gas fields 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
The volume of the project APG from Yarayner oilfield transportation to CS	FCapg PJ	ths m3	209744	141618	19350	30989	86502
Gazprom losses during gas production at gas wells	%	-	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
CO2 emission due to Gasprom gas production	**$LE_{NG,rec}$**	**tCO2**	3076	1535	120	201	587

Table E 2.5. Calculation of emissions due to combustion of the natural gas in gas turbines at gas treatment plants 2008-2012

Item	Units	2008	2009	2010	2011	2012
The specific gas consumption on Gazprom treatment plants during the processing&compressing of the NG under baseline with effic-34% (modern gas turbine)	m3/ths.m3	158	158	158	158	158

CO2 emission factor from gas burning in gas turbine in treatment plants of Gazprom gas fields (standard chemical composition from IPCC 2006)	tCO2/ths.m3	2,106	2,106	2,106	2,106	2,106
APG used in the project - The volume of the project APG transportation to Vyngapur CS	ths.m3	209744	141618	19350	30989	86502
Coefficient of pressure correction	-	7,6	7,6	7,6	7,6	7,6
CO2 emission due to Gasprom gas treatment plants during the NG processing	tCO2	9163	6187	845	1354	3779

Table E 2.6. Total emissions outside the project boundary associated with the baseline 2008-2012

Item	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Leakage due to production of the natural gas at gas fields	tCO2e	**3076**	**1535**	**120**	**201**	**587**
Leakage due to combustion of the natural gas in gas turbines at gas treatment plants	tCO2	9163	6187	845	1354	3779
Total emissions outside the project boundary associated with the baseline	**tCO_2e**	12239	7722	965	1555	4366

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

>>

Item	Units	**2008**	**2009**	**2010**	**2011**	**2012**
Sum PE+LE	tCO_2e	41134	46472	4976	8120	29730

E.4. Estimated baseline emissions:

>>

In absence of the project activity all extracted APG would have been burned in the flare stacks at BPS -1 of Yarayner oilfield leading to CO_2 and CH_4 emissions.

Table E 4.1. Total baseline emissions from APG flaring at BPS -1 in 2008-2012

Item	Index	Unit	2008	2009	2010	2011	2012
APG flaring at BPS-1 in	$FC_{APG,\ Flare,\ BL}$	ths. m^3	**209744**	**141618**	**19350**	**30989**	**86502**

baseline							
CO_2 emission factor	$EF_{CO2,Flare}$	tCO_2/ths. m^3	2,38	2,46	2,38	2,41	2,41
CO_2 emissions from APG flaring at BPS-1	$BE_{CO2,Flare}$	tCO_2	**500095**	**348564**	**46008**	**74614**	**208276**
APG flaring at BPS-1 in baseline	$FC_{APG,\ Flare,\ BL}$	ths. m^3	209744	141618	19350	30989	86502
CH_4 emission factor(in terms of CO_2)	$EF_{CH4,Flare}$	tCO_2e/ths. m^3	0,400	0,397	0,404	0,401	0,401
CH_4 emissions (in terms of CO_2) from APG flaring at BPS-1 in baseline	$BE_{CH4,Flare}$	tCO_2e	**83908**	**56289**	**7824**	**12415**	**34654**
Total baseline emissions	**BE**	**tCO2**	**584003**	**404853**	**53832**	**87029**	**242930**

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

>>

Emission reductions resulting from the project are calculated using the formula 14 in section D.1.4.

Numeric values are given in section E.6.

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

>>

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2008	3948	37186	584003	542869
2009	2648	43824	404853	358381
2010	368	4608	53832	48855
2011	580	7540	87029	78909
2012	1618	28112	242930	213200
Total (tonnes of CO2 equivalent)	9161	121270	1372646	1242214

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:

>>

According to the State Committee for Ecology and Natural Resources of the Russian Federation Decree dated 15.04.2000, #r 372 "On compliance with regulations regarding the planned economic (and other) actions and their ecological impact", developers must include environmental issues into the project design documentation.

The section "Environment Protection" (EP) is integrated into the design documentation of this project. The design documentation was prepared in 2007 (section №3 of the technical documentation "Construction of Yarayner oilfield. Pipeline BPS-1 Yarayner oilfield - Vyngapur CS", TomskNIPIneft.

Based on the outcomes of the environmental section the permission on emissions of polluting substances by stationary sources was issued for the period of 20.10.2008 – 31.12.2012[27].

