



Presentation

of the construction of the plant the
production of industrial pellets in
Onega, Russia Federation
performance **150 000** tones / year

General overview

Location: the plant is located in the North-West of Russia, in Onga, Archangelsk region.

Plant capacity: with total capacity of 150,000 tons per year the plant will be one of the largest biofuel production sites in Russia and Europe.

Equipment: Technological equipment for the plant will be designed and supplied by leading European producers on a turn-key basis.

Resource base: 4.5 mln tons of lignin located near the plant and sufficient for 12 years of continuous pellets production.

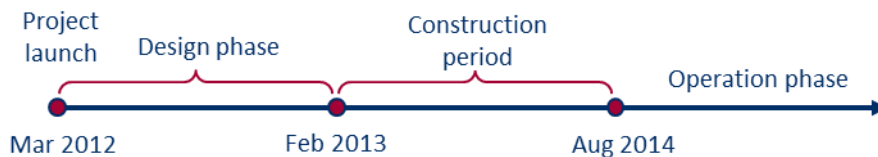
Lignin pellets are valued 20-25% higher compared to wood pellets due to the higher calorific value. Independent laboratories confirmed key physical and biochemical properties of the lignin and its ability to be pelletised

Market: strong demand for industrial pellets from Central and North-West Europe as well as growing local demand in Russia.

Target customers: large utility companies and power plants, using industrial pellets as fuel for heat and power production.

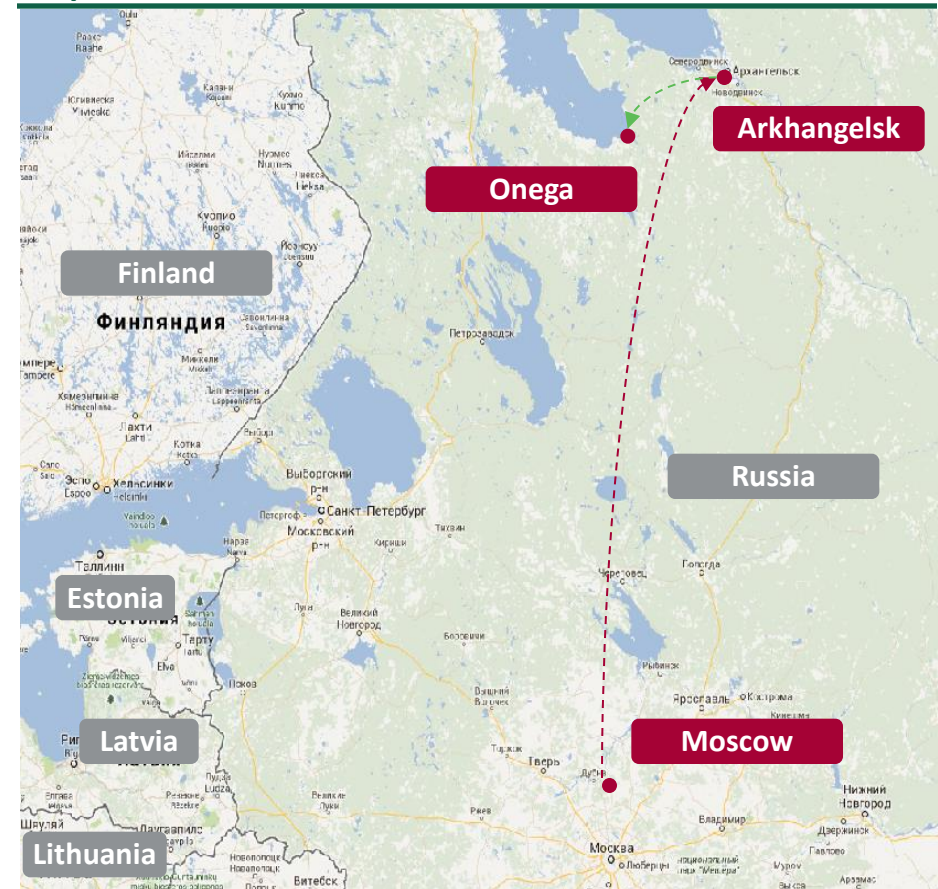
Current status

- Debt and equity financing is fully secured
- All required permits for plant construction are in place
- Major construction contracts had been signed
- Construction works are in progress
- Commissioning of the plant is scheduled for III Q 2014



