European Bank for Reconstruction and Development – EBRD

Forest Sector Study of the Russian Far East –
Road Map for Value Added Investment in Forest Industry

Situation Analysis Report
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PREFACE

This report was prepared at the request of European Bank for Reconstruction and Development (EBRD) by Indufor Oy.

The intended users of this study/report are the Client, and the Client’s stakeholders. No other third party shall have any right to use or rely upon the report for any purpose. This report may only be used for the purpose for which it was prepared and its use is restricted to consideration of its entire contents. The conclusions presented are subject to the assumptions and limiting conditions noted within.

The sections on roundwood availability and quality are based on data provided by FAO and market information is based on third party information. No field assessment or evaluation in the forest or cross-examination of the data has been carried out by Indufor.

Two Indufor consultants made a two-week fact-finding mission to the Russian Far East in May 2013. The trip included visits to Khabarovsk and Vladivostok.

We thank the European Bank for Reconstruction and Development for trusting us with the opportunity to carry out this assignment.

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EXECUTIVE SUMMARY

The Russian Far East Federal District, consisting of 9 regions, was analysed in terms of potential for new forest industry investments. The analysis covered forest resources, infrastructure and markets for forest industry products.

Theoretical potential for increasing harvesting is very large as the annual allowable cut in the Russian Far East stands at 95.5 million m³ while the current harvesting only reaches 12.5 million m³ per annum. However, economic availability of new harvesting areas is limited as the road infrastructure is generally poor. Due to mining industry development in some areas the road and railroad infrastructure is being developed and this may open new possibilities for forest industry investment in the future. Long term view to forests as a renewable natural resource is lacking and few companies are committing to long term sustainable investments.

There are 5 possible sources of raw material that can be considered for new forest industry investments: 1. by-products of the existing forest industry installations (>0.5 million m³), 2. currently non-utilized small diameter logs (3-5 million m³), 3. large diameter logs currently exported to Asia (5 million m³ from the RFE), 4. currently underutilized / idle forest lease areas and 5. opening of wholly new forest lease areas.

Demographic factors combined with the socioeconomic situation result in large differences between skills and capabilities among the region. The most developed areas offer clearly much better operating environment for forest industries.

Markets for wood products were assessed and the most attractive products seem sawnwood, particleboard and bioenergy. Pulp and paper manufacturing in the Russian Far East does not seem feasible after a brief analysis, particularly unbleached softwood pulp and BCTMP were analysed. Biofuel markets may become attractive in the future as the technology matures.

Indufor evaluated the potential for new forest industry investments in the Russian Far East in a scoring matrix. The scoring matrix was done separately for the 9 Russian Far East regions, based on a scale of 1 to 5, 1 being the lowest score and 5 the highest score. The scoring matrix had 8 criteria and each criteria was assessed against forest industry products / projects.

| Results of the Project Ranking per Region per Product |
|------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Product | Amur | Jewish AO | Kamchatka | Magadan | Primorsky | Sakha Rep. | Khabarovsk | Chukotka AO | Sakhalin |
| Sawnwood | 2.7 | 2.5 | 1.7 | 1.5 | 3.3 | 2.5 | 3.7 | 1.5 | 2.5 |
| Plywood | 2.8 | 2.3 | 1.4 | 1.4 | 3.1 | 2.2 | 3.5 | 1.4 | 2.2 |
| Reconstituted panels | 2.8 | 2.6 | 1.7 | 1.7 | 3.4 | 2.6 | 3.6 | 1.6 | 2.4 |
| OSB | 2.8 | 2.5 | 1.7 | 1.7 | 3.3 | 2.5 | 3.6 | 1.5 | 2.4 |
| Other panels | 2.8 | 2.8 | 1.7 | 1.7 | 3.5 | 2.6 | 3.6 | 1.7 | 2.4 |
| Bleached chemical pulp | 2.8 | 1.6 | 1.5 | 1.4 | 2.7 | 2.3 | 2.7 | 1.4 | 2.1 |
| Paper and paperboard | 2.8 | 1.6 | 1.5 | 1.4 | 2.5 | 2.1 | 2.5 | 1.4 | 2.1 |
| Bioenergy | 3.0 | 2.5 | 1.7 | 1.6 | 3.5 | 2.9 | 3.9 | 1.8 | 1.8 |
| Biofuels | 2.5 | 1.9 | 1.6 | 1.5 | 3.3 | 2.5 | 3.5 | 1.6 | 2.5 |

