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

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

>>

"Utilization of associated petroleum gas from the Verkhnekamsk oil fields, «Permneftegazpererabotka» LLC, Perm, Russian Federation"

Sectoral scopes:

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

Version 05
Date: 06/05/2011

A.2. Description of the project:

>>

The project is aimed at the efficient utilization of associated petroleum gas (APG) that otherwise would have been flared at the BPS of the Verkhnekamsk oil fields located in the Krasnovishersk district of the Perm Region.

The oil field has been under development since 1970. Commercial production started in 1990. Currently the field (Ozernoye, Gagarinskoye and Magovskoye fields, so called Verkhnekamsk oilfields) is being developed and operated by "LUKOIL-Perm" LLC.

The project is implemented at the production facilities (inc. new gas pipeline system) of "Permneftegazpererabotka" LLC. (the LUKOIL`s daughter enterprise) and oil fields of "LUKOIL-Perm" LLC.

Situation existing prior to the project

In process of oil treatment at the booster pump stations (BPS) of the Verkhnekamsk oil fields associated petroleum gases are separated from the crude oil. All extracted APG has been burned at the flares of BPS due to the remoteness of the oil fields, the lack of transport infrastructure and gas consumers in the areas of oil production.

Project purpose

Having at disposal the some APG resource «LUKOIL-Perm» Company undertakes activities for its efficient utilization.

For this purpose, in cooperation with «Permneftegazpererabotka» LLC («PNGP») the project envisages construction of the new system of recovery, transportation of APG the length of more than 180 km with a diameter 250-350mm, and a compressor station GCS "Magovskaya" necessary for the delivery of associated gas to consumers.

This pipelines with the compressor station provide the necessary APG transport system in the Verkhnekamsk oil fields and provide a useful utilization of APG through by the transport of most part of extracted APG under high pressure from all the BPS to the consumers:

- at Uralkaliy utilized APG will be used to heat generation in the boiler room of mine BKPRU-4, and will be replacing the previously used of natural gas.

- at "PNGP" utilized APG will be used (processing) to the production of aw product for commercial propane/butane mix (CPBM), stable natural gasoline (SNG) and stripped gas (SG) .

Electricity for the pipeline, vapor recovery units and GCS is imported from the external power supplier Tumenenergo.

The following table shows the dynamics of a promising dispose of APG from Verkhnekamsk oil fields at GCS "Magovskaya" and placing it to consumers for the period 2011-2012.

Table A.2. APG balance for period 2011-2012

	2011	**2012**
Delivery of APG at GCS "Magovskaya" for transportation		
Gagarinskoye oil field, ths.m3	24 979	33 832
Ozernoye oil field, ths.m3	18 654	26 657
Magovskoye oil field, ths.m3	17 165	32 239
GCS "Magovskaya", ths.m3	**60 798**	**92 728**
Useful part of APG		
BKPRU-4 «Uralkaliy» , ths.m3	30 664	83 699
«PNGP» , ths.m3	30 134	9 029
All	**60 798**	**92 728**

Project history [1]*:*

24.10.2007 -Decision to implement this project with applying the norms of the Kyoto Protocol. (Protocol of Meeting, "Choice Analysis for Recovery, transportation and processing of associated petroleum gas from the Verkhnekamsk oil fields", dd. 24.10.2007, "Permneftegaspererabotka" LLC)
12.12.2008- Construction works started. Order №297 от 12.12.2008, "Permneftegaspererabotka" LLC.
23.12.2010-Commissioning of the project. Order №377 от 23.12.2010, "Permneftegaspererabotka" LLC.
30.04.2011 –Startup (Tentative date. Can be changed).

Baseline scenario
Under the baseline scenario all extracted APG at the BPS of Verkhnekamsk oil fields 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:

- Sectoral policies and legislation do 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.

[1] Protocol of Meeting, "Choice Analysis for Recovery, transportation and processing of associated petroleum gas from the Verkhnekamsk oil fields", dd. 24.10.2007, "Permneftegaspererabotka" LLC .

Emission reductions
As a result of the project activity the APG that otherwise would be flared will be efficiently utilized: **153526** mln. m3 of APG will be utilized in 2011-2012**.**
That will result in a considerable amount of GHG emission reductions. Estimated GHG emission reductions are **379189** tons of CO_2 equivalent in the period 2011-2012.

A.3. Project participants:

>>

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)	«Permneftegazpererabotka» LLC	No
Party B – no	-	-

A.4. Technical description of the project:

A.4.1. Location of the project:

>>

A.4.1.1. Host Party(ies):

>>

Russian Federation

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

>>

The Perm region

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

>>

The Krasnovishersk, Solikamsk, Alexandrovsk, Dobriansk district and the Perm City

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

Figure A.4.1.4.1. Perm Region on the Map of the Russian Federation

The Perm Region is situated in the eastern part of the East European Plain and on the west slide of the Middle and North Urals. Its area makes 160,600 square km. The Perm Region borders the Komi Republic in the north, the Kirov oblast and Udmurtia – in the west, Bashkiria – in the south, the Sverdlovsk oblast – in the east. The area extent from north to south makes 645 km, from west to east – 417.5 km.

"Permneftegazpererabotka" LLC (gas processing plant) is located in the Perm City that is the capital of the Perm Region. The Perm City is 1522 km from Moscow.

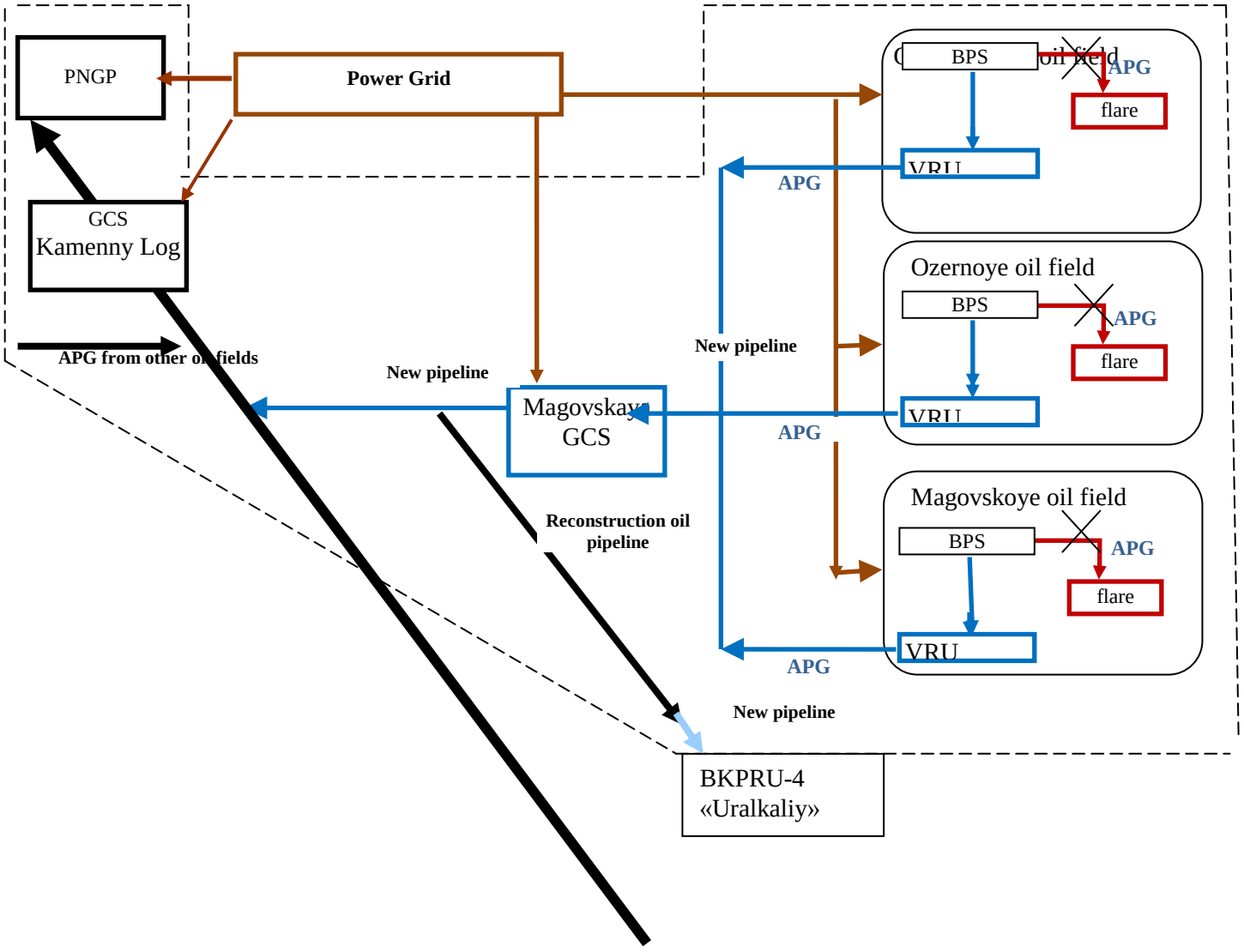
Verkhnekamsk oilfields are located in the Krasnovishersk district, approximately 350 km to the north from "Permneftegazpererabotka" LLC. The Ozernoye oil field is 39 km to the south-west from the town of Krasnovishersk, the Gagarinskoye oil field is 30 km to the south from the town of Krasnovishersk, and the Magovskoye oil field is 35 km to the south from Krasnovishersk.

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

>>

The project provides putting into operation of the system of recovery, transportation of APG released after oil separation.

Figure A.4.2.1. Scheme of APG recovery, transportation and consumption



BPS – boost pumping station;
APG – associated petroleum gas;
GCS – gas compressing station;
VRU- Vapor Recovery Unit
BKPRU- Berezniki potassium mine №4
PNGP-Permneftegaspererabonka

.

