

JSC Arkhangelsk PPM

GHG EMISSIONS REPORT 2015

Condensed website version



IN COMPLIANCE WITH ISO 14064-1:2006

ARKHANGELSK, 2016

Published by: JSC Arkhangelsk PPM.

Reporting period: 01.01.2015 – 31.12.2015.

Basis: The report has been produced by CCGS LLC for and in cooperation with JSC Arkhangelsk PPM in compliance with the requirements of ISO 14064-1:2006 *Greenhouse Gases. Part 1. Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals.*

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INTRODUCTION

This report has been produced by CCGS LLC for and in close cooperation with JSC Arkhangelsk PPM, and is a follow-up to a corporate greenhouse gas (GHG) management system development at JSC Arkhangelsk PPM, which has been ongoing since 2000.

The purpose of this report is to make a registry of JSC Arkhangelsk PPM's GHG emissions that occurred over the period from January 1, 2015, to December 31, 2015, in compliance with the requirements of ISO 14064-1:2006.

In 2000 JSC Arkhangelsk PPM launched the Biomass to Energy Joint Implementation Project at JSC Arkhangelsk Pulp and Paper Mill within the framework of Article 6 of the Kyoto Protocol. The project covered modernization (replacement) of two utilizing boilers and the fuel feed system at CHPP-3. Due to such upgrade it now became possible to burn more bark, wood waste and wastewater sludge, and to do it with higher efficiency. The GHG emissions reduction achieved due to this project were successfully validated, verified and sold in the international market as carbon units.

In 2003 JSC Arkhangelsk PPM with the assistance of Environmental Investment Center took the first inventory of its GHG emissions for the years from 1990 to 2002. The results of this inventory were verified and approved by Environmental Resources Trust.

In 2003 Director General of JSC Arkhangelsk PPM, Mr. Vladimir Beloglazov, delivered a speech at the 9th Conference of the Parties to the UN Framework Convention on Climate Change in Milan, Italy, announcing JSC Arkhangelsk PPM's voluntary commitment for the period ending on December 31, 2012, to cap its GHG emissions at 2.6 Mt CO₂e per year with the projected pulp production of 1 Mt per year.

In 2004 Environmental Investment Center on assignment coming from JSC Arkhangelsk PPM developed the fundamental concepts of the Climate Strategy for JSC Arkhangelsk PPM for the period towards 2012.

From 2003 onwards, JSC Arkhangelsk PPM has taken inventories of its GHG emissions occurring within the boundary of its Novodvinsk industrial site and from 2012 within the boundary of the whole organization including its daughter companies on a yearly basis. The GHG emission data are disclosed to the Mill's buyers and other interested parties on request.

In 2013 the Climate Strategy for the period towards 2020 was approved. In accordance with this strategy the company assumed a voluntary obligation to limit its GHG emissions at 2.2 Mt CO₂e per year with an increase in pulp cooking up to 1 Mt per year. Emissions per 1 tonne of pulp, therefore, should not exceed 2.2 tonnes of CO₂e.

From 2013 yearly verification of GHG emission reports prepared according with ISO 14064-1:2006 standard is carried out. The verifications are conducted by Bureau Veritas Certification Rus with a reasonable (justified) level of assurance.

By the results of each verification JSC Arkhangelsk PPM received the certificate and expert conclusion which certifies that GHG emissions management system and data on GHG emissions volume answer the requirements of the international standard ISO 14064-1:2006.

JSC Arkhangelsk PPM has participated in CDP's program for disclosure of GHG emissions data and has received the highest rating among Russian companies since 2014.

1. COMPANY PROFILE

1.1. General information about JSC Arkhangelsk PPM

Arkhangelsk Pulp and Paper Mill (APPM) was founded in 1940 and until 1992 used to be a state-owned industrial enterprise with all its industrial facilities based in Novodvinsk, Arkhangelsk Region. In 1992 the Mill was restructured into a joint stock company, Arkhangelsk Pulp and Paper Mill (JSC Arkhangelsk PPM), which later on was privatized.

JSC Arkhangelsk PPM's major shareholder is Austrian-German Group [Pulp Mill Holding GmbH](#) (based in Vienne, Austria) which owns 100% of shares of JSC Arkhangelsk PPM. Pulp Mill Holding produces pulp, cardboard and packaging in Russia and Ukraine.

Legal and mailing address of JSC Arkhangelsk PPM: 1, Melnikov Street, Novodvinsk, Arkhangelsk Region, 164900, Russia.

Geographical Coordinates: 64°25'00" S, 40°49'00" E.

