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Sustainability report 2018

graanul invest

Interview with Raul Kirjanen

CEO of Graanul Invest

What was the year 2018 like from the sustainability point of view?
Since this is only the second time for us to prepare a sustainability report, and the historic reference period is not very long, there are still several fluctuations in the data. Since technical improvement additions the group and expansions in production units have a significant impact to the set goals, there is still no definite base level formed.

On the positive side, I can point out that our environmental footprint in producing pellets is clearly one of the best in the world. It is also a pleasure to see that the reforestation has gained good momentum. On the negative side, we are concerned about the failure to meet the targets in terms of accidents at work. Although the severity of accidents has been light, it is not an excuse, knowing that our goal is a work environment free of occupational accidents.

What is the impact of environmental conditions on production?
Since we have set very high targets, we are already affected by very small changes in the environment. As an example, I can mention the changes in the raw material basket, where we have used more firewood instead of chips of the sawmill industry. The increase in the cost of raw materials has certainly been a major problem.

At the same time, we have managed to organize our production according to the reasonable availability of raw materials. We have been able to organize things so that neither has the transportation distance of raw material grown significantly nor has the raw material basket composition changed.

What are the goals of the group in forestry? What has enabled the forest portfolio to be expanded?
The goal of our forestry direction is, simply put, sustainability. We have been working hard to balance the age and composition structure of the forest portfolio. We have put great emphasis on reforestation, surpassing the goal of a million planted trees in 2018. In reforestation, it is important to ensure good quality of plants and the volume of reforestation. We have also taken our own path in forest regeneration, where we are increasingly renewing woodland with hardwoods - especially birch trees.

The woodland market is still very active, and we have been able to successfully implement our capabilities and experience. However, it is a bit sad for me that the activity of selling woodland has definitely increased due to unjustified confusion in forestry.

How do you assess the role of SBP certification in calculating the CO2 chain in the biomass market?
The SBP system has certainly occupied an important place in the biomass certification market. This is an important step towards demonstrating to the public impartially and thoroughly that the production of pellets is sustainable and environmentally important. Given the public pressure and often the false pretenses of lobbying organizations representing competing technologies, it is certainly necessary to continue and further develop such frameworks.

Economical or sustainable?
My opinion is that there is not one without the other. For us, resource efficiency, savings at every stage of production and logistics, and especially monitoring of all stages and setting clear metrics is very important. The claim that everything is well with us is no longer sufficient today. The information technology tools at our disposal enable us to accurately monitor our activities and results, and then to provide results of that data to the public.

What are the most important plans from a sustainability perspective?
We have improved so far that we no longer have any major low-hanging fruits that could impact substantially our sustainability. Today we are in a position where we can make improvements by a few percentage points in one or another area. We will certainly work even harder on occupational safety, to ensure that our people have a safe and pleasant work environment.

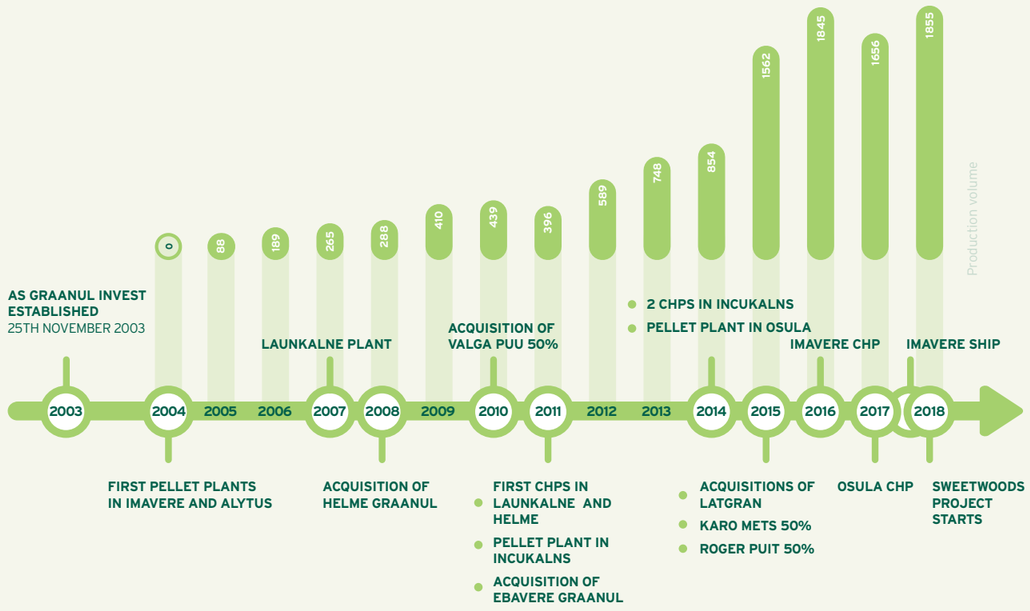
Company overview

The Graanul Invest Group is engaged in the production of bioenergy and renewable energy, forestry and the development of biomaterials. The company, based on private capital, started its operations in Estonia in 2003 and has grown over 15 years into a group of dozens of subsidiary companies operating in the Baltic States and employing over 500 people.

The company has grown rapidly, and for many years, Graanul Invest has been Europe's largest manufacturers of pellets and one of the largest producers of renewable energy in the Baltic Sea region.

Graanul Invest Group has 11 modern pellet factories and six combined heat and power plants across Estonia, Latvia, and Lithuania. The Group also includes three Estonian forest companies, which makes Graanul Invest one of the largest private forest owners in Estonia.

The goal of the company is to produce and deliver to our customer's eco-friendly and high-quality production and thus contribute to environmental conservation and waste reduction.



Graanul Invest business areas

PELLET PRODUCTION AND SALES

ENERGY PRODUCTION

FORESTRY

BIOPROCESSES

2018 in figures

While 2017 was a difficult year for the Baltic timber industry due to the raw material crisis, in 2018, a new major influencer - record high timber prices in ports - had to be faced. The Scandinavian paper industry purchased uncommonly low quality wood at an ever-increasing cost to mitigate its forest management difficulties. Graanul Invest managed to grow its production to 1.7 million tons (in 2017, 1.6 million tons) in synergy with the local forest and timber industry. The optimal production capacity of the Group is 2.2 million tons.