For the project implementation is need the construction of vapor recovery units (VRUs), gas compressor station (GCS) and gas pipelines (GP):

- GP "Ozernoye oil field –Magovskaya GCS" of 26 km length; diameter 300 mm
- GP "Gagarinskoye oil field – tie-in point into GP "Ozernoye oil field –Magovskaya GCS" of 8 km length; diameter 100 mm
- GP "Magovskoye oil field –Magovskaya GCS" of 4 km length.
- Magovskaya GCS – tie-in point into the existing GP "Unva – Kamenny Log" of 138.6 km length, diameter 350 mm
- Magovskaya GCS with capacity 120 mln.m3 per year
- Reconstruction of the existing old oil pipeline «НГСП-1212 "Chashkino - ПК0 to the feeding of associated gas from the " GCS "Magovskaya length of 28.8 km; diameter 219-530mm
- GP from НГСП-1212 "Chashkino-НГО to BKPRU-4 «Uralkaliy» length of 4.8 km; diameter 400mm

Process description
APG at the exit from the BPS under separation pressure feeds into to the VRU and after in the new fields gas pipeline to the GCS "Magovskaya".
At Magovskaya compressor station transported APG comes with low pressure and subsequent transport to the main gas pipeline system needs to compressing. The compressing of «project» APG is on Magovskaya compressor station.
After compressing on GCS APG under high pressure distribution in reconstruction oil pipeline for delivery to BKPRU-4 «Uralkaliy and in the new gas pipeline to the tie-in point into the existing GP "Unva – Kamenny Log.
Later transported APG into pipeline "Unva – Kamenny Log mixing with APG from other oilfields and distribute to the next compressor station Kamenny Log, where once again is the compressing. After second compressing APG once again mixing with APG from other oilfields and distribute to the «PNGP» LLC.
At Uralkaliy utilized APG will be used to heat generation in the boiler room of mine BKPRU-4, and will be replacing the previously used of natural gas.
At "PNGP" utilized APG will be used (processing) to the production of aw product for commercial propane/butane mix (CPBM), stable natural gasoline (SNG) and stripped gas (SG).
Electricity for the pipeline, vapor recovery units and GCS is imported from the power supplier «TUMENENERGO».
Electricity for the processing needs at PNGP is also imported from the power supplier «TUMENENERGO».

Personnel passed training for operation of the gas pipeline installations in process of starting-up and adjustment works.

12.12.2008- Construction works started. Order №297 от 12.12.2008, "Permneftegaspererabotka" LLC.
23.12.2010-Commissioning of the project. Order №377 от 23.12.2010, "Permneftegaspererabotka" LLC.
30.04.2011 –Startup (Tentative date. Can be changed).

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

>>
Under the project activity all volume of extracted APG that was previously flared will be efficiently used through injection into the new gas pipeline and transportation to the consumers. 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 stacks. 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, one way or another, regulate the APG use do not enforce oil companies to minimize flaring. 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 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 rose up to 64.3%[2] as compared with 24.4%[3] in 2006. It testifies for the insufficient enforcement of this requirement that cannot motivate the oil company to efficiently utilize APG. 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:

>>

	Years
Length of the crediting period: 2011-2102	2
Year	Estimate of annual emission reductions in tonnes of CO_2equivalent
2011	144333
2012	234856
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	379189
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	227514

A.5. Project approval by the Parties involved:

>>

On October 28, 2009 the Chairman of the Russian Federation Government, V. Putin, signed Resolution 843 "On measures for realization of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change". This document depicts a JI-project approval procedure in the Russian Federation.

According to item 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

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

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

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.

Second approval (second party) is possible after reception of the positive determination opinion from AIE from first party.

SECTION B. Baseline

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

>>

As appropriate, project participants may, but are not obliged to, apply approved clean development mechanism (CDM) baseline and monitoring methodologies. Based on that a JI specific approach regarding baseline setting is used. This approach is based on the provisions of Guidelines for users of the JI PDD Form (Version 02) [4] and includes the following steps:

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. (Continued common practice for utilization of A*PG), *i.e. the combustion of all extracted APG in the flares at BPS of the Verkhnekamsk oilfields.*

Alternative scenario 2. The project itself (without being registered as a JI activity), i.e. construction of the new system of recovery, transportation of APG from Verkhnekamsk oilfields.

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 Verkhnekamsk oilfields, the electricity is imported from the centralized grid «TUMENENERGO» and distributed through the well-developed transformation and distribution system.

[4] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

The analysis also not consider variants related to the injection of APG to reservoir pressure maintenance as "LUKOIL-Perm" LLC for reservoir pressure maintenance on Verkhnekamsk oilfields uses water.
The analysis also not consider variants related to the primary processing of APG on the Verkhnekamsk oilfields and the production of methanol, due to lack of potential customers near Verkhnekamsk oilfields as well as a significant removal of transport (nearest railway station located more over in 60 km).

a) Description of alternative scenarios.

*Alternative scenario 1. (Continued common practice for utilization of A*PG), *i.e. the combustion of all extracted APG in the flares at BPS of the Verkhnekamsk oilfields.*

"LUKOIL-Perm" LLC is producing oil and gas at Verkhnekamsk oilfields. In process of oil treatment at the BPS associated petroleum gases are extracted from the crude oil., which is completely burnt at the BPS flares, which would lead to significant GHG into the atmosphere. To reservoir pressure maintenance on oilfield uses water. The electricity for oilfield tech needs is imported from the centralized grid «TUMENENERGO».

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 of Verkhnekamsk oilfields oilfield in 2011-2012

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
APG to be flared at BPS of Verkhnekamsk oilfields oilfield										
Gagarinskoye oil field, ths.m3	24 979	33 832	30 784	31 399	28 883	26 570	24 442	22 483	20 682	19 025
Ozernoye oil field, ths.m3	18 654	26 657	25 321	22 027	21 362	20 695	19 428	17 431	15 980	14 615
Magovskoye oil field, ths.m3	17 165	32 239	39 792	45 844	44 614	41 488	39 410	37 436	35 562	33 781
All	**60 798**	**92 728**	**95 897**	**99 270**	**94 859**	**88 753**	**83 280**	**77 350**	**72 224**	**67 421**

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[5] and by partially revised Decree № 410 dd. 01/07/2005[6].
In below table the environmental payments having been made by "LUKOIL-Perm" LLC for APG flaring in the previous years are presented.

Table B 1.2. Environmental payments for APG flaring at BPS of Verkhnekamsk oilfields[7]

Environmental Payments	2006	2007	2008
In ths rubles.	78	91	96

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" implements new rules for the ecopayments

[5] «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»
[6] «On alterations in annex # 1 to the Decree of the Government of Russian Federation dd 12/06/2003 # 344»

[7] Information was presented by the environmental department of Lukoil Perm

calculation. 95 % of emissions from the APG burning will be calculated as above-limit emissions with coefficient 4.5 starting with January 1, 2012.

In the this scenario 1 from 2012 about 1 million m3/year of methane will issues in the atmosphere. Ecopayments will be about 0,8 million rubles / year or 6.9 million rubles for the period 2012-2020.

Table B 1.3 Calculations of ecopayments for the APG flaring at BPS of Verkhnekamsk oilfields

	CH4 volume into the atmosphere as the result of the incomplete burning	Coefficient (governmental regulation № 7 8 January 2009)	Coefficient (governmental regulation №344 12 June 2009)[8]	CH4 part for the taxing	Amount of ecopayments
1	*2*	*3*	*4*	*5*	*6*
	ths m3		*ruble / t*	*%*	*mln rub/ year*
2012	1054	4,5	250	95	0,830
2013	1090				0,859
2014	1129				0,889
2015	1079				0,849
2016	1009				0,795
2017	947				0,746
2018	879				0,693
2019	821				0,647
2020	767				0,604
	9466				6,9

Alternative scenario 2. The project itself (without being registered as a JI activity), i.e. construction of the new system of recovery, transportation of APG from Verkhnekamsk oilfields.

Under this scenario 2 all of extracted APG will be efficiently used through both: injection into the new system of recovery, transportation. This will prevent the CO2 and CH4 emission, which would have been under the scenario 1 in the case of flared this APG volume on the Verkhnekamsk oilfields BPS flares.
For this purpose, "LUKOIL-Perm" LLC in cooperation with «Permneftegazpererabotka» LLC («PNGP») the project envisages construction of the new system of recovery, transportation of APG the length of more than 180 km with a diameter 250-350mm, and a compressor station GCS "Magovskaya" necessary for the delivery of associated gas to consumers.

This pipelines with the compressor station provide the necessary APG transport system in the Verkhnekamsk oil fields and provide a useful utilization of APG through by the transport of most part of extracted APG under high pressure from all the BPS to the consumers:
- at Uralkaliy utilized APG will be used to heat generation in the boiler room of mine BKPRU-4, and will be replacing the previously used of natural gas.
- at "PNGP" utilized APG will be used (processing) to the production of aw product for commercial propane/butane mix (CPBM), stable natural gasoline (SNG) and stripped gas (SG) .
Electricity for the pipeline, vapor recovery units and GCS is imported from the power supplier «TUMENENERGO».

The following table shows the dynamics of a promising dispose of APG from Verkhnekamsk oil fields at GCS "Magovskaya" and placing it to consumers for the period 2011-2012.

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

Table B.1.4. APG useful balance for period 2011-2012

	2011	**2012**
Delivery of APG at GCS "Magovskaya" for transportation		
Gagarinskoye oil field, ths.m3	24 979	33 832
Ozernoye oil field, ths.m3	18 654	26 657
Magovskoye oil field, ths.m3	17 165	32 239
GCS "Magovskaya", ths.m3	**60 798**	**92 728**
Useful part of APG		
BKPRU-4 «Uralkaliy» , ths.m3	30 664	83 699
«PNGP» , ths.m3	30 134	9 029
All	**60 798**	**92 728**

For realization of this alternative the sum of 1013 mln. Rubles[9] are 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.:

- 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 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”.

[9] According to the design documentation (Utilization and marketing of APG from Verkhnekamsk oil fields of the Perm region – designing of transportation system and gas preparation facilities (gas transport method is steel pipeline). Detailed design. Volume1. Book 7.Investment effectiveness)

- 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[10]. 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 "LUKOIL-Perm" LLC 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 increase of those payments under the regulation # 7 would not make the Company turn to APG utilization because of this reason. 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 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

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

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 "LUKOIL-Perm" LLC Company had to build a new 180 km 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 barriers)

For *Scenario 1* no investment capital is required. Nevertheless, APG flaring necessitates making environmental payments in amount approximately 90 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 1013 million roubles 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 & dry stripped gas 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 price of dry gas after processing used in the investment analysis made for this project is 918 rubles per ths. m3, which is too low to return investments (see section B2), which is higher that the price of the natural gas (inc. dry gas) on the domestic market (297-445 rubles per ths. m3) and gas price for this region (for Permtransgas738-754 rubles per ths. m3) by Gazprom[11].