The technical design documentation "Construction of Yarayner oilfield. Pipeline BPS-1 Yarayner oilfield – Vyngapur CS" has obtained the positive opinions issued by the Federal State Entity "GlavGosExpertiza Rossii" #93 dated 19.02.2007.

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:

>>

Project itself represents the environment-friendly activity as it is directed at reducing APG flaring at BPS-1 of Yarayner oilfield. Thereby this leads to significant methane emissions reductions in the amount of 195089 tCO_2e in the period of 2008 – 2012.

SECTION G. Stakeholders' comments

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

>>

No consultations with stakeholders regarding the project are required for the following reasons:

1. GPN-NNG leases a land allotted to the Yarayner oil field from a local government administration. Prior to the oil field development GPN-NNG had observed the required consultation with local population discussing the environmental issues, which might arise with regard of such activities.

2. The project site is located on the territory leased by GPN-NNG beyond water protection areas, reindeer pastures and animals' migration paths. This allotment does not fall into the category of a land of priority natural management.

3. The Project will enhance a local environmental background as its implementation will reduce the pollution with harmful substances coming out from the APG flaring.

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[27] Resolution # 246 dd. 02.12.2008. Rosteknnadzor.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Represented by:	AkimovVitaliy Viktorovich
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NCSF is not the project participant

Annex 2

BASELINE INFORMATION

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 2008-2010

Data/Parameter	ρ_{CH4}
Data unit	kg/m^3
Description	CH_4 density at standard conditions (temperature of 20 °C (293.15 K, 68 °F) and an absolute pressure of 101.325 kPa (14.696 psi, 1 atm).
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	Thermal Design of Boilers (Norm-based method), NPO CKTI, SPb, 1998
Value of data applied (for exante calculations/determinations)	0.668
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CH_4 density is necessary to calculate the emission factor for APG flaring
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	ρ_{CO2}
Data unit	kg/m^3
Description	CO_2 density at standard conditions (temperature of 20 °C (293.15 K, 68 °F) and an absolute pressure of 101.325 kPa (14.696 psi, 1 atm).
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	Thermal Design of Boilers (Norm-based method), NPO CKTI, SPb, 1998
Value of data applied (for exante calculations/determinations)	1.842
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CO_2 density is necessary to calculate the emission factor for APG flaring
QC/QA procedures (to be) applied	Reference data
Any comment	-

Data/Parameter	**GWP_{CH4}**
Data unit	tCO_2/tCH_4.
Description	Global Warming Potential of methane required for the calculation of CH_4 emission factor from APG flaring at BPS-1,2,3,3A
Time of determination/monitoring	constant
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 exante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Global Warming Potential of methane is needed to calculate the CH_4 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	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	Natural science	
Value of data applied (for ex-ante calculations/determinations)	Carbon dioxide, CO2	1
	methane, CH4	1
	ethane, C2H6	2
	propane, C3H8	3
	i-butane, C4H10	4
	n-butane, C4H10	4
	i-pentane, C5H12	5
	c-pentane, C5H12	5
	n-pentane, C5H12	5
	hexane, C6H14	6
	geptane, C7H16	7
	octane, C8H18	8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Quantity of carbon moles in a mole of a component of APG is needed to calculate the CO2 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	Determined once at the PDD development stage
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
QA/QC procedures (to be) applied	Based on reference data and real data of flare stacks and shoot calculation
Any comment	-

The parameters to be directly monitored

Data/Parameter	**$FC_{APG,PJ}$**
Data unit	Ths.m^3 (under standard conditions)
Description	The volume of transported APG *at* BPS-1 of the Yarayner oilfield to Vyngapur CS The main source of baseline emissions. Transported APG in the baseline would be burned in flares
Time of determination/monitoring	Monthly
Source of data (to be) used	Calculated parameter based on measured at flare stacks and oilfield boiler house
Value of data applied (for exante calculations/determinations)	2008: 209744; 2009: 141618; 2010: 19350; 2011: 30989; 2012: 86502
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all transported APG is needed for baseline emissions calculation.
QC/QA procedures (to be) applied	Equipment are verified and calibrated "Tyumen center for standardization, metrology and certification"
Any comment	-

2008	2009	2010	2011	2012
209744	141618	19350	30989	86502

Data/Parameter	**$FC_{APG,All}$**
Data unit	Ths.m^3 (under standard conditions)
Description	All volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield
Time of determination/monitoring	Monthly
Source of data (to be) used	Metran 350
Value of data applied (for exante calculations/determinations)	2008: 287563; 2009: 245677; 2010: 140887; 2011: 113453; 2012: 95514

