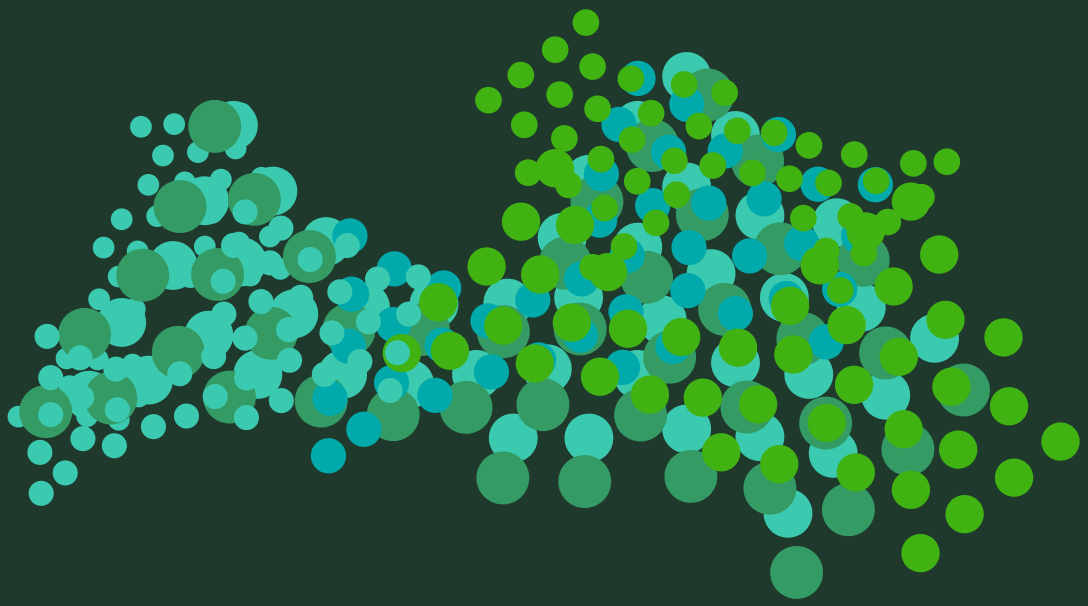

FOREST SECTOR
IN THE 25 YEARS OF INDEPENDENCE OF LATVIA

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THE GREEN GOLD

We can certainly call Latvia the land of forests. Almost every inhabitant in Latvia is related to forest, forestry and forest products in one or another way. Since long ago wood has been used in heating, construction, production of furniture and other household items. Today forest sector and its wood processing industry have developed into one of the most important sectors of the national economy by generating 20% of the national export income. Forest sector directly employs more than 80 thousand people working in different sectors. And almost 145 thousand people get irregular income from forest. Forest has deep roots into our culture traditions, as well as provides opportunities for spending free time – questionnaires indicate that 80% of Latvian people regularly spend their free time in forest hunting, in sports activities or picking berries and mushrooms. And furthermore there are large nature values in our forests that in some cases are unique not only on European, but also global level.

These facts are of common knowledge in Latvia therefore our forests are called „the green gold". However we got this opportunity not because we simply have them. The forest that grows by itself represents beautiful nature values, but it becomes „the green gold" because we have learned to use and manage it wisely – by protecting nature values, by securing resources for national growth and contributing to the wellbeing of our society. Thus we can comparatively call forest sector a shining coin in the wallet of Latvia's national economy where one side of the coin is forestry, and the other is woodprocessing sector. Inseperable. This brochure has been developed with the goal to tell the readers about the forest sector development in the past 25 years by illustrating the particular situations with the specific and relevant data. And once more it should be noted that all the processes in the sector do not happen as such, but are the result of smart decisions of the people who care about Latvia's national economy.

Photo: Latvia's State Forests

Photo: Latvia's State Forests

FOREST SECTOR MANAGEMENT

When looking back at the forest sector development, it has experienced remarkable growth not only in development of technology and knowledge, but also by creating a relevant forest sector management model. On the Government level since 1997 forest sector lies under the Ministry of Agriculture Forest Department. It is responsible for developing forest sector development strategy, as well as for developing regulations on forest management, forest resource use, nature protection and game management. In order to take into account opinions of different interest groups, Forest Advisory Board has been established. The State Forest Service under the Ministry of Agriculture is the organization responsible for supervising the enactment of the requirements set in the national laws and Government regulations relating to forest management.

It is the established close collaboration and consultation among the government institutions, entrepreneurs, researchers and representatives from education field, that has allowed to reach common view at the seemingly diverse forest related interests by seeing clearly the direction where forest sector needs to head in the conditions Latvia lies into. In order to make these views legally binding Latvia's Forest Policy has been developed which emphasises the main goal – sustainable management of forests and forest lands. Whereas today the document that represents mid-term forest sector strategic planning is Forest and Related Sector Development Strategy 2015-2020 (FRSDS2020) adopted by the Government.

HISTORY

In order to look objectively at the current situation in Latvia's forest sector today, first we should look back and understand the development of the forest areas in Latvia as we see them today.

The species of plants and trees that we have today started to develop relatively very recently – 14-16 thousand years ago when the last glaciers of the Ice Age left the territory of Latvia where they had dominated for 200 thousand years. As the climate got milder the tree species typical today in Latvia started growing in the territory of Latvia – pine and birch. And 9 thousand years ago forest covered up to 90% of the territory. The climate was getting warmer and more humid which facilitated broadleaves forest development with oaks, lime trees, fluttering elm, hazel. In all territory of Latvia hornbeam and beech was common.

Approximately six thousand years ago forest area in Latvia's territory started to decrease. It can be explained by expanding bogs due to cooler and more humid climate, as well as impact of human activity. At that time people who lived in the territory of Latvia actively cleared forest by cutting and burning in order to establish agriculture land for growing crops. As people tried to establish land for crop growing on more rich soils where broadleaves were growing, the areas of the latter started decreasing. Since the crop growing cycle was just 8 years the area overgrew with forest again. But broadleaves species did not regenerate in the former crop fields and there were conifers, birch and grey alder forests regenerating.

When in the 11th century the method of clearances was substituted by fallows, forests were eventually displaced from farmlands. In fallow system the land was used every third year allowing it to rest the other two years. As a result of this during the last 1000 years forest area in Latvia has both decreased several times and also regenerated due to various wars, epidemics, and political system. Also in those times there were situations similar to what we have experienced like shortage of fire wood when it had to be brought from abroad and overgrowing of abandoned farmlands.

In the second half of the 19th century along with the industrial revolution there was significant population growth and urbanization which brought significant demand for food. As a result on the turn of the 19th and 20th century forests covered just 30% of the territory of Latvia. Already in the 18th century there was knowledge and understanding developing about forestry principles, forest management and regeneration. Although in the beginning it was German forestry practise applied, with the beginning of the 20th century local foresters contributed greatly to the development of forestry by introducing practise more suitable to Latvia's conditions. Unfortunately The First World War started and the scarce forest areas decreased even more. Trees were cut in large areas close to the frontlines in order to build fencing, bridges, bunkers, and defence walls. Economically most valuable forest stands were harvested mostly in Kurzeme region and along the river Daugava.

Rafting in the river Gauja, 1926

As the Republic of Latvia was proclaimed on the 18th November, 1918, the question of management of the state owned and privately owned forest properties had to be settled. The Forest Department was established within the Ministry of Agriculture that managed the forest areas that belonged to the Ministry. Initially those were almost two million ha of forest including bogs and other areas with no forest cover. But as a result of the rural reform the latter decreased, and in 1930 forest covered just 27% of the territory of Latvia.

Although the harvesting volumes were set by the harvest estimate for five years, the rapid construction development in rural areas as well as the positive changes in export prices facilitated significant alterations in the set estimates. However, recognizing the forest value, the harvested areas were regenerated. And a big part of the stands that today have reached the cutting age were planted by people with a single idea to ensure forest resources for next generations. This fact speaks for the long term thinking at that time. Recovery from the First World War damage in the 20ies of the last century in Europe had created big demand for timber that resulted in price increase. Our wood processing industry took advantage of this condition and during the first independence of Latvia the timber export contributed 38% of the total export

Photo: Strenči Tourism information centre archive

Photo: JSC „Latvijas Finieris" archive

value. The largest product groups were sawnwood, plywood, pit-props, pulpwood, matches, and hewed timber. Although after Mr. Kārlis Ulmanis became the leader of the country more attention was paid to export production of other industries, especially agriculture production, still it was timber that secured the stability of the national economy.

After the Second World War as the Soviet occupation started to take over, the economy in Latvia was centralized according to five year plan and it was contributed in division of labour in whole USSR territory. Although forestry had been developed and there were ongoing research carried out in forestry and forest selection, wood processing was not included in the list of priority industries except for furniture factories. Instead those were industries like electrical engineering, radionics, transport machine building industry, chemistry, knitted-goods industry and pharmacy that were developed. In agriculture sector those were fisheries, dairy farming, bacon production dominant. It should be noted that also agriculture was not on the priority list of the Soviet Latvia and it started developing just in the 60ies of the last century when almost a million ha of wet soils were drained. But during those times a large part of abandoned agriculture lands were overgrown with broadleaves that were not used intensively during the Soviet period.

As a result of agrarian reform forest area in Latvia decreased to 27%

As a result in the beginning of the 1990ies as Latvia regained independence and restored property rights, in the forests that historically belonged to the state during the first independence and also in the later years there were more conifer forest stands concentrated. But the abandoned agriculture lands with broadleaves dominating became the properties of private owners.

DATA SOURCES

In Latvia there are three natural resources important for the national economy and that can be counted on in a long term – our people, our land and what we grow on this land. Purposeful and rational management of the three resources is the very base of the state existence. Due to the geographical location and climate there are ideal conditions in Latvia for forestry, therefore a large part of our land resource we use for timber production. Taking into account that planning in forestry is specifically long term, all the decisions are taken based on precise data that describes the amount and quality of the resources available. And not only today and tomorrow but also longer time ahead. The data on forest resources is being obtained by two different methods that each have different approach and goal, however the data obtained complements each other and enhances its accuracy.

One of the most fundamental forest resource data base is State Register of Forests (SRF). It is facilitated and updated by the State Forest Service. It contains data on forest areas that have been inventoried and on the management activities that have been carried out in the forest areas. However SRF does not represent 100% of Latvia's forests since there are about 200-300 thousand ha forests without inventory. There are several reasons to that but one of the most common is that forest owner has not inventoried abandoned agriculture lands that have overgrown with forest.

Simultaneously the Government have delegated Latvia's State Forest Research Institute „Silava" (LSFRI „Silava") to do forest resource statistic inventory (FSI) within the national forest monitoring programme. In all the territory of Latvia there are 16 000 round shape sample plots of size 500 m² established in forest and non-forest lands and they are unknown to public. Once in 5 years each plot is visited and the on-site situation is recorded. In case there are growing trees in the plot they are precisely measured and in each next cycle visit a comparative analysis is done. Thus information is gathered how many trees have been cut, how many trees have died standing, how many trees have grown from the start and how the growing stock has changed. As of today there have been two FSI cycles carried out – the first one ended in 2008 and the second in 2013. And the data of the second cycle is used as basis of LSFRI "Silava" data on forest condition in Latvia. With every next FSI cycle the measurement precision is improved. Although they are insignificant, upon publishing the data of current cycle, also the data of the previous cycle are streamlined. Thus it is possible that some data that we used 5 years ago is slightly different.

One should understand that any figure mentioned above is indicative. The situation in forest is changing day by day. Therefore it is impossible to tell precisely how many ha is covered by forests or how many cubic meters of timber there are in the forest. As you are reading these lines the standing volume has increased by several dozen if not hundreds of cubic metres.

All decisions in forest sector are taken based on precisely known data that describe the volume and quality of the resources available

Photo: SFS

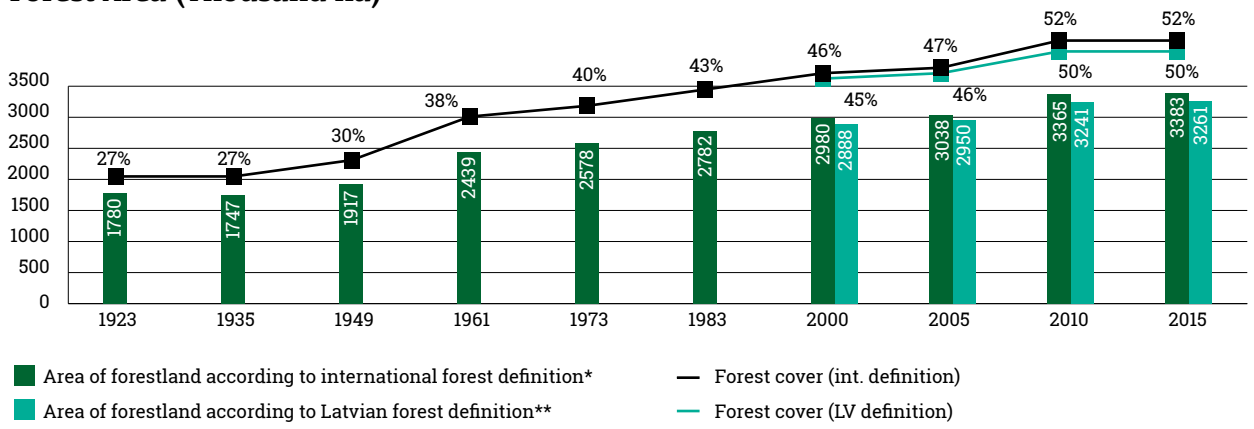
FOREST AREA

It should be understood that forest sector is very diverse and so are its strategic planning goals for which the particular data is used. Therefore often the same by name figures may be described by different definitions and different calculation algorithm. A great example to this is such seemingly constant measurement as forest area. Because if someone asks what the forest area in Latvia is, there should be a clarifying question – in what context the question is asked. Whether it is interest about the resource availability or is it planned to analyse the forest area development trends in Latvia? Or is the data needed to be submitted for completing international reports? The answers will be different and all of them correct.