Forest chips were used to produce heat and power in combined plants (CHP):

- Electricity 2018: 333,987 MWh (in 2017: 277,307)
- Heat energy 2018: 889,549 MWh (in 2017: 760,907)

In total, there was 48,384 ha of forest land, most of it located in Estonia, in the group of forest enterprises forming Graanul Invest group in 2018. Compared to 2017, the group's forest area increased by nearly 30% last year (it was 36,414 ha in 2017).

In order to ensure the sustainability of the forest we are engaged in continuous forest regeneration, and in 2018 we were able to exceed the target of planting 1 million trees. In total, we planted 1,094,000 trees, which is 57% more than a year earlier (in 2017, it was over 693,000).

Production	2017	2018
Pellets	1 649 486 t	**1 760 630 t**
Electricity	277 307 MWh	**333 987 MWh**
Heating	760 907 MWh	**889 549 MWh**

Forestry	2017	2018
Forest land	36 414 ha	**48 384 ha**
Trees planted	693 000	**1 094 000**

Forests of Graanul Invest

Forest portfolio of Graanul Invest Group developed strongly in 2018. Our forestry companies, Karo Mets, Roger Puit and Valga Puu, grew by a total of 10,970 hectares, forming a 48,384 hectare sustainable forestry portfolio. It makes one of the largest private forest owners in Estonia, owning over 2% of Estonian forests. Forest management plans in Latvia have also reached a portfolio of 1,000 hectares, for which we are actively seeking additions.

2017 - 36,414 ha
2018 - 48,384 ha
2019 -> 60,000 ha

All our forests are covered with the PEFC ® (Program for the Endorsement of Forest Certification) certificate, and we market large volumes of roundwood according to FSC ® (Forest Stewardship Council) supply chain requirements. However FSC ® material flows in our region are in a declining trend as their latest changes in requirements have gone into conflict with the interests of small forest owners. However, the availability of certified wood did not decrease but moved over to PEFC ® system.

The forest companies of Graanul Invest harvested a total of 811,327 cubic meters of timber in 2018 through various cutting methods. Forest management activities were carried out both in own forests and as a service in other private forests. 36% of the timber from the portfolio went to the sawmill industry, 22% to the paper industry and 42% to the energy industry. In the course of forest work, 859,480 cubic meters of forest residues were harvested, all of which were transferred to Graanul Invest's combined heat and power plants for the production of electricity and heat.

Over a million trees planted

There has also been great emphasis on reforestation in the development and expansion of forestry. The year 2018 was extremely successful in this field, and we were able to plant **over 1,094,300 trees**. It is in hundreds of thousands more than in previous years and even exceeds the target set for the whole group. In addition, we planted pine seeds on less fertile soils, of which about 40,000 trees could grow with the usual percentage of survival.

Marti Samsonov, Head of the Forest Sector : Forest companies must be thanked for and praised for their reforestation efforts. Finding plants and increasing planting capacity has required a lot of planning and resources. Enhanced cooperation with nurseries will hopefully also allow us to maintain this level.

Forest management unit up to 1 year after the harvest, ready for forest renewal.

Well-kept access is important for both forest work and to quickly extinguish forest fires.

5 year old trees at their full vitality.

RETENTION TREES. Even dead retention trees are important for biodiversity as places of habitation and as nest trees.

YOUNG FOREST. 15-20 year old trees.

FOREST. 60-70 years after forest renewal.

Production of wood pellets

Graanul Invest Group produced a total of 1,760,630 tons of wood pellets in 2018, of which about 9% were premium pellets used in households, and the remainder were industrial pellets. We are moving in the right direction, and we managed to increase our production volume by 111,144 tons compared to last year, but this is still little in the light of the maximum capacity of the group which is 2.2 million tons. The largest volume - 891,566 tons - was produced by our Latvian factories, in Estonia, the volume was 779,900 t, and in Lithuania, it was 89,164 t.

We continue to be proud of the fact that, in order to achieve our maximum production capacity, we have not begun to source raw materials outside conventional supply areas and chains. Our raw material is strictly the surplus of the forest and wood industry, i.e., sawdust, chips, offcuts, firewood, energy wood, and logging residues. We have patiently followed the natural chain of biomass in the timber industry and adjusted our pellet production accordingly. While in 2017 there was a shortage of raw materials caused by difficult weather conditions in Estonia, this year the influencer is the Scandinavian market. The weather there has made forest management difficult, and the paper industry imported a large amount of the substitute material from the Baltic States at a price that local industry was unable to compete with.

The use of electricity for production was on average 147.54 kWh per ton of pellet. Despite the fact that we use only self-produced renewable energy, it has risen compared to previous years and exceeds our internal energy performance targets. The increase in electricity consumption is due to a decrease in the proportion of bulk material in our raw material basket. Sawdust and wood chips require less pre-treatment (chipping) in factories and a decrease in their proportion increases the amount of energy required for pre-treatment.

The consumption of diesel fuel used in production was 0.60 liters per ton of production. We have been able to make the use of diesel fuel even more efficient and meet our target for the year 2018. Diesel fuel is used by our front loaders, which we use to move the material on the factory territory (storage and forwarding).

Average water consumption was 0.12 m3 per ton of pellets produced, which remained at the same level as in 2017. The internal target was not achieved, but in fact, this indicator is very positive, because the summer of 2018 was exceptionally hot and the biomass dryers needed plenty of water for cooling. The summer temperature difference between the years 2018 and 2017 was over 15%, and this fact makes the stability of specific consumption of water very positive.

Jaano Haidla, Member of the Management Board: It is a pleasure to note that the Group's production capability has increased over the years through various innovative technical solutions, and thus the cost-effectiveness of pellet production has increased, allowing us to confront new challenges.