2008	**2009**	**2010**	**2011**	**2012**
287563	245677	140887	113453	95514

Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all high pressure APG is needed for emissions reduction calculation.
QC/QA procedures (to be) applied	Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”
Any comment	-

Data/Parameter	$FC_{APG,F}$
Data unit	Ths.m^3 (under standard conditions)
Description	Volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to flare
Time of determination/monitoring	Monthly
Source of data (to be) used	Metran 350
Value of data applied (for exante calculations/determinations)	2008: 77819; 2009: 104059; 2010: 121537; 2011: 82464; 2012: 9012
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of high pressure APG delivered to flare is needed for emissions reduction calculation.
QC/QA procedures (to be) applied	Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”
Any comment	-

2008	2009	2010	2011	2012
77819	104059	121537	82464	9012

Data/Parameter	$FC_{APG,boier\ house}$
Data unit	Ths.m^3 (under standard conditions)
Description	Volume of high pressure APG from 1st stage of separation on BPS-1 of Yarayner oilfield delivered to oilfield boiler house
Time of determination/monitoring	Monthly
Source of data (to be) used	Jumo dtrans p02
Value of data applied (for exante calculations/determinations)	see table below
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of high pressure APG delivered to boiler house is needed for emissions reduction calculation.
QC/QA procedures (to be) applied	Equipment are verified and calibrated “Tyumen center for standardization, metrology and certification”
Any comment	-

2008	2009	2010	2011	2012
0,000	0,000	5000	0,000	0,000

Data/Parameter	Chemical composition of APG at BPS-1
Data unit	%
Description	Chemical composition (under standard conditions) of APG required for the calculation of emissions factor from flaring at BPS-1
Time of determination/monitoring	Mountly
Source of data (to be) used	Gas chromatograph Crystallux 4000M Color 800
Value of data applied (for exante calculations/determinations)	see table below

Component	2008	2009	2010	2011-2012
Carbon dioxide, CO2	0,746%	0,745%	1,089%	0,86%
methane, CH4	81,480%	80,954%	82,351%	81,59%
ethane, C2H6	6,147%	5,869%	4,264%	5,43%
propane, C3H8	5,105%	5,071%	4,246%	4,81%
i-butane, C4H10	1,512%	1,518%	1,903%	1,64%
n-butane, C4H10	2,060%	1,950%	1,537%	1,85%
neo-pentane C5H12	0,002%	0,000%	0,000%	0,00%
i-pentane, C5H12	0,674%	0,716	0,866%	0,75%
n-pentane, C5H12	0,678%	0,856%	1,162%	0,90%
hexane, C6H14	0,542%	1,348%	0,860%	0,92%
geptane, C7H16	,000%	0,000%	0,000%	0,00%
octane, C8H18	0,000%	0 000%	0,000%	0,00%
Nonane C9H20	0,000%	0,000%	0,000%	0,00%
Decan C10H22	0,000%	0,000%	0,000%	0,00%
u-decan C11H24	0,000%	0,000%	0,000%	0,00%
hydrog n sulfide, H2S	0,000%	0,000% 0,000%	0,000%	0,00%
nitrogen, N2	0,955%	0,897%	1,585%	0,85%
oxygen, O2	0,008%	0,028%	0,009%	0,30%

Justification of the choice of data or description of measurement methods and procedures (to be) applied	The chemical composition is needed to identify the volume fraction of carbon, methane and VOC and calculate the GHG emission rates due to the combustion of the given gas. Data from 2008-2010 are real measured, data to 2011-12 are annual average data based on 2008-2010
QC/QA procedures (to be) applied	Equipment are verified and calibrated "Tyumen center for standardization, metrology and certification
Any comment	-

Data/Parameter	Global Warming Potential of methane
Data unit	tCO_2/tCH_4.
Description	Global Warming Potential of methane required for the calculation of CH4 emissions factor from APG flaring at BPS-1
Time of determination/monitoring	constant
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 exante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Global Warming Potential of methane is needed to calculate the CH_4 emission factor due to the combustion of the APG.
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	Methane emission factor by APG flaring at BPS-1
Data unit	$tCO_2e/ths.\ m^3$
Description	Methane emission factor is needed to calculate the GHG emission rates due to the flaring of APG at BPS-1
Time of determination/monitoring	mountly
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2, Energy, Chapter 4 (Subsection 4.2. "Fugitive emissions from oil and natural gas systems", adapted equations 4.2.4 page 4.45).
Value of data applied (for exante calculations/determinations)	**2008**: 0,400; **2009**: 0,397; **2010**: 0,404; **2011**: 0,401; **2012**: 0,401
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Methane emission factor is needed to calculate the GHG emission rates due to the flaring of APG.
QC/QA procedures (to be) applied	-
Any comment	-