According to the historic administrative understanding the following areas fall in the total forest area of Latvia: forest stands, damaged stands, burnt stands, wind fallen stands, and clearings. Thus we get 3 260 850 hectares of forest or 50% forest density. This is the data that is most commonly used when talking to public in Latvia. Whereas, when following UN FAO definition, also glades and forest infrastructure objects should be counted in forest area. Therefore when speaking to international audience we refer to 3 383 720 ha or 52% forest area. And here we have some good reason to be proud of – Latvia is the fourth most forested country in Europe. Only Finland with 60%, Sweden with 62% and Slovenia with 63% are ahead of us.

And finally forest area can be calculated also from territories where theoretically forest management could be possible. Then, after excluding lakes, rivers and marshes, we actually get a figure that is far bigger than 60% of the terrestrial area of Latvia!

Forest Area (Thousand ha)



*Include forest stands, damaged stands, burnt areas, windfalls, cutting areas, gaps and the land under forest infrastructure facilities.
**Include forest stands, damaged stands, burnt areas, windfalls, cutting areas.

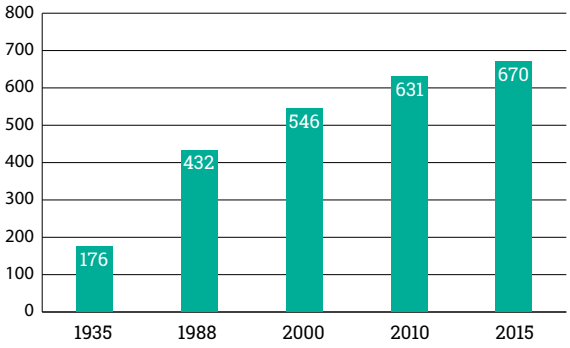
Source: 1923-1990 Forest Fund; 1990-2015 NFI

THE STANDING STOCK ACCUMULATED IN FORESTS

According to all the available long-term data, the available timber resources in Latvia's forests are constantly increasing. Furthermore it is happening not only because the forest area has doubled if compared to the first half of the last century. At the same time the total timber volume accumulated in forests has increased four times which means that forest productivity has increased. In other words forest capital value has increased considerably, and it is possible to get a lot more valuable material from one hectare than before. For example, if compared to 1961, the mean standing volume per one ha has more than doubled and according to FSI today is about 368 m^3 per ha.

On the one hand we have data that we harvest less timber in our forests than the volumes of annual increment are thus demonstrating the sustainability of our forestry. On the other hand it is clear that this large increase of the standing stock has not happened due to the climate change or the unselfish will of the Mother Nature to make Latvia wealthier. It is sure that forests would grow in Latvia without human presence; however our goal is to obtain possibly greater economic benefit from forests. Therefore the increase of the available timber resources in Latvia is taking place due to determined forest management set by forest sector with the use of the latest research findings and technology achievements in forest selection, regeneration, thinning, and harvesting.

Total growing stock volume (Million m^3)



Source: Forest Fund, SFS, NFI

Photo: Latvia's State Forests

Dominant Tree Species Share and Area in Forest Stands Registered in the SRF

Total		Year 2011	Year 2012	Year 2013	Year 2014	Year 2015	Changes during the last year (%)	Changes during the last year (ha)
Pine	%	35,4%	35%	34,7%	34,3%	34%	-0,3%	-2718
	ha	1009171	1003625	1000737	995992	993274		
Spruce	%	18,2%	18,1%	18%	18%	17.9%	0,3%	1482
	ha	520602	520038	520745	521843	523325		
Birch	%	30,5%	30,6%	30,7%	30,8%	30,9%	1%	9106
	ha	870812	875870	885728	894926	904032		
Aspen	%	4,8%	5%	5,2%	5,4%	5,6%	4%	6277
	ha	137172	144001	150437	157084	163361		
Grey Alder	%	7,1%	7,2%	7,3%	7,4%	7,5%	1,8%	3951
	ha	202578	206511	210705	214235	218186		
Black Alder	%	2,8%	2,9%	2,9%	3%	3%	2,5%	2127
	ha	80494	82165	83734	86483	88611		
Ash	ha	15560	15027	14582	13674	13011	-4,8%	-663
Oak	ha	9797	9903	9931	10009	10077	0,7%	69
Other species	ha	7773	8270	8714	9167	9637	5,1%	470

State Forests		Year 2011	Year 2012	Year 2013	Year 2014	Year 2015	Changes during the last year (%)	Changes during the last year (ha)
Pine	%	47,9%	47,9%	47,7%	47,4%	47,9%	0%	10
	ha	687360	687213	687905	686241	686251		
Spruce	%	21,6%	21,6%	21,6%	21,6%	21,6%	0%	25
	ha	310232	310363	312063	312981	313006		
Birch	%	23,1%	23%	23%	23,1%	23.1%	0,3%	1123
	ha	331722	330045	331657	333912	335036		
Aspen	%	3,2%	3,3%	3,4%	3,5%	3,6%	3,1%	1565
	ha	46434	47233	48728	50619	52183		
Grey alder	%	0,7%	0,7%	0,7%	0,7%	0,8%	1,7%	180
	ha	10351	10437	10604	10834	11014		
Black alder	%	2,7%	2,7%	2,7%	2,8%	2,9%	2,3%	943
	ha	38125	38797	39255	40590	41534		
Ash	ha	7304	6970	6791	6176	5682	-8%	-494
Oak	ha	2821	2913	2930	2949	2942	-0,2%	-7
Other species	ha	1928	1979	1996	1979	2023	2,2%	44

Other forests		Year 2011	Year 2012	Year 2013	Year 2014	Year 2015	Changes during the last year (%)	Changes during the last year (ha)
Pine	%	22,7%	22,1%	21,7%	21,3%	20,8%	-0,9%	-2728
	ha	321811	316412	312832	309751	307023		
Spruce	%	14,8%	14,7%	14,5%	14,3%	14,3%	0,7%	1457
	ha	210370	209675	208682	208862	210320		
Birch	%	38%	38,2%	38,4%	38,5%	38,6%	1,4%	7983
	ha	539090	545825	554017	561014	568996		
Aspen	%	6,4%	6,8%	7%	7,3%	7,5%	4,4%	4713
	ha	90738	96768	101709	106456	111178		
Grey alder	%	13,6%	13,7%	13,9%	14%	14,1%	1,9%	3772
	ha	192227	196074	200100	203401	207173		
Black alder	%	3%	3%	3,1%	3,1%	3,2%	2,6%	1184
	ha	42369	43369	44479	45893	47077		
Ash	ha	8256	8057	7791	7497	7329	-2,2%	-168
Oak	ha	6977	6990	7000	7060	7136	1,1%	76
Other species	ha	5845	6291	6718	7188	7614	5,9%	426

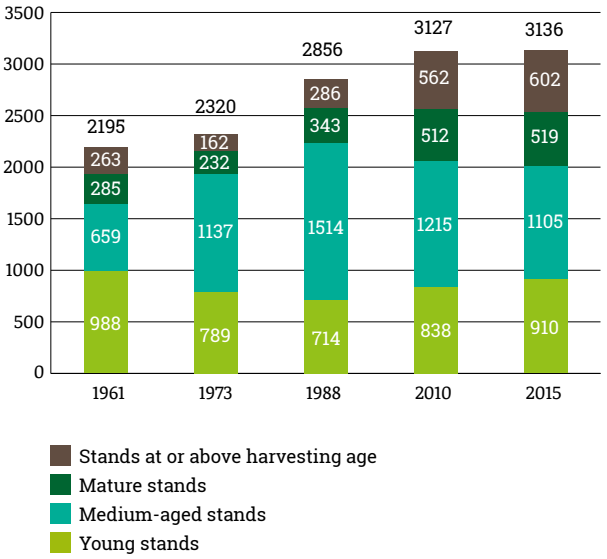
Source: SFS

FOREST STAND STRUCTURE

Although seemingly natural, actually the forests that we see in the traditional landscape of Latvia have not developed naturally but just like arable lands are created by determined activities of people. The biggest part of forests have established by natural regeneration after harvesting, also sown or planted. For example in this manner most of conifers – pine and spruce stands have been created. Whereas the rest of forests have developed on abandoned agriculture lands, which in fact is the result of irrational use of agriculture lands during Soviet time. With each year the public understanding about forest value is improving. It is improving not only in terms of value available here and today, but as the value that is possible to increase significantly by determined action. Those are common efforts of forest sector to motivate forest owners to change their practise from doing nothing to thinking more about managing their land – by organizing educating activities, by making available European Union (EU) structural funds for establishing new forests, for regeneration and for early thinning, as well as by amending regulations. In terms of regulations in 2015 the Government adopted amendments in the Law on Protective Belts that decreases limitations on tree cutting in protective belts of surface water bodies in grey alder stands. Because even a very dense grey alder stand that has grown naturally can provide at its best 20% timber for packaging, and 80% energy wood. It is possible to turn this proportion vice versa by active management which would also contribute to visual effect. The forest stands that we see in Latvia's landscape are in constant change. As we see from the available data, during the past 25 years the age structure of Latvia's forests is undergoing planned levelling out, gradually aiming at theoretically ideal forest age structure model to be achieved in the coming centuries. During the last years the area of plantation forests that have been planted form selected planting material have increased considerably. Also a new term in the land use has been created – tree-plantings on agriculture lands.

Species composition have always been a changing phenomena in Latvia depending on the regulation of the time and the respective choices of forest owners within the conditions of the regulation as for forest regeneration, management decisions to be taken, and soil quality in forest lands. A great example of this activity is birch. During the Soviet time this species was considered almost a weed and the use was minimal. Therefore in the beginning of the 90ties more than two thirds of the birch in Latvia was in average

Forest age structure (Thousand ha)



Source: NFI

age stands. Today, with the birch processing industry developing, including the capacities of the company "Latvijas Finieris", more and more areas both in state and private forests are regenerated with selected birch plants.

It should also be noted that standing volumes, age structure, and species composition are being determined after the dominant tree species of the first storey. Since there are 64% mixed stands with several tree species in Latvia, in a part of cases species composition changes can be explained by their natural competition. For example if a pine stand has not been cleaned after planting, it is very likely that birch will take over. Also in situations when the standing volume of two species is similar, it is likely that in few years the dominant species will change.

In order to present the species composition in Latvia's forests, the Ministry of Agriculture and other leading organization of the forest sector publicly use data from SRF. From the view point of resource availability it is a logical view – processing industry need to know the data on the available timber resources. As for long term resource planning it would not make sense to include areas that have not been inventoried, as well as overgrown meadows that at some point can be returned for agriculture production.

FOREST HEALTH AND VIABILITY

In order to ensure sustainable forest management it is very important to know what and how much is growing there as well as its health condition. Due to permanent and long term researchers' efforts, Latvia has very precise long term data available. The 1st and 2nd level forest health condition monitoring performed by LSFRI "Silava" finds that during the last 25 years the forest health condition of Latvia's forests has improved. Tree defoliation (loss of leaves or needles) in 2015 of pine constituted 20,2%, of spruce – 20,8%, of birch 19,5%. It corresponds quite accurately with the average data in Europe, thus we can say that in European context Latvia's forest health is quite good. At the same time due to various factors a part of forest stands lose their viability and die, and are harvested after receiving sanitary felling permit. Also these risks in Latvia are well known and are considered in planning both daily forest management as well as taking decisions that refer to the whole forest sector long-term planning. Because forest that we grow today will ensure Latvia with forest resources after several decades therefore it is especially important that its value is not decreasing.

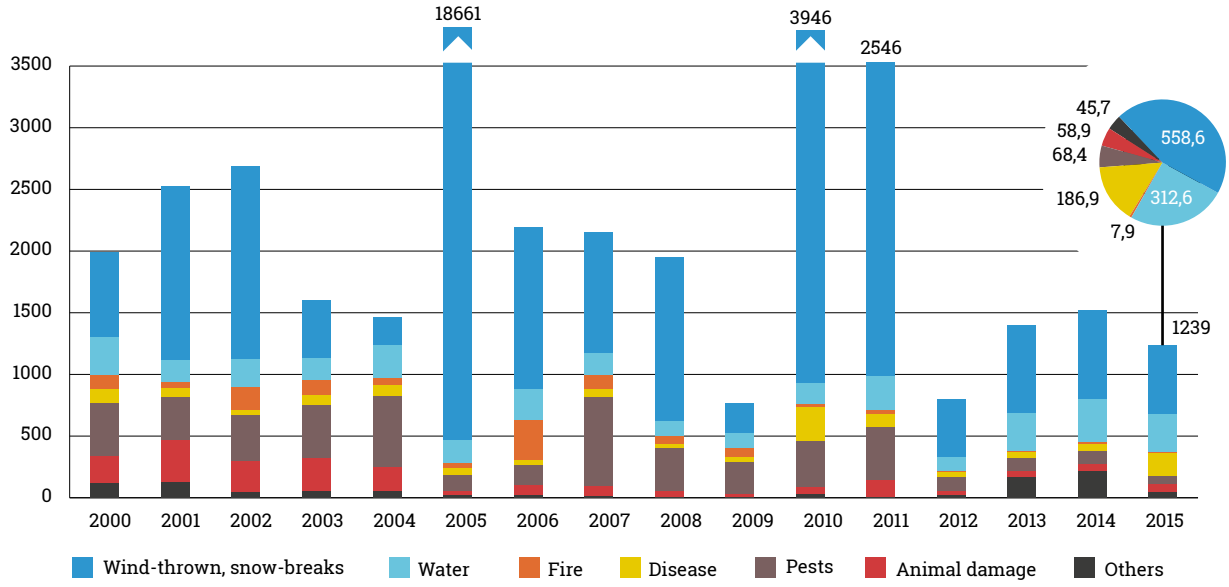
According to the sanitary felling permits issued by SFS historically the largest natural damage cause have been wind-falls and snow-breaks. They surely are extraordinary situations that can not be predicted. However forest sector has proved to be able to act quickly and eliminate the consequences to the utmost thus trying to avoid massive spread of pests. Together with diseases it is the second significant cause to massive forest damage in Latvia. It should be noted that spread of pests and diseases is being monitored constantly therefore forest managers are always alert. For example, according to the pest and disease monitoring performed by LSFRI "Silava" today after several years of discontinuation, we should be aware of spruce bark beetle. In order to react on the upcoming threat you can see pheromone traps placed in forests in several regions in North-Vidzeme, South-Kurzeme, and South-Latgale. In some other places you can see stump extraction in spruce and pine stands as one of the many ways recommended by researchers to deal with root decay. Pine stands are more resistant to root decay but in case of spruce the situation in Latvia is really serious – almost a quarter of trees have decay in stem and can be used mostly as energy wood or pulp wood. There are also cases when it is impossible to win the disease, at least for the time being. Ash trees is an example – almost all of them not only in Latvia but also in Europe are infected with fungus disease Chalara fraxinea, that causes massive withering and dying. That is the reason why ash stand area in Latvia has decreased 1,5 times and every year it continues to decrease by 500 ha.