Consumption	2017	2018	2019
kWh per ton of pellets	141.76 target 140	147.54 target 139	145
litres per ton of pellets	0.62 target 0.65	0.60 target 0.60	0.59
m^3 per ton of pellets	0.12 target 0.10	0.12 target 0.10	0.10

Combined heat and power plant

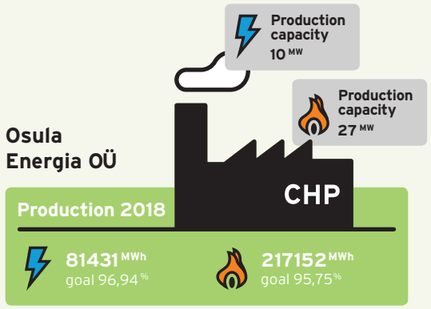
Biomass-based combined heat and power plants are becoming increasingly important in the region's energy sector and remain one of the main sources of renewable energy. Biomass-based units for parallel production of heat and electricity are used to supply both our pellet plants and the local grid. We use wood bark and chips of logging residues as fuel for these plants. We get most of the bark from the debarking lines of our pellet plants, but we also buy what is left over from the wood industry. Forestry residues, i.e., branches, treetops, and bark reach our combined heat and power plants as an accessory product in chipped form.

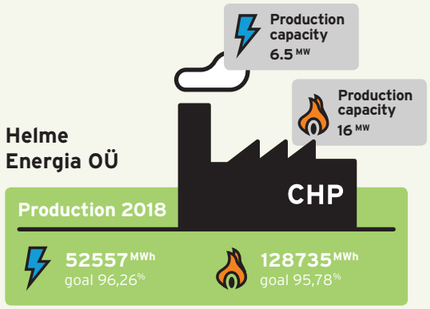
Martin Saks, Head of the Energy Sector: In 2018, the Group's power plants have been technically reliable and have ensured stable combined production of heat and power.

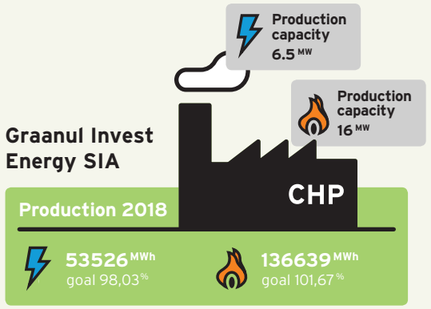
Compared to 2017, we have been able to increase electricity production by 20% and heat energy by 17%. This is mainly due to the fact that Osula combined heat and power plant was operating for its first full year, and that biomass flows were more stable. With all our energy production, we are getting close to optimum capacity, and in the near future, we will focus more on energy efficiency rather than on increasing volume.

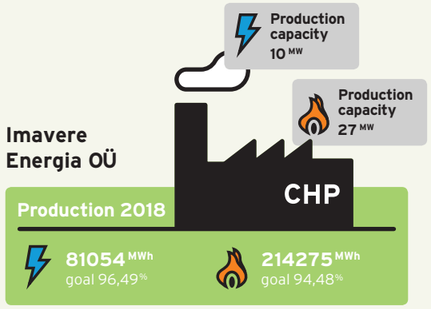
Combined heat and power plants also showed very high efficiency and reliability in 2018, reaching 97.7% of the set target. In Latvia, however, we have been producing over 99% of our target for 2 years in a row.

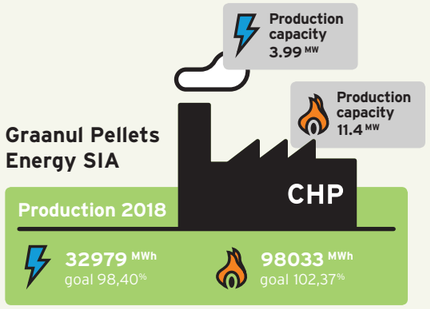
The energy produced by Graanul Invest is renewable and carbon neutral according to all recognized criteria. We can make sure of this because we extend the requirements of sustainable forest management and supply chain also to the supply of heating material. Biomass containing high quality wood, endangered species or originating from forbidden areas must not enter into energy production.