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

[11] http://www.ngvrus.ru/docs/preyskurant.pdf

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 & dry gas prices	No influence	Makes the project unprofitable due to low 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, i.e., *Alternative scenario 1. (Continued common practice for utilization of A*PG)*, i.e. the combustion of all extracted APG in the flares at BPS of the Verkhnekamsk oilfields*, is **the baseline scenario.**

The key information and data used to establish the baseline

Data/Parameter	Volume of APG at GCS Magovskaya		
Data unit	Ths m 3 (at standard condition)		
Description	The main source of baseline emissions. All extracted APG in the baseline would be burned in flares.		
Time of determination/monitoring	Constant		
Source of data (to be) used	Flow meter (Probar 3095 MFA)		
Value of data applied (for exante calculations/determinations)	2011	2012	
	113453	95514	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all extracted APG is needed for baseline emissions calculation.		
QC/QA procedures (to be) applied	Equipment are verified and calibrated «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014		
Any comment	-		

Data/Parameter	Chemical composition of APG from BPS of Verkhnekamsk oil fields on GCS Magovskaya
Data unit	%
Description	Chemical composition (at standard condition) of APG required for

	the calculation of emissions factor from APG flaring at BPS Verkhnekamsk oil fields
Time of determination/monitoring	1 times in month
Source of data (to be) used	*Gas chromatograph Crystallux 4000M UNICO 1201*
Value of data applied (for exante calculations/determinations)	Carbon dioxide, CO2 — 2,43% methane, CH4 — 56,85% ethane, C2H6 — 18,12% propane, C3H8 — 10,12% i-butane, C4H10 — 1,55% n-butane, C4H10 — 2,01% i-pentane, C5H12 — 0,44% n-pentane, C5H12 — 0,39% hexane, C6H14 — 0,15% geptane, C7H16 — 0,00% octane, C8H18 — 0,00% hydrogen sulfide, H2S — 0,85% nitrogen, N2 — 6,90% oxygen, O2 — 0,00%
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.
QC/QA procedures (to be) applied	Equipment are verified and calibrated «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014
Any comment	-

Data/Parameter	ρ_{CO2}
Data unit	kg/m3
Description	Carbon dioxide (CO_2) density under the standard condition
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	GOST 30319.1-96. Natural gas. Methods of calculating the physical parameters. Determination of physical parameters of natural gas, its components and its products
Value of data applied (for exante calculations/determinations)	1,829
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CO2 required for the calculation of emissions factor from apg flaring at BPS
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	ρ_{CH4}
Data unit	kg/m3

Description	Metane (CH4) density under the standard condition
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	GOST 30319.1-96. Natural gas. Methods of calculating the physical parameters. Determination of physical parameters of natural gas, its components and its products
Value of data applied (for exante calculations/determinations)	0,667
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CH4 required for the calculation of CH4 emissions factor from APG flaring at BPS
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	APG flaring efficiency
Data unit	%
Description	APG flaring efficiency required for the calculation of emissions factor from apg flaring at BPS
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	2006 IPCC guidance (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)	98
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The flaring efficiency is needed to calculate the GHG emission rates due to the combustion of the APG.
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	Global Warming Potential of methane
Data unit	t CO_2/t CH_4.
Description	Global Warming Potential of methane required for the calculation of CH4 emissions factor from apg flaring at BPS
Time of determination/monitoring	Fixed parameter
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 CH4 emission rates 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 of Verkhnekamsk oil fields
Data unit	tCO2e/ths. m^3
Description	Methane emission factor is needed to calculate the GHG emission rates due to the flaring of APG at BPS
Time of determination/monitoring	monthly
Source of data (to be) used	2006 IPCC guidance (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 4.44).
Value of data applied (for exante calculations/determinations)	-
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	-

At the baseline case in process of oil treatment at the booster pump stations (BPS) of the Verkhnekamsk oil fields associated petroleum gases are separated from the crude oil. All extracted APG has been burned at the flares of BPS due to the remoteness of the oil fields, the lack of transport infrastructure and gas consumers in the areas of oil production:

as the baseline all of the extracted APG flared would flares, the volume of APG supplied to the flares would be equal to the volume of APG supplied to the GCS Magovskaya:

$$\mathbf{BE = BE_{CO2,F} + BE_{CH4,F}}$$

BE - emissions from APG flaring (with incomplete burning) at BPS of Verkhnekamsk oilfields, $t.CO_2$
$BE_{CO2,F}$ - emissions from APG flaring at BPS of Verkhnekamsk oilfield**s**, $t.CO_2$
$BE_{CH4,F}$ - CH4 emissions from incomplete burning at BPS of Verkhnekamsk oilfields, $t.CO_{2\,e}$

$$BE_{CO2,F} = FC_{APG,\ CS,\ PG} * EF_{CO2\ f,\ APG}$$

$FC_{APG,\ CS,\ PG}$ – volume of APG at GCS Magovskaya, at standard conditions, ths m^3
$EF_{CO2\ f,\ APG}$ – CO_2 emission factor from APG flaring at BPS, $t.CO_2/ths.\ m^3$

$$EF_{CO2\ f,\ APG} = (y_{CO2} + (Nc_{CH4} * y_{CH4} + Nc_{ЛНОС} * y_{ЛНОС})) * \rho CO2 * FEf$$

$y_{CO2,}\ y_{CH4}\ y_{VOC}$ – volumetric fractions of carbon, methane and volatile organic compounds VOC[1] in APG at GCS Magovskaya, (information source – gas test protocol).
$Nc_{CH4,}\ Nc_{VOC}$ – quantity of carbon moles in a mole of methane and VOC accordingly.
ρCO_2 – CO_2 density at 20°C is taken equal to 1.829 kg/m3.
FE –efficiency of APG combustion in a flare is taken equal to 0.98.

$$BE_{CH4,\ F} = FC_{APG,\ CS,\ PG} * EF_{CH4,F}$$

$EF_{CH4,\ F}$ – CH4 emission factor from incomplete burning at BPS in terms on CO_2, $t.CO_2e./ths.\ m^3$

Due to incomplete combustion of APG flaring part of APG extracted to the atmosphere is not oxidizing. IPCC 2006 determines the efficiency of burning 98%, then 2% is not burned completely, which causes methane emissions to the atmosphere. Methane emission factor in terms of CO2-eq. determined as follows:

$$EF_{CH4,F} = y_{CH4} * \rho CH4 * (1-FEf) * GWP_{CH4}$$

y_{CH4}– volumetric fractions of methane in APG at GCS Magovskaya, (information source – gas test protocol at standard conditions).

ρCH4– the density of methane CH4 under standard conditions, equal to 0.667 kg/m^3

FE - APG flaring efficiency, equal to 0,98[12]

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

[12] 2006 IPCC Guidelines, volume 2, Energy, Chapter 4, Fugitive emissions,p.4.49

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

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 through the analysis of 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 in the design documentation «Utilization and marketing of APG from Verkhnekamsk oil fields of the Perm region – designing of transportation system and gas preparation facilities (gas transport method is steel pipeline). Detailed design. Volume1. Book 7. Investment effectiveness».

Table B2.1 The outcomes of the estimations of the project's efficiency in 2005

Index	Unit	
CAPEX	mln rubles	1013
operating costs	mln rubles	1467,37
Discount rate	%	10
IRR	%	8,52
NPV	mln rubles	- 59,78

Conclusion:

On the date of the project start the project is absolutely unattractive from investor's point of view.

Sensitivity analysis

Sensitivity of the project NPV to deviation of such factors as the investment cost, operational costs were assessed. The results of the analysis are presented in the table below.

Table B 2.2. Results of sensitivity analysis

investment cost -10%

Index	Unit	
CAPEX	mln rubles	912,49
Operating costs	mln rubles	1467,37
Discount rate	%	10
IRR	%	11,05%
NPV	mln rubles	38,82

investment cost +10%

Index	Unit	
CAPEX	mln rubles	1115,09
Operating costs	mln rubles	1467,37
Discount rate	%	10,00%
IRR	%	0,06
NPV	mln rubles	-158,37

operational cost -10%

Index	Unit	
CAPEX	mln rubles	1013,79
Operating costs	mln rubles	1320,63
Discount rate	%	10
IRR	%	9,86%
NPV	mln rubles	-5,61

operational cost +10%

Index	Unit	
CAPEX	mln rubles	1013,79
Operating costs	mln rubles	1614,10
Discount rate	%	10
IRR	%	7,16%
NPV	mln rubles	-113,94

Thus, even considerable deviations (from -10% till +10%) of above mentioned factors cannot make enhance the project NPV. Only in the case of reducing capital costs on 10% NPV higher than 0.
As for justifying the cost effectiveness of the project were determined discount factors of 10% and 15% (Detailed design. Volume1. Book 7. Investment effectiveness»). We choose the conservative approach and show the discount rate only 10%.
When sensitivity analyzing of option (to reduce capital costs by 10%) show more than 10%, but it's still lower than adopted in the calculation of 15%.

The project is financially attractive, if 3 out of 4 scenarios at changing of the key parameters the cost-effectiveness indicators show that it is effective.

In addition, this option is only just a theoretical, because the actual investment was much more than put into the calculation in 2005.

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 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.

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

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

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[15]. 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.

Moreover, in the Perm region, analog of this project do not exist, because in this region, oil production development only Lukoil-Perm. (http://www.perm-kray.ru/pam102-1.htm) And this is only project being implemented in the respective geographical areas of the Lukoil company - the first of its kind.

In Russia LUKOIL utilizes over 3,3 bcm of APG at Lokosovky, Usinsky, Permneftegaspererabotka and Korobkovsky gas-processing plants:

Gas-processing plant name	The year of construction	The year of entering in LUKOIL group
Lokosovsky GPP	1970	2002
Usinsky GPP	1980	2001
Korobkovsky GPP	1949	1996
Permneftegaspererabotka	1969	1998

Usinskiy gas processing plant reconstructed oil pipeline for gas transporting in 2001. The length of such gas pipeline riches 70 km. After GPPs entering in LUKOIL group there were no other projects like PNGP`s project (recovery, transportation and processing).