Photo: Pauls Bekeris

Every year the damage by cervidea in young stands is increasing

Researchers have concerns that we are going to have extreme weather conditions including storms and freezing rain more and more often due to climate change. Also regarding pests climate change brings along new risks as during the past years average temperature has increased. As a result we have longer vegetation period which on the one hand lets trees grow longer, but on the other hand facilitates pest development as they develop second and third generation in a year. Therefore forest sector have funded a number of researches to find solutions to develop forest stands that can resist climate change consequences. Many of the latest findings today are being gradually implemented into practise. It should be noted that there is another threat to forest health closely linked to climate change – globalization. Free trade across borders has created great opportunities for a number of Southern-based pests to arrive and settle in Latvia. For instance pine wood nematode whose arrival to Latvia

Damaged forest stands (Thousand ha)



Source: SFS

makes it now very complicated to export conifer timber to other countries. In order to combat pest at early stage State Plant Protection Service continuously inspects imported wood products as well as does onsite inspections in forests.

The last years as for forest fires have passed relatively peacefully. However forest fire hazard has been listed as one of the identified future risks. As a result of climate change there are going to be less rainfalls in summer. Up to now the main cause of forest fires has been human careless activity with fire, especially burning the last year's grass. Therefore along with public education, rational use of land is especially important to mitigate forest fire risks, including afforestation of abandoned agriculture land. Also one of the objectives of forest road infrastructure development done by SC "Latvijas valsts meži" (LVM, Latvia's State Forests) is to limit possible forest fire damage.

Although in the stats of SFS issued sanitary fellings the damage done by wild animals accounts just for 5%, today they are a significant risk to successful forest management. For example there is strong connection between dying forest stands because of too much moisture and beaver population. Besides that in 500 000 ha forest lands there are outdated and unmanaged drainage systems. If a beaver builds its dam on these systems, as a result we lose about 240 ha of forest annually. LVM experts have found a successful solution – along with renovation of drainage systems there is close cooperation started with hunters. As a result at least in state forests beaver damage is no longer a significant threat. However there is another problem coming up – increasing damage of young stands done by red deer, moose and roe deer. For example in state forests in 2015 there have been 6,4 thousand ha forest damaged out of which 450 ha young stands destroyed completely. Also in this regard there was a collaborative and coordinated action plan developed – forest owners reassess their management activities and continue using repellents, and hunters do their job and form correct gender and age game population.

Photo: Pauls Beķeris

CO_2 ACCUMULATION

As mentioned above in several examples forest sector in Latvia is adjusting its development to the upcoming risks to be brought along by climate change. At the same time it is also a global fight – it has been estimated that every year at least 1% of global GDP is being used to compensate damage done by climate change. However it is possible for people to impact climate change itself – mainly by creating less greenhouse gas (GHG) emissions, the most dangerous of which is carbon dioxide (CO_2). Thus in Europe there has been a new term introduced "Low Carbon Economy" and ambitious target set to decrease in all EU countries GHG emissions by 80-95% compared to 1990. Forest sector takes one of the leading roles to reach the goal – trees absorb CO_2 from the atmosphere and fix carbon. Besides, not only while growing carbon is stored but also in timber products. By using them more in household, energy production and other industries, e.g., construction, CO_2 concentration in atmosphere is being considerably reduced, thus slowing down global warming.

At the same time the mid-term commitments set in Kyoto protocol are on the agenda for the Latvia's forest sector. The pace of decreasing GHG emissions in forest management in Latvia should not be slowed down between 2013 and 2020. The reference level for Latvia is equivalent of 16 303 million tons, and any decrease of CO_2 absorbance will be considered as applying. Until now the increase of forest area and standing volume have had a positive impact on absorbing CO_2 and storing carbon in forest ecosystem. At the same time it is the forest age structure that is hindering the process – the increase of stands that have reached and exceed the cutting age. We are approaching the balance when the increment compensates harvesting, natural loss, and GHG emissions from soil, but does not increase the stored carbon volume. Therefore from this angle it is very important to have a planned forest management and timely replacement of old forest stands with young ones. Young stand management, replacement of unproductive stands, forest regeneration with selected planting material, development and maintenance of forest infrastructure – this is a part of complex set of activities that is being done on a daily basis in order not only to increase forest productivity, viability, and adoption potential to risks related to climate change, but also to ensure further fulfilment of Kyoto protocol commitments.

Deliberate forest management and timely replacement of old stands with young ones is very important to ensure the increase of carbon accumulation.

BIODIVERSITY

Like it is with forest economy where its value lies within the volume and quality of timber available, the nature values characterize the biodiversity of forest. The term "biodiversity" has been introduced along with development of today's environment protection policy, and biodiversity is commonly defined as diversity of live organisms in all environments, including, terrestrial, marine and other water ecosystems and ecologic complexes, also forests. It includes diversity within species, among species, and among ecosystems.

The data gathered until today indicates that Latvia is very rich in biodiversity. There are about 27,7 thousand plant, animal and insect species registered, but their actual number may be larger by several thousands. For many endangered species in Europe or even globally the population living in Latvia forms a great part of their total population. Such as black stork, lesser spotted eagle, white-backed woodpecker, corn crake, common crane, beavers and otters. Besides, the continuously performed monitoring of large carnivores indicates that wolves and lynxes that in other places of Europe have almost disappeared have a constant population in Latvia that is even necessary to regulate by hunting.

In case of Latvia it is important to note that just like forests also the biodiversity in forests has not appeared just by itself. For many centuries human management activities are an integrated part of forest life cycle, and habitats of so many species have been developed and are preserved by traditional Latvia's forestry – small scale clearfelling system. Forest with no human interference can be found just in 6889 ha or 0,2% from the total forest area. Thus, as there are sound decisions taken that are grounded in facts, biodiversity in Latvia will remain at the current numbers and diversity. For example, one of very significant elements characterising forest biodiversity is the volume of deadwood which is very suitable home for various organisms – from fungus and insects to even some small mammals. According to FSI data, the volumes of deadwood in Latvia's forests during the past 10 years have been constantly increasing and today reach 24,3 m^3 per ha. If the results of the sample plots in 19 European countries of "Biosoil" project are compared, in 80% cases the deadwood constitutes less than 20 m^3 per ha.

It is quite soon that we will know a lot more about Latvia's nature values' importance in European context. In order to evaluate the status and quality of EU specially protected habitats in Latvia, with the co-funding of the EU Cohesion Fund there was total habitat mapping started in 2016. It is organized by the Nature Protection Agency (NPA) which is responsible for implementing nature protection policy in the country. The mapping is planned to be finished by the end of 2019, and forest sector is supporting this project conceptually, as it will provide a clear reference level from where to start measuring the changes of biodiversity in future. Otherwise representatives of green NGOs are estimating these changes based on questionable and subjective methods. At the same time forest sector stands firmly to have evaluation of specially protected species, forest and forest related habitats as an outcome of the habitat mapping in order to ensure a favourable protection status for them; to have optimal management provisions for the protected nature territories developed, at the same time not decreasing the area that is available for timber growing and harvesting. These provisions of Forest and Related Sectors Development Strategy 2020 are adopted by the Government.

Provided there are thoroughly analysed and data based decisions taken in forestry the biodiversity in general in Latvia will remain at the current quantity and diversity

Photo: Latvia's State Forests

NATURE PROTECTION

It was the beginning of the last century when people realized that it is necessary to preserve nature values. The first protected area – Moricsala – was established in 1912 as "site of nature loveliness". In Soviet times The Gauja National Park, Krustkalni and Teiči Nature Reserves were established, and Grīņi Nature Reserve founded in 1936 was re-established. Taking into account the understanding of the time about processes in forest, as well as the marginal role on forestry in the planned economy of the USSR, it was decided that the best way to protect nature is prohibiting management activities. Nowadays, in spite of the fact that knowledge about forest management has improved remarkably, Latvia's environment policy is being created with similar understanding. As a result we have developments of alterations in forest management goals that contrast to the delusive explanations to public about the dominance of economic interests. Namely – the area of so called commercial forests has been constantly decreasing, and today according to the data of SRF different restrictions to forest management apply to 850 000 ha forest land or 28% of the total forest area in Latvia. The largest part of forest with restrictions on forest management lie within specially protected nature areas of national importance, protective belts for protection of environment and nature resources, including culture monuments, and microreserves. The procedure for establishment of the latter is quick and simple due to the necessity to protect rare and endangered species. The hardest restrictions are set in state forests where in more than two thirds of forests that have reached cutting age it is not possible to do economically valid forest management.

At the same time today's knowledge about processes in forest allows defining a valid statement that this kind of approach only in very rare cases facilitates biodiversity. It is sure that it's necessary to obtain information about the nature values and habitats of rare species in Latvia. But since almost all of the forests in Latvia have developed as a result of management activities, in many cases the tools used in nature protection are questionable – provisions that forest owner is or isn't allowed to do in these areas. A good example for this case is restricted management belt along the Baltic Sea and the Riga Gulf coast where clearfelling is prohibited in pine stands. The researchers of LSFRI "Silava" confirm that after the currently allowed harvesting method these areas can't be regenerated with pine which needs open space and light. As a result instead of protecting the pine stands, their replacement with broadleaves is facilitated. There are a plenty of examples where the restrictions on forest management that are set for the sake of nature protection do not reach their initial goals.

It is no wonder that new nature values are regularly found in forests where the main management goal has always been commercial activity – nature protection provisions in Latvia are set on regulation level. And in terms of forest management the regulations are among the strictest in Europe. It is defined in The Forest Law that it is the duty of forest owner or lawful possessor to follow the general nature protection requirements in order to secure preservation of forest biodiversity, to preserve forest ability to protect soil from erosion, to protect surface and underground waters from pollution, to protect significant culture heritage elements in forest, as well as to facilitate forest stability and adoption to climate change. As a result in commercial forests when harvesting by clearfelling we can say that a large natural disturbance is imitated – forest fire with following soil preparation that facilitates surface soil mineralization. Whereas selective and gradual fellings imitate low natural disturbances – windfalls, falling of separate trees, pest and diseases damage. In both cases there are structures characteristic to natural forest maintained: biologic old trees, dead trees standing and lying in different decomposition stages, also undergrowth, advance growth, wet depressions, overflowing glades, preserved groups of trees, hollowed trees, trees hollowed by woodpeckers, old stumps and wood fungus, ant-hills, and nests of big birds.

Therefore in future a discussion about revision of nature protection policy should be initiated, where new restrictions would not be imposed, as well as the existing restrictions would be carefully revised with options of allowing economically valid methods to obtain wood. Also, if looking nationally and calculating economy, it should be estimated precisely how much protected areas Latvia can afford. Taking into account the population development and aging in Latvia, it is clear that with every year it will be more and more difficult to provide for the state budget. Therefore the issue about effective management of each land hectare will become more pressing.

Photo: Pauls Beķeris

110 years old pine stand in the nature park of „Primeval valley of the river Abava" where following the regulations selective cuttng has been done. According to LSFRI Silava researchers these areas are not possible to regenerate with pine neither by natural regeneration nor planting.

FOREST PROPERTIES

In Latvia forest properties can be divided into two big groups. About 49% of forest land (1 495 633 ha in 2015) in Latvia belongs to the state. The largest part of it lies under supervision of the Ministry of Agriculture, and these forests are managed by Stock Company "Latvijas valsts meži" established in 1999. According to conception adopted by the Government the goal of managing these forests is realizing the economic interests of the state. By doing this LVM is ensuring preserving and increasing forest capital value, as well as optimal income from forest management in a long term.

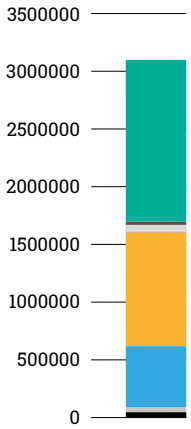
It should be noted that LVM personnel do the strategic and tactic planning of forest management, but don't do harvesting, timber transportation or regeneration activities. These activities are outsourced on contract basis according to the Law on Public Procurement. In order to optimize and improve the service quality the ways of cooperation with the contractors are being improved on a regular basis, in many cases introducing information exchange and planning systems that are unique in Europe.