Web-site: www.appm.ru

JSC Arkhangelsk PPM has a fully operational integrated management system which incorporates:

- Quality management system to ISO 9001;
- Environment management system to ISO 14001;
- Occupational health and safety management system to OHSAS 18001.

JSC Arkhangelsk PPM is annually certified according to standards ISO 14064-1:2006 and GOST R ISO 14064-1-2007.

1.2. Organizational structure

Apart from the pulp and paper mill in Novodvinsk, Arkhangelsk Region (hereinafter JSC Arkhangelsk PPM (Novodvinsk)), JSC Arkhangelsk PPM has three daughter companies located in different areas in Russia (See Fig.1, 2):

- JSC Arkhbum (based in Novodvinsk with branches in Podolsk and in Istra District of Moscow Region);
- JSC Byt (Novodvinsk);
- Arkhbum Tissue Group LLC (Kaluga Region).

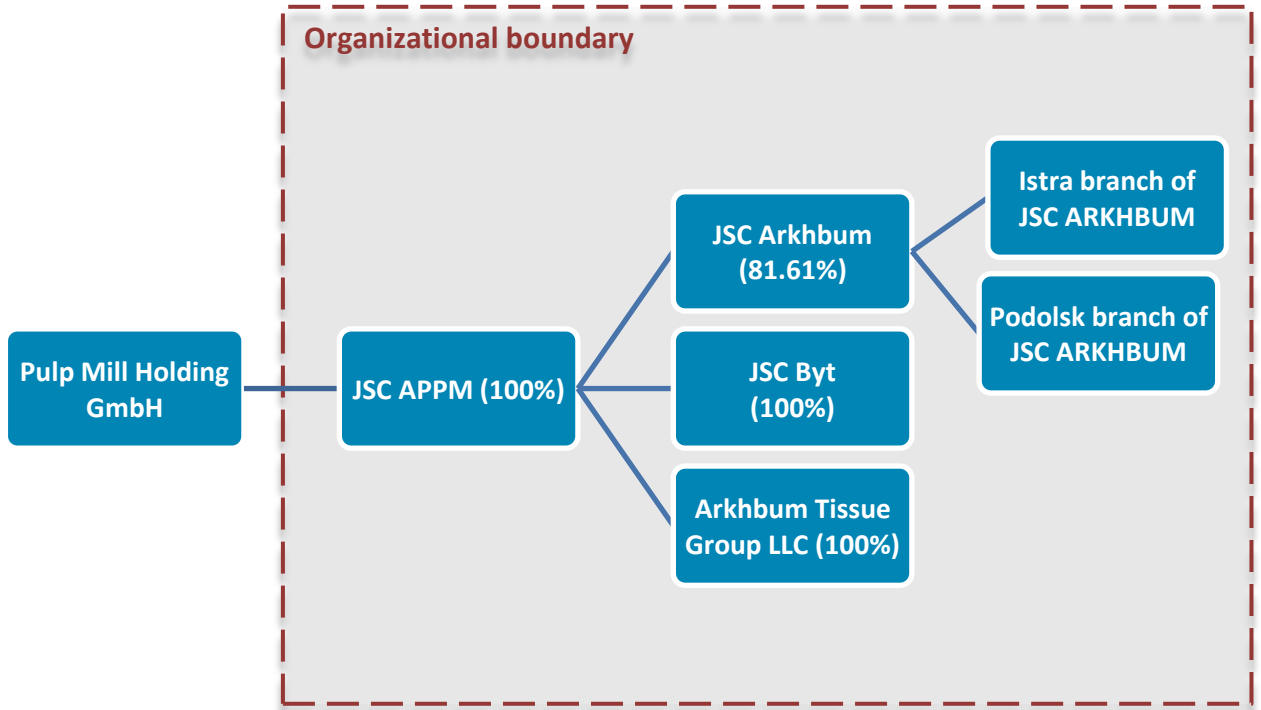


Fig.1. Shareholders and daughter companies of JSC Arkhangel'sk PPM



Fig.2. JSC Arkhangel'sk PPM on the map of Russia

2. OUTLINING THE BOUNDARY FOR THE GHG REGISTRY

2.1. Organizational boundary

In accordance with ISO 14064-1:2006 and considering the operational specifics of JSC Arkhangelsk PPM and its affiliated companies, it was decided to establish the organizational boundary and to consolidate the GHG emissions following the **control approach**, which implies that the organization accounts for all quantified GHG emissions from its industrial facilities over which it has financial or operational control. So, JSC Arkhangelsk PPM's boundary for registering GHGs shall comprise all organizations and units mentioned in Section 1.2.

