



**PELLET FACTORY  
"INTERSOURCE" LTD**



**Beregovo, Ukraine**

# LOCATION



The factory is located in an industrial zone on the outskirts of the small town of Beregovo in the Transcarpathian region.

The location of the plant was chosen in this place not by accident. Firstly, in order to minimize transportation costs for the delivery of finished products.

So, since the beginning of its production activity the products manufactured by the plant are fully realized in Europe, especially in Italy, Germany, Hungary, Czech Republic, Austria and Poland

Delivery to consumers is made by motor transport of 22 tons in a car or by rail.

Secondly, the plant required a high voltage line supply, preferably from two independent sources, supply of natural gas, water and sewerage. All this was optimally solved by locating the plant exactly where it is now, where it is now.

## About the factory: Production capacity



Website: [intersource.com.ua](http://intersource.com.ua)

In September 2009 in Transcarpathian region Royal-Invest LLC completed construction of a factory for production of fuel pellets from wood.

Special attention was paid to its start-up and commissioning. From the beginning of August till December, 2009 with attraction of leading specialists of equipment suppliers companies (which will be described in detail below) every element of the technological line was studied, put into operation, tested and adjusted to the optimal mode.

At the beginning of 2010 the plant was put into production operation.

To today, the built factory is the most powerful and is one of the TOP 6 major producers of wood pellets in Ukraine. Its production volume is 5 tons per hour, and with uninterrupted, 24-hour production, per day the volume of output is 120 tons. Therefore, the yearly volume of output, taking into account planned and unscheduled stops, is more than 28 thousand tons.

# PRODUCTION



The factory can produce from technical pellets, for thermal power plants, with a diameter of 6 - 12 mm to high quality, so-called "white" fuel pellets with a diameter of 6 - 8 mm, which can fully comply with the European quality standard (EN plus). At the same time, the conversion of the plant for the transition from the production of technical pellets to "white" and vice versa is about 2 hours and can be performed by any of the shifts working at the plant.



The factory uses technological coniferous species of wood as raw materials. As already mentioned, the plant is designed and built to ensure maximum versatility in the raw materials consumed. It means that any raw material can be used for fuel pellet production at the factory: chips, sawdust, balances, round wood (diameter up to 400 mm) with humidity from 15 to 50 percent. A chipper is installed in the technological chain to grind raw materials to the necessary working fraction. A highly productive dryer is installed to remove excess moisture. A debarking machine is installed to remove the bark (for the production of "white" pellets).

# PRODUCTION

IN 2021 THE FACTORY PASSED CERTIFICATION AND CERTIFIED PRODUCTS ACCORDING TO EUROPEAN QUALITY STANDARDS



Laboratory for testing of solid biofuels and compost  
4000 Plovdiv, 139 Ruski Blvd, E. 4, phone: +359 893 558 648, fax: +359 32 625 754  
e-mail: biofuel-lab@esp-seve.eu, http://www.esp-seve.eu

Certificate of Accreditation, Reg. No. 192 LI / 07.01.2020 valid until 07.01.2024, issued by EA BAS, in accordance with the requirements of standard BOS EN ISO/IEC 17025:2018

### TEST REPORT

Nº 32-L-PI-935 / 27.01.2021

**CUSTOMER** customer's name and information  
ENAMA SERVIZI SRL  
00159 Roma - Italia, Via Venafro 5  
Stefano D'Andrea

**Intersource LTD**  
Name of the supplier company (ENplus® ID number)

**SOLID BIOFUELS - WOOD PELLETS**  
Sample name - type?

32-01-935 / 15.01.2021  
Number of the request

15.1.2021  
Sample receiving day in the laboratory

935, wood pellets, 1 pcs., plastic bag, 10 kg, PU140KR-A1, A222151  
Sample number, type, identification, etc., quantity, other information about sample

**SAMPLING CERTIFICATE for ENplus® certification, from 15.12.2020**  
Number and date of sampling report and sampling plan

**TEST METHODS**  
ISO 17828:2015  
ISO 18134-2:2015  
ISO 18122:2015  
ISO 17831-1:2015  
ISO 18846:2016  
ISO 18125:2017

ISO 17828:2015  
ISO 18846:2016  
ISO 18994:2016  
CEN/TS 15379-1:2006  
ISO 18968:2015

15 - 26.01.2021  
Sample test performing period

Laboratory for testing of solid biofuels and compost  
Location of the test

**HEAD OF LABORATORY:**  
Lina Pavlova

TEST REPORT Nº 32-L-PI-935 / 27.01.2021 p. 1 from 2

ENAMA SERVIZI S.R.L.