The company is developing also other fields of its activities, for example providing hunting and recreation services, as well as ensuring production of selected seeds and plants for domestic and export markets. The company's turnover in 2015 was 265,55 million Euros, and profit after taxes 59,3 million Euros. From the total profit 52 million Euros were paid to state treasury

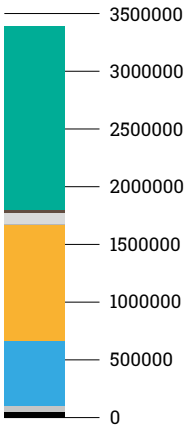
Optimal forest road density is important for effectiveness of forestry works. It has positive impact on forest productivity, ease of access for forest management and recreation, as well as to ensure forest fire safety

Photo: Pauls Beķeris

Forest Properties, 2015

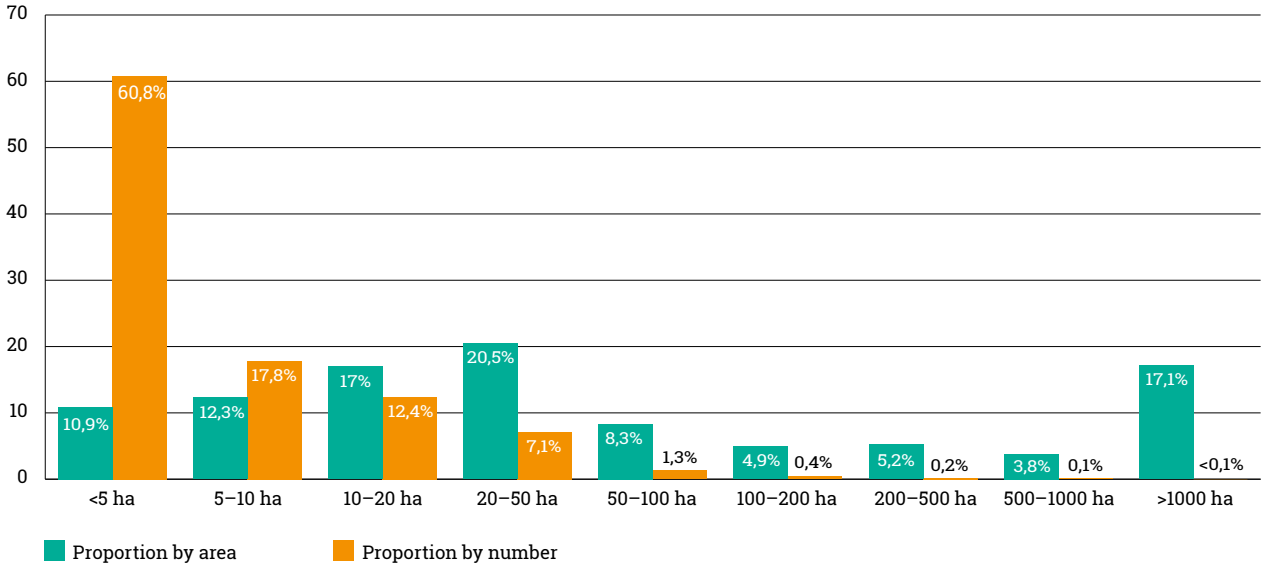


Forest, ha	Owner (legal possessor)	Forest Land, ha
1406629	Ministry of Agriculture (LVM)	1597440
26736	Ministry of Agriculture (Forest Research Agency)	28353
59087	Ministry of Environment Protection and Regional Development (NPA)	88259
4518	Ministry of Defence (Armed forces)	7788
3678	Other ministries	3811
986113	Private persons	1013891
530052	Legal entites	563961
43687	Municipalities	47975
46631	„Rīgas meži" LTD	52762



Source: SFS

Structure of Private Forest Owners, 2015



Source: SFS

Photo: Pauls Beķeris

as dividend. This amount of money is sufficient, for example, to pay salaries to almost all doctors in Latvia.

Every year LVM buy some forest land from private forest owners. The money for this purpose comes from sources not related to forest management, i.e., management of sand and gravel pits, as well as renting out sites for peat extraction. The goal of this land buying process is to keep a positive balance of commercial forests. As the nature protection requirements become harder, there are constantly new specially protected nature areas and micro-reserves established. Also municipalities that don't have their own forest land are actively seeking for options to establish forest park areas near cities. Besides sometimes commercial forests are expropriated for the sake of state importance object development.

The rest of forests belong to private and legal persons, as well as to municipalities. Municipalities own about 2,9% of forest land, among these the biggest owner is the Rīga City. Rīga owns 61,7 thousand ha outside city borders and 4,6 thousand ha within Rīga and Jūrmala administrative territories. And there are about 144 thousand private forest owners. It is a significant social group and constitutes about 7,2% from the total population of Latvia – this figure is among the highest in Europe. The interests of big and small forest owners, companies and municipalities are represented by a non-governmental organization "Latvia's Forest Owners' Association" founded in 2005.

Big forest owners for whom forest management is the main business and source of income plan their forestry work in long term

As the level of understanding in society in Latvia about the necessity to rationally manage each hectare of land is improving, people are realizing that forest management can't be just a hobby. As a result there is forest property consolidation going on, and the number of forest owners is gradually decreasing, while the average size of properties is increasing. Nevertheless, still in 90% of cases the forest land that belongs to a

Photo: Pauls Beķeris

Unique globally and fully automatized spruce plant waxing machine in LVM tree nursery "Podiņi".
Totally in 2015 there have been 46,8 million plants of various tree species sold.

private person is no larger than 20 ha. But the share of this size properties makes up just 40% of all private forest land. The share of properties larger than 200 ha has increased to 26%.

During the last years there are forest owners' cooperatives establishing their activities. Every year the interest to cooperate in managing forest properties is increasing, as people understand that it is a better way to stand for their interests in timber market, as well as to have professional people and technologies for their forestry activities. As a result in the middle of 2016 there were seven forestry service cooperatives operating, among them three are with considerable activity: "L.V.Mežs", "Mežsaimnieks", and "Vidzeme". Although the forest area represented by cooperatives is still under 10 000 ha, it has an increasing trend, besides, the turnover of the leading cooperatives is coming close to one million Euros.

From the general point of view of forest sector this is a positive development. The big forest owners, also cooperatives, for whom forest management is business and a source of income, they plan forest management in a long term, and put into practise the latest findings of forestry research. They are also more stable participants in the wood supply chain.

FOREST MANAGEMENT

And here we should return back to the mentioned in the beginning the "green gold" of Latvia. It is very important to understand that it's not possible to talk about forests as the value of national economy and not managing them rationally at the same time. Therefore we can be confident to say that forest sector is most interested to make sure that Latvia's forest resources are not decreasing and their value is increasing in future.

We have all the preconditions for sustainable and productive forest management – favourable climate, land resources and knowledge. We have available in a long term research developed recommendations on how to increase forest productivity. We have available high quality, genetically improved, and appropriate to climate change reproductive material of the main local tree species. Following these preconditions Latvia's forestry practise is based on small scale clearfellings done at a determined time, and afterwards are regenerated and managed according to provisions of the Forest Law in order to have a new forest flourishing soon again. And in order to provide independent judgement about legal origin of timber products, as well as about sustainable and responsible management, there are globally recognized certification schemes operating in Latvia.

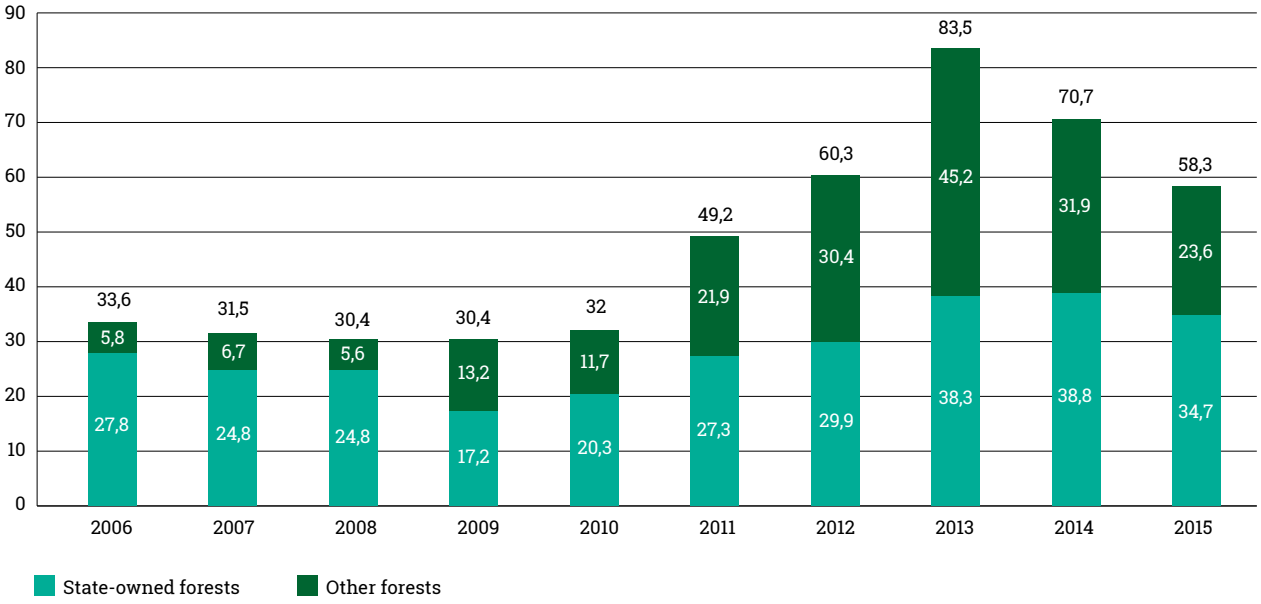
It is also very important to understand that knowledge on forest management and technologies used in forest management are not fixed. They are developing constantly and forest in the 21st century is not growing the same way as it did one hundred or one thousand years ago. For instance, for quite some time already there are plants of high quality used in forest regeneration. They are a result of a long and scrupulous selection work that enable the young trees to grow faster and protect themselves from various hazards during their life cycle. Significant contribution to a faster forest growth is facilitated by technologic advantages to manage stands more efficiently. In Latvia these processes are facilitated by the available to private forest owners state and EU fund support for improving forest economic value, including replacement of the low value grey alder and goat willow stands. As a result the forest areas where early thinning have been done, as well as areas that have been regenerated with selected reproductive material in private forests have increased considerably. And consequently it has created preconditions for increased forest productivity and viability in Latvia in future. Besides many forest owners have understood that with planned and precise early thinning it is possible to decrease the length of forest growing cycle, and get tree volumes that correspond to cutting age by 10-20 years earlier. Therefore when we talk about such tree species as birch and pine, we

16 years old birch stand where the first thinning has been done already. Birch will reach the cutting age set in the regulations at the age of 30-35

By using selected reproductive material and taking appropriate steps in forest management forest owner can expect harvest from forestry in own life

Photo: JSC „Latvijas Finieris"

Thinning of Young Stands in Latvia (Thousand ha)



Source: SFS

Regenerated Tree Species in 2015, Total

Tree species	Natural regeneration (ha)	By sowing, planting (ha)	Total (ha)
Pine	1799,90	5864,20	7664,10
Spruce	1241,00	6205,00	7446,00
Birch	10314,30	1394,70	11709,00
Aspen	7560,70	6,30	7567,00
Grey alder	5611,40	20,30	5631,70
Black alder	1273,30	161,20	1434,50
Oak, ash	39,80	7,70	47,50

Source: SFS

Photo: „Jāde" Ltd

can surely say that when a young person plants forest then it is not a gift for the next or after next generation, bet with knowledge-based management he or she will be able to get harvest from the forest in own life. Traditions still prescribe that felling age for birch is 71 years, but in life we can see that a tree grown from a good planting material and correctly managed reaches the diameter of felling at 30-35 years of age. Also for pine the felling age set in regulations is 101 years, however there are plenty of pine stands that will be possible to harvest at the age of 60-80.

It should be noted that today timber processing industry have increasing interest about processing medium sized logs, not very large dimensions that used to be viewed as the best material. Therefore although forestry in a certain way can be viewed as a separate industry, it is very tightly linked to local processing industry. Almost all timber products produced in Latvia are exported and compete in international market, therefore we can't look at our forest management practise separately from developments in other countries with large forest areas. As we can see in Finland forest felling is not limited by any age, it is forest owner's decision when it is the best time to harvest. Also in Sweden regulations allow harvesting forest earlier than it used to be, thus facilitating competitiveness of nationally produced products and avoiding wasteful wood rotting in forest.

There are 3,052 million ha of forest that is available for growing wood for harvesting with the total standing volume of 624 million m^3. Still the timber harvesting volumes are far from the maximum sustainable resource flow level – we annually harvest about 63% of the total annual increment. It is far from Finland

Almost all sawn logs from Latvia are processed locally, but the missing part imported

(70%), Sweden (85%), or at our neighbour's Lithuania (73%). Therefore there is no need to artificially set limits to harvesting volumes for forest owners – we are not threatening the sustainability of our resources in any way.

At the same time, being aware of the large share of forests that belong to the state, for forest sector it is very important to understand for their development planning, what timber resources theoretically can be counted on as available. Therefore every five years there is an estimate made on the maximum felling volumes to be harvested in state forests in final felling. For this purpose there are the most appropriate algorithms used that were updated in 2015. These estimates have always been prudent and far from the theoretical maximum that would be possible to harvest while not losing forest sustainability. If compared to the previous period, the estimated allowed felling volumes in state forests have remained at the same level also for period 2016 – 2020. It should be noted that when speaking of tree species and hectares, the classification is after the dominant trees in the stand. But according to the SFI data in 64% of all forests stands in Latvia there are two or more tree species, therefore when forest sector is planning forest resource availability, the estimates are done in more detail taking

into account also the volumes available in the forest second storey.