February 2014

Map



Key financials

Total investments during construction phase	EUR41,9 mln
Equity investments	EUR11,6 mln
Debt financing	EUR30,3 mln

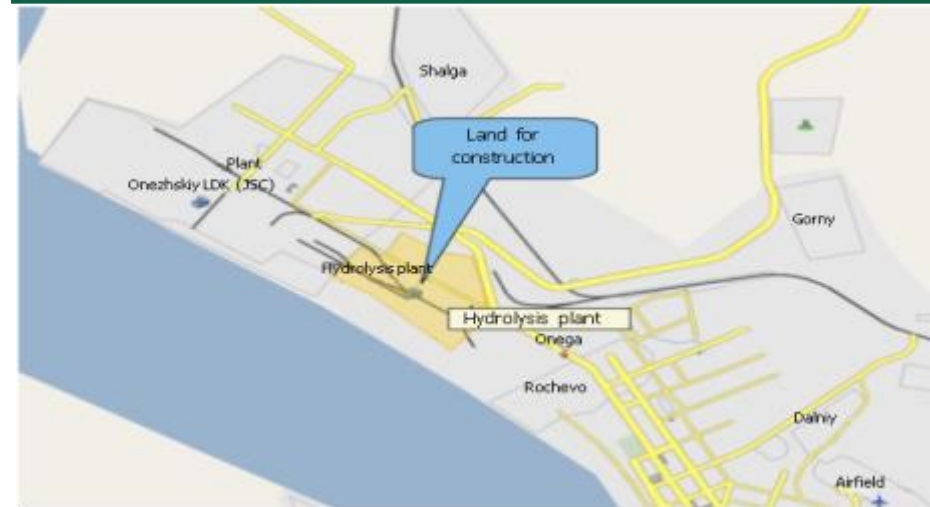
Plant's infrastructure

- The Project is implemented on the production site of the former Onega Hydrolysis Plant. The industrial area covers 12 hectares. The land lease period is 49 years.
- The production site has all the necessary utilities and infrastructure, including railway, sewerage, water and electricity.
- There are also buildings and structures of the former hydrolysis production facilities, one part of which will be demolished and the other reconstructed or left alone

Raw materials

- Storage of raw materials is organized in an open fashion on prepared sites with a height difference of up to 1 m. Distance from the production site to the lignin dump: 3 km
- Reserves of the Project's raw materials are located in two storage sites:
 - Area no. 1 has approximate dimensions of 650x640 m and contains about 4.2 million cubic meters of lignin
 - Area no. 2 has dimensions of 350 x 70 m and contains approximately 77.2 thousand cubic meters of lignin
- Based on the tests, the total weight of hydrolyzed lignin reserves under the Project is approximately 4.5 million tons of raw substance

Location of the plant in relation to Onega



Layouts of lignin storage sites



For the processing of waste lumber sawmill Onega in 1940 began construction of the Onega hydrolysis plant. Soon construction was halted due to the outbreak of WWII. In 1944, construction was resumed.

In September 1954, Onega hydrolysis plant was put into operation. The plant's capacity was - 3,000,000 liters of ethanol per year. The plant has been repeatedly modernization and production of alcohol by 1984 had increased to five million liters of ethanol per year.

Due to changes in the excise law in 1993, and also because of the high energy intensity of the production of ethanol from waste lumber became unprofitable. Plant was shut down and was declared bankrupt in 2005.

General view of the plant after the stop:



Now no emissions and waste production

Technology

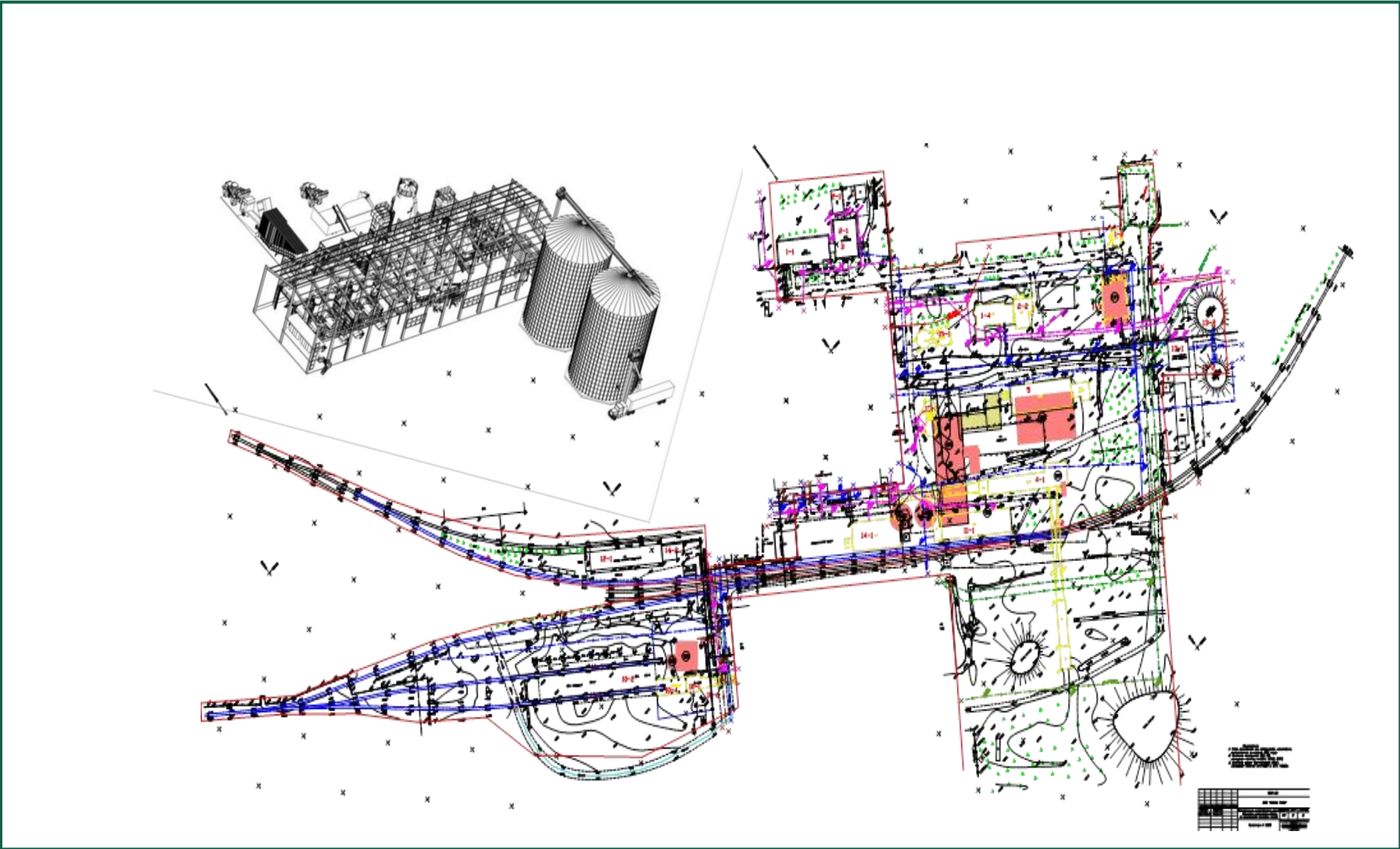
- Agreement with the technology line integrator (Alligno Maschinenexport GmbH), which will make the "turn-key" design, supply and supervision installation of the production equipment, was signed, first set of equipment is produced and dispatched;
- Independent study of raw materials and technologies of pellet production were conducted; test batch of finished products was produced;

Design & Construction

- Design documentation by the Plant's general designer, "Macro Plan" (LLC) have been prepared and successfully passed examination by expert authorities;
- Necessary specifications and permits for the Project (including electricity, water supply and drainage) have been obtained;
- Site of the Plant was prepared, including demolition of existing dilapidated buildings and structures;
- Construction permit (major license for construction works in Russia) have been received;
- Contract with general EPC constructor have been signed;