EN plus A1  
EN plus A2

ID.: UA 028

## CERTIFICATO ENplus® ENplus® CERTIFICATE

n.249 (UA 028)

Si certifica che il pellet di legno per riscaldamento domestico prodotto da:  
It is hereby certified that the wood pellets for heating purposes produced by:

**Intersource Ltd**  
Pechers'kyi descent 19, office 6, Kyiv, 01011 (Ukraine)

nel sito di:  
at the plant of:  
**Str. Verhovynska, 22 - 90202 - Beregovo, Transcarpathian reg. (Ukraine)**

risulta conforme ai requisiti del Manuale ENplus®  
"Schema di certificazione della qualità del pellet di legno" rev.3.0, Agosto 2015 e alle classi di qualità:  
meets the requirements of the ENplus® Handbook  
"Quality Certification Scheme for Wood Pellets" rev.3.0, August 2015 and at the quality classes:

### ENplus A1® e ENplus A2

a seguito di ispezione iniziale e di continua sorveglianza  
based on an initial inspection and continuous surveillance/monitoring

La validità di questo certificato può essere verificata su [www.enama.it](http://www.enama.it)  
Validity of this certificate can be checked at [www.enama.it](http://www.enama.it)

Data di prima emissione / Date of first issue: Roma, 19.02.2021  
Valido fino al / Valid until: Roma, 18.02.2024

ENAMA Servizi S.r.l.

Laboratorio per il testing di prodotti a base di legno per riscaldamento domestico (ENplus®) S.r.l. è un laboratorio di certificazione accreditato in conformità con lo standard ISO/IEC 17025:2018.  
The laboratory is accredited for testing of wood pellets for domestic heating (ENplus®) S.r.l. is a certification laboratory accredited in accordance with the standard ISO/IEC 17025:2018.  
Il laboratorio è autorizzato a emettere certificazioni ENplus® per i prodotti a base di legno per riscaldamento domestico (ENplus®) S.r.l. è un laboratorio di certificazione accreditato in conformità con lo standard ISO/IEC 17025:2018.  
The laboratory is authorized to issue ENplus® certificates for wood pellets for domestic heating (ENplus®) S.r.l. is a certification laboratory accredited in accordance with the standard ISO/IEC 17025:2018.  
Questo certificato è valido a seguito di ispezione iniziale e di continua sorveglianza (ENplus®) S.r.l. è un laboratorio di certificazione accreditato in conformità con lo standard ISO/IEC 17025:2018.  
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ENAMA Servizi S.r.l. - Via Venafro, 5 - 00159 ROMA (ITALIA)  
Cod. Fis. (P.IVA) 150377510019 P.I. 06403600019 - 06403600019 - 06403600019 - 06403600019

Laboratory for testing of solid biofuels and compost  
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### TEST REPORT

Nº 32-L-PI-936 / 27.01.2021

**CUSTOMER** customer's name and information  
ENAMA SERVIZI SRL  
00159 Roma - Italia, Via Venafro 5  
Stefano D'Andrea

**Intersource LTD**  
Name of the supplier company (ENplus® ID number)

**SOLID BIOFUELS - WOOD PELLETS**  
Sample name - type?

32-01-936 / 15.01.2021  
Number of the request

15.1.2021  
Sample receiving day in the laboratory

936, wood pellets, 1 pcs., plastic bag, 10 kg, PU150KR-A2, A222153  
Sample number, type, identification, etc., quantity, other information about sample

**SAMPLING CERTIFICATE for ENplus® certification, from 22.12.2020**  
Number and date of sampling report and sampling plan

**TEST METHODS**  
ISO 17828:2015  
ISO 18134-2:2015  
ISO 18122:2015  
ISO 17831-1:2015  
ISO 18846:2016  
ISO 18125:2017

ISO 17828:2015  
ISO 18948:2016  
ISO 18994:2016  
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ISO 18968:2015