The most attractive regions for forest industry investments are Primorsky and Khabarovsk Krai, and in limited cases for specific products Amur Oblast and Sakha Republic. The Situation Analysis Report offers a list of potential investment projects, of which 5 were chosen for further analysis in the project meeting on June 19th 2013 in London.

The projects are 1. sawmill, 2. glulam production facility, 3. particleboard mill, 4. small diameter timber sawmill, and 5. liquid biofuels production facility. At this stage it was not possible to identify investors for the projects and the further analysis is conducted without a fixed location for the projects.
1. BACKGROUND INFORMATION

1.1 Russian Far East

The Far East Federal District is the most remote region of Russia, occupying the largest territory and having the smallest, most thinly spread population. The district consists of 9 regions:

- Amur Oblast
- Jewish AO
- Primorsky Krai
- Khabarovsk Krai
- Magadan Oblast
- Kamchatka Krai
- Chukotka AO
- Sakha Republic
- Sakhalin Oblast

The region faces challenges related to economic development, infrastructure and human resources compared to other regions of Russia. The period of transition during the 1990s resulted in higher transport prices and economic isolation from other regions of Russia. Some major problems included rising unemployment level, mass outflow of people to more economically stable regions and poverty. Even though the economy of the district is recovering and investments are undertaken by the Russian government, the Far East is a region where economy is growing mainly due to natural resources in general, including oil&gas and mining.

Figure 1.1 Russian Far East Regions

1.2 General Economic Conditions

1.2.1 GDP

Russia has showed solid economic performance through 2012, while the global economy has experienced a recession period. Strong oil price, large current account surplus and low public debt improve competitiveness of the Russian economy. According to the World Bank assessment in 2013, the level of unemployment in Russia has been decreasing gradually, incomes have been growing and inflation has slowed down from the peak years.

In 2012 economy growth comprised 3.4%, which is slightly lower than in the previous year. The GDP growth has recovered after the crisis, although it has not reached the level of 2007 (Figure 1.2). GDP is prompt to grow in 2013 by 1.8% and 3 % in 2014 as projected by the European Bank of Reconstruction and Development.

Figure 1.2 GDP Development in Russia, 2007-2014f

![GDP Development in Russia, 2007-2014f](image)


1.2.2 Business Cycles

Recent economic achievements in Russia have resulted predominantly from high oil prices. Economic growth decreased after 2008 as well as industrial output is projected to decrease in 2013. There was an increase in inflation rate in the second half of 2012 and projections for 2013 remain quite pessimistic. According to World Bank, economic growth in Russia will be slower than in Brazil, Turkey and South Korea. Aging population, reduced oil prices and lack of significant investments create pessimistic projections for the Russian economy in the next few years.

Table 1.1 Russia’s Economic Outlook, 2012-2014

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013f</th>
<th>2014f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth (%)</td>
<td>3.4</td>
<td>1.3</td>
<td>2.5</td>
</tr>
<tr>
<td>Oil price assumption (Average, USD per barrel)</td>
<td>105</td>
<td>102</td>
<td>102</td>
</tr>
</tbody>
</table>

There has been a gradual decrease in inflation rate from 2007 onwards. Despite stabilizing inflation, headline inflation failed to meet the set targets. This has been caused by an increase in food prices, which resulted from the drought in Russia, higher taxes on alcohol and rise in administrative prices (World Bank, 2013). In January 2013 inflation equalled 7.1%, whereas in January 2012 this indicator was considerably lower at 4.2% (Figure 1.3).