2.2. Operational boundary

Direct emissions of GHG from JSC Arkhangelsk PPM include:

- Emissions of carbon dioxide (CO₂), methane (CH₄) and nitrogen oxide (N₂O) from fuel combustion in stationary and mobile sources;
- Methane emissions (CH₄) from waste handling;
- Emissions of carbon dioxide (CO₂) from pulp production processes due to adding of fresh carbonates.

According to ISO 14064-1:2006 (paragraph 4.2.2) carbon dioxide emissions from biomass combustion are accounted for separately and are not included in the total amount of GHG emissions.

Refrigerant emissions resulted from leakages for conditioners are insignificant and therefore are not considered.

Table 1 below shows direct emission sources of all industrial facilities included in the organizational boundary with a breakdown by categories.

Table 1. Direct GHG emission sources at JSC Arkhangelsk PPM

Industrial facility	Categories of GHG emission sources													
	Stationary fuel combustion								Mobile fuel combustion			Waste handling	Use of carbonates	
	Fossil fuel					Biomass			Gasoline	Diesel fuel	Liquefied/ compressed gas		CaCO ₃	Na ₂ CO ₃
	Natural gas	Liquefied gas	Coal	Heavy fuel oil	Diesel fuel	Bark and wood waste	Liquor	Wastewater sludge						
JSC Arkhangelsk PPM (Novodvinsk)	-	+	+	+	-	+	+	+	+	+	-	+	+	+
JSC Byt	-	-	-	-	-	-	-	-	+	+	-	-	-	-
Arkhbum Tissue Group LLC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JSC Arkhbum (Novodvinsk)	-	-	-	-	-	-	-	-	+	+	-	-	-	-
Podolsk Branch of JSC Arkhbum	-	+	-	-	+	-	-	-	+	+	+	-	-	-
Istra Branch of JSC Arkhbum	-	-	-	-	+	-	-	-	+	+	+	-	-	-

Energy indirect emissions are typical for most industrial facilities and are related to import (purchase) of electricity from the outside suppliers (See Table 2).

Table 2. Consumers and suppliers of imported energy

Industrial facility	Suppliers of imported energy		Comments
	Heat	Electricity	
JSC Arkhangelsk PPM (Novodvinsk)	–	OJSC Arkhangelsk power grid company	The Mill's heat demand is entirely met by its own CHPPs 1, 2, 3. Electricity demand is almost completely covered by in-house generation, and only a small amount of electricity is purchased from a grid company.
JSC Byt	–	OJSC Seti	All its heat demand is supplied by Arkhangelsk PPM. Electricity demand is partially covered by Arkhangelsk PPM and partially from the power grid.
JSC Arkhbum (Novodvinsk)	–	OJSC Arkhangelsk power grid company OJSC Seti	All its heat demand is supplied by Arkhangelsk PPM. Electricity demand is partially covered by Arkhangelsk PPM and partially from the power grid.
Podolsk Branch of JSC Arkhbum	–	OJSC Mosenergosbyt	All their heat demand is met by the boiler houses operated by these companies. Electricity is supplied from the grid.
Istra Branch of JSC Arkhbum	–	OJSC Mosenergosbyt Municipal enterprise Joint Istra electric networks	
Arkhbum Tissue Group LLC	–	–	No operational activities in 2015.

Other indirect emissions are not accounted for herein as these are very difficult to quantify, while the uncertainty of corresponding estimates is very high.

This is allowed by ISO 14064-1:2006 as this type of emissions is an optional reporting category.

3. BASE YEAR

The year 1990 was selected as the base year for the following reasons:

- The RF Presidential Decree No.752 of September 30, 2013, commissions to the Government of the Russian Federation to ensure that GHG emissions are reduced down to 75% of 1990 levels by the year 2020;
- The year 1990 is also the base year for Russia according to the Kyoto Protocol¹;
- Necessary input data for 1990 and the following years are available and can be used to identify sources and estimate GHG emissions;
- It is the year when pulp production volumes hit their historical maximum, which APPM is currently aiming to go back to.

¹ Russia did not make any quantitative commitments to limit and reduce its GHG emissions during the second Kyoto period (2013-2020), but neither did it bail out of the Kyoto Protocol, and it still remains its full participant.