15 - 26.01.2021  
Sample test performing period

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Location of the test

**HEAD OF LABORATORY:**  
Lina Pavlova

TEST REPORT Nº 32-L-PI-936 / 27.01.2021 p. 1 from 2

To ensure that the quality of manufactured products complies with European standards, each batch of pellets undergoes quality control in the factory's laboratory, equipped in accordance with the requirements of the certifying body



# TYPES OF PACKAGING

**At the moment, packaging of finished products is being done at the plant:**

- In 1000 kg big bags using an automatic system that allows packing pellets from 700 kg to 1.5 tons.
- In 15 kg bags, which are stacked on pallets of 1.05 tons. Packaging is performed by an automated line with a capacity of 4-5 bags per minute, which allows packing up to 30 tons of products per working shift (8 hours).



Упаковка: біг-беги по 1000 кг або мішки по 15 кг



# PRODUCTION. EQUIPMENT

During the construction of the factory the main priority was to obtain the maximum quality of finished products. In this regard, to create a technological line at the plant, the best European equipment was installed. of world-known companies:

- 1. Debarker - Soderhamn Erikson SE (Sweden).** It consists of debarker, feeding and diverting mechanisms, control and monitoring system. Currently disassembled and located on the territory of the plant.
- 2. Two feeding tables** (before the debarker and after the debarker - depending on whether it is necessary to debark or not) manufactured by a Polish company. One of them (before the debarker) is equipped with a so-called stepfeeder to separate the logs. Currently disassembled and located on the factory premises
- 3. A cutting machine** that grinds round logs, balances, coarse chips to the required raw material fraction. The manufacturer is Bruks Klöckner (Germany). It includes the machine itself, feeding system, diverting distribution conveyor system, as well as control and monitoring system.



# PRODUCTION: EQUIPMENT.

**3. Drying equipment of drum type.** Manufacturer - C.R.S.I. SA. (Italy). It is universal and can work both on natural gas and dry pinch. It consists of a gas burner, solid fuel furnace, drying drum, aspiration cyclone system, supply and discharge system, control and monitoring system.

**3. Technological line processing raw materials from raw chips to finished products.** The manufacturer is ANDRITZ FEED & BIOFUEL A/S (Denmark). The main elements of this line are two hammer grinders of coarse and fine fraction, two press granulators with nominal capacity of 3.5 tons per hour each, cooling system, filtration system, aspiration systems, three storage and distribution hoppers, system of feeding and withdrawal conveyors, as well as automated control system and monitoring of the work of each element of the technological line.