Referring to the annual harvesting volumes it is mostly based on market situation and roundwood prices. And the latter are linked to timber product prices and use in Latvia's export markets. Forest owners understand it quite well. Of course on the one hand there is a will to maximize profit at times when sawn wood costs most. On the other hand it is clear for everybody that in long term the best price for roundwood will be paid by the local wood processing companies whose total processing capacities exceed considerably the available harvesting volumes in Latvia. If there is no lasting wood flow, the local processing industry would be destroyed and all the roundwood from Latvia would have to be exported. Therefore forest sector operators are aware about the need to cooperate and to agree for the sake of mutual competitiveness of the sector. As a result almost all sawn wood is processed locally, and the missing part is imported.

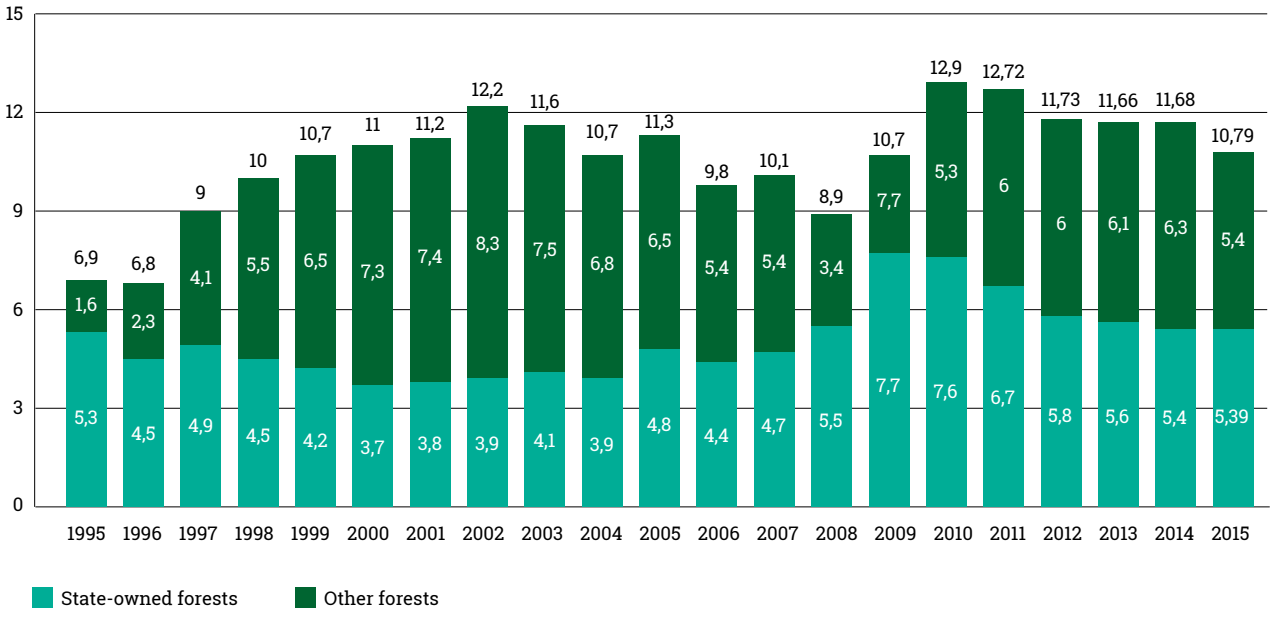
One of the tools to ensure constant resource flow is the decision taken in 2010 that LVM is replacing tenders of standing trees with direct roundwood assortment deliveries to processing companies. It decreased seller and buyer costs thus contributing to timber processing competitiveness in global markets. The system created is so effective that the export of sawn timber from state forests equals to zero.

Maximum allowed felling volumes 2016–2020 in LVM forests

Dominant tree species	Area (ha)	Timber volume (m^3)
Pine	31 628,0	8 786 561
Spruce	11 334,0	3 331 063
Birch	35 132,0	8 554 659
Aspen	5318,3	1 607 707
Black alder	4317,0	1 046 441
Ash	321,3	83 107
Oak	84,5	22 510
Total	**88 135,1**	**23 432 047**

Source: Ministry of Agriculture

Timber Production (Million m^3)



Source: SFS

TIMBER INDUSTRY

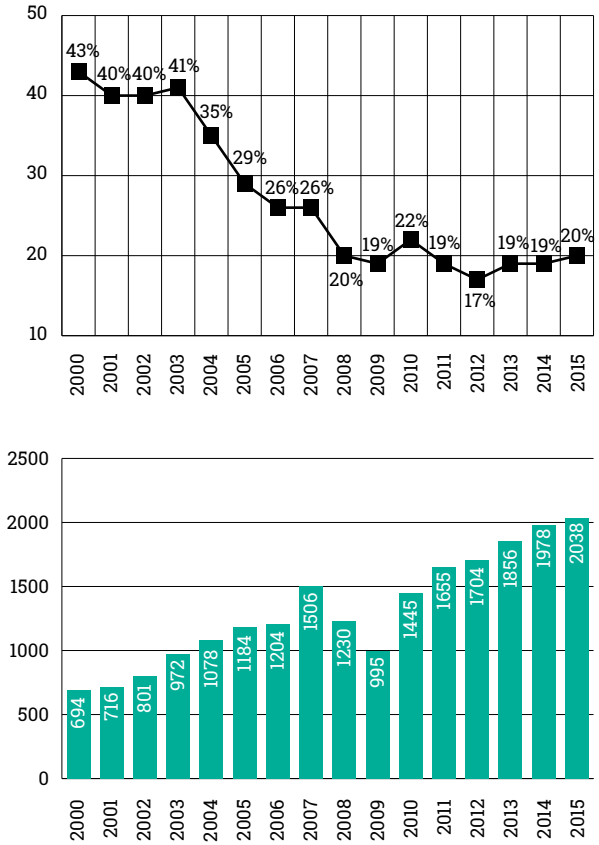
We have reached the other side of our coin – Latvia's wood processing industry. After regaining Latvia's independence it was one of the first that was able to shift its thinking from the planned to market economy conditions. Thanks to such great leaders as, for example, Mr. Juris Biķis from JSC "Latvijas Finieris", in many factories machines were not turned into scrap metal, but continued their operations. By finding customers abroad and convincing them that the companies from the newly re-established country would be trustworthy partners, representatives from timber industry ensured inflow of currency that was so much necessary for the development of the economy of Latvia.

In order to better represent their interests in Latvia's and international markets, companies started uniting into associations. To ensure their development and coordinated work, as well as to represent timber industry interests internationally Latvia's Timber Industry Federation was established in 2000 (TIF). As the number of small sawmills increased rapidly, and also larger processing units started to develop, the export of simple green and unsorted sawntimber increased considerably, and shortly before millennium reached 43% in the total export balance. Although in monetary terms compared to nowadays forest sector export comprised "only" 700 million Euros.

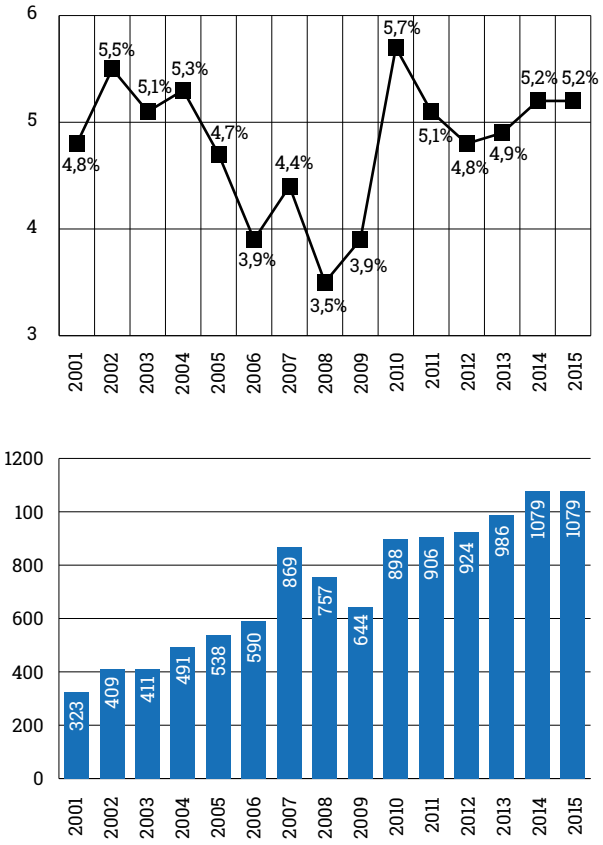
Sawmills take important role in the development of wood processing industry that process a big part of conifers obtained from Latvia's forests into boards or beams

Photo: Pauls Beķeris

Proportion of forest sector exports in total Latvian exports (Million EUR)



Added value of the forest sector and its proportion in GDP (Million EUR) (actual prices)

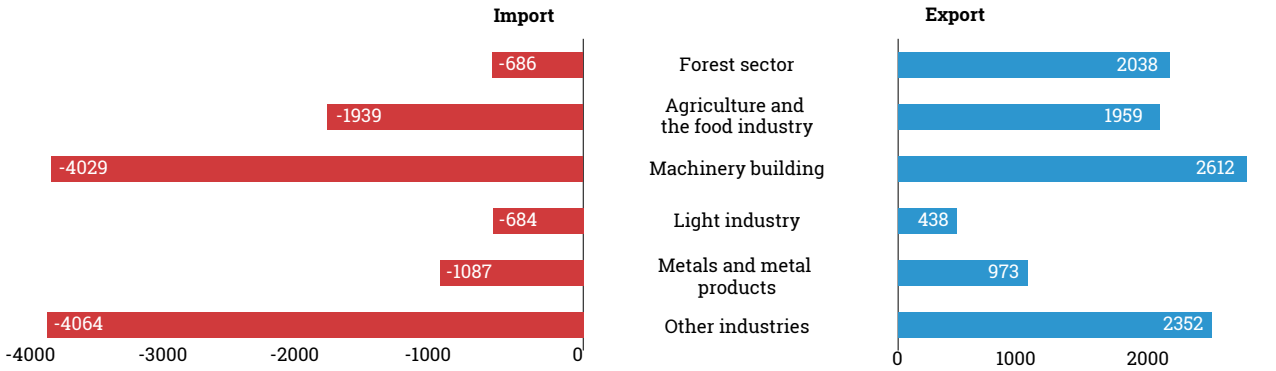


Source: CSB

Since then development of Latvia's timber processing industry has been going on within each individual company as well as in common movement towards deeper timber processing and creation of more added value to the "green gold" of Latvia. It is important to understand that none of the products itself does not contribute to added value. The added value is generated in the creation process, and in the economy the added value is estimated as the total of profit, personnel salaries, direct tax, and depreciation. And forest sector has worked a lot on all of these components in the past years.

A significant role in this process is taken by primary processing companies or sawmills, that process a big part of conifer logs into sawn-wood, or so called boards or beams. And it is not correct to view these as low added value products. Vice versa, today the bulk of the boards produced in Latvia are ready construction materials, final products that are built into house walls, floors, or bearing constructions in Germany, Great Britain or Japan. In Latvian leading conifer timber sawmills the added value per one worker has long ago reached the level that of Sweden or Finland. Also the well known Latvian birch plywood is no longer just

Latvia's Import-Export Balance (Million EUR), 2015



Source: CSB

a side material for concrete forms. Today it is a material adjusted for use in specific niches with improved acoustic, moisture and fire endurance qualities.

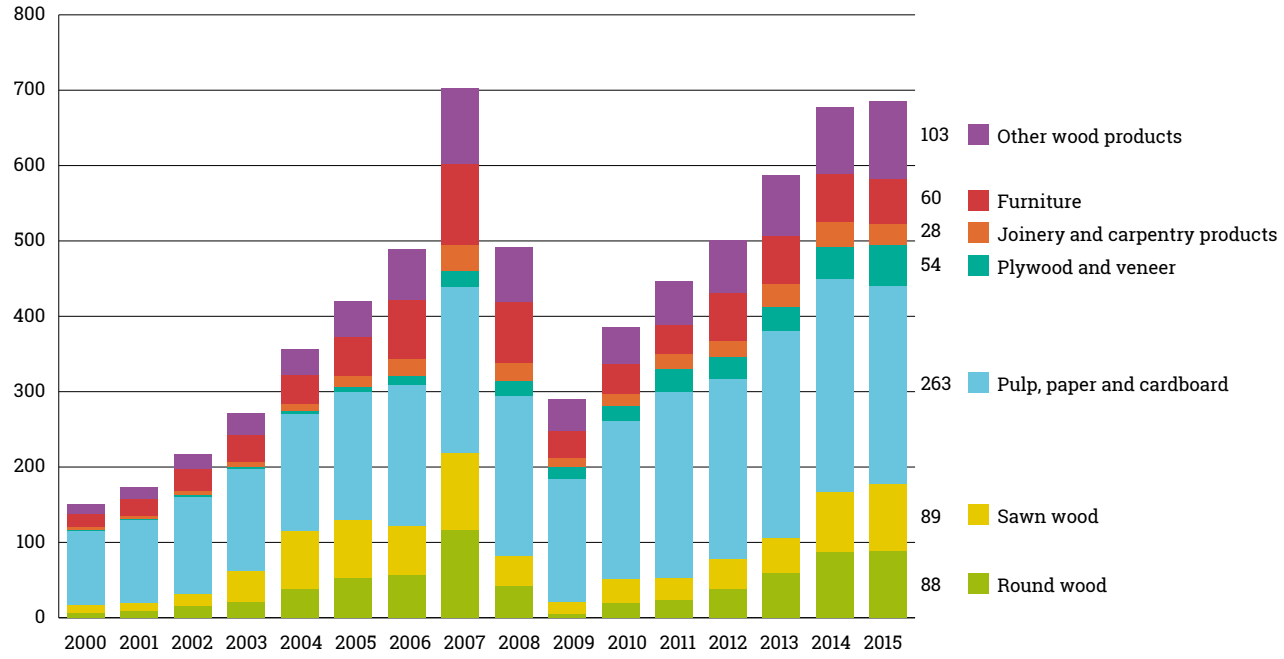
Forest sector is well aware that when planning long-term development it will not be possible to base it on significantly increasing primary processing volumes in future. Already today the processing capacities, at least in conifers' segment exceeds the harvesting volumes in Latvia by 40-50%, thus changing the status from net exporter to net importer country. With practically same harvesting volumes since 2003 the consumption of roundwood has increased by a quarter, and in 2015 conifer sawn wood import exceeded export by 380 000 m^3. A little different situation is with the availability of birch sawn logs where it is possible for industry to develop capacities counting on local resources. The participants of the industry are well aware of that and so JSC "Latvijas Finieris" is planning to build a new veneer peeling factory in Kurzeme region. And forest harvesting company "Stiga RM" in the end of 2014 bought and later reconstructed the bankrupted factory "Kurzemes Finieris" in the city of Kuldīga.