Sales & logistics

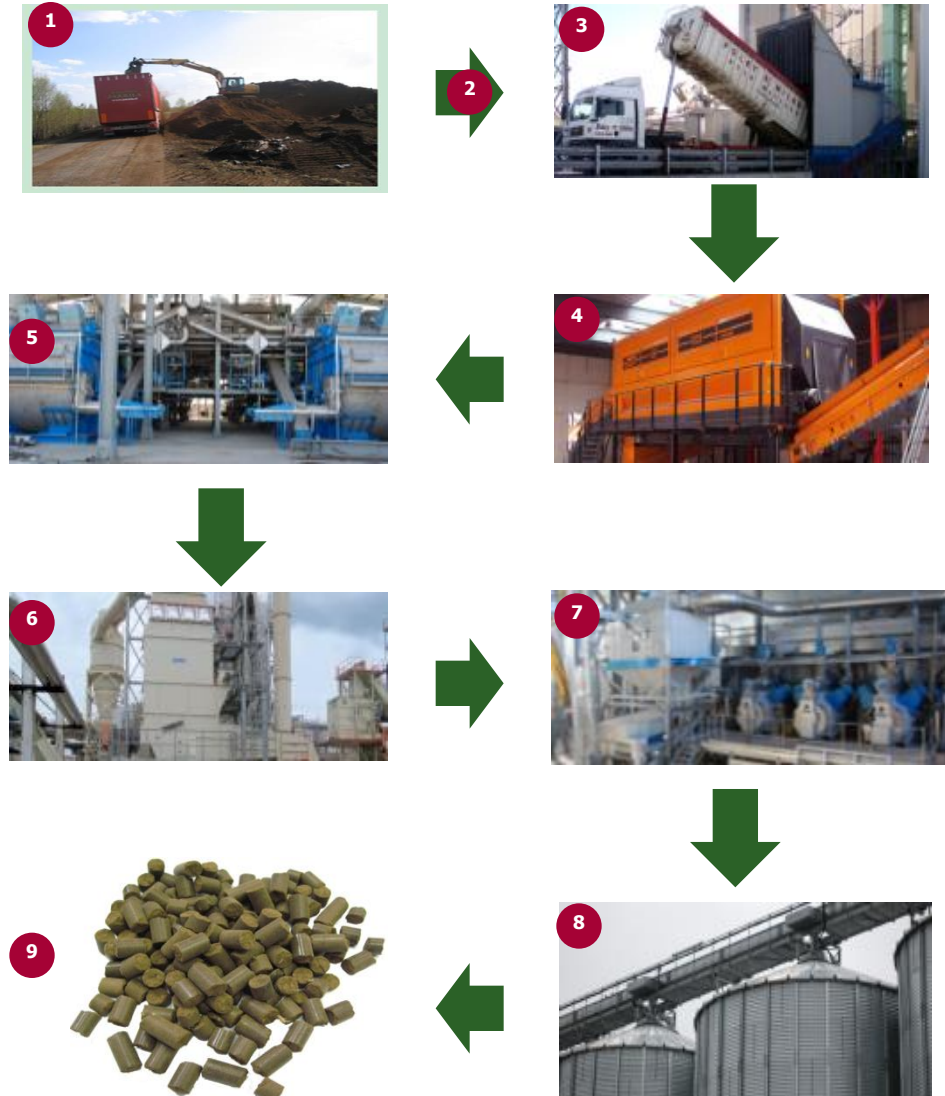
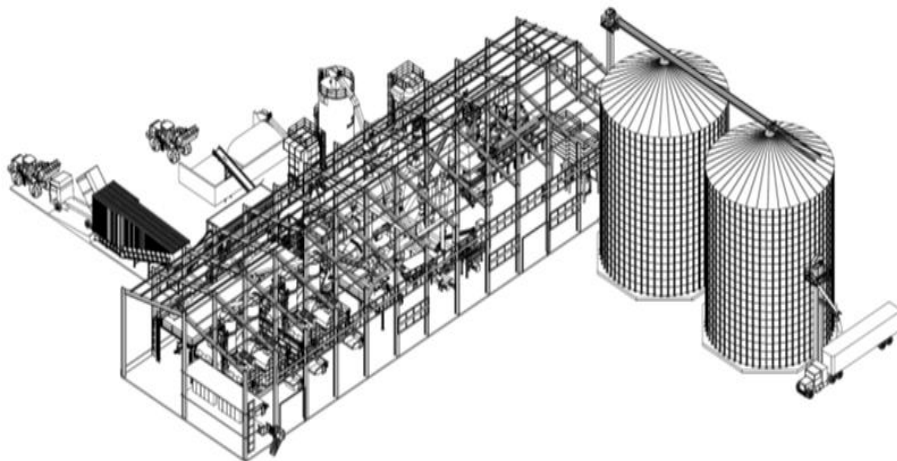
- Preliminary agreements for sale of finished products were signed;
- Major transportation routes for finished products have been analyzed,