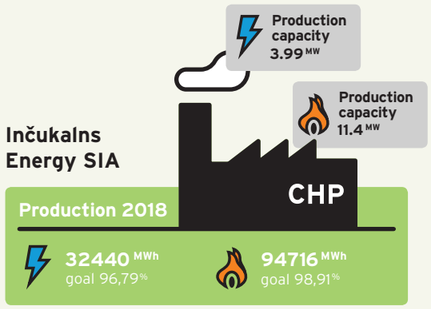












Use of renewable energy

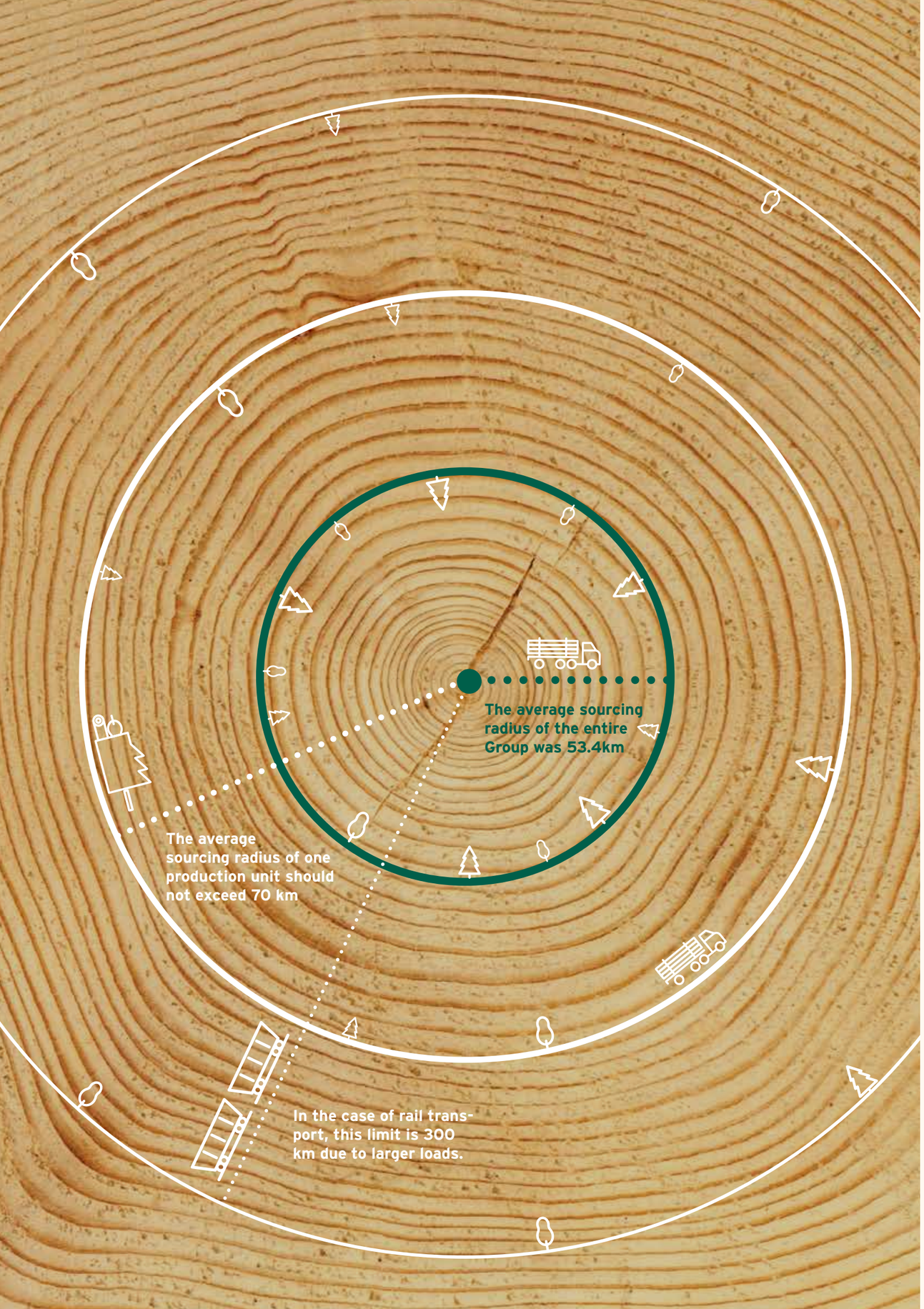
The network of combined heat and power plants of Graanul Invest serves our own pellet plants and also supplies the local grid with stable renewable energy. It is important for us to cover the energy needs of all our factories and to increase the share of renewable energy in the regional energy market. Burning of waste generated from timber industries in combined heat and power plants is the most efficient solution for low-quality biomass because thermal energy is generated as a by-product of electricity or vice versa.

Mihkel Jugaste, Quality and Certification Systems Manager: While a few years ago we had to buy electricity from the national grid, we have now exceeded our needs in power generation and have reached to the level that 13% of all renewable energy produced in Estonia has been produced by Graanul Invest.

While in 2017, the company's electricity production exceeded the energy consumption of the whole group by 8%, then in 2018 this number increased to 17%. Despite the fact that we produce energy on the territory of 5 plants, but there are a total of 11 plants, it is possible because the combined heat and power plants sell up to 46% of their electricity to the grid. Our biggest energy producers are Imavere, Osula and Incukalns production parks (pellet plant + combined heat and power plant), producing in 2018 almost 70% of the total 333,987 MWh of electricity produced by the group.

Our groups newest combined heat and power plant in Osula has been the first to create a solution that will enable us to supply our neighboring timber industry with the heat produced by us. This solution will enable us to make use of all of the energy we produced and help our neighbors to reduce their environmental footprint. In the first full year, more than 20,000 MWh of heat was exported and used to dry sawn timber.

2017	2018	2019 Eesmärgid
Production 277 307 MWh	**Production 334 000 MWh**	**Production 335 000 MWh**
Consumption 255 616 MWh	Consumption 285 000 MWh	Consumption 275 000 MWh



Raw material sourcing

Timber industry waste used to produce pellets reaches us to a large extent on trucks, but we are also increasing the share of rail transport. In production units that have existing rail connections, it is possible to further reduce the fuel consumption of the supply chain.

From regional wood industry waste, we use planer chips, sawdust, logging residues,offcuts, and defective logs.For such material, we record the distance of each load from the sawmill or component plant to the gate of the pellet plant. In addition, we map the origin of all material that we receive from our suppliers all the way to the forest level. In this way, we can be sure that our production material does not come from a country where sustainable forest management practices are not being followed. Through local wood processors, our supply base extends beyond the Baltic States to Sweden, Finland, Norway, Russia, Poland, and Belarus.

A significant part of the production material is also made up of low-quality surpluses of the forest industry, such as curved or spoiled logs, small diameter roundwood or low-value hardwood species. It is a material that is cut to access high-quality saw logs and later sorted.

For roundwood, we record the distance of the wood from the forest to our gate.

To be environmentally and economically sustainable, we have calculated that the average sourcing radius of one production unit should not exceed 70 km when using truck transport. In the case of rail transport, this limit is 300 km due to larger loads.

Also in 2018, we continued firmly within the set target and the average sourcing radius of the entire Group was 53.4 km (with train transport). This number has fluctuated very little from year to year, indicating that our suppliers and supply chains are very stable.

Kert Kruusimägi, Biomass Purchasing Manager: The regional location of our factories in rural areas near major sawmills and timber industries provides a good and rational opportunity to use wood and forest industry waste as a raw material for our pellet industries. Thanks to modern information technology capabilities, we can very accurately monitor and control the origin of materials and prevent unauthorized materials from entering the industry.

Certificates

International certificates continue to play an important role in the wood and energy industries. They help to improve the environmental, quality and social aspects of our entire value chain and keep the company a step ahead of market requirements.