Latvia can no more compete with prices in international markets as it has been gradually losing the

It is only veneer production that can develop capacities on local resource availability

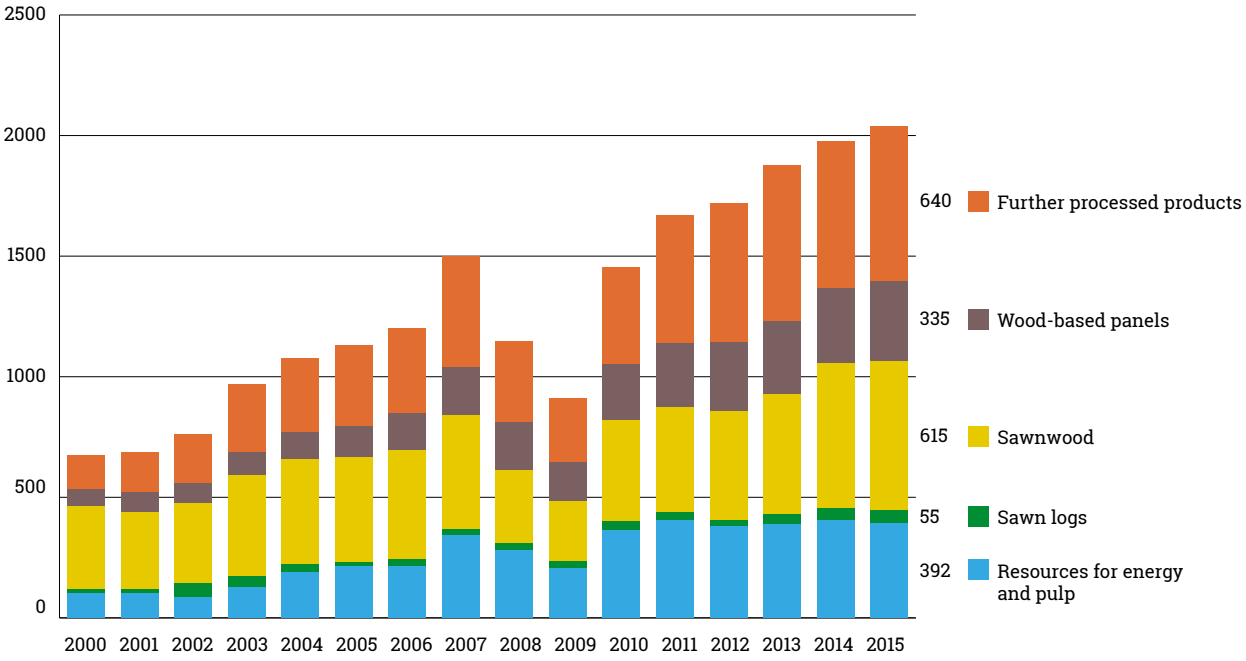
Photo: Pauls Beķeris

Forest Sector import development (Million EUR)



Source: CSB

Forest Sector Export development (Million EUR)



Source: Latvian Forest Industry Federation

Photo: Hester Architects

Multi-storey timber building in the city of Liverpool in Great Britain constructed by „Nordic Homes" Ltd

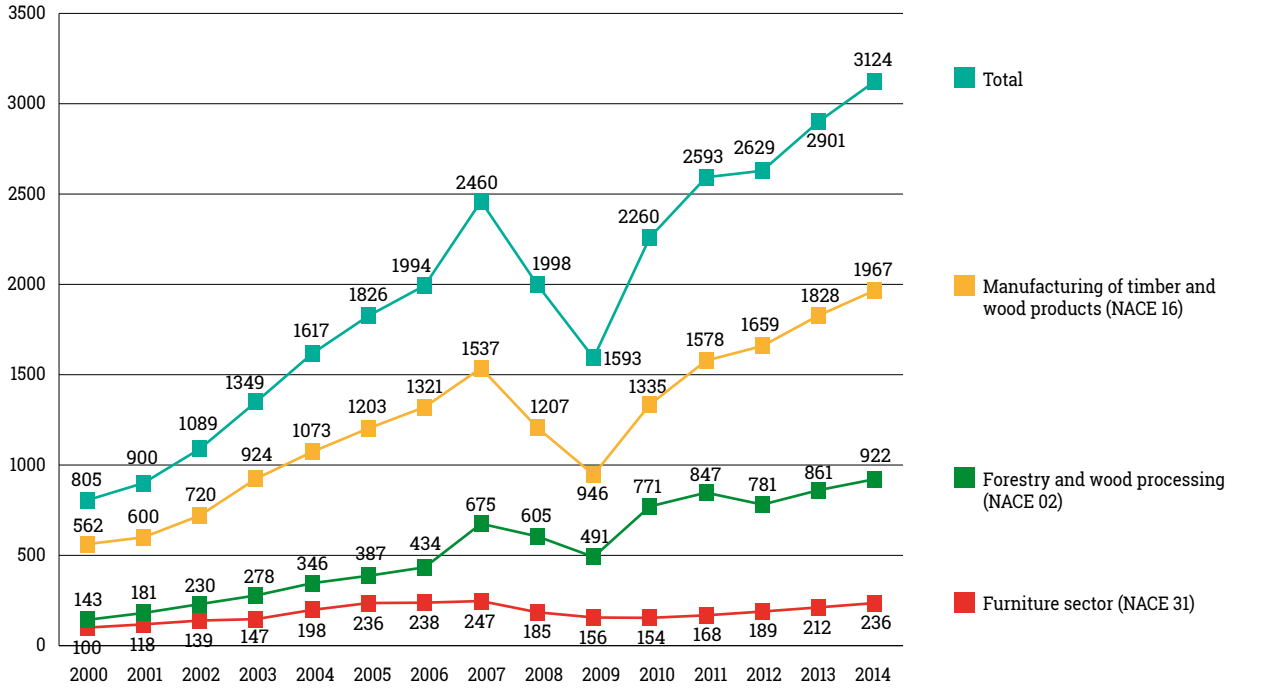
status of cheap labour country. Thus the forest sector development is closely linked to product development, which again means applying the latest knowledge and technologies. So when thinking long-term, forest industry is investing in new machines and production facilities about 120-180 million Euros annually, and it is one third of investment amount in processing industries in Latvia! A lot of attention is devoted to the very beginning of the primary processing – sawn wood sorting. Today it is possible to tell the maximum production outcome from each log with the help of the latest 3D scanners that are set up in sawmills. Consequently this raises the quality bar for forestry – there is a huge difference whether from one log it's possible to produce sawn timber for 200 Eur/m^3 or pellets for 8 Euros per a loose cubic meter. Likewise the requirements have changed for raw material for plywood production – birch saw logs. Factories get equipped with technologies for processing smaller logs, requirements for quality increase. Therefore forest sector so much is thinking about selection and forest stand early thinnings that results in shorter life cycle of trees and increased output of valuable assortments.

Forest sector is constantly working to develop deeper processing that follows the primary processing. One of the tools is the co-funding of EU structural funds that many industry companies use to develop their technology park, improve infrastructure, or improve knowledge of their employees. Nevertheless forest sector is not dependant on EU money – it constitutes just a small part of the total investments. The level of precaution from investments from own funds ensures stable development and co-funding from Europe allows taking risks and facilitates breakthrough. As a good example we can mention "Cross Timber Systems" Ltd that was the first in Northern Europe to start producing cross laminated timber construction panels. Or "Latvāņi" Ltd that has a unique production lane set up allowing to introduce in production a quite innovative product – constructions from laminated timber beams for house renovation or thermo insulation from outside.

Development of deeper processing is an ongoing process also in primary processing companies. For example SC "Stora Enso Latvija" has started production of thermo timber, and "Gaujas koks" Ltd has invested in glued construction elements' factory. As a result during the last 12 years the forest sector's added value per one cubic meter has increased 2,5 times, and the share of deeper processed products in exports has increased from 37% to 54%.

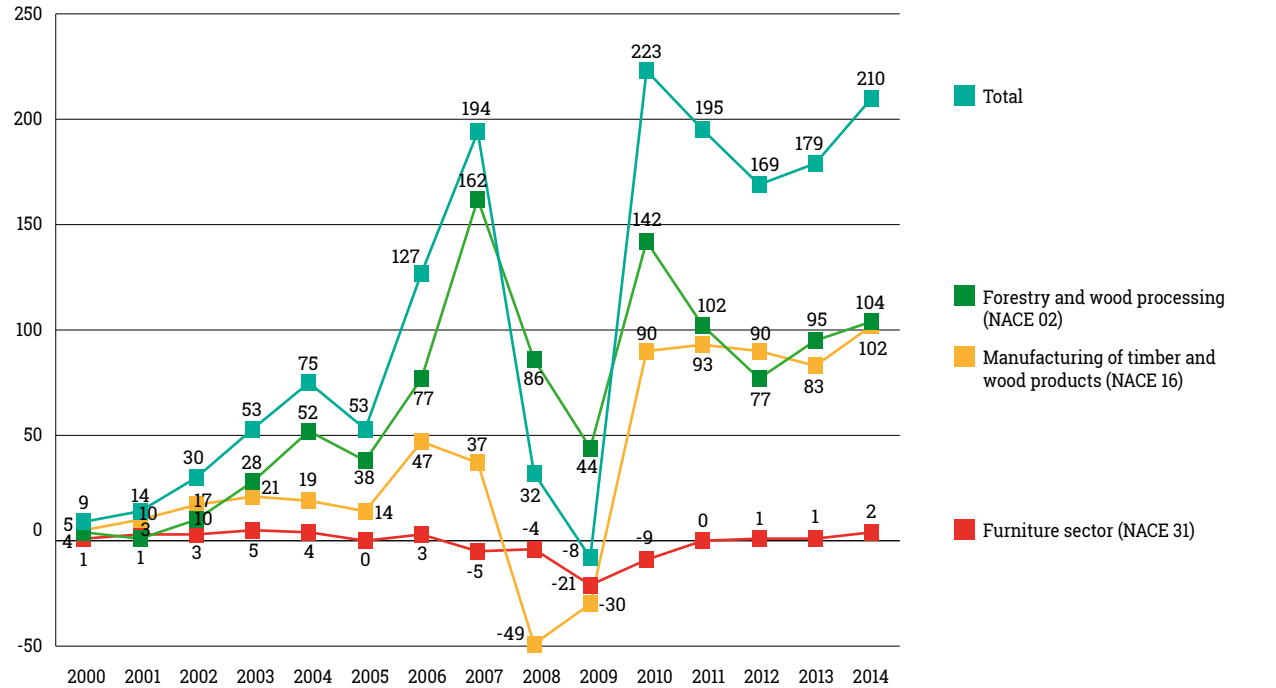
The growth can be well observed also in other figures of macro economy. The main graph lines describing the forest sector have risen almost at 45 degrees

Net turnover of Forest sector (Million EUR)



Source: CSB

Profit of Forest sector companies (Million EUR)



Source: CSB

angle with the only notch in 2008 and 2009, but that has a global and commonly known explanation. Year by year forest sector is reaching new records of export volumes, and in 2015 for the first time the bar of 2 billion Euros was exceeded. We have to admit that the share of forest sector in export balance has decreased but it can be explained by the development of other sectors of Latvia's national economy. Besides, as the inter-sector collaboration becomes tighter it is getting more difficult to draw a line of forest sector borders. For instance the costs of furniture or timber frame houses include also costs of glass, metal, and other materials.