Figure 1.3 Inflation in Russia, 2007-2012


1.3 Political Situation and Stability

1.3.1 Federal and Local Administration

The Far East Federal district is supervised by the Plenipotentiary of the President, whose role is to make sure that Federal authority is being implemented. The Far East Federal District is managed region-by-region with the Governors’ and regional legislative assemblies’ power.

Several state initiatives were suggested to eliminate astute problems in the region such as adopted Regulations on the Anti-Corruption Council under the Plenipotentiary of the President in the Far East Federal District. The government has also proposed the Strategy for Economic and Social Development of the Far East and Baikal region until 2025. These initiatives, among others, demonstrate active participation of the state in the development of the region. However the decision-making process has been very centralized and does not provide much authority to the Federal District.

Over the last few years, various attempts at the state level have been made to improve communication of decisions to the citizens of the Far East Federal District. Open Ministry has been initiated by the Ministry of the Russian Federation for Development of the Far East. Its mission is to provide legislative support for strategic objectives of the state policy in the Russian Far East.

1.4 Infrastructure

The Far East is the vast, unexplored/ unexploited remote region of Russia, which partly explains its slow economic development. Being located nearby the Asian markets and having access to the waterways, the Far East has a great economic potential. The development of the region’s infrastructure is among the state’s priorities.
Russian government considers the Far East as the region with a high economic potential. Therefore, the state has taken the course to modernize the Far East and improve its infrastructure. There are a number of investment projects undertaken in accordance with Transport strategy of the Russian Federation until 2030 and Strategy for Economic and Social Development of the Far East and Baikal region until 2025. As a result of these investment projects new railway systems, highways, airports and harbours are planned to be constructed. Also, driven by the APEC Summit – 2012 in Vladivostok, the Far East received substantial state investments of about USD 20 billion. As a result, two major bridges, namely Zolotoy Rog Bridge and Russky Island Bridge, were built in preparation to the Summit, among others.

1.4.1 Roads

Highway length in the Far East decreased after the collapse of the Soviet Union. However, due to increased economic activity, their number has started to grow since 2005 (Figure 1.4).

**Figure 1.4  Length of Highways in the Russian Far East, 1990-2010**

![Graph showing length of highways in the Russian Far East, 1990-2010](image)

Source: Rosstat, 2011.

The main highways are concentrated in the southern part of the Far East Federal District, while the northern part has a tremendous need for modernized and new highways.

The largest highways include:

- M-58 Amur Chita-Khabarovsk
- M-60 Ussuri Khabarovsk-Vladivostok
- M-56 Kolyma, built from M-60 through the Sakha Republic
1.4.2 Railways

The share of railways comprises over 80% of freight turnover in the Far East Federal District. Railway is therefore the most crucial means of transport and a precondition for most industrial activity. Most important ones are the Trans-Siberian Railway, Baikal-Amur Mainline, and Amur-Yakutsk Mainline (is still under construction).

According to Ernst & Young report (2011), investors expect Russia to upgrade its infrastructure. As stated by the Ministry for Regional Development, there are several investment projects aimed at improving railway system in the region. Among the plans:

- Development of South Yakutia (2008-2019) – foundation of an industrial area consisting of hydropower development projects and a cluster of industrial manufacturers. Around RUB 104.8 billion (25%) are allocated by the state for development of railways and highways. The project undertakes construction of highways with a total distance of 150 km as well as railways of 270 km.
- Foundation of mining and metallurgy cluster in the Amur oblast, as a result of which Shimanovskaya-Gar railway (railway project is put into operation in 2014) is going to be constructed.
1.4.3 Harbours

The Far East has the longest coastline in Russia. Therefore, water transport is particularly important for the international trade. The largest harbours in the region are:

- Kamchatka Krai: Petropavlovsk-Kamchatsky;
- Khabarovsk Krai: Sovetskaya Gavan and Vanino;
- Magadan Oblast: Nagayevo;
- Primorsky Krai: Nakhodka, Vladivostok and Vostochniy.
- Sakhalin Oblast: Korsakov.