FSC ® and PEFC ® certificates continue to have a strong impact on our forest management and timber supply chain. Additional requirements for felling and regeneration of the forest, as well as limits for origin, legality, and species of wood products preclude inappropriate raw materials from our supply chain and guarantee compliance with the EU Timber Regulations. Graanul Invest continues to hold both sustainable forestry certificates, but we have noticed a rapid almost 30% growth of PEFC ® material in our supply base.

The Renewable Energy Directive (RED II) has established our sector's rules of the game for a long time. FSC ® and PEFC ® certificates focusing only on the first part (supply chain) of the value chain are not enough to meet these requirements or prove compliance thereof. In order to ensure sustainable forestry and overall efficiency in the logistics and the production chain, we have a Sustainable Biomass Partnership (SBP) certificate, which has become the most important standard for the woody biomass based bioenergy sector. SBP has created a system and a third-party verified data platform that can help accurately identify and regulate all production-related fuel and energy usage as well as the resulting greenhouse gases. This will enable our customers and us to measure the actual savings potential of biomass and meet the requirements of the Renewable Energy Directive. The scalability of the difference between sustainable forestry and Graanul Invest's approaches (through SBP) are well illustrated in the adjacent graph. Graanul Invest is already selling 80% of its material under the SBP-Compliant claim that meets the highest requirements of SBP.

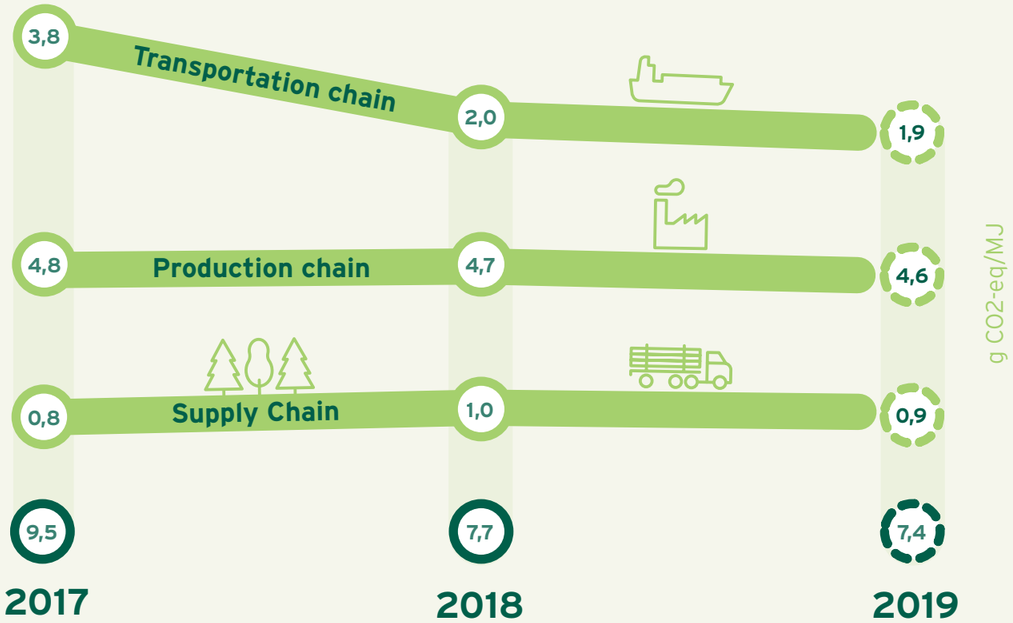
One of the most important parameters of pellet production is the emission indicator of the total production and supply chain, which binds the emitted emissions to the energy contained in the pellets. In 2017, SBP reports showed that we were 3.5 times below the average European pellet market emissions indicator with 9.5 g CO2-eq/MJ. In 2018, we were able to further improve this indicator, and it **fell to 7.7 CO2-eq/MJ**. This was thanks to the addition of Osula combined heat and power station, to the use of our own ship, MV Imavere for supplying our main customers and the continuation of the principle of continuous improvement.

The quality of our wood pellets easily exceeds the highest requirements of the market as set out in standards ENplus® and DINplus®. All our premium pellet production meets the highest quality grade ENplus A1.

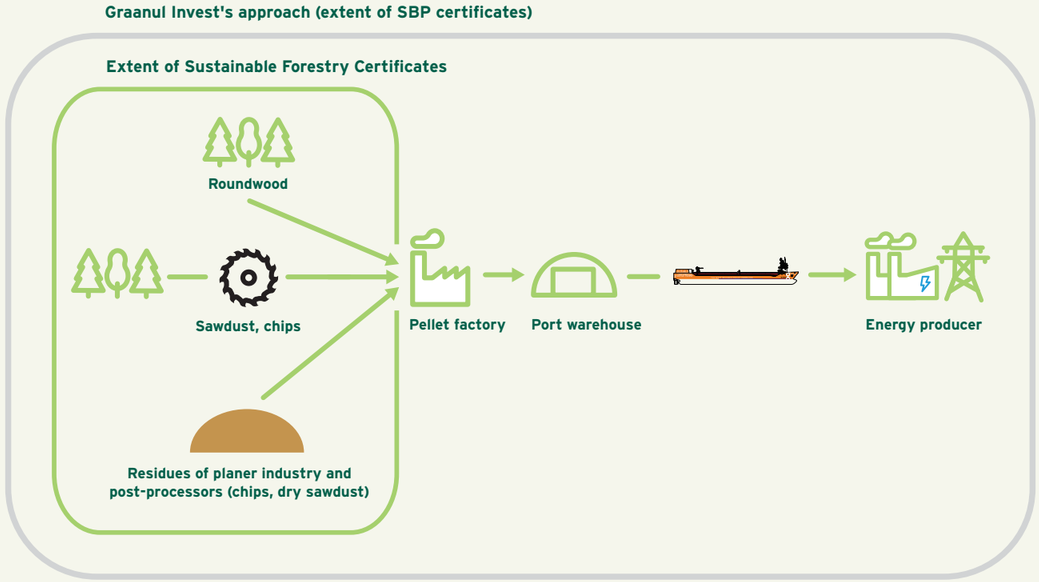
For better and more systematic management of our operations, we manage an integrated management system that complies with ISO standards, covering quality, environment, energy, and safety. As an upgrade, we have introduced to our procedures an energy management system that has already been successfully implemented in our Latvian plants and Estonian plants.