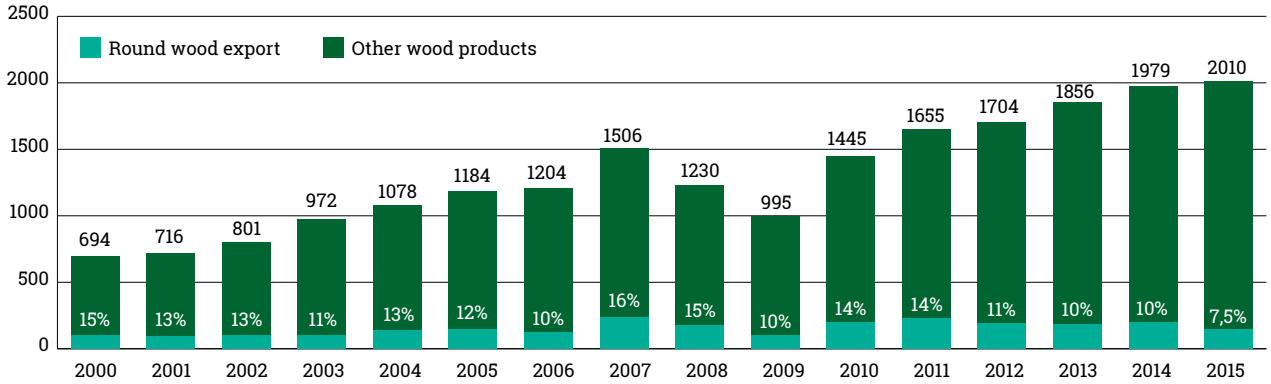
Of course there are separate factors outside forest sector that are hindering the general development and have impact on profit figure of individual companies. However forest sector players are aware of these challenges and try to handle them. One of such examples is increasing price development of some components that form energy tariffs. As a result for Latvia's largest industrial energy consumers electricity price is the highest in the Baltic states. For most of the processing companies this is not a deadly factor however it has negative impact on profit and thus also development. Besides the high electricity prices have become a hindering factor for inter-sector business project development. For example if we look at the high use of paints, varnish, glues and other chemical products used for timber treatment, it would be logic that production of these would gradually develop in Latvia. Unfortunately, if we look at the cost of energy in the total breakdown of chemical industry product cost, it is more reasonable to cover logistic costs from abroad than to invest in development of local production.

Latvian company „Cross Timber Systems" Ltd was the first in Northern Europe that started producing cross laminated timber construction panels or CLT

Photo: Pauls Beķeris

We could stop on this if forest sector was not facing another challenge when society has delusive view on definite processes related to timber industry in the country. For example, people don't understand how it is possible that in spite of resource shortage Latvia is exporting roundwood. This is the case that needs further explanation. First of all, most of the logs that can be seen in ports is pulpwood that is exported to the Scandinavian pulp and paper industry. These are mostly low quality logs, for example spruce infected with root decay, or tops of standard tree stems which however are too small to be economically efficient to

Proportion of Round wood in forest sector export (Million EUR)



Source: CSB

Photo: Pauls Bekeris

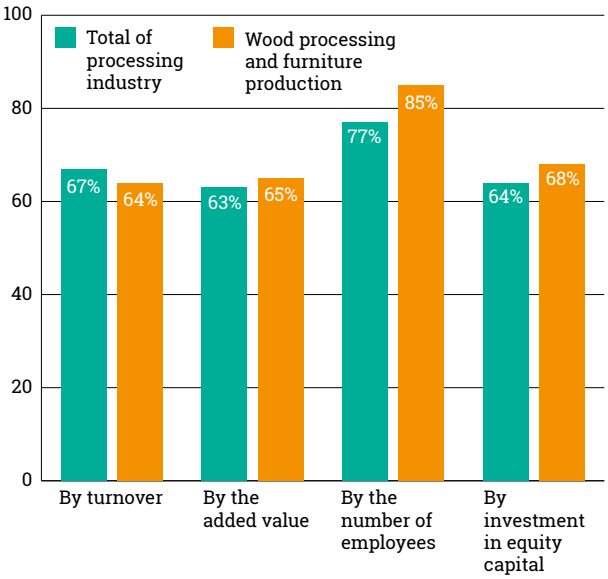
Most of the log stacks seen in ports is pulp wood meant for pulp and paper industry of Scandinavian countries

be processed in other products. The fact that there is also a little sawnlogs exported can be explained by mutual roundwood trade near Lithuania and Estonian borders where producers often choose to deliver logs from Latvia and vice versa.

Secondly, the share of roundwood in the total export is decreasing – the demand from Scandinavian pulp factories for Baltic pulpwood has been very low lately both as for volumes and price. Instead, the OSB and pellet production have developed significantly in Latvia that is now consuming large amounts of previously exported low quality log assortments. For example the total pellet production output in near future will reach 2 million tons. These volumes make Latvia one of the leading pellet producers globally. And since all the produced pellets are sold abroad, Latvia has become the biggest pellet exporting country in Europe.

And finally – there is often view that there is no big difference whether we export our roundwood or no since timber processing companies belong to foreigners anyway. In fact the situation in this case is quite the opposite. In timber processing industry, and thus also in supporting forest sector in decision making, local capital is dominant.

The Share of Local Capital in Wood Processing, 2013



Source: CSB

RESEARCH

Globally there is a commonly recognized division of industry into high and low technologies based on how big share in the cost composition theoretically is taken by research costs. If classified after this view then forest sector undoubtedly falls under the second group. Nonetheless it wouldn't be right to consider that forestry and wood processing invest less in research. If compared to producers of electronics, in order to survive in the market you need to develop absolutely new models every year that have to have better technological performance compared to the previous ones. While traditional timber products as such don't develop that fast – wooden board or beam has not changed its core meaning for hundreds of years. Also to get from genetically improved plant to a better sawn log takes quite some time. In Latvia's forest sector in general research has always been a close partner to ensure daily developments. As a result if taking the forest sector share in the national economy its funding also provides a remarkable contribution to the research organisations. This way there is a constant growth of technical and human resource capacities in the main research institutions of the forest sector – LSFRI "Silava", in the Forest Faculty of Latvia University of Agriculture, Latvian State Institute of Wood Chemistry, and also in "Institute of Forest and Timber Research and Development" which is known after abbreviation MeKA.

In forestry the main implementer of the latest research findings and driver of the research process is LVM. The company has set two priority goals that need to be reached with the support of research – qualitative, productive, and vital forest stands, as well as efficiency of internal resources by raising productivity, precision, and optimising costs. At the same time all the research projects funded by LVM are publicly available and private forest owners who are now more and

It is possible to simulate climate change impact on tree development in controlled environment in the climate lab of LSFRI Silava

Photo: Aigars Roga

more looking at forestry as a long-term investment can use them in their practise. Of course most of the research findings can't be directly turned into production the next day. The main benefit is the knowledge that accumulates and participants of the sector will gradually learn to turn the knowledge into money. In some cases such estimates are made. For instance research on forest tree selection that in future will provide by 20% increased forest productivity and will widen the export options of plants, will ensure contribution of 40 million Euros. Research on birch wood dyeing on molecular genetic level as a result increasing the qualitative and quantitative figures of birch stands can provide 30 million Euros big economic gain. By increasing resistance to stem decay, the gain could be 0,8 million Euros annually. And the decayed stump processing into chips in state forests would provide 0,7 million loose cubic meters of heating material annually that is approximately 6 million Euros. And the economic gain from recommendations for decreasing climate change impact in young stands about 1,5 million Euros annually.

Also in timber processing we should not expect that researchers would suddenly create something absolutely new that would make everybody rich. This is unlikely to be the case to use the common comparison with "Skype" or "Nokia". Instead timber processing companies with the help of researchers are constantly trying to attribute new qualities to the existing timber products, they are looking for new niches and sectors that would use these improved products, develop technologies, and also use different services to test products ready for production. Many projects are realized together, also with Forest Sector Competence Centre that was established in 2011, by attracting co-funding of EU structural funds in industrial research programme that facilitates cooperation between researchers and producers in developing new products and technologies.

And finally altogether from different sources for development and innovation there will be approximately one billion Euros available for development which will be invested according to Smart Specialisation Strategy adopted by the Government. Since one of the fields to be supported is bio economy where according to the latest terminology belongs also use of Latvia's land resources including forestry and production of timber products, also forest sector has all the possibilities to apply for the funds.

Photo: Pauls Bekeris

Wood processing companies with the help of researchers constantly try to impart new qualities to existing timber products

JOB IN FOREST SECTOR

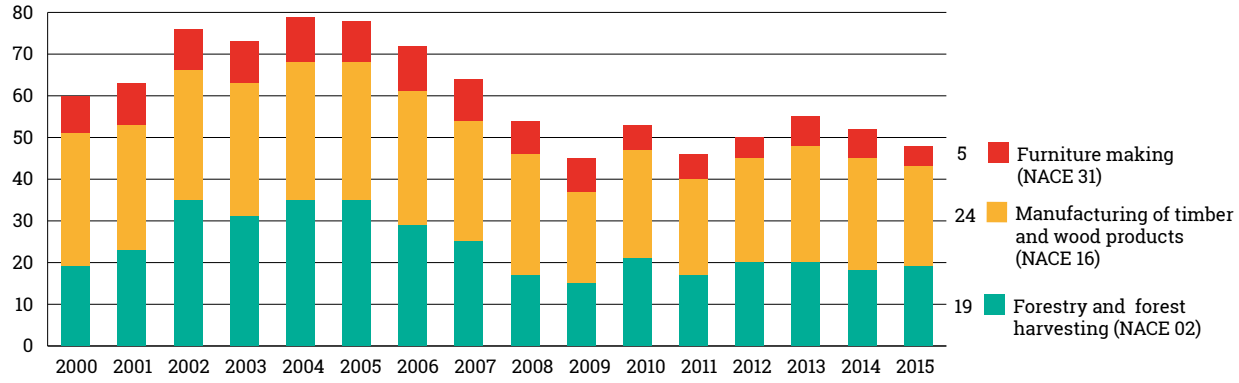
Forest sector companies have always been very important provider of work places for the people of Latvia, and it is especially distinctive in rural areas. For example in timber processing industry only 20% of jobs are located in Riga, and in Latvia today there is not a single parish where one could not find a small or big timber processing company. Very often they are the most important employers in the district and thus also the main support for local economy and people. Many people who are involved in agriculture in summer are doing seasonal works in forestry in spring and winter. At the same time as technologies are developing and production becomes automatized, the need for low-qualified workforce in the sector is gradually disappearing. Instead the demand for qualified specialists is rising. Therefore the graduates of vocational schools and universities, especially engineers will always find jobs in forest sector. By increasing the production output per one employee, companies are building their competitiveness internationally. It means that there is objective ground for increasing salaries that in timber processing industry increase by 5-7% annually.

Of course the perception about wood processing for people is influenced by what they see in the near vicinity. If there are companies in the parish that are in the beginning stage of their development, for some reason are wearing out or are operating in the grey market, the perception about the working conditions and pay in forest sector is being created not a very good one.

As technologies develop and production processes become automatized there is a growing demand for qualified workforce

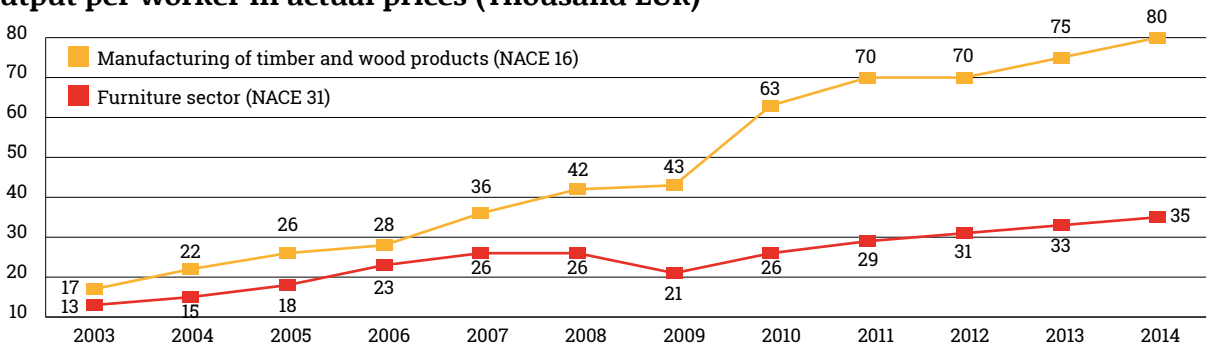
Photo: Pauls Beķeris

Employment in the forest sector (Thousand people)



Source: CSB

Output per worker in actual prices (Thousand EUR)

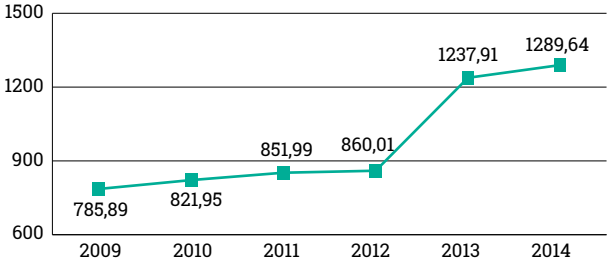


Source: CSB

But in exporting companies that were able to raise productivity and pay taxes to the state in reality situation is better than on average in Latvia. In 2015 the gross monthly salary in Latvia was 818 Euros, in processing industries – 765 Euros, but in the largest wood processing companies that provide jobs to one sixth part of the total number employed in forest sector, the gross salary already in 2014 was almost 1300 Euros.

Forest sector leading organizations have always been keen to improve the tax system, and are collaborating with state institutions to do so, including with the State Revenue Service. Thus, although in many smaller companies there is still some notion of grey economy, in general tax policy in forest sector is among the most coherent in Latvia.

The Average Gross Salaries in Orderly* Wood Processing Companies, EUR



* The large exporting wood processing companies that pay all the taxes to the state and employ one sixth part of all employed in forest sector

Source: Latvian Forest Industry Federation

Photo: LUA Forest Faculty

EDUCATION IN FOREST SECTOR

Every year there are about 150 new forest sector specialists graduating from Forest Faculty of Latvia University of Agriculture

It is for sure that forest sector companies like in any other field of national economy need a very wide range of professionals, starting with office managers, lawyers or economists, and finishing with logistics professionals or marketing experts with excellent language knowledge for working in international timber products market. These work places are open for graduates of different schools in Latvia or abroad, therefore this time we will pay attention to knowledge that is specific to forestry and wood processing.