The aforesaid information make clear that the presented project is unique since any other project does not consists of the APG transportation on considerable distances. The realization of projects is easier because such projects do not involve huge expenses.

The survey makes clear that there are some properties of nature which involve the enlarged investment to the Project:

- there are protected areas with the special authorities control;
- climatic conditions are difficult (long winter with low temperature);
- there are potassium fields during the pipeline that require the additional measures for their protection.

Also the projected pipeline is one of the longest pipeline and has the private financing. The existent gas infrastructure was built within energy program on the money from state budget in 1970s in the time of USSR.

Conclusion:

All the aspects considered demonstrate that APG utilization (particularly through pumping into gas pipeline) 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.

[15] According to Resolution of the Government of Russian Federation # 334 “On providing access of independent entities to the gas transmission system of Gazprom”

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.

These considerations are fully applicable to the proposed project, which is economically unattractive because of high capital costs for the construction of systems for collection and transportation of associated gas.

In addition, project activity of «LUKOIL-Perm» in cooperation with «PNGP» differs from activity of another oil companies for useful APG utilization by:

Oil companies that make not many projects on APG utilization as usual fulfill conditions of license agreements so these projects are implemented as a particular responsibilities of license holders.

Just the other way round license agreement given to «LUKOIL-Perm» Company on exploitation of Verkhnekamsk oilfields doesn't contain conditions for obligatory APG utilization. So implementation of the Project is voluntary activity made by license holder.

Conclusion: based on the facts mentioned above we can conclude

- 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.
- Project activity the first of its kind of the Perm region

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

Provision of additionality proofs

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

- License agreement for the development of Verkhnekamsk oil fields (Ozernoye, Gagarinskoye and Magovskoye fields) protocol CKR Rosnedra №4902 from 07.10.2010; №3284 from 17.11.2004; №4015 from 28.06.2007)
- Protokol of decision to implement this project with applying the norms of the Kyoto Protocol. (Protocol of Meeting, "Choice Analysis for Recovery, transportation and processing of associated petroleum gas from the Verkhnekamsk oil fields", dd. 24.10.2007, "Permneftegaspererabotka" LLC)
- Design documentation «Utilization and marketing of APG from Verkhnekamsk oil fields of the Perm region – designing of transportation system and gas preparation facilities (gas transport method is steel pipeline). Detailed design. Volume1. Book 7. Investment effectiveness».

Step 3. Explanations on how GHG gases emission reductions are archived

Baseline GHG emissions

Under the baseline scenario all extracted APG at BPS of Verkhnekamsk oil fields would be flared. At that GHG gases including carbon dioxide CO_2 and methane CH_4 would be emitted. Flare stacks are 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, the 2006 IPCC Guidelines recommend to consider the efficiency of such combustion equal to 98%[16].

Project GHG emissions

Under the project activity all of extracted APG will be efficiently used through both: injection into the new field new gas system of recovery, transportation to GCS "Magovskaya" (for compressing) and then for the delivery of associated gas to consumers.

However, there will be emissions in the project boundary from the:

- methane (CH_4) physical leaks during APG processing at PNGP.
- methane (CH_4) physical leaks during transportation of APG
- APG combustion at «Uralkaliy» (Will be replacing the combustion of natural gas that, in fact, did not entail additional GHG emissions)
- Electricity production for the processing of the APG under project activity
- Heat production for the processing of the APG under project activity

GHG emission reductions
Emission reductions will occur due to APG flaring reduction (considerable APG volume will be efficiently utilized through the injection into the new field gas pipeline system and the delivery to the consumers) under the project.

The mechanism applied to estimate emission reductions for the period 2011-2012 is shown in the following tables (please also refer to the calculations in the section E.).

Table B 2.1. Mechanism of estimate of emission reductions in 2011-2012

Item	Index	Unit	**2011**	**2012**
APG flaring at BPS	$FC_{APG, CS, PG}$	ths.m3	60798	92728
CO_2 emission factor	$EF_{CO2,Flare}$	tCO2/ths.m3	2,60	2,60
CO_2 emissions from APG flaring at BPS	$BE_{CO2,Flare}$	tCO2	158182	241257
APG flaring at BPS	$FC_{APG, CS, PG}$	ths.m3	60798	92728
CH_4 emission factor(in terms of CO_2)	$EF_{CH4,Flare}$	tCO2/ths.m3	0,159	0,159

[16] 2006 IPCC Guidelines for National Greenhouse Gas Inventory (Subsection 4.2. "Fugitive emissions from oil and natural gas systems", adapted equations 4.2.4 p 4.44).

CH_4 emissions (in terms of CO_2) due to incomplete combustion from APG flaring at BPS	$BE_{CH4,Flare}$	tCO2e	9681	14766
Total baseline emissions	**BE**	**tCO2**	**167864**	**256022**
Specific electricity consumption coefficient per ths. cubic meter for APG collection and compressing under the project activities from Verkhnekamsk oilfields	$SFC_{elec,\ north,\ PG}$	MWh/ths.m3	0,15	0,15
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
CO2 emission factor	EF_{CO2el}	tCO2/ MWh	0,606	0,606
Emissions from electricity consumption at CS	PEelec cs	tCO2	5563	8485
Specific electricity consumption per ths. cubic meter of processing APG on the PNGP	$SFC_{elec,\ process,\ PG}$	MWh/ths.m3	0,303	0,303
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
Volume of APG delivery to BKPRU-4 Uralkaliy	$FC_{\mathbf{APG,\ Ural,\ PG}}$	ths.m3	30 664	83 699
CO2 emission factor	EF_{CO2el}	tCO2/ MWh	0,606	0,606
Emissions from the consumption of additional quantities of electricity for technological purposes in the processing of PNGP	PE elec process	tCO2	5533	1658
gas losses at APG processing operations on PNGP	C process loss CH_4.	%	2,70%	2,70%
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728

Volume of APG delivery to BKPRU-4 «Uralkaliy»	$FC_{APG,\ Ural,\ PG}$	ths.m3	30 664	83 699
Volumetric fractions of methane in APG at GCS Magovskaya	y_{CH4}	%	56,85%	56,85%
Global warming potential for methane	GWP_{CH_4}	t CO_2/t CH_4	21	21
Emissions from methane losses at APG processing operations on PNGP	PE processCH_4	t CO2e	**6479**	**1941**
gas losses at APG transport operations	C loss CH_4	**%**	1,23%	1,23%
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
Volume of APG delivery to BKPRU-4 Uralkaliy	$FC_{APG,\ Ural,\ PG}$	ths.m3	30 664	83 699
volumetric fractions of methane in APG at GCS Magovskaya	y_{CH4}	%	56,85%	56,85%
Global warming potential for methane	$GWPCH_4$	t CO_2/t CH_4	21	21
Emissions from methane losses at APG transport operations	PEtransCH_4	t CO2e	5955	9082
Total project emissions	**PE**	**tCO2**	23530	21167
Emissions reductions	**ER**	**tCO2**	144333	234856

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	Include	Main baseline emission source
		N_2O	Do not include	Negligibly small [17]
		CH_4	Include	Incomplete burning (2% of APG volume to be flared)

[17] Calculations presented in Excel form

Scenario	Source	GHG type	Include/Do not include	Comment
Project	Use of electricity from the grid at project tech needs (compressing and transportation)	CO_2	Include	Main project emission source
		N_2O	Do not include	Negligibly small [18]
		CH_4	Do not include	Negligibly small
	Use of electricity from the grid for the processing of the APG under project activity	CO_2	Include	Main project emission source
		N_2O	Do not include	Negligibly small [19]
		CH_4	Do not include	Negligibly small
	Heat production for the processing of the APG under project activity	CO_2	Do not include	Negligibly small
		N_2O	Do not include	Negligibly small
		CH_4	Do not include	Negligibly small
	Methane (CH_4) physical leaks during APG processing at PNGP	CO_2	Do not include	Negligibly small
		N_2O	Do not include	Negligibly small
		CH_4	Include	Project emission source
	Methane (CH_4) physical leaks during transportation of APG	CO_2	Do not include	Negligibly small
		N_2O	Do not include	Negligibly small
		CH_4	Include	Project emission source

[18] Calculations presented in Excel form

[19] Calculations presented in Excel form

The main emissions potentially attributable in the context of the project are emissions arising from:

- Electricity production for the processing & compressing and transportation of the APG under project activity
- Heat production for the processing of the APG under project activity
- methane (CH_4) physical leaks during APG processing at PNGP.
- methane (CH_4) physical leaks during transportation of APG
- APG combustion at «Uralkaliy» (Will be replacing the combustion of natural gas that, in fact, did not entail additional GHG emissions)

1. The project provides for the increase of electricity consumption at PNGP and CS as a result of processing of APG under project activity, therefore the emissions from electricity production in outside power system will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

2. The project provides for the increase of heat consumption at PNGP as a result of processing of APG under project activity, therefore the emissions from heat production in PNGP boiler room will be also increased. The quantitative assessment provided in the section E shows that these are negligibly small (less than 2000 tCO_2)[20], and hence they are neglected.