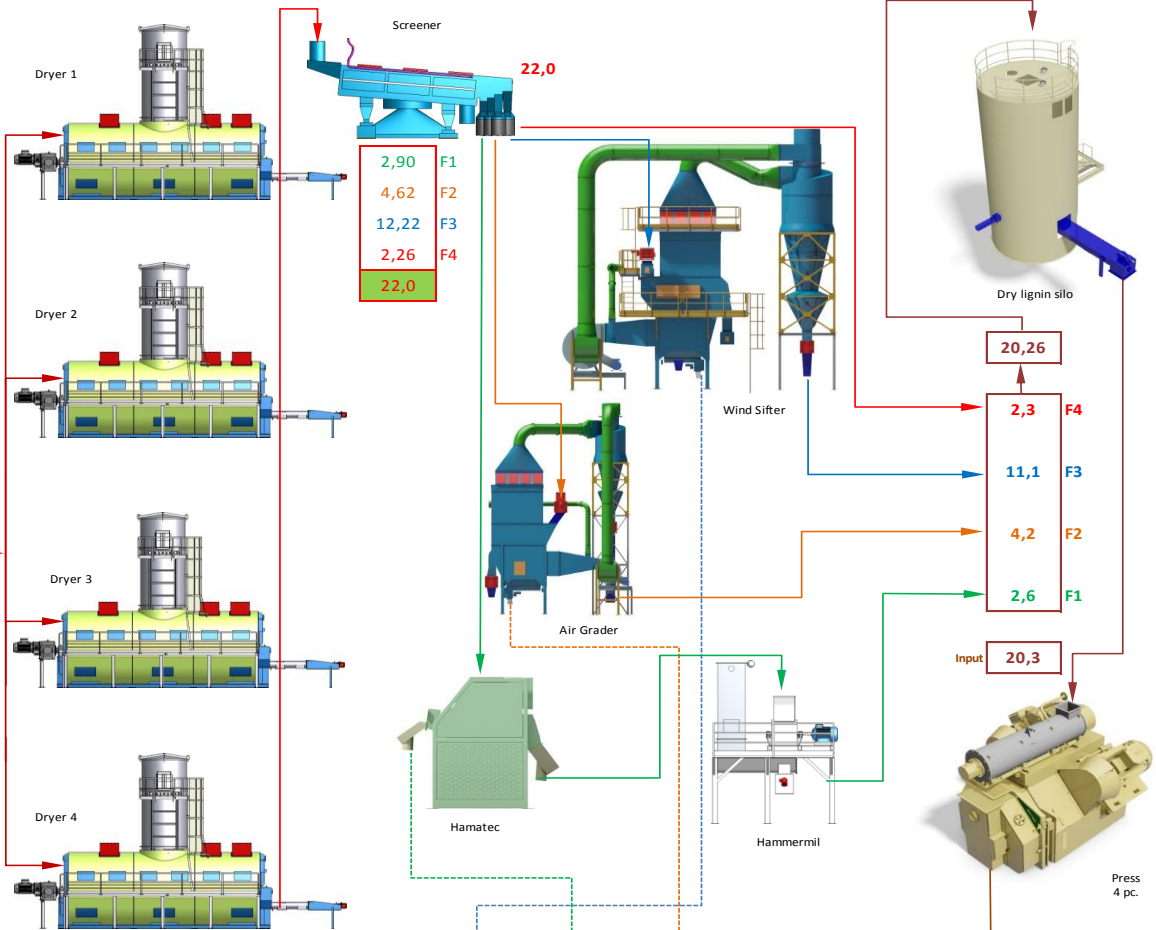
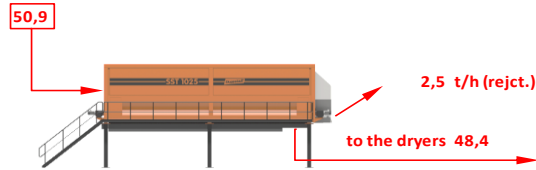


Workflow

1. Gathering of lignin in the storage area (dumps of lignin)
2. Transportation from the storage area by trucks (~4 km) to the Plant's site
3. Receiving on the plant site by automatic feeding bunker and rough treatment (pre-sifting) to separate large inclusions
4. Raw material is feeding into the drum sieve unit
5. Dryer operation
6. Separation ("thin clearing")
7. Pelletization
8. Warehousing of finished pellets in silos
9. Packing finished pellets in big bags or soft containers.