Forest related higher education has a long history – the Forest Faculty of Latvia University of Agriculture which is Alma mater for most of Latvia's foresters and wood processors, celebrated its 75th anniversary in 2014. Nowadays the study process in Forest Faculty is being organized in close collaboration with the general forest sector development trends. With the help of EU structural funds in the recent years the study infrastructure has been considerably improved – redecoration of facilities, new equipment for labs and wood processing have been purchased. In collaboration with employing companies there are regular lectures organized with participation of the leading experts from sector companies and organizations, and students get professional field practise places. "Forest Research Agency" is becoming a strong infrastructure centre for practical learning and demonstration objects. In cooperation with students' association "Šalkone" a programme for preparing new study books was started in 2013, but the study resources that are available in the developed by the University e-study base provide possibilities for distance learning. Forest Faculty students are actively taking advantage of the EU mobility programme "Erasmus+" and study one academic semester in universities in other European countries.

There is also a study programme "Material Technologies and Design" in Riga Technical University

where it is possible to get higher education related to forest sector.

Similarly important place in the labour market is for professionals with vocational secondary education. Today it is possible to get forest sector professional knowledge in different qualification levels in 19 vocational secondary education schools. In order to follow the study contents in the schools and to facilitate the efficiency of sector vocational education, in 2011 there was Wood Processing Industry Expert Board established. With its participation many schools continue attracting EU structural co-funding not only for renovating facilities, but also for obtaining modern wood processing machines. The greatest attention goes to Competence Centres of Vocational Education, and we can regionally look at Kuldīga Vocational School of Technologies and Tourism, Jelgava Vocational School, Cēsis Vocational School, and Ogre Vocational School. In these schools there are programme run machines for working with massive timber and different strand boards which allow students learn working with the latest industrial production technologies. But in the capital in the Riga Arts and Media Vocational School it is possible to learn the design furniture modelling profession based in ancient craftsmanship traditions. In close cooperation with the sector leading organizations and companies new study programmes constantly are being developed. For instance in Ogre Vocational School one can get qualification of forest harvester operator and forwarding machine operator. In Kuldīga Vocational School of Technologies and Tourism students can become professionals of furniture design. Likewise in the recent years there are such notions entering sector vocational education as education based in working environment and also module learning system.

As technologies develop, forest sector is constantly thinking about possibilities for professionals to improve their competences not only when young but also at later age. A great contribution to this is provided by MeKa – the centre of further education of the institute regularly organizes seminars and courses of different levels for managers and workers of wood processing companies, professionals of the sector and related sectors. Studies like this are becoming more and more popular, they allow saving time and resources as well as do not impact work quality during studies. Aditionally MeKa offers for workers in forest harvesting to improve theoretical knowledge and practical skills for forest machines - harvester and forwarder.

Photo: Pauls Beķeris

Many vocational secondary schools, e.i. Ogre Vocational Secondary School seen in Picture, successfully attract funding from EU structural funds for renovating facilities and purchasing modern machines for wood processing

CONSUMPTION OF TIMBER PRODUCTS

In the local market certainly the largest consumption of wood has historically been and today is in the energy sector. Besides, the trend indicates that although individual households are the largest consumers of energy wood, its share during the last year has decreased as the industrial use if energy wood in district heating has increased. And it has logic in it as wood is one of the most competitive energy sources in thermal energy production.

At the same time, if we don't count the cases when for example a board is sold for furniture production, which exports its production, from the rest of the timber production produced in Latvia, as final products stay less than 10%. This can be explained by various reasons, among them one can find the small population of Latvia. However among the main reasons is the inherited from the soviet times construction regulations and the wrong perception in society about timber as primitive and unsafe construction material. As a result timber in Latvia until recent was used only as auxiliary material, e.g. for concrete forms or in a better case as a material for window frames, doors, stairs, roof constructions, flooring or wall finish.

At the same time in many European countries timber share in construction materials has increased significantly. Being aware of the high costs of construction as a process, builders put more and more emphasis on using ready components in order to make the time used on construction site as short as possible. And Latvia's timber industry has reacted quite well to this trend. Many strong companies producing timber constructions have developed. With numerous examples they have proven that our producers today are able to create two storey timber houses that we can not build here in Latvia. Such companies are for example "Nordic Homes" LTD that has created a nine storey student dormitory building in the city of Liverpool in Great Britain. And by the way in the Latvia's Construction Award Ceremony it got the Award "Timber Building" in 2015.

Being aware of the importance of the local market, the lack of which is among other hindering factors to the further timber processing, forest sector is doing a lot to increase public awareness, as well as promoting cooperation with architects, constructors and property developing companies. Many good examples of building with wood have been presented. One of the most significant examples is the daughters' company of JSC "Latvijas Finieris" "Verems" LTD plywood factory that is the first in Latvia industrial building built with laminated big dimension timber constructions. Also in their next development projects JSC "Latvijas

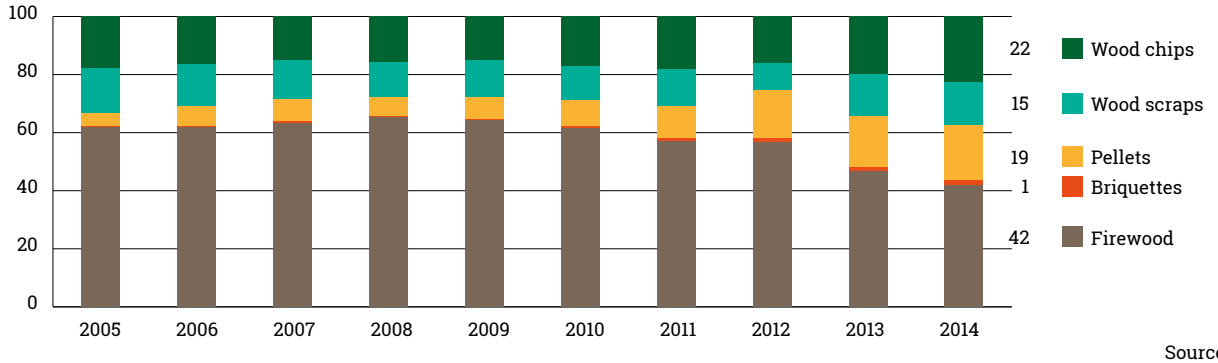
Photo: Pauls Beķeris

The curved glulam timber beam pedestrian bridge accross the road at the entrance to the Tērvete Nature Park was designed, produced, and set up by „IKTK" Ltd.

Photo: Pauls Beķeris

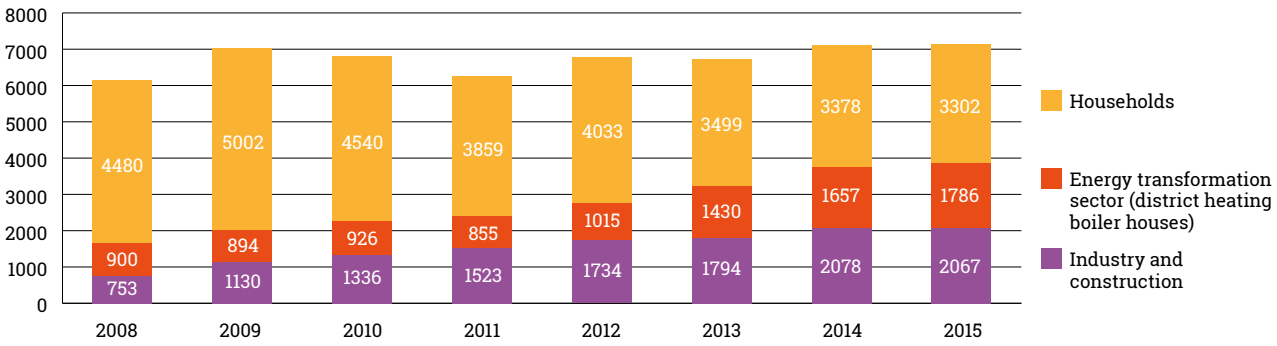
All the furniture in the National Library are locally produced. To participate in this large public tender several leading furniture producers united their forces.

Types of energy-wood in total output (%)



Source: CSB

Wood biomass Consumption in Energy Production (Thousand m^3)



Source: Forest and Wood Products Research and Development Institute

Finieris" is determined to use only timber in construction. Another example is research centre on massive timber construction "IKTK" Ltd, and their main goal is to concentrate on generating knowledge and do industrial research on large timber infrastructure object construction, safety and longevity. It was with the participation of "IKTK" Ltd when a unique project in Latvia was realized – curved glued beam pedestrian bridge across the road at the entrance of the Tērvete recreation park.

Also architects are starting more and more to see in timber advantages of modern, ecologic, very elastic in use and economically feasible material. For example in 2016 many of the solutions presented for the Museum of Contemporary Art were from timber constructions. As these initiatives accumulate, with the help of Latvia's Timber Construction Cluster, the process of modernization of outdated building regulations. It would make it possible to start building five to six storey timber frame houses in Latvia.

Speaking about the local consumption of furniture it has always been related to the general development of the economy and especially the pace of construction development. Thus it explains the not big but steady increase demand for furniture. It should be noted that local furniture producers that produce high quality massive furniture always have to compete with more simple and considerably cheaper large producers from abroad. So we can be very proud that all the furniture in National Library are locally produced. In order to take part in this public procurement several Latvia's leading furniture producers united their forces.

Photo: Pauls Beķeris

RECREATION

Gathering of forest non-timber products is a way to spend people's leisure time, not a source of income

For the people living in Latvia that for centuries have been united with forest and to a great extent have been dependent from the forest gifts, also today picking berries and mushrooms as well as walking and doing sports activities in forest is a traditional way of spending leisure time. Being aware of that, for almost 8% of the total forest area in the country the main management goal is defined for recreation. Likewise for these activities all the state and municipal forests are freely available. As for private forests, it is forest owner's right to limit access to his or her forest. However such practise has not been a widespread one during the 25 years of independence of our country. A great job in creating and managing recreation areas for public is done by LVM. The company is regularly investing the money earned from selling wood into creating new recreation areas and infrastructure objects meant for learning about forest. Likewise the Nature Protection Agency is developing various cognitive trails and bird viewing towers in Latvia. For a large part of society in Latvia hunting is one of the most important ways of recreation. During the last years the number of people involved in this activity has decreased and today constitutes about 21 thousand persons. At the same time the monitoring of game animals done by State Forest Service indicate that the population of the game animals has been stable, besides, in case of Cervidae there is a rising trend.

It is impossible to set a price for the emotional satisfaction gained while being in forest. Also the process of getting non-timber forest products – mushrooms, berries, nuts or game – for most of the people is among the favourite ways of spending the leisure time and a hobby, not a source of income. In most cases these forest products are used for own consumption, therefore making a monetary estimate of the value of these products can be just theoretical by comparing the gained volumes to the market prices. The Ministry of Agriculture has done such an estimate once in the far 2010. During this time in between the situation has definitely changed, however it still gives idea of the great social value of Latvia's forests. In the study it was found that the total value of the non-timber forest products and services was about 138 million Euros in 2010. Out of these the value of the non-timber products was 100 million euro, or if calculated per person, forest has given goods to each person in Latvia worth 50 Euros, and half of them were mushrooms. And the total value of services provided by forest was 38 million Euros, and the largest part of these were related to hunting. It should be noted that the costs related to obtaining the forest goods are not taken into account in these estimates. These costs can exceed the market price of the goods obtained for persons for whom these activities are hobby and provide emotional satisfactions.

Photo: Ministry of Agriculture

FOREST DAYS

Once a year in spring when the nature is awakening and the first green shoots appear in the greyish routine, in the whole territory of Latvia Forest Days are celebrated. It is a tradition that can be traced back to the first independence of Latvia. Successfully survived through the Soviet time, Forest Days regained the traditional looks and form in the middle of 90-ies. Nowadays every year from March until May LVM and SFS organize hundreds of activities in Latvia for forest owners, school children and every Latvia's inhabitant. People get involved in forest regeneration activities, taking care of surroundings and culture and historic objects, there are quizzes organized, exhibitions, bird watching days, as well as informative seminars and lectures. Thus Forest days have become the key factor in creating public opinion of forest regeneration. Due to Forest Days many people of Latvia have understood the big role forest sector takes in the national economy.

Forest Days have become the most important way to communicate to public about forest regeneration

THE GOLDEN CONE

All this dynamic, deliberative and long-term oriented forest sector development, of course is not happening by itself. It is shaped by people – patriots of their work place, company, industry and country. To say "thank you" to the greatest of them in front of all Latvia, forest sector is presenting award "Golden Cone". Every year it is presented in five categories: "Lifelong Contribution", "Innovative Entrepreneurship", "Sustainable Forest Management", "Contribution to Raising Public Awareness", "Science Contribution in Forest Sector Development". And those nominees that do not get the main award get the award "The Small Golden Cone".

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CLT	Cross laminated timber
NPA	Nature Protection Agency
EU	European Union
SPNT	Specially protected nature territory
LTIF	Latvia's Timber Industry Federation
LUA	Latvia's University of Agriculture
LVM	SC „Latvijas valsts meži" (Latvia's state forests)
LSFRI Silava	Latvia's State Forestry Research Institute „Silava"
MeKA	Forest and timber products research and development institute
CM	Cabinet of Ministers
FSI	Forest Statistic Inventory
FRSDS 2020	Forest and related sectors development strategy 2015–2020
FSR	Forest State Register
GHG	Greenhouse gases
SFS	State Forest Service

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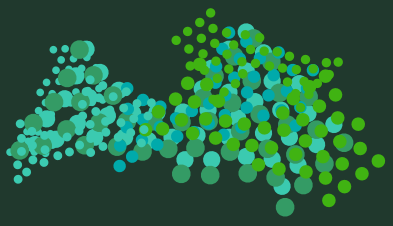

2016

FOREST SECTOR
IN THE 25 YEARS OF INDEPENDENCE OF LATVIA