3. The project provides for the increase volume of APG for processing at PNGP due to supply of additional volume of APG under the project activity, therefore the CH_4 emissions during processing of the project APG will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

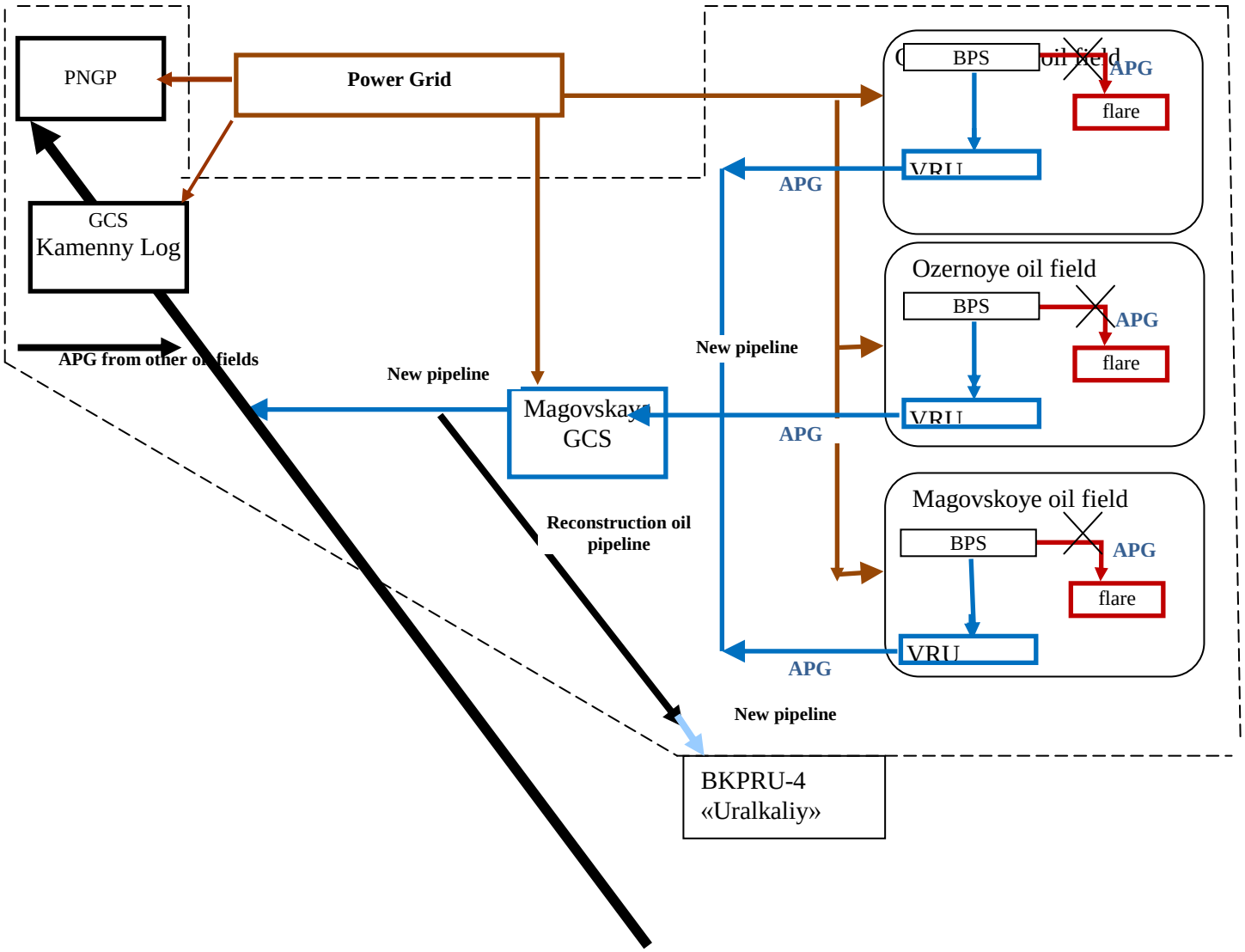
4. The project provides for the increase volume of APG for compressing&transportation at gas pipelines and GCS due to supply of additional volume of APG under the project activity, therefore the CH_4 emissions during compressing&transportation of the project APG will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

5. APG will displace an equivalent quantity of the natural gas by end customers (Uralkaliy) that would be otherwise used. As the equivalent amount of natural gas would be combustion under the baseline, the leaks in the both scenarios are equal, which do not lead to additional emissions. Therefore these emissions can be neglected.

Schematically the project boundary embrace BPS of Verkhnekamsk oilfields including new gas pipeline and GCS

[20] The calculation is presented in Excel format: PNGP calculation

Figure B.3.1. The project boundary



BPS – boost pumping station;
APG – associated petroleum gas;
GCS – gas compressing station;
VRU- Vapor Recovery Unit
BKPRU- Berezniki potassium mine №4
PNGP-Permneftegaspererabonka

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: 02.02.2011.

The baseline has been designed 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 C. Duration of the project / crediting period

C.1. Starting date of the project:

>>

The project's starting date is 23.12.2010. This first date of commissioning of the project equipment.

C.2. Expected operational lifetime of the project:

>>

Expected operational lifetime of the project is 20 years or 240 months: from 23.12.2010 till 23.12.2030

C.3. Length of the crediting period:

>>

Crediting period is determined within the budget period of Kyoto Protocol from 01.05.2011 till 31.12.2012 and making 1 year and 8 month or 20 months.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

>>

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 all extracted APG at the BPS of Verkhnekamsk oilfields 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. 2006 IPCC Guidelines for National Greenhouse Gas Inventory prescribes to use 98% efficiency factor when estimating GHG emissions from incomplete flaring combustion.

Project emissions

Under the project activity all of extracted APG will be efficiently used through both: injection into the new field gas pipeline system and transportation via gas pipeline to the Magovskaya GCS and then delivery to the consumers. This will prevent the CO2 and CH4 emission, which would have been under the baseline scenario in the case of flared this part of APG on the BPS flares.

For this purpose, “LUKOIL-Perm” LLC in cooperation with «Permneftegazpererabotka» LLC («PNGP») the project envisages construction of the new system of recovery, transportation of APG the length of more than 180 km with a diameter 250-350mm, and a compressor station GCS "Magovskaya".

This pipelines with the compressor station provide the necessary APG transport system in the Verkhnekamsk oil fields and provide a useful utilization of APG through by the transport of most part of extracted APG under high pressure from all the BPS to the consumers:

- at Uralkaliy utilized APG will be used to heat generation in the boiler room of mine BKPRU-4, and will be replacing the previously used of natural gas.

- at "PNGP" utilized APG will be used (processing) to the production of aw product for commercial propane/butane mix (CPBM), stable natural gasoline (SNG) and stripped gas (SG) .
Electricity for the pipeline, vapor recovery units and GCS is imported from the power supplier «Tumenenergo».

The main emissions in the context of the project are emissions arising from:

- 1)Electricity production for the processing of the APG under project activity
- 2)Heat production for the processing of the APG under project activity
- 3)methane (CH_4) physical leaks during APG processing at PNGP.
- 4)methane (CH_4) physical leaks during transportation of APG
- 5)APG combustion at «Uralkaliy» (Will be replacing the combustion of natural gas that, in fact, did not entail additional GHG emissions)

1) The project provides for the increase of electricity consumption at PNGP and CS as a result of processing of APG under project activity, therefore the leakage from electricity production in outside power system will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

2) The project provides for the increase of heat consumption at PNGP as a result of processing of APG under project activity, therefore the leakage from heat production in PNGP boiler room will be also increased. The quantitative assessment provided in the section E shows that these are negligibly small (less than 2000 tCO_2) [21], and hence they are neglected.

3) The project provides for the increase volume of APG for processing at PNGP due to supply of additional volume of APG under the project activity, therefore the CH_4 emissions (leaks) during processing of the project APG will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

4) The project provides for the increase volume of APG for compressing&transportation at gas pipelines and GCS due to supply of additional volume of APG under the project activity, therefore the CH_4 emissions (leaks) during compressing&transportation of the project APG will be also increased. The quantitative assessment provided in the section E shows that these emissions are significant (higher than 2000 tCO_2 a year), and hence must be taken into account for GHG emission reductions calculation.

[21] The calculation is presented in Excel format: PNGP calculation

5) APG will displace an equivalent quantity of the natural gas by end customers (Uralkaliy) that would be otherwise used. As the equivalent amount of natural gas would be combustion under the baseline, the leaks in the both scenarios are equal, which do not lead to additional emissions. Therefore these emissions can be neglected.

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 emission factors from approved PDD "Installation 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 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:
Emission factor calculated for the exact energy system -0,606 tCO2/MWh
Emission factors from Netherlands study (table 2)-0,557 tCO2/MWh

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

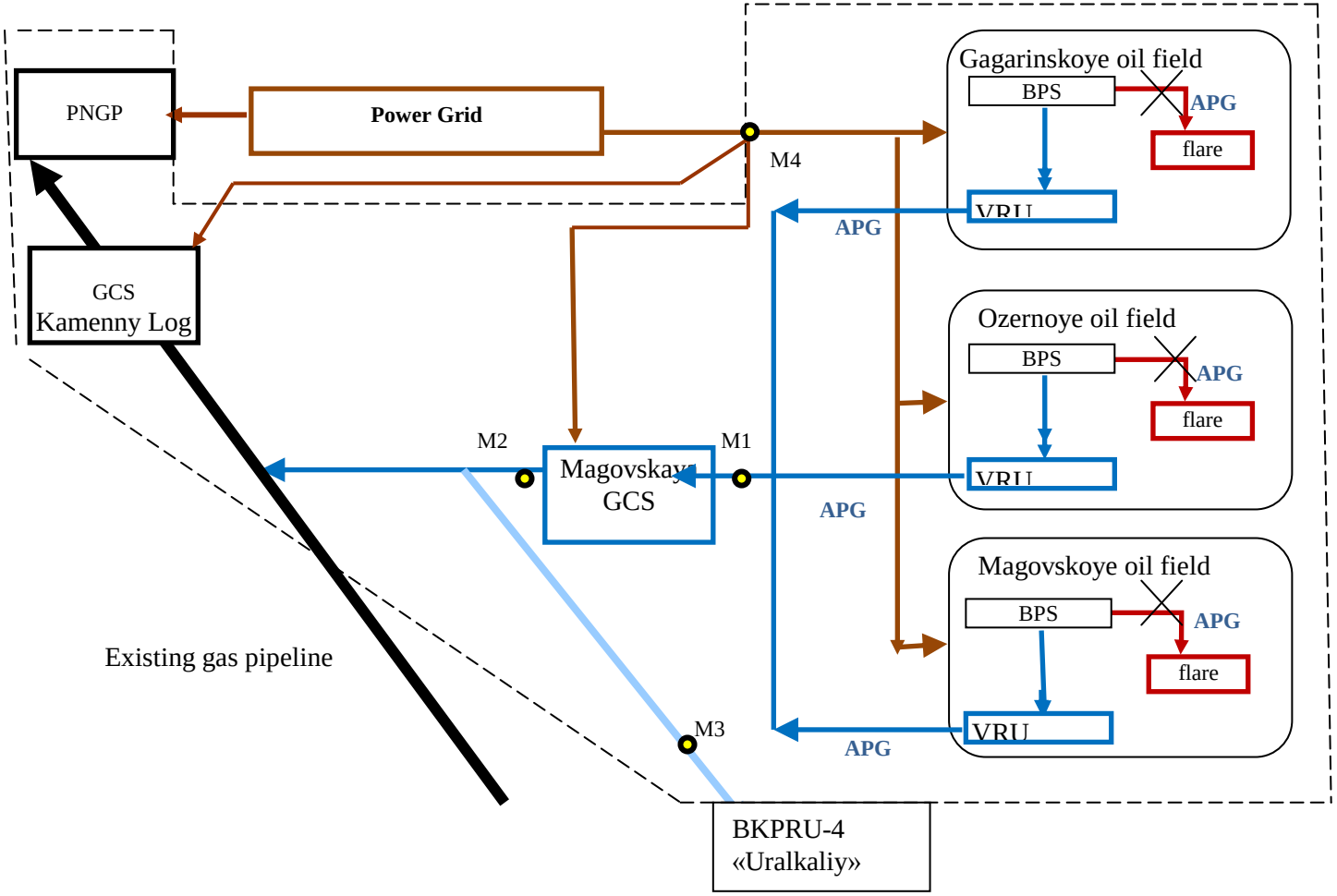
Variables to be monitored

Based on that, the monitoring of the following parameters should be provided:

1. Composition of extracted APG at GCS «Magovskaya»
2. Volume of APG at GCS Magovskaya
3. Volume of APG delivery to BKPRU-4 «Uralkaliy»
4. Specific electricity consumption coefficient at Magovskaya CS

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

Figure D.1.1. Monitoring points



Conventional signs: The Project infrastructure The existing infrastructure

Electricity → The Baseline infrastructure - - - - - - - Projects boundaries

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	*Volume of APG at GCS Magovskaya*	*Flow meter Probar 3095 MFA*	*Ths. m3*	*m*	*constant*	*100%*	*electronically*	
M1	*Chemical composition of extracted APG at GCS «Magovskaya»*	*Gas chromatograph Crystallux 4000M UNICO 1201*	*% vol.*	*m*	*monthly*	*100%*	*Paper*	*Analysis is made in the chemical – analytic laboratory*
M3	*Volume of APG delivery to BKPRU-4 «Uralkaliy»*	*Flow meter 22*	*Ths m3*	*m*	*constant*	*100%*	*electronically*	

[22] Data on flow meters will be provided when the pipeline&commercial metering devices will be built.

M4	*Specific electricity consumption coefficient at Magovskaya CS*	*Annually technical documentation*	*kWh/ths.m3*	*c*	*annually*	*100%*	*electronically*	

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

>>

Project GHG emissions from gas physical leaks during transportation and processing of APG and electricity consumption for processing and compressing:

$$PE = PEelec\ cs + PE_{trans} + PE_{process} + PE_{elec\ process} \quad (1)$$

Project emissions from electricity consumptions:

$$PEelec\ cs = SFC_{elec,\ north,\ PG} * FC_{APG,\ CS,\ PG} * EF_{CO2el} \quad (2)$$

$SFC_{elec,\ north,\ PG}$ – specific electricity consumption coefficient per ths. cubic meter for APG collection and compressing under the project activities from Verkhnekamsk oilfields, kWh/ths.m3[23].

$FC_{APG,\ CS,\ PG}$ – volume of APG at GCS Magovskaya, at standard conditions , ths m^3

EF_{CO2el} – grid emission factor, tCO_2/MWh

[23] Standard parameter, provided by LLC «PNGP» for transportation of associated gas. It includes all electricity consumers on the way of APG from VRU to PNGP. In 2010, this coefficient was 151.65 kWh / m3. Approved coefficient for 2011, at the time of writing this PDD, was absent, therefore, is used to calculate the parameter for 2010. This parameter may be present to the auditor.

Project emissions from gas physical leaks during transportation:

$$PE_{trans.} = C_{apg\ loss\ trans} * FC_{APG,\ CS,\ PG} * y_{CH4} * GWP_{CH4} \quad (3)$$

C apg loss trans – gas losses coefficient at APG transport operations, %
$FC_{APG,\ CS,\ PG}$ - volume of APG at GCS Magovskaya, at standard conditions, ths m^3
y_{CH4}– volumetric fractions of methane in APG at GCS Magovskaya, (information source – gas test protocol at standard conditions).
GWP_{CH4}– global warming potential for methane, equal to 21 tCO_2/tCH_4

Project emissions from gas physical leaks during processing at PNGP:

$$PE_{proces.} = C_{apg\ loss\ proces} * (FC_{APG,\ CS,\ PG} - FC_{APG,\ Ural,\ PG}) * y_{CH4} * GWP_{CH4} \quad (4)$$

$C_{loss\ proces CH_4}$ – gas losses coefficient at APG processing operations on PNGP, %
$FC_{APG,\ CS,\ PG}$ - volume of APG at GCS Magovskaya, at standard conditions, ths m^3
$FC_{APG,\ Ural,\ PG}$- volume of APG delivery to BKPRU-4 «Uralkaliy», at standard conditions, ths m^3
y_{CH4}– volumetric fractions of methane in APG at GCS Magovskaya, (information source – gas test protocol at standard conditions).
GWP_{CH4}– global warming potential for methane, equal to 21 tCO_2/tCH_4

Project emissions from electricity consumption for processing needs at PNGP:

volume of APG delivered for processing at PNGP is calculated as the difference between the volumes of APG from GCS «Magovskaya» and volume delivered by Uralkaliy, since the metering devices of the PNGP comes other APG from different oilfields.

$$PE_{elec\ proces} = SFC_{elec,\ process,\ PG} * (FC_{APG,\ CS,\ PG} - FC_{APG,\ Ural,\ PG}) * EF_{CO2el} \quad (5)$$

$SFC_{elec,\ process,\ PG}$ – specific electricity consumption coefficient per ths. cubic meter of processing APG on PNGP.

$FC_{APG,\ CS,\ PG}$ - volume of APG at GCS Magovskaya, at standard conditions, ths m^3

$FC_{APG, Ural, PG}$- volume of APG delivery to BKPRU-4 «Uralkaliy», at standard conditions, ths m^3
EF_{CO2el} – grid emission factor, tCO2/MWh

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
M1	*Chemical composition of extracted APG at GCS «Magovskaya»*	*Gas chromatograph Crystallux 4000M UNICO 1201*	*% vol.*	*m*	*monthly*	*100%*	*Paper*	*Analysis is made in the chemical – analytic laboratory*
M2	*Volume of APG at GCS Magovskaya*	*Flow meter Probar 3095 MFA*	*Ths m3*	*m*	*constant*	*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):

>>

Baseline GHG emissions from APG flaring (with incomplete burning) at BPS of Verkhnekamsk oilfields:

as the baseline all of the extracted APG flared would flares, the volume of APG supplied to the flares would be equal to the volume of APG supplied to the GCS Magovskaya:

$$BE = BE_{CO2,F} + BE_{CH4,F} \quad (6)$$

BE - emissions from APG flaring (with incomplete burning) at BPS of Verkhnekamsk oilfields, t.CO_2
BE$_{CO2,F}$ - emissions from APG flaring at BPS of Verkhnekamsk oilfield***s***, t.CO_2
BE$_{CH4, F}$ - CH4 emissions from incomplete burning at BPS of Verkhnekamsk oilfields, t.$CO_{2\,e}$

$$BE_{CO2,F} = FC_{APG,\ CS,\ PG} * EF_{CO2\ f,\ APG} \quad (7)$$

$FC_{APG,\ CS,\ PG}$ – volume of APG at GCS Magovskaya, at standard conditions, ths m^3
$EF_{CO2\ f,\ APG}$ – CO_2 emission factor from APG flaring at BPS, t.CO_2/ths. m^3

$$EF_{CO2\ f,\ APG} = (y_{CO2} + (Nc_{CH4} * y_{CH4} + Nc_{ЛНОС} * y_{ЛНОС})) * \rho CO2 * FEf \quad (8)$$

$y_{CO2,}$ y_{CH4} y_{VOC} – volumetric fractions of carbon, methane and volatile organic compounds VOC[1] in APG at GCS Magovskaya, (information source – gas test protocol).
$Nc_{CH4,}$ Nc_{VOC} – quantity of carbon moles in a mole of methane and VOC accordingly.
ρCO_2 – CO_2 density at 20°C is taken equal to 1.829 kg/m3.
FE –efficiency of APG combustion in a flare is taken equal to 0.98[24].

$$BE_{CH4,\ F} = FC_{APG,\ CS,\ PG} * EF_{CH4,F} \quad (9)$$

EF $_{CH4, F}$ – CH4 emission factor from incomplete burning at BPS in terms on CO_2, t.CO_2e./ths. m^3

Due to incomplete combustion of APG flaring part of APG extracted to the atmosphere is not oxidizing. IPCC 2006 determines the efficiency of burning 98%, then 2% is not burned completely, which causes methane emissions to the atmosphere. Methane emission factor in terms of CO2-eq. determined as follows:

[24] 2006 IPCC Guidelines, Volume 2, Energy, Chapter 2, Stationary Combustion, p.2.14

$$EF_{CH4,F} = y_{CH4} * \rho CH4 * (1-FEf) * GWP_{CH4} \quad (10)$$

y_{CH4}– volumetric fractions of methane in APG at GCS Magovskaya, (information source – gas test protocol at standard conditions).

ρCH4– the density of methane CH4 under standard conditions, equal to 0.667 kg/m^3

FE - APG flaring efficiency, equal to 0,98[25]

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):

>>

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

- Not applicable

[25] 2006 IPCC Guidelines, volume 2, Energy, Chapter 4, Fugitive emissions,p.4.49

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

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

>>

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):

>>

$$ER = BE - PE \quad (10)$$

ER – CO_2 emission reductions for the project, tCO_2
BE – CO_2 baseline emissions, tCO_2
PE – CO_2 project emissions, tCO_2

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

>>

The environmental monitoring at "Permneftegazpererabotka" LLC is carried out in accordance with environmental legislative requirements of the Russian Federation[26]. The monitoring is aimed at control of environmental performance and achieving of targeted and planned values through execution of environmental management program.

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

In accordance with the above indicated standards, collection and recording of data on the Project's impact upon the environment is carried out by the following two characteristics:

- Air;
- Soil.