# PRODUCTION: EQUIPMENT

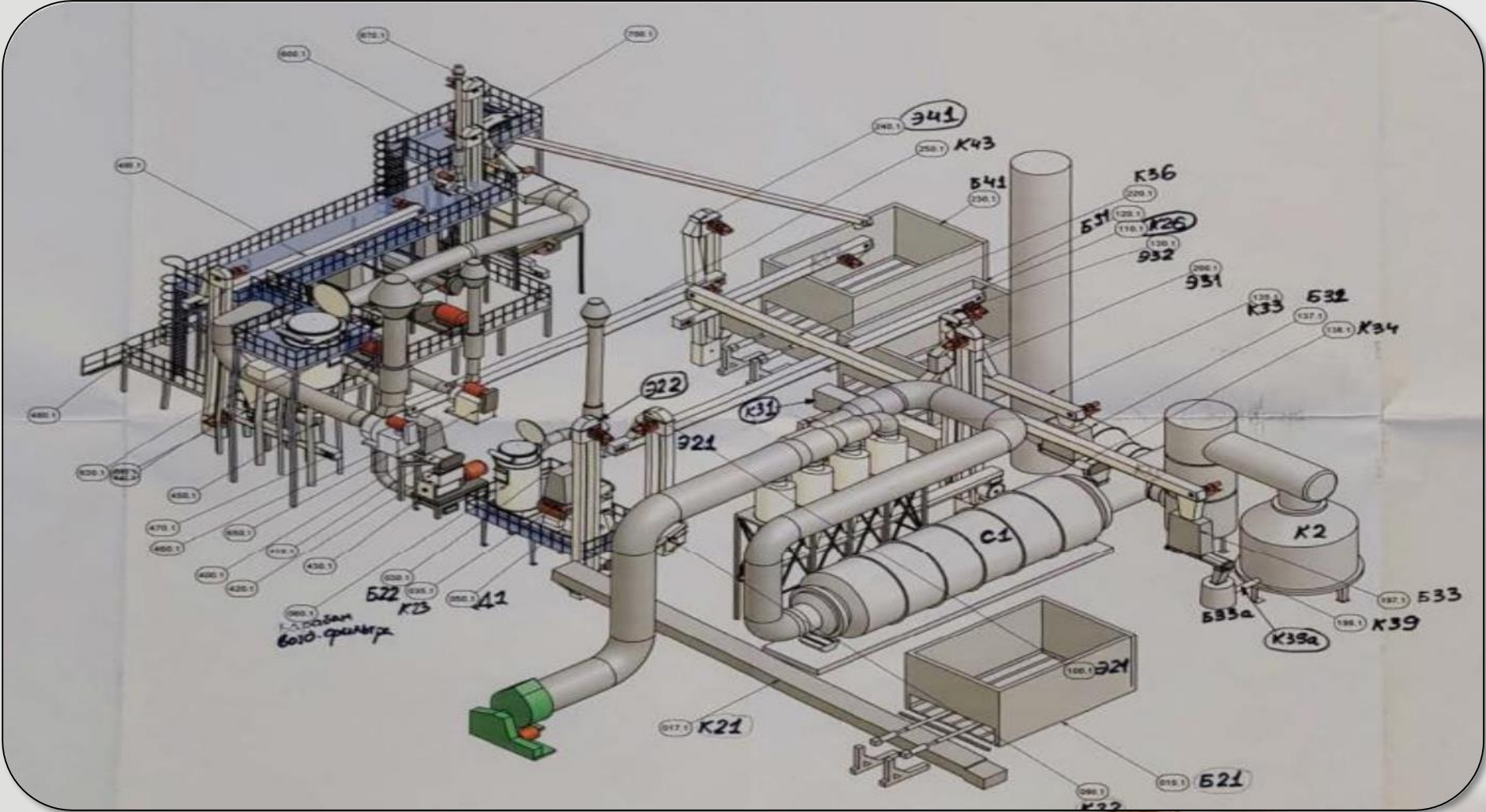
6. **Big-bag filling system** - produced by a Ukrainian company. It consists of 2 connected hoppers, with two independent load hoppers and big-bag filling systems, as well as a control and monitoring system.



To date, the plant has installed an **automatic line for packing into 15 kg bags** with a capacity of 3.5 tons per hour.



# 3D MODEL OF THE PRODUCTION LINE



# TECHNOLOGICAL PROCESS DESCRIPTION

The current technological process of pellet production is divided into several sections:

**Area #1 - preparation of large-size chips** - is a system of logs, balances, trimmings, hump logs feeding after debarker, transportation system and chipper. Log feeding after the debarker is intended for the production of industrial "gray" pellets from round logs with bark. The transportation system contains a metal detector, which stops the first and second technological sections if metal is detected in the wood. The chipper chops wood (chopping) into chips with dimensions (on average) 30 x 30 x 15 mm.

**AREA #2 - TRANSPORTATION AND STORAGE OF WOOD CHIPS.** This section allows to transport wood chips to the end canopy and either to load them into the loading hopper or to store them in the canopy on the floor storage. This is designed to buffer the raw material and to allow the first three process sections to operate independently of the subsequent ones. The first three technological sections are controlled from the operator's room located near the debarker.

**SECTION 3 - PRIMARY CRUSHING.** It consists of a feed hopper, a feed system, an Optimill 900 hammer shredder and a system for feeding the crushed raw material to the next section. In addition, this section includes a hopper with movable floors which acts as a buffer and also transfers the raw material to prevent it from sticking together. The average fraction after primary after primary crushing is 4 x 1 x 0.5 mm. The size fraction can vary depending on the screens installed in the hammer shredder.

**STAGE No. 4 - Drying of raw materials (Alfa 4000).** It consists of two heat sources - a gas burner and a solid fuel furnace, as well as a drum-type dryer, an aspiration system and a system for the removal and transportation of dried raw materials.

drum-type dryer, aspiration system and the system for removal and transportation of dried raw materials. The solid fuel furnace operates on dried wood chips, which have undergone primary grinding. Of the total volume of dried raw material, approximately 16 percent is used to maintain the operation of the solid fuel kiln. Approximately 16 percent of the total dried feedstock is used to keep the solid fuel furnace running. The average gas consumption when operating the gas burner is 75 m<sup>3</sup> for the production of 1 ton of fuel pellets.