Input lignin MC [%]: →→→→→→→→ 60%
 Output from the dryers lignin MC [%]: →→→→→ 12%
 Infeed lignin weight [t/h]: 50,9
 Rejected after the drum screener [% , t/h]: →→→→→→ 5%
 Lignin weight after the screener [t/h] 48,4
 Infeed lignin weight [t/h]: 29,04
 Weight of water in output from the dryers lignin[t/h]: 2,64
 Weight of the evaporated water [t/h]: 26,40
 Weight of the oven dry lignin [t/h]: 19,36
 Weight of lignin out of the dryers [t/h]: →→→→→ 22,0
 Working time [h]: 7 700
 Production capacity per year [t]: 154 000

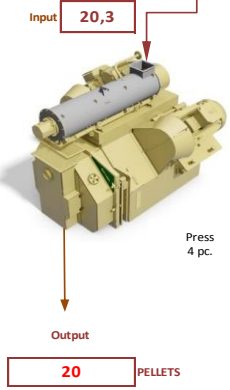


Recalculation of waste after the initial MC in PAL: 3,8

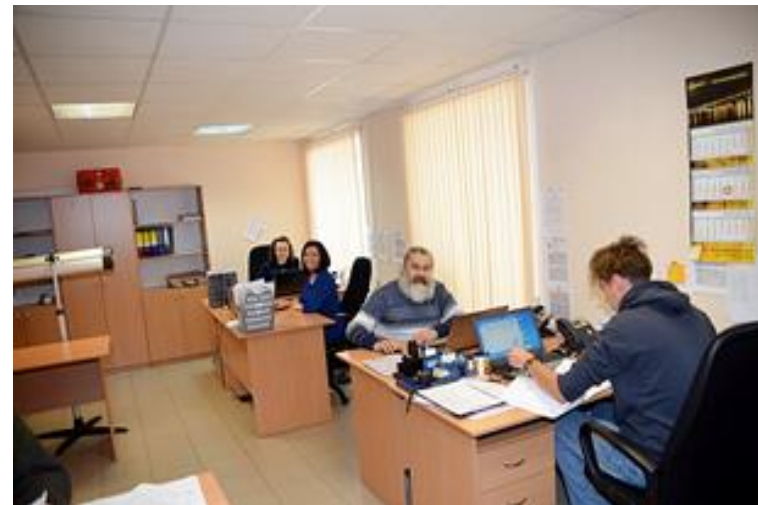
Equipment	Fractions distribution	Waste	Clean lignin	Tonns	
Hamatec	F1 [4-10mm]	13,18%	8,80%	91,20%	2,64
Air Grader	F2 [2-4mm]	21,01%	8,80%	91,20%	4,22
Wind Sifter	F3 [0.25-2 mm]	55,56%	8,80%	91,20%	11,1
Fine (dust-like) fraction	F4 [<0.25 mm]	10,25%	→→→→→→→→	→→→→→→→→	2,3
	100,00%				20,3



WASTE [t/h]: 4,3



- Project offices in Moscow and Onega were established;
- The core project team in Moscow and Onega (incl. General Director, Construction Director, Financial Director etc.) was hired;
- Corporate governance bodies (incl. the Board of Directors and Audit Committee of the Company) were created;
- Company's internal policies have been developed;



Description



- Fuel pellets are packed in big bags or soft containers (MK-14-10)
- One container can contain about 9 tons of pellets
- Containers are loaded onto railroad cars (5 pieces/car)
- Now we are developing alternative transportation approach to increase the load capacity of one train car up to 65 tons.