Table D1.5.1.Environmental monitoring system

Environmental characteristic	Monitoring object
Air	Air pollutant emissions ; Gas cleaning and dust capturing installations; Atmospheric air conditions in sanitary protection area of the enterprise and in the city.
Soil	At "Permneftegazpererabotka" LLC site; At waste disposal sites.

The main types of monitoring at "Permneftegazpererabotka" LLC are:

- Internal visual and instrumental-laboratory monitoring;
- External monitoring;
- Monitoring of environment pollution sources is carried out in accordance with the approved schedules of laboratory monitoring.

Controlling of the sources of pollutant emissions testing of laboratory "Permneftegazpererabotka".
The results of monitoring and measurements are delivered to the Department of Industrial Safety, Labour Protection and Ecology of "Permneftegazpererabotka" LLC.
General governing and supervision of the environmental monitoring implementation is entrusted on the Deputy Head Department of Industrial Safety, Labour Protection and Ecology "Permneftegazpererabotka"LLC .

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary
M1 M2 table D.1.1.3	low	Equipment are verified «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014

M2 M1 M3 table D.1.1.1	low	Equipment are verified «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014

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 "Permneftegazpererabotka" 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[27].

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. Making a monitoring report	Submits a Monitoring Report in Department of Industrial Safety, Labour Protection and Ecology of «PNGP» Company
2.	PNGP, Perm	Chief engineer	Coordination of work between the NCSF and PNGP. Approval of Monitoring Reports (MR)	Approval of Monitoring Reports (MR) Submits a MR for verification.
3.	PNGP, Perm	Department of Industrial Safety, Labour Protection and Ecology	Systematization and submission of annual production data for monitoring reports in the NCSF.	Submission of the monitoring reports for approval at Chief engineer.
4.	PNGP, Perm	Department of supply of raw materials	Approval of the balance of production of raw materials. Analysis of data on the company's activities during the reporting period and prepare of monthly balances of raw materials.	Submission of monthly balances for the calculation at Department of Industrial Safety, Labour Protection and Ecology

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

5.	PNGP, Perm	Department of Chief Power engineer	Approval of the energy industrial balance. Analysis of data on the company's activities during the reporting period and the preparation of quarterly balance of energy use.	Submission of quarterly balance of energy use at Department of Industrial Safety, Labour Protection and Ecology
6.	PNGP, Perm	Production dispatching Department	Preparation (Systematization and formation of daily data) data for the monthly balances of raw materials.	Providing approved data for the prepared of balances of raw materials at Department of supply of raw materials
7.	PNGP, Perm	Chief Technologist Department	Systematization and submission of APG composition data	Providing approved data of APG balance at Department of supply of raw materials
8.	«KamNIIKIGS», Perm	Chemical-analytical laboratory	Preparation of monthly gas test results on APG composition from GCS Magovskaya and BPS	Submits gas tests results to the Chief Technologist Department
9.	PNGP, Perm	Shift operators	Collection of daily data of the APG use and supply	Data is fixed in a mode log and is submitted to the production-dispatching department

Necessary for the calculation of greenhouse gas emission reductions data are collected as is usually done at the“Permneftegazpererabotka” Company, so monitoring does not require any other additional information compared with already collected.
All quantitative data are under observation, which is a common, everyday practice: data from sensors monitoring the checkpoints, except for data of APG composition, are transferred to the automated metering devices and time is automatically recorded in an electronic database of AISKUE and recorded at the operators and database of Production dispatching Department .
All gas tests data are displayed in the Chemical-analytical laboratory of «KamNIIKIGS» that are certified for such work and provides the necessary accuracy class. Gas tests results submitting to the Chief Technologist Department.

In Production dispatching Department on the basis of daily statistics from the control points by systematization and accounting are formed daily information on the use of raw materials.
In the department of supply of raw materials monthly based on production data from the Production dispatching Department are formed and approved by the balance of the use of raw materials.

Completed and signed by the monthly production balances the use of raw materials, reflecting the monthly values specified in the monitoring data submitted, upon request, for the Department of Industrial Safety, Labour Protection and Ecology

Also, this department annually requests the approved by the chief power engineer balance of energy use, and the department of chief technologist of the necessary data of the APG chemical composition.

Annually, Department of Industrial Safety, Labour Protection and Ecology provides an annual summary of the balances the use of raw materials and energy along with monthly data of APG composition from GCS Magovskaya and BPS of Verkhnekamsk oilfields in the Project Development Department of «NCSF Company» for the annual GHG emissions reductions calculation and prepare the monitoring report.

Annual monitoring report is sent to the Chief engineer of «PNGP» LLC for approval. Approved annual monitoring report submitted to the independent expert company to conduct an annual verification of achieved emission reductions.

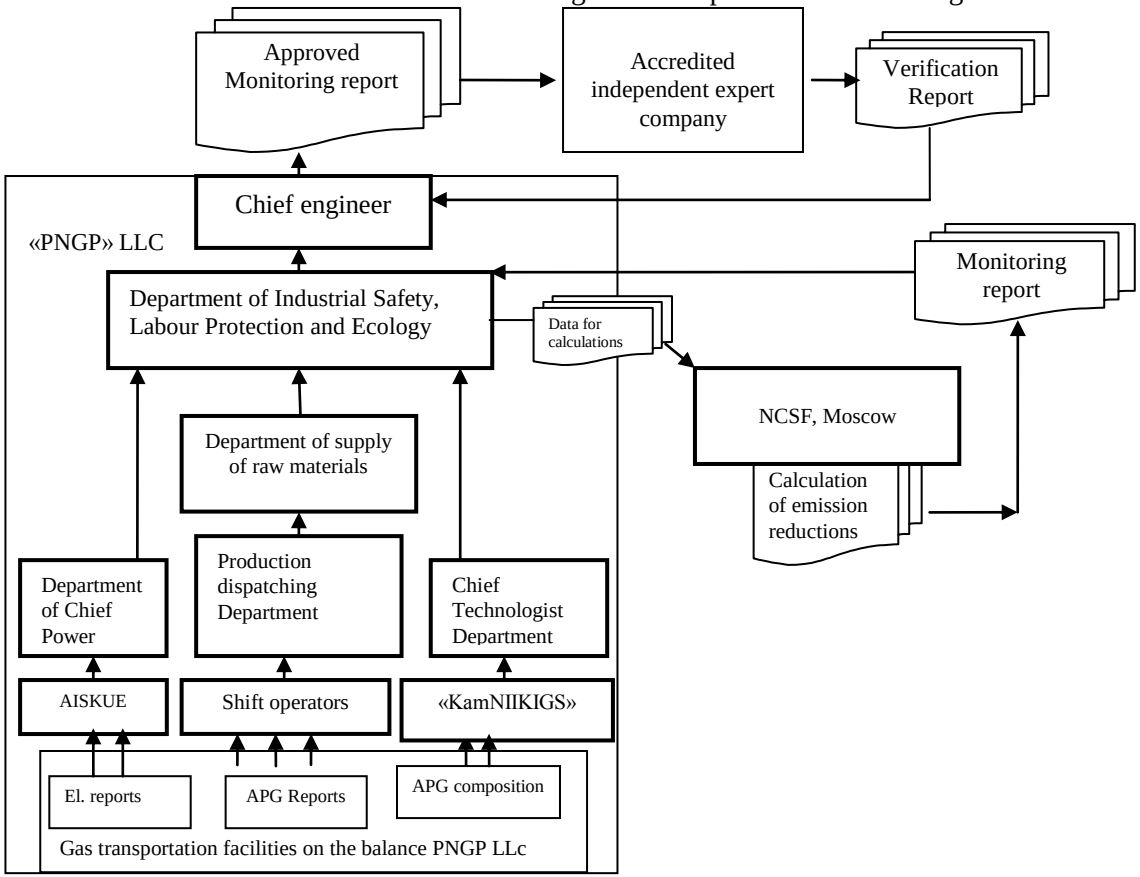
Storage of monitoring data of the use of raw materials and energy in «PNGP» LLC carried out in electronic form on the network resources. Shelf life -5 years. Data of the APG composition stored in paper form- 5 years.

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:
In the event of accident or breakdown of the gas meters:
-In case of failure or lack of metering devices (instrumentation) for a period of eleven days or more, the amount of delivered gas is calculated by the supplementary agreement of the parties.
-If necessary, removal of meters associated with their repair or checking in «KamNIIKIGS», the parties shall notify each other of such circumstances. In the absence of devices for a period of ten or less days, the volume of delivered gas per day is calculated as the average daily reading data of metering in the last full 10 days of gas metering.
-If necessary, removal of gas chromatograph associated with their repair or checking in «KamNIIKIGS», the parties shall notify each other of such circumstances. In the absence of devices for a period of ten or less days, the monthly composition of delivered gas is calculated as the average monthly reading data of metering in the last full months of gas compositions metering.

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

In assessing the GHG emissions resulting from implementation of project and baseline emissions determined by formulas presented in section D.

E.1. Estimated project emissions:

>>

Under the project activity all of extracted APG will be efficiently used through both: injection into the new field new gas system of recovery, transportation to GCS "Magovskaya" (for compressing) and then for the delivery of associated gas to consumers.

The calculation of project emissions does accept emissions that occur in the outside energy system «Tumenenergo» for electricity generation for the tech needs of the project gas pipeline & GCS & processing operations at PNGP.

However, there will be emissions from the methane (CH_4) physical leaks during APG processing at PNGP and methane (CH_4) physical leaks during transportation of APG.