4. GHG EMISSIONS QUANTIFICATION METHOD

Following the recommendations of the Intergovernmental Panel on Climate Change² GHG emissions from fuel, energy and carbonate consumption were estimated using a calculation method that operates with the following formula:

$$E = A \times EF \quad (1)$$

Where E – GHG emissions;

A – data on the company’s activity over the reporting period, in particular, data related to consumption of different fuels, power and heat and to use of carbonates;

EF – emission factor.

The *First Order Decay* method was used to calculate methane emissions from landfills. *FOD* takes into consideration the specifics of anaerobic decomposition of bio-organic waste over time. The calculations were based on approaches and methods suggested by the IPCC in 2006.³

² See 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/>

³ See 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5, Chapter 3: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

5. GHG REGISTRY OUTPUTS

The calculations show that GHG emissions from JSC Arkhangelsk PPM amounted to 1 832 253 tCO₂e in 2015 (see Table 3).

GHG emissions from JSC Arkhangelsk PPM have reduced by 1 271 168 tCO₂e, or by 41%, as against the base year 1990.

Compared to 2014, GHG emissions from JSC Arkhangelsk PPM have decreased by 164 254 tCO₂e, or by 8.2%.

The total GHG emissions from JSC Arkhangelsk PPM in 2015 were 16.7% below the company's voluntary emission limit of 2 200 000 tCO₂e per year set for the period up to 2020. It means that in 2015 the company succeeded in performing its voluntary commitment.

However, it should be noted that APPM's voluntary GHG emissions limit allowed for an increase in pulp cooking volumes, which was expected to reach up to 1 million tonnes per year by 2020. However, in reality only 827 245 tonnes of pulp were cooked in 2015, which is 17.3 % less than the planned volume.

In order to bring the projected and actual GHG emissions and pulp cooking volumes down to a common denominator it might be worthwhile to introduce one more parameter: GHG emissions per 1 tonne of cooked pulp. This is an integral indicator of the product's carbon intensity.

GHG emissions per unit of output that correspond to JSC Arkhangelsk PPM's voluntary commitment are $2\,200\,000/1\,000\,000=2.2$ tCO₂e/tonne of cooked pulp. Actual GHG emissions per unit of output amounted in 2015 to 2.215 tCO₂e/tonne of cooked pulp. So, the carbon intensity of JSC Arkhangelsk PPM's output in 2015 was 0.7% above the level set by its voluntary commitment.

In the total of direct and indirect emissions the largest amount (calculated to tCO₂e) is accounted for by carbon dioxide – 91.1%, 7.9% of methane and 1.0% of nitrous oxide (see Table 4).

Table 3. Summary Table of GHG Emissions from JSC Arkhangelsk PPM, in tonnes of CO₂e

Emission Categories / Sources	1990	2014	2015					Compared to 1990		Compared to 2014		
	APPM	JSC APPM	JSC APPM Novodvinsk	JSC Byt	JSC Arkhbum Novodvinsk	Branches of JSC Arkhbum		Total for JSC Arkhangelsk PPM	tCO ₂ e	%	tCO ₂ e	%
						Podolsk	Istra					
Direct emissions	3 008 936	1 986 183	1 800 255	57	8 834	5 334	4 888	1 819 368	-1 189 568	-39,5%	-166 815	-8,4%
Stationary fuel combustion	2 909 045	1 827 067	1 649 314	–	–	5 140	4 597	1 659 051	-1 249 994	-43,0%	-168 016	-9,2%
Mobile fuel combustion	15 187	11 764	2 601	57	8 834	194	291	11 977	-3 210	-21,1%	213	1,8%
Industrial processes (use of carbonates)	30 383	8 169	9 221	–	–	–	–	9 221	-21 162	-69,7%	1 052	12,9%
Leakage (waste management)	54 321	139 183	139 119	–	–	–	–	139 119	84 798	156,1%	-64	0,0%
Indirect energy emissions	94 485	10 324	5 120	459	1	3 187	4 118	12 885	-81 600	-86,4%	2 561	24,8%
Total GHG emissions	3 103 421	1 996 507	1 805 375	516	8 835	8 521	9 006	1 832 253	-1 271 168	-41,0%	-164 254	-8,2%
Emissions with sold energy	528 105	262 767	261 291	–	–	–	–	261 291	-266 814	-50,5%	-1 476	-0,6%
CO ₂ emissions from biomass combustion	1 274 993	1 349 362	1 534 565	–	–	–	–	1 534 565	259 572	20,4%	185 203	13,7%