Mihkel Jugaste, Quality and Certification Systems Manager: The world's largest certificates have been able to create very good frameworks for sustainable forest management and increase the transparency of the wood supply chain. But energy and pollution from the forest to the end product chain is the "blind spot" that the industries are allowed to hide. I am very pleased that we have adopted an integrated approach to greenhouse gases at an early stage and understand the full impact of all our activities. The impact of end-user activities on the environment also depends on the activity of the previous link in the chain, and the climate goals cannot be achieved if someone in the chain leaves the information to themselves.

Total greenhouse gas emission of the value chain



The scope of greenhouse gas calculation



Bioprocesses

The goal of Graanul Invest´s bioprocesses direction is to develop new generation sugars and high purity lignin from lower quality wood using innovative processes. Our strategic goal is to develop into Europe's leading producer of biomass-based biochemical and biomaterials.

As a result of years of development, have made preparations to establish a test plant for wood fractionation technology, which allows more than 90% of wood to be converted into useful products. An innovative technology platform would provide an opportunity for a further valorization of technological wood, which in turn will enable a decisive change in wood processing. We have set ourselves the goal of launching the first pilot plant for decomposing industrial hardwoods by 2020.

Graanul Invest, together with its partner, succeeded in gaining the most prestigious European bioeconomy research development support for the SWEETWOODS project in a very intense competition. The research funding issued by the Bio-Based Industries Joint Undertaking (BBI-JU) was a confirmation of the great potential for developing innovative technology. The European Union has set itself the goal of significantly reducing its dependence on imported fossil-based products and supporting the development of a green economy. The SWEETWOODS project led by Graanul Invest deals with these same topics, seeking alternatives to the use of fossil materials and developing new bio-economy value chains based on wood fractionation.

In addition to Graanul Invest, five well-known European industrial companies, Global Bioenergies, Armacell, Tecnaro, Metgen, Recticel, three innovation and sustainability consulting companies, Spinverse, 2B and Vertech Group, have been involved in the project. Together with partners, the main objective of the project is to demonstrate innovative applications of lignin in industrial scale for the production of biomaterials. Lignin is tested during the project, for example, in bioplastics, elastomeric foams (used in insulation materials) and polyurethane foams (used in the production of construction foams.

In addition to lignin, we can also extract large quantities of valuable wood sugars by fractionation of technological wood. The production of biochemicals from sugars is becoming a more serious alternative to the fossil fuel-based chemical industry. In addition to the SWEETWOODS project, REWOFUEL is involved in the valorization of sugars. The focus of this project is on the production of bio-isobutene, a platform chemical from food sugars and its further valorization in the aerospace industry and as a fuel additive. To minimize the generation of residues in production, the use of products in animal feed and asphalt production is tested alongside these processes.

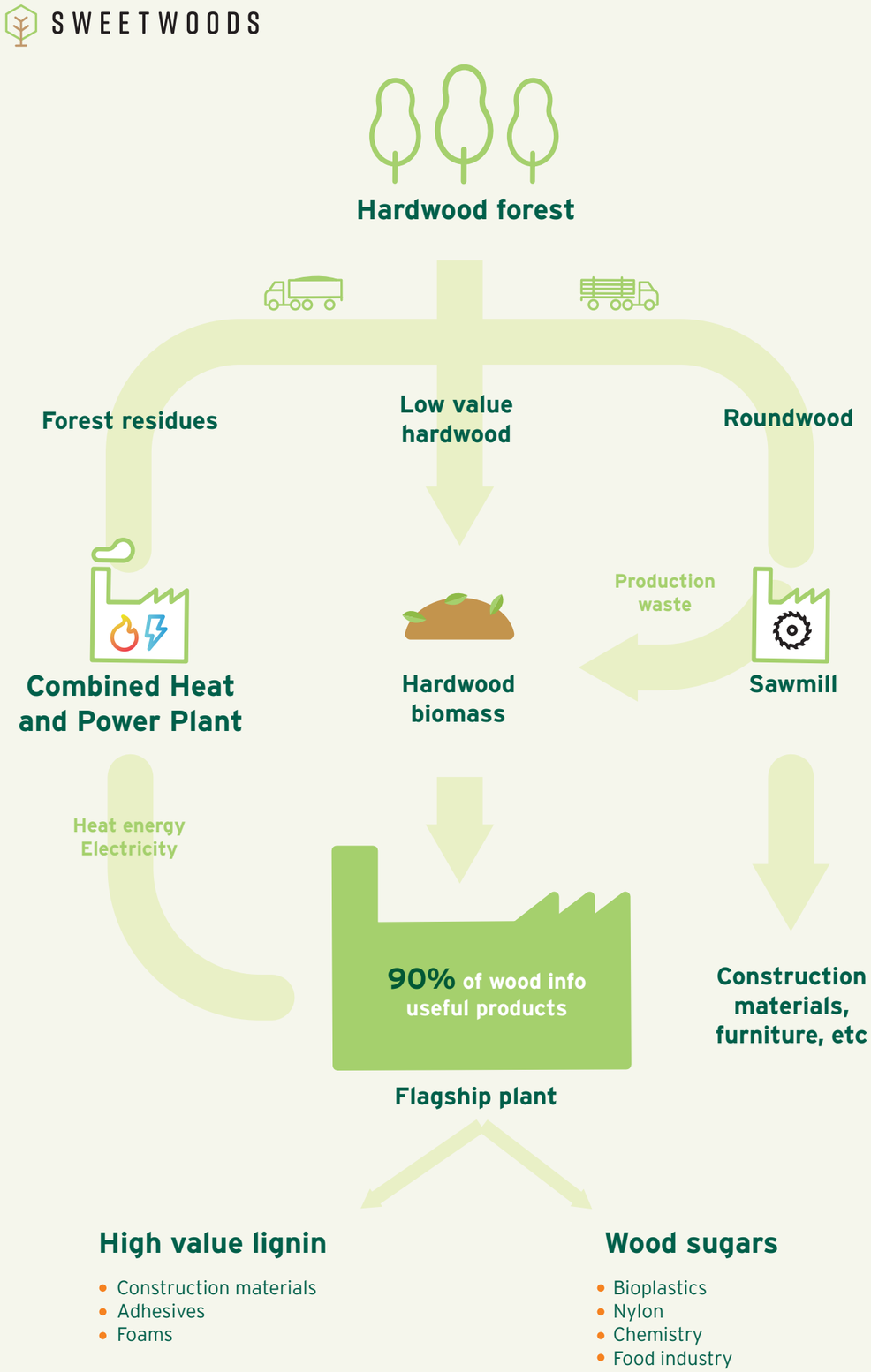
In addition to high-efficiency factors, wood fractionation technology provides the opportunity to build regional woodworking complexes and turn from industrial revolution times approach of the larger the better to the reginal approach of the smaller the smarter. According to our understanding, modern wood processing technology has the following main advantages over conventional solutions:

- Efficiency factor for converting wood into useful products over 90%
- Technology does not depend on the type of wood
- The modular design allows the technology to match the capabilities of the area
- Low environmental impact and low ecological footprint

The main goal of Graanul Invest is to develop into a reliable intermediate product supplier in the market of biochemicals and biomaterials. We want to keep focusing on the higher value down-stream processing technologies right from the start to choose the end products that will create the most location-based added value.

The further we move in the value chain locally, the more added value and innovative knowledge will remain for the faster development of the region's knowledge-based economy.

Peep Pitk, Research and Development Manager: The construction and launching of a wood fractionation experimental plant in 2019 is the first sign of a new development direction for technological wood valorization. Innovative technology enables the production of lignin and C5/C6 sugars as a sustainable raw material for various biochemicals and biomaterials and material industries. This is the beginning of the use of technological wood in completely new areas.



Shipping

Graanul Invest bought the vessel MV Imavere, which started operating for us from the beginning of 2018. At this point, we took the ambitious goal for MV Imavere to transport 500 000 tons of pellets per year. Through this goal, we thought it was possible to save more than 1.5 million liters of marine fuel, based on the average parameters of the European shipping market. The calculation was made in comparison to the 7,000-9,000 t capacity ships previously used on the same trade routes as Imavere currently operates. **Our first ship is a handy size type and accommodates more than 30,000 tons of pellets.**

MV Imavere has been very well adapted to her new work and her crew and exceeded her goal by 8% in the first year. Having now accurate data on the actual fuel consumption of the ship, it has become clear that the fuel savings have been doubled, or about 3.1 million liters, and switching to a larger ship has been necessary. However, this kind of improvement is not only achieved by changing vessel size, but also depends on the routine for using it. **Our logistics team, in cooperation with the crew and operator, has reached a very good synergy, where the ship is kept running on consecutive basis and the loading windows are not missed.**

It is clear that the use of smaller vessels is only conceivable today for customers whose ports do not accommodate large vessels. Even in these directions, we cannot stick to outdated and costly vessels and thus, we have upgraded our fleet in the form of LNG vessels. **Our custom-built vessels can accommodate around 9,000 tons of pellets and, thanks to innovative technology and clean fuel, should bring our logistics chain to a whole new era.**

Emissions savings potential of LNG vessel.

Olari Tiide, Logistics Manager: Our new LNG ships that will be completed in 2019-2020 have many important advantages. On one hand, their high load capacity and on the other hand even 25% less CO2 emissions compared to diesel ships, which means significant environmental savings.

Health and safety

A safe working environment is the basis for all the goals of Graanul Invest. It's not wrong to say that this is the area that we supervise most thoroughly in our company. Despite continuous expanding, it is unacceptable for the number of accidents at work to increase.

In 2018, our company had 0.87 work accidents per 100 workers. This is more than a double increase compared to the year 2017 when it was 0.35. Despite the fact that most of them are minor accidents, such an increase requires immediate intervention and corrective measures. That is why in the departments involved in the increase in occupational accidents, additional third-party safety training was carried out and an additional safety barrier was built around one specific device in each plant. On a positive note, we can point out that 6 of our factories have been free of occupational accidents for 3 consecutive years.

Development and continuous improvement of occupational safety remain a priority for the company, and in 2019, we will transfer our occupational safety management system to the latest standard ISO 45001 (today OHSAS 18001). This gives us the reason to believe that we are moving at the same pace as the world's most modern industries.

In addition, we have launched training to reach the situation where all the employees have the capability for the provision of first aid. In the case of accidents at work, it is important that the closest employee is able to provide the aid, not the person designated for first-aid who may be at the other end of the production facility.

Our occupational safety requirements also extend to the supply chain (in Latvia and Lithuania), where we check the knowledge and activities of our suppliers in this field. In Latvia, we are auditing our suppliers even during forest work to ensure that they comply with the safety requirements.

Renato Okspuu, Working Environment Specialist: The increase in last year's occupational accidents is a reality that is mainly affected by one new and rapidly expanding department. We have now made our own conclusions and are working on improving workplace safety there. At the same time, we can welcome the fact that internal controls have shown an improvement in overall safety and awareness.

Measuring system Loadmon

Our Estonian factories were equipped in 2017 with fully automatic feedstock reception measurement system Loadmon, which has proven to be very reliable and accurate, and therefore in 2018 it was also installed to our Latvian plants. The innovative Loadmon system works at the reception gate using a point cloud or 3D image which is generated from each load in just minutes and without human intervention. By the end of 2018, there were only 2 factories out of 11, where the measurement was still done without a 3D model. We have set a goal for 2019 to reach the point where all Graanul Invest factories operate the same measurement system.

With the electronic measuring system Loadmon, we have received 1,737,603 cubic meters of roundwood and 5,064,175 m3 of bulk material. The program records the entire measurement history and corrects its calculation logic according to the increasing sample and specific cases. There is no known more accurate system for measuring moving cargo on the top of the truck.