Table E 1.1. CO_2 emissions from the project activities in 2011-2012

Item	Index	Unit	**2011**	**2012**
Specific electricity consumption coefficient per ths. cubic meter for APG collection and compressing under the project activities from Verkhnekamsk oilfields	$SFC_{elec,\ north,\ PG}$	MWh/ths.m3	0,15	0,15
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
CO2 emission factor	EFCO2el	tCO2/ MWh	0,606	0,606
Emissions from the consumption of additional quantities of electricity for technological purposes in CS and pipeline	PE	tCO2	5563	8485

Table E 1.2. CO_2 emissions from the electricity consumptions for processing needs at PNGP under project in 2011-2012

Item	Index	Unit	2011	2012
Specific electricity consumption per ths. cubic meter of processing APG on the PNGP	$SFC_{elec,\ process,\ PG}$	MWh/ths.m3	0,303	0,303
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
Volume of APG delivery to BKPRU-4 Uralkaliy	$FC_{\mathbf{APG,\ Ural,\ PG}}$	ths.m3	30 664	83 699

CO2 emission factor	EF_{CO2el}	tCO2/ MWh	0,606	0,606
Emissions from the consumption of additional quantities of electricity for technological purposes in the processing of PNGP	PE elec process	tCO2	5533	1658

Table E 1.3. $CO_{2\,e}$ emissions from the methane (CH_4) physical leaks during APG processing at PNGP under project in 2011-2012

Item	Index	Unit	2011	2012
Gas losses at APG processing operations on PNGP	C apg process loss	%	2,70%	2,70%
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
Volume of APG delivery to BKPRU-4 «Uralkaliy»	$FC_{\mathbf{APG,\ Ural,\ PG}}$	ths.m3	30 664	83 699
Volumetric fractions of methane in APG at GCS Magovskaya	$\mathbf{y_{CH4}}$	%	56,85	56,85
Global warming potential for methane	$GWP_{CH_4.}$	t CO_2/t CH_4.	21	21
Emissions from apg losses at APG processing operations on PNGP	PE processCH_4.	t CO2e	6479	1941

Table E 1.4. $CO_{2\,e}$ emissions from the methane (CH_4) physical leaks during transportation of APG under project in 2011-2012

Item	Index	Unit	2011	2012
Gas losses at APG transport operations	C loss CH_4.	**%**	1,23	1,23
Volume of APG at GCS Magovskaya	$FC_{APG,\ CS,\ PG}$	ths.m3	60798	92728
Volume of APG delivery to BKPRU-4 Uralkaliy	$FC_{\mathbf{APG,\ Ural,\ PG}}$	ths.m3	30 664	83 699
Volumetric fractions of methane in APG at GCS Magovskaya	$\mathbf{y_{CH4}}$	%	56,85	56,85
Global warming potential for methane	$GWPCH_4$.	t CO_2/t CH_4.	21	21
Emissions from gas losses at APG transport operations	PEtransCH_4.	t CO2e	5955	9082

Table E 1.5. Total project $CO_{2\,e}$ emissions under project in 2011-2012

Item	Index	Unit	2011	2012

Total project emissions	**PE**	**tCO2**	23530	21167

E.2. Estimated leakage:

>>

This option not used

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

>>

Without leakage sum does not change

E.4. Estimated baseline emissions:

>>

Under the baseline scenario all extracted APG at BPS of Verkhnekamsk oil fields would be flared. At that GHG gases including carbon dioxide CO_2 and methane CH_4 would be emitted. Flare stacks are 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, the 2006 IPCC Guidelines recommend to consider the efficiency of such combustion equal to 98%[28].

Table E 4.1. Total baseline emissions from APG flaring at BPS of Verkhnekamsk oil fields in 2011-2012

Item	Index	Unit	2011	2012
APG flaring at BPS	$FC_{APG, CS, PG}$	ths.m3	60798	92728
CO_2 emission factor	$EF_{CO2,Flare}$	tCO2/ths.m3	2,60	2,60
CO_2 emissions from APG flaring at BPS	$BE_{CO2,Flare}$	tCO2	158182	241257
APG flaring at BPS	$FC_{APG, CS, PG}$	ths.m3	60798	92728
CH_4 emission factor(in terms of CO_2)	$EF_{CH4,Flare}$	tCO2/ths.m3	0,159	0,159
CH_4 emissions (in terms of CO_2) due to incomplete combustion from APG flaring at BPS	$BE_{CH4,Flare}$	tCO2e	9681	14766
Total baseline emissions	**BE**	**tCO2**	167864	256022

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 10 in section D.1.4.

Numeric values are given in section E.6.

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

[28] 2006 IPCC Guidelines for National Greenhouse Gas Inventory (Subsection 4.2. "Fugitive emissions from oil and natural gas systems", adapted equations 4.2.4 p 4.44).

>>

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)
2011	23530	-	167864	144333
2012	21167	-	256022	234856
Total (tonnes of CO2 equivalent)	44697	-	423886	379189

SECTION F. Environmental impacts

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

>>

The project has obtained the positive opinions issued by Perm Interregional Agency of Ecological, Technological and Atomic Control:

-opinion №489-2 dated 21.06.2006 (on the gas transport system)
-opinion №59-1-4-0488-10 dated 24.12.10 (on pipeline to the Uralkaliy)

Project has permission on emissions:

-Permission ZV № 05-29-1/1758 dated 21.06.2006 (on period to 2010) for air pollutant emissions from the stationary sources, given by federal survey of ecological, technological and nuclear control «Rostekhnadzor».

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

The section "Environment Protection" (EP) is integrated into the design documentation "Utilization and marketing of APG from Verkhnekamsk oil fields in Perm region. Designing of the transportation infrastructure and gas treatment equipment". The project documentation was designed in 2005 by the research institute of the oil industry "PermNIPIneft" LLC.

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 activity does not adversely impact on the environment, as directed at reducing the flaring of APG at BPS of Verkhnekamsk oil fields. This leads to significant of methane emissions reductions. As a result of reductions from incomplete burning of APG at BPS of Verkhnekamsk oil fields.

SECTION G. Stakeholders' comments

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

>>

The information on the Project has been placed on the official web page of JSC LUKOIL in Section "Environmental Protection", as well as in the Information Bulletin of «Permneftegazpererabotka» LLC. (No.3 dated 25.12.2006) in Section "Environment and Safety". These publications has not given rise to any public comments.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	«Permneftegazpererabotka» LLC.
Street/P.O.Box:	Promyshlenaya
Building:	98
City:	Perm
State/Region:	-
Postal code:	614055
Country:	Russian Federation
Phone:	+7 (342) **235-89-00**
Fax:	+7 (342) **235-89-12**
E-mail:	-
URL:	http://www.pngp.ru
Represented by:	Andrey Vakhrushev
Title:	Deputy chief of Department of Industrial Safety, Labour Protection and Ecology
Form of addressing:	Mr
Last name:	Vakhrushev
Middle name:	-
First name:	Andrey
Department:	Department of Industrial Safety, Labour Protection and Ecology
Phone (direct):	**+7 (342) 220-74-82**
Fax (direct):	
Mobile:	
Personal e-mail:	Andrey.Vakhrushev@pngp.lukoil.com

NCSF is not the project participant

Annex 2

BASELINE INFORMATION

The key information and data used to establish the baseline

Data/Parameter	Volume of APG at GCS Magovskaya	
Data unit	Ths m 3 (at standard condition)	
Description	The main source of baseline emissions. All extracted APG in the baseline would be burned in flares.	
Time of determination/monitoring	Constant	
Source of data (to be) used	Flow meter (Probar 3095 MFA)	
Value of data applied (for exante calculations/determinations)	2011	2012
	113453	95514
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The volume of all extracted APG is needed for baseline emissions calculation.	
QC/QA procedures (to be) applied	Equipment are verified and calibrated «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014	
Any comment	-	

Data/Parameter	Chemical composition of APG from BPS of Verkhnekamsk oil fields on GCS Magovskaya	
Data unit	%	
Description	Chemical composition (at standard condition) of APG required for the calculation of emissions factor from APG flaring at BPS Verkhnekamsk oil fields	
Time of determination/monitoring	1 times in month	
Source of data (to be) used	*Gas chromatograph Crystallux 4000M UNICO 1201*	
Value of data applied (for exante calculations/determinations)	Carbon dioxide, CO_2	2,43%
	methane, CH_4	56,85%
	ethane, C_2H_6	18,12%
	propane, C_3H_8	10,12%
	i-butane, C_4H_{10}	1,55%
	n-butane, C_4H_{10}	2,01%
	i-pentane, C_5H_{12}	0,44%
	n-pentane, C_5H_{12}	0,39%
	hexane, C_6H_{14}	0,15%
	geptane, C_7H_{16}	0,00%
	octane, C_8H_{18}	0,00%
	hydrogen sulfide, H_2S	0,85%
	nitrogen, N_2	6,90%

	oxygen, O2 | 0,00%
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.
QC/QA procedures (to be) applied	Equipment are verified and calibrated «KamNIIKIGS» certificate of accreditation №РОСС RU.0001.515267 to 04.02.2014
Any comment	-

Data/Parameter	ρ_{CO2}
Data unit	kg/m3
Description	Carbon dioxide (CO_2) density under the standard condition
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	GOST 30319.1-96. Natural gas. Methods of calculating the physical parameters. Determination of physical parameters of natural gas, its components and its products
Value of data applied (for exante calculations/determinations)	1,829
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CO2 required for the calculation of emissions factor from apg flaring at BPS
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	ρ_{CH4}
Data unit	kg/m3
Description	Metane (CH4) density under the standard condition
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	GOST 30319.1-96. Natural gas. Methods of calculating the physical parameters. Determination of physical parameters of natural gas, its components and its products
Value of data applied (for exante calculations/determinations)	0,667
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Density of CH4 required for the calculation of CH4 emissions factor from APG flaring at BPS
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	APG flaring efficiency

Data unit	%
Description	APG flaring efficiency required for the calculation of emissions factor from apg flaring at BPS
Time of determination/monitoring	Fixed parameter
Source of data (to be) used	2006 IPCC guidance (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)	98
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The flaring efficiency is needed to calculate the GHG emission rates due to the combustion of the APG.
QC/QA procedures (to be) applied	-
Any comment	-

Data/Parameter	Global Warming Potential of methane
Data unit	t CO_2/t CH_4.
Description	Global Warming Potential of methane required for the calculation of CH4 emissions factor from apg flaring at BPS
Time of determination/monitoring	Fixed parameter
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 CH4 emission rates 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 of Verkhnekamsk oil fields
Data unit	tCO2e/ths. m^3
Description	Methane emission factor is needed to calculate the GHG emission

	rates due to the flaring of APG at BPS
Time of determination/monitoring	monthly
Source of data (to be) used	2006 IPCC guidance (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 4.44).
Value of data applied (for exante calculations/determinations)	-
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	-

Annex 3

MONITORING PLAN

Please see section D

- - - - -