Table 4. Emissions of JSC Arkhangelsk PPM by GHG types

Emission Categories	GHG Emissions in 2015, tCO ₂ e			
	CO ₂	CH ₄	N ₂ O	Total
Direct emissions	1 656 104	144 231	19 033	1 819 368
Stationary fuel combustion	1 635 113	5 085	18 853	1 659 051
Mobile fuel combustion	11 770	27	180	11 977
Industrial processes (use of carbonates)	9 221	–	–	9 221
Leakage (waste management)	–	139 119	–	139 119
Indirect energy emissions	12 885	–	–	12 885
Total GHG emissions	1 668 989	144 231	19 033	1 832 253
Emissions with sold energy	260 063	62	1 166	261 291
CO ₂ emissions from biomass combustion	1 534 565	–	–	1 534 565

The company's key performance indicators were analyzed in order to identify the reasons for changes in emissions in regard to the base and the previous year.

The analysis has shown that the key factors that contributed to reduction in GHG emissions from JSC Arkhangelsk PPM in 2015 as against 1990 base year are as follows:

- **Larger proportion of biomass in the fuel mix, which raised from 28.1% to 45.9%;**
- **Reduction in energy to output ratio (energy intensity) of Arkhangelsk PPM in Novodvinsk (in terms of heat consumption – by 35.5%, and in terms of power consumption by 15.1%);**
- **10.2%, decline in pulp cooking, from 921 500 tonnes down to 827 245 tonnes.**

The key factors that determined the decrease in GHG emissions at JSC Arkhangelsk PPM in 2015 as compared to the previous year 2014 are as follows:

- **Replacement of the fossil fuel (coal) burned at CHPP-1 of JSC Arkhangelsk PPM in Novodvinsk by climate-neutral biomass wastes (BWW and wastewater sludge (WWS));**
- **Reduction in energy intensity of production at Arkhangelsk PPM in Novodvinsk (electricity – 2.8%, heat –2.0%).**

6. VERIFICATION RESULTS

GHG emissions reports for 2012-2015 were verified according to ISO 14064-1:2006 standard.

The verifications were carried out by Bureau Veritas Certification Rus with the reasonable (justified) level of assurance.

By the results of each verification JSC Arkhangelsk PPM received the certificate and expert conclusion which certifies that GHG emissions management system and data on GHG emissions volume answer the requirements of the international standard ISO 14064-1:2006 (see Annex 1).

7. IMPLEMENTATION OF GHG EMISSIONS REDUCTION PROJECTS

According to the adopted climate strategy for the period till 2020 JSC Arkhangelsk PPM implements or plans to implement a number of GHG emissions reduction projects at the production site in Novodvinsk (see Table 5).

Table 5. The implementation process of GHG emissions reduction projects

Project	Implementation status	GHG emissions reduction, tCO ₂ e
Increase of biomass proportion in fuel mix		
Biomass-to-energy project at CHPP-3	Implemented 1 stage – 2000 2 stage – 2005	158 187
Construction of new multifuel boiler in CHPP-1	Implemented in 2014	60 973
Construction of wastewater sludge dewatering unit	Implemented in 2015	5 815
Energy saving and decrease of energy intensity of production		
Upgrading of washing unit at Pulp Production Line	Implemented in 2014	38 113
Construction of new sulfate semi-chemical pulp plant	Implemented in 2015	2 096
Upgrade of cardboard-making machines	In the process of implementation	–
Construction (upgrade) of evaporator plant and liquor recovery boiler	In the process of implementation	–
Total GHG emissions reduction in 2015		265 184

The most significant carbon projects are biomass-to-energy project at CHPP-3 of JSC Arkhangelsk PPM implemented within the framework of Article 6 of the Kyoto Protocol and the project for construction of multifuel utilizing boiler at CHPP-1 of JSC Arkhangelsk PPM. As a result of these projects implementation GHG emissions reductions for 2015 were 158 187 and 60 973 tCO₂e correspondingly.

In 2015 the implementation of two GHG emissions reduction projects was finished. The first project is directed at decrease of the humidity of wastewater sludge from biological wastewater treatment (WWS) at JSC Arkhangelsk PPM that allows for increase of the volumes of WWS combustion in the plant's utilization boilers. The second project is directed at increase of the enterprise's capacity of semi-chemical pulp cooking and

decrease of energy intensity of production and includes construction of a new Sulphate Pulp Production Line. By monitoring results GHG emissions reduction for 2015 under these two was 7 911 tCO₂e.

GHG emissions reduction for 2015 from the project of reconstruction of washing unit at Pulp Production Line (implemented in 2014) was 38 113 tCO₂e.

Aggregated GHG emission reduction for 2015 from carbon projects implementation is 265 184 tCO₂e.