# TECHNOLOGICAL PROCESS DESCRIPTION

**SECTION NO. 5 - SECONDARY FINE GRINDING OF RAW MATERIALS.** It includes a storage hopper with movable floors, conveyor systems, and a Multimill 1000 hammer shredder.

**SECTION NO. 6 - GRANULATION.** It consists of a special filter (JesmaFilter), conveyor lines, two conditioners and two press-granulators PM-3. With the help of conditioners, to which a steam line is connected, the raw material is heated and softened, and lignin is extracted from it. Then, the prepared raw material enters the pelletizer, where it is pressed into a pellet.

**SECTION NO. 7 - COOLING OF THE FINISHED PELLET.** The obtained fuel pellets are transported to the cooling unit, where their temperature is reduced to ambient. Then the cooled pellets get to the vibrating machine, which sifts the good pellets from small pieces of compressed wood. The small pieces go for re-crushing and pelletizing, and the finished fuel pellets to the next process section.

**SECTION NO. 8 - PACKING OF PELLETS INTO BIG BAGS.**

All production in the production building (from the fourth to the eighth technological section) is controlled from the operator's room located in it. The control takes place through a personal computer connected to the hardware complex, which is located in the control room. The drying equipment is controlled from another personal computer, also located in the operator's room. Special software is installed on each of the computers to control and monitor the operation of each unit of the technological line.

**SITE NO. 9 - PACKING INTO 15 KG BAGS**



# Territory. Infrastructure: Logistics.



The total area of the territory where the plant is located is 3.3 hectares. The land is owned by ROYAL-INVEST Ltd. The territory of the plant is fenced with a reinforced concrete fence. The territory is guarded round the clock. A remote video surveillance system of 14 cameras is installed

The plant is housed on the premises:

**1. Production and administrative building with a total area of 1730 m<sup>2</sup> (72 x 24).** The building contains: production building with technological line for fuel pellets production, operator's room, from which the whole plant is controlled, household premises, office premises, boiler room, spare parts warehouse, workshop, switchboard room.

**2. Storage of finished products with a total area of 540 m<sup>2</sup> (30 x 18).** Part of the warehouse is equipped with shelving. Total capacity of the warehouse - 1174 tons

**3. Side storage - area 430 m<sup>2</sup> (24 x 18).** The warehouse has a loading hopper of dry sawdust. In 2019, the warehouse is equipped with shelving for the