Lignin pellets



Raw materials



The total weight of hydrolyzed lignin reserves under the Project is approximately 4.5 million tons of working substance

Main equipment



- **Tracked excavator Liebherr R 934 C Litronic**

Bucket capacity: 1,80 m³

- **articulated dump truck Volvo A40F with lateral supers from the body for transportation of the "light" materials with low density**

Operating weight: 31.000 kg

body Capacity – 39.000 kg (42,3 m³)

- **Wheel loaders Liebherr L556 II**

Operating weight: 10.600 kg

Bucket capacity: 4,0 m³


- **4 x trucks MAN TGS 26.440 6X4 BLS-WW with semitrailers**

load capacity: 28.360 kg

Volume: 41 ca.m³



Lignin pellets



PRODUCT DECLARATION
"Bio-coal pellets" production company Bionet

SUPPLIER: OJSC «BIONET» RUSSIA 164840, 215-A, LENIN AVE., ONEGA, ONEGA DISTR., ARKHANGELSK REGION

TRADED FORM: WOOD PELLETS

ORIGIN AND SOURCE: 1.2.1 RESIDUES CHEMICALLY UNTREATED

(LOCATIONS) OF ORIGIN: ONEGA, ARKHANGELSK REGION, (63°53'N - 38°07'E).

CHEMICAL TREATED MATERIAL: NO

NORMATIVE PROPERTIES ACCORDING TO EN 14961-2

DIAMETER, D & LENGTH, l: D08 8±1; 3.15 ≤ L ≤ 40 [mm]

WATER CONTENT, M: M10 ≤ 10 [w- % as received]

ASH CONTENT, A: A3.0 ≤ 3.5 [w- % dry]

MECHANICAL DURABILITY, DU: DU 97.3 ≥ 97.3 [w- % as received]

FINES, F: F 1.0 ≤ 1.0 [w- % at factory gate]

ADDITIVES: 0 [w- %]

BULK DENSITY, BD: BD700 ≥ 700 [kg/m3]

NET CALORIFIC VALUE, Q: Q 20.5 ≥ 20.5 [MJ/kg as received]

INFORMATIVE PROPERTIES ACCORDING TO EN 14961-2

CHLORINE, Cl: Cl 0.02 ≤ 0.021 [w- % dry]

NITROGEN, N: N 0.2 ≤ 0.2 [w- % dry]

SULPHUR, S: S 0.10 ≤ 0.174 [w- % dry]

Ash MELTING BEHAVIOUR, DT: DT1200 ≥ 1200 [°C]

POSITION OF SIGNATORY: GENERAL DIRECTOR OJSC «BIONET»

NAME: IGOR CHEREMNOV

26 APRIL, 2014

General overview

	NCV dry matter moisture 0%	Moisture content		NCV, as received	Bulk density	Energy density, as received	
	MWh/t	GJ/t	%	MWh/t	GJ/t	kg/m3	GJ/m3
Stem wood chips	5.1-5.6	18.5-20.0	40-55	1.9-3.1	7.0-11.0	250-350	2.5-3.2
Whole tree chips	5.1-5.6	18.5-20.0	45-55	1.9-2.8	7.0-10.0	250-350	2.5-3.2
Sawdust	5.3	19.0-19.2	45-60	1.7-2.8	6.0-10.0	250-350	1.6-2.5
Bark (birch)	5.8-6.4	21.0-23.0	45-55	2.2-2.8	8.0-11.0	300-400	2.2-3.2
Bark (coniferous)	5.1-5.6	18.5-20.0	50-65	1.4-2.5	5.0-9.0	250-350	1.8-2.5
Wood pellets	5.3	19.0-19.2	8-10	4.7	17.0	650-750	11.0
Briquettes	5.3	19.0-19.2	8-10	4.8	17.3	650-750	11.0
Energy grasses	4.8-4.9	17.1-17.5	15-30	3.1-3.9	11.0-14.2	70	0.8-1.4
Peat (sod)	5.9	21.2	39	3.3	12.0	380	4.7
Peat (pellets)	5.5-5.8	19.7-21.0	9-16	4.6-5.2	16.6-18.7	680-770	11.2-14.4
Straw (chopped)	4.9	17.4	17-25	3.4-3.9	12.4-14.0	80	1.1-1.4
Corn residues	5.1	18.4	50	2.2	8.0	-	-
Coal	7.8	27.9	10	6.9	24.8	-	-
Heavy fuel oil	11.5	41.0-41.3	0.3-0.5	11.4	40.9-41.2	-	-
MSW from households	5.1-6.5	18.5-23.4	25-36	3.3-4.7	11.7-16.9	150-200	2.5-3.6
Black liquor	3.5-4.2	12.5-15.0	-	-	-	-	-
Torrefied wood pellets	6,8	24,5	10-12	6	21,07-	750	14
Lignin powder/ pellets	7.1	25.5	10-12	6.1	22.1	750	16,58