The reliability and transparency of the system created throughout the supply chain, along with improved measurement accuracy, has been one of Loadmon's main goals, but its effectiveness and performance is not limited to it. The total time saved on the measured material can be counted in months, not in days, and that is equal to the time that the trucks have not had to spend on the factory territory waiting in queues. This smart solution is a powerful way to reduce the overall emissions associated with stockpiling of material and significantly improves the working environment of our plants.

From our experience, we can confirm that the Loadmon measurement system has made a measuring of low quality roundwood and bulk materials more reliable, more accurate and more transparent, and is definitely an effective tool for industries using similar materials.

Jaano Haidla, Member of the Management Board: We continue to find innovative solutions to the bottlenecks in the timber industry. Loadmon is a bright example of how a vision can become a reality in a few years, bringing the whole roundwood measuring to a new level in the sector.

Continuous improvement

At the end of August, a new debarking and chipping line was launched at our Gulbene plant, bringing the capacity of the plant to a new level. The new line allows the plant to expand the range of materials used for its production and increases the quality of pre-treatment.The debarking line removes the bark from the timber that otherwise would reduce the quality of the pellets, and that could be rather used for the production of heat energy for drying. The chipping part of the new technology gives us the opportunity to control the raw material fraction and thereby increase efficiency. Additionally, dependency on mobile chippers and the diesel fuel they consume will be non-existent.

A separate warehouse, the so-called dry dust hall, that can hold 500 tons of material, has been completed in Alytus plant for storing dry bulk material (planer dust, sawdust). This kind of material reaches us very clean and dry, and we must maintain these conditions when storing it. This is what the new warehouse allows and moreover, it reduces the release of fine dust into the environment.

Since the last quarter of 2018, all our laboratories have been using measuring boards developed in our own factories. In the case of pellets, it is important that they remain within a certain length range. Production with the right qualities must not be too short or too long, so the average length should be measured. We have carried out the measurement procedure so far with calipers, spending 15 minutes for measuring only one parameter. The measuring boards developed by us reach a more accurate result in just a few minutes. The possibility of human error is also reduced.

The Helme production park includes our forest chipper department, which cooperates with Graanul Invest forest companies. Chippers accompanied by trucks clear the forest felling sites of the generated logging residues.

Branches, treetops, bark, and brush are chipped into a suitable fraction and brought to our combined heat and power plants as fuel. In the summer of 2018, a new 200,000 m3 capacity wood chipper was added to this department. The newer and more powerful chipper will help reduce the fuel costs associated with biomass processing and increase the quality of wood chips, i.e., the fuel of the combined heat and power plants. This, in turn, increases the efficiency of combined heat and power plants and the amount of green energy produced.

In Imavere and Osula we have started testing sealed roller bearings. It is an ambitious innovation project that has not been successful so far even for the equipment manufacturers themselves. The goal is to extend the lifetime of one of the main cost components - press bearings - and eliminate the use of large amounts of fossil lubricants. The first results of the project have exceeded expectations, and this year we are going to introduce the solution for commercial use.

Urmo Ariva, Chief Technology Officer: The main advances in the rapid development of our technology in recent years have been in reducing emissions and increasing the resource efficiency of energy and equipment. We have simultaneously made both capital investments and improved daily production. Monitoring of production data has enabled monitoring and analyzing the resource efficiency of cost components of larger equipment, which in turn allows to target and measure the introduction of new innovative solutions.

Support activities

All of the activities of Graanul Invest Group - bioenergy and biotechnology development, forestry, and renewable energy - are forward-looking solutions. That is why the Group's support activities are largely focused on supporting young people as our future. We have decided to contribute to the development of youth sports, education and research.

Graanul Invest is in Estonia the main sponsor of volleyball youth teams and a long-term supporter of volleyball, both at the level of the team and supporting various local volleyball clubs. For the last couple of years, we have sponsored the activities of the Estonian Ski Association. Together with our subsidiaries, we have been supporting many local sports clubs, athletes and hobbyists throughout the years. In 2018, we supported a total of 58 different projects in Estonia and Latvia.

Many of our subsidiaries have developed their own areas of support that they cheer for wholeheartedly and offer longer-term financial support. In the case of support activities, we have primarily focused on the interests of the local community and on what the favorite activities are in the given region. As team sports have become popular among young people, we are supporters of several youth football, volleyball and basketball clubs. For example, our forest company Valga Puu has been sponsoring football for young people from South Estonia for years and has also shouldered the activities of basketball and volleyball girls in the region. Our subsidiary Latgran also supports several clubs in Latvia.

In addition to ball games, we also sponsor, for example, a cycling club in Pärnu, a wrestling club in Latvia, youth biathlon and downhill skiing, track and field and do a lot more to contribute to the development of regional sports life.

In addition to supporting sports activities, in 2018 we have also contributed to the acquisition of innovative teaching materials, to the restoration of the monument of Lurich, supported Junior Achievement and acquisition of the Christmas presents for the children in orphanages.

Jaano Haidla, Member of the Management Board: We are developing hand in hand with society, and we support future joint activities both at the county level and in the Baltics as a whole. We would like to contribute to the local community and to encourage young people because young people are our future.

Looking to the future

The Sustainability Report of Graanul Invest Group will be issued once a year (Q1). As a result of the new system and new approach, the company has set itself key performance indicators that will lead the focus, policy, and investments of the Group year after year.

Continuous improvement of these indicators ensures the progressiveness and sustainability of our operations throughout the value chain.

- Planted trees: 1 094 000 trees (2017 - 693 050)
- Energy use in pellet production: 147.54 kWh per ton of pellets (2017 - 141.7 kWh)
- Area of certified forest land: 100% (2017 – 100%)
- Occupational accidents per 100 employees: 0.87 (2017 – 0.35)
- Supply chain GHG (greenhouse gases) per amount of energy contained in pellets: 7.7 CO2-eq/MJ (2017 – 9.5 CO2-eq/MJ)