**2. Storage of finished products. Total capacity of the warehouse-412 tons**

**3. Storage shed for finished products and sawn timber - area 504 m<sup>2</sup> (14 x 36)**



# Territory. Infrastructure: Logistics.



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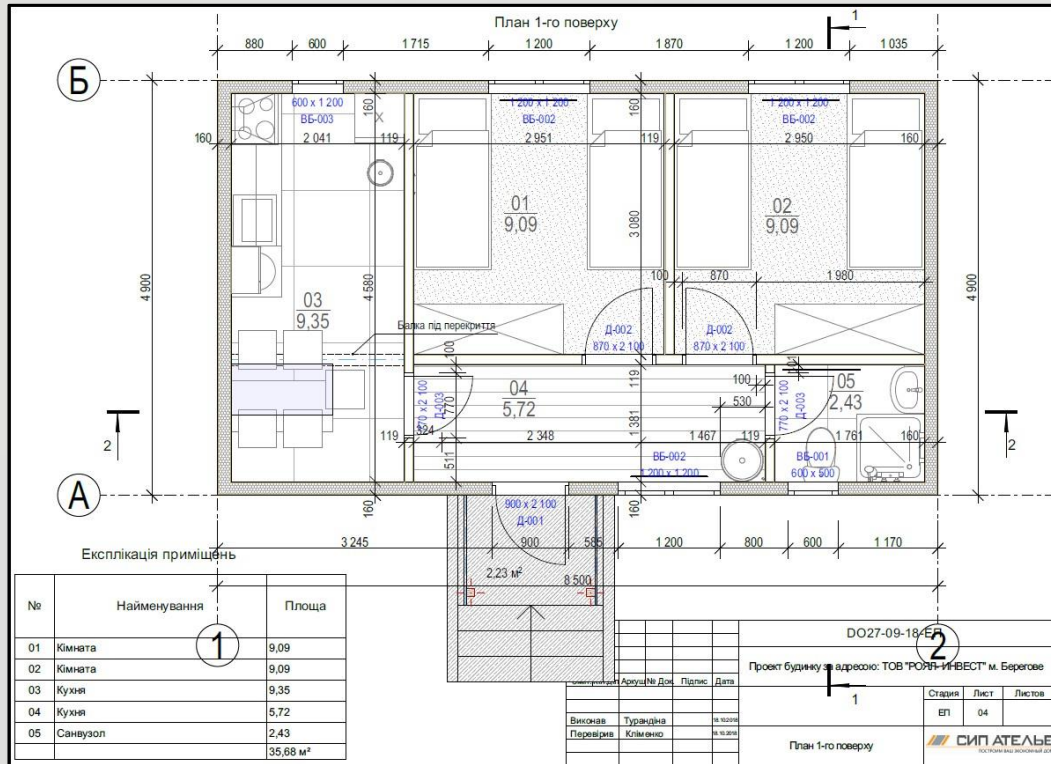
5. Side chip storage with an area of 500 m<sup>2</sup> (18 x 24). It contains: inlet loading hopper (50 m<sup>3</sup> of bulk wood chips), floor storage for wood chips, system of feeding conveyors.
6. Fire hydrants.
7. Potable water reserve tank with a capacity of 100 m<sup>3</sup>. Divided into two parts of 50 m<sup>3</sup> (one working, the other reserve and vice versa). Fully automated.
8. Well with a pump.
9. Transformer substation SCTP with two voltage transformers of 1600 kW each.
10. KW each.
11. Searchlight towers with lightning protection.
12. Canopy over the raw material feeding line to the chipper.
13. Operator's room for controlling the feeding tables, log transportation system and chopped wood chips removal, as well as for controlling the debarking and chopping machines.
14. Exit gate.
15. Gas cabinet.

## OPPORTUNITIES!

On the territory of the plant there is an undeveloped area of 1.3 hectares, which can be used for woodworking production and thus create a closed cycle of waste-free woodworking production!

# Territory. Infrastructure. Logistics.

To provide the pellet production and sawing line with personnel (on a rotational method) in 2019, a cabin with a total area of 36 m<sup>2</sup>, for 8 beds made of cip-panels with a bathroom and kitchen was built. The cabin is heated, hot water and equipped with all necessary appliances for life.



# Moving and loading vehicles



For unloading of railcars, storage and transloading of timber, loading of round timber on feeding tables, the factory uses:

- **Liebherr A924 grapple, Germany**
- **Front loader XJ 932, China** with the possibility of replacing the front grapple on the bucket For transportation of finished products on the territory of the plant, its storage and loading into vehicles, the plant uses 4 cars, manufactured by Shangly, Toyota, load capacity of 4 tons and 2 tons. Also for loading of finished products into vehicles at the plant there is an auto ramp, which can be easily moved around the plant site and change the height of lifting.

# Logistics and transportation



LOADING AND TRANSPORTATION OF WOOD CHIPS AND PELLETS INTO RAILCARS

The availability of a railway line and specialized loading and unloading equipment at the plant allows to load products, in the form of wood chips or pellets, directly into railcars and transport them through Ukraine and for transshipment at hub stations in Poland, Romania, Slovakia. the territory of Ukraine and for transshipment at hub stations in Poland, Romania, Slovakia.



# Logistics and transportation



For the delivery of raw materials, the plant has a railway line capable of receiving up to **10 standard wagons and up to 8 specialized wagons**. The branch line runs through the territory of the plant along the open warehouse of raw materials, as well as next to the feeding table, which allows loading the table with raw materials directly from the wagon. The distance from the territory of the plant to the Beregovo railway station is approximately 1 km.



To reduce transportation costs for delivery of raw materials to the plant, Royal-Invest purchased 10 specialized railcars. "Royal-Invest purchased 10 specialized railcars. Four manufactured by Altayvagon (Russia) and 6 manufactured by Stakhanov Wagon Works (Lugansk region, Ukraine). The four Russian wagons allow loading up to 65 m<sup>3</sup> of round wood in each, while the Ukrainian-made wagons can hold about 72 m<sup>3</sup> of wood.