2008	**2009**	**2010**	**2011**	**2012**
0,400	0,397	0,404	0,401	0,401

Data/Parameter	SFCgt
Data unit	m3/m3
Description	Specific fuel consumption at Vyngapur CS for compression of the APG supplied under project activity
Time of determination/monitoring	Annual
Source of data (to be) used	Technical documentation at Vyngapur CS
Value of data applied (for exante calculations/determinations)	2008: 0,0662; 2009: 0,0824; 2010: 0,0786; 2011: 0,0757; 2012: 0,0757

2008	2009	2010	2011	2012
0,0662	0,0824	0,0786	0,0757	0,0757

Justification of the choice of data or description of measurement methods and procedures (to be) applied	Necessary to calculate the fuel consumption at Vyngapur CS
QC/QA procedures (to be) applied	Based on measurements carried out by the CS. All measurements are conducted with instruments calibrated and attorneys' Tyumen center of standardization, metrology and certification ".
Any comment	-

Data/Parameter	Chemical composition of pumped APG at Vyngapur CS
Data unit	%
Description	Chemical composition of pumped APG at Vyngapur CS
Time of determination/monitoring	Monthly
Source of data (to be) used	Gas chromatograph Crystallux 4000M Report on the composition of gas from an accredited chemical-analytical laboratory. Ltd." The Noyabrskiy GPP. "
Value of data applied (for exante calculations/determinations)	see table below

	2008	2009	2010	2011-2012
Carbon dioxide, CO_2	0,283%	0,215%	0,108%	0,202%
methane, CH_4	76,224%	76,441%	76,123%	76,263%
ethane, C_2H_6	7,768%	8,034%	8,198%	8,000%
propane, C_3H_8	8,235%	8,196%	8,453%	8,294%
i-butane, C_4H_{10}	1,710%	1,673%	1,630%	1,671%
n-butane, C_4H_{10}	2,430%	2,427%	2,470%	2,442%
neo-pentane C_5H_{12}	0,000%	0,000%	0,000%	0,000%
i-pentane, C_5H_{12}	0,538%	0,483%	0,468%	0,496%
n-pentane, C_5H_{12}	0,489%	0,429%	0,415%	0,444%
hexane, C_6H_{14}	0,378%	0,345%	0,326%	0,350%
geptane, C_7H_{16}	0,000%	0,000%	0,000%	0,000%
octane, C_8H_{18}	0,000%	0,000%	0,000%	0,000%
Nonane C_9H_{20}	0,000%	0,000%	0,000%	0,000%
Decan $C_{10}H_{22}$	0,000%	0,000%	0,000%	0,000%
u-decan $C_{11}H_{24}$	0,000%	0,000%	0,000%	0,000%
hydrogen sulfide, H_2S	0,000%	0,000%	0,000%	0,000%
nitrogen, N_2	1,839%	0,000%	1,728%	1,189%
oxygen, O_2	0,113%	1,714%	0,090%	0,639%

Justification of the choice of data or description of measurement methods and procedures (to be) applied	The chemical composition is needed to identify the volume fraction of carbon, methane and VOC and calculate the GHG emission rates due to the combustion of the gas (APG). Data from 2008-2010 are real measured, data to 2011-12 are annual average data based on 2008-2010
QC/QA procedures (to be) applied	Equipment are verified and calibrated «Tyumen center for standardization, metrology and certification»
Any comment	-

Data/Parameter	Eproc
Data unit	%
Description	Loss coefficient of methane from the preparation and compressing of APG at Vyngapur CS

<table>
<tr><td>Time of determination/monitoring</td><td colspan="5">Annual</td></tr>
<tr><td>Source of data (to be) used</td><td colspan="5">Annual technical documentation at Vyngapur CS</td></tr>
<tr><td rowspan="2">Value of data applied (for exante calculations/determinations)</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr>
<tr><td>0,60%</td><td>1,41%</td><td>0,79%</td><td>0,70%</td><td>0,70%</td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td colspan="5">Necessary to leakage calculate at processing operations at Vyngapur CS</td></tr>
<tr><td>QC/QA procedures (to be) applied</td><td colspan="5">Based on measurements carried out by the CS. All measurements are conducted with instruments calibrated and attorneys' Tyumen center of standardization, metrology and certification ".</td></tr>
<tr><td>Any comment</td><td colspan="5">-</td></tr>
</table>

Annex 3

MONITORING PLAN

Please see section D

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