# Logistics and transportation



Transportation of raw materials is carried out by means of two MAN and DAF tractors with 3 trailers:

- **Vonhool timber truck** - loading volume of hump logs about 30 m<sup>3</sup> dense, firewood - about 45 m<sup>3</sup> dense;
- **Shmits timber truck** - loading volume of hump logs about 30 m<sup>3</sup> dense, firewood about 45 m<sup>3</sup> dense. m<sup>3</sup> dense, firewood - about 45 m<sup>3</sup> dense;
- **Dump trailer "Berger"** for transportation of short up to 2 m firewood and wood chips. Capacity of firewood - 42 m<sup>3</sup> dense, wood chips - 60.8 m<sup>3</sup> bulk capacity

**Tilt trailer KRONE** - 22-23 tons is used for transportation of pellets.



# LUMBER PRODUCTION

*In 2021, ROYAL-INVEST LLC decided to diversify its business. A 530 m2 warehouse was reconstructed and a sawn timber production line was installed. THE SAWING SHOP CONSISTS OF THE FOLLOWING EQUIPMENT:*

- 1. WOODMIZER LT -70 band sawmill. Capacity of 10 m3 of finished products per shift.*
- 2. Circular sawing multisaw face sawing machine with mechanical feed model TM-10 (Kivertsypetslesmash).*
- 3. Circular sawing multisaw trimming machine model PO-6M (Kivertsypetslesmash).*
- 4. Two manually fed circular crosscut saws model VT-20 (Kivertsypetslesmash).*

***Purpose of diversification:** profit making due to realization of new products, partial provision of own pellet production with raw materials.*

***(waste from sawing wood - hump, sawdust)***



# FACTORY POWER SUPPLY

At a distance of 500m from the territory of the factory there is an electric substation Beregovo 3. This substation has two independent sources of power supply: the first one - 100 MV power line, the second one - 35 MV. From this substation two high-voltage cables of 6 MV each enter the factory. These two cables can be connected to two different power sources at the Beregovo 3 substation. In this way, high protection against voltage loss is ensured. The above two high-voltage cables are connected to a transformer substation located on the plant site. Each piece of equipment in the TPS has its own separate lead (feeder). The main consumer is the switchboard room located in the production building. The next consumers are electrical panels of drying equipment, chopping machine, debarker, factory lighting, etc. It should be noted that the Beregovo 3 substation is equipped with the ASCOE system, which allows to promptly monitor electricity consumption and transfer this data to the oblenergo.

# Heat, Gas, Water Supply and Air Conditioning of Production and Administrative Facilities

Also on the territory of the plant there is a gas closet with a gas measuring unit. A medium pressure gas pipeline is connected to it. From the cabinet gas pipeline is connected to the production building, specifically to the gas burner of the drying equipment. Also through a gas-reducer the low-pressure gas pipeline is connected to the boiler room built into the production building.

\*Due to the increase in gas prices it is currently not used and is mothballed

The operation of process equipment requires a constant water supply to the steam generator to produce steam. In order to create a water supply system independent from outside influences, the following complex of facilities was designed and constructed. On the territory of the plant a water reserve tank with a total capacity of 100 m<sup>3</sup> was built, which consists of two tanks of 50 m<sup>3</sup> each (one is used, the other is in reserve). This tank was connected to a branch from the municipal water supply network. A borehole was also drilled on the territory of the plant. Water from it was brought through a special system of purification and water treatment also to the constructed tank. From the reservoir, the water was brought to the industrial and administrative building and connected to the building's water supply system as well as to the steam generation system for the technology. The pumps, valves in the reservoir and the well are controlled both in automatic and manual modes.

A new branch line was constructed to ensure uninterrupted operation of the sewerage system that runs through the plant site. This branch bypassed the industrial and administrative building and ran along its edge (see site layout).

In order to create optimal climatic conditions both in the industrial building and in the administrative premises, a modern ventilation and air conditioning system was designed and built. The optimal mode of the supply and exhaust system was organized, and a centralized air conditioning system was installed for the air supplied to the administrative premises.

***We are always ready to answer  
your questions and provide  
additional information!***