The following harbours have the railway connection: Korsakov (Sakhalin local railway connection), Nakhodka, Sovetskaya Gavan, Vanino, Vladivostok and Vostochniy.

The port of Vanino is the largest harbor in Khabarovsk Krai with the turnover of 19.1 million tons of cargo in 2011. The harbor is located on Baikal-Amur Mainline. Ferry services connect the port of Vanino with Kholmsk on Sakhalin Island. By 2020 it is planned to construct new terminals, which will increase the capacity of the harbor to 50 million tons of cargo. The factors hindering the development of the harbor are insufficient capacity of Komsomolsk-Vanino railway as well as limited power supplies. Transportation distance by Baikal-Amur Mainline is 650 km shorter than by the Trans-Siberian railway, which is the main advantage of Vanino over the harbors in Primorsky Krai.

Most likely Vanino will not continue as a multicargo port but will be a metals and coal port. This hinders the development of the region as a whole and is especially problematic for the forestry industry of the region.

The Nakhodka harbour's turnover amounted to 15 million tons of cargo in 2011. Coal, petroleum, containers, metal, scrap metals and refrigerated cargo are transported through the harbour.
The Korsakov harbour is located on Sakhalin Island with the turnover of 1.2 million tons of cargo in 2012. The harbour provides trans-shipment of timber, coal, crude oil and petroleum products, metals and equipment. The harbour is connected to the settlements of Sakhalin through roads and railways as well as ferries.

The airways are also important for domestic transport, especially for the regions with poor infrastructure, which are hard to access.

According to the Transport Strategy of the Russian Federation until 2030, there are several major investments in development of infrastructure in the Far East, including:

- Comprehensive development of the Far East harbours including Vladivostok and South Primorsky transport node, Khabarovsk Krai in close connection to development of the Trans-Siberian railways. Implementation of the project is planned for 2016-2020.
- Development of the transport node Vostochny-Nakhodka – comprehensive upgrading and construction of new harbours, railways, highways and tunnels. Construction of harbours with an overall capacity of 10 million TEU (twenty-foot-container equivalent unit) per year. Implementation of the project is from 2010 until 2020.
- Expansion of railway to Nakhodka, Vladivostok, Sovetskaya Gavan, Vanino harbours and expansion of the capacity of these harbours, and development of the Baikal-Amur Mainline and Trans-Siberian Railway.

1.4.4 Bridges

The bridge over the Amgun River in Komsomolsk-na-Amure (Khabarovsk) is the largest bridge on the Baikal-Amur Mainline (Figure 1.7).

Figure 1.7 Bridge Over the Amgun River, Komsomolsk-na-Amure


The Khabarovsk Bridge is a road and rail bridge, which connects the Jewish Autonomous Oblast and the city of Khabarovsk (Figure 1.8).
Also, three bridges were constructed in Vladivostok towards APEC Summit 2012 and they are Russky, Zolotoy Rog and De-Friz-Sedanka bridges.

Among the priority projects targeted at construction of new bridges is also the construction of the bridge across the Lena River in Yakutsk in the Sakha Republic. The project develops interconnection of Yakutsk and the western part of Russia. Implementation of the project takes place in 2013-2017. The bridge is required to connect the city of Yakutsk with railroad as currently the railroad reaches the opposite bank of the river. Moreover, a bridge over Tatar Straight linking Sakhalin Island and mainland is in the priority list of projects for the Far East albeit in mid- to long-term prospective.

1.4.5 Power Systems

Electricity system of the Far East region includes energy system of the Far East, partially unified energy system of Siberia and isolated local energy areas such as Yakutskenergo, Magadanenergo, Kolymaenergo, Sakhalinenergo, Kamchatskenergo. In fact, unified energy system of the Far East is isolated from other regions of Russia. Unified Energy System of the East (OES Vostok) operates in:

- Amur Oblast
- Jewish Autonomous Oblast
- Khabarovsk Krai
- Primorsky Krai
- Southern Sakha Republic

Regional Power Grid of Amur Oblast (RDU)

The power grid manages power supply in the Amur Oblast as well as in Aldan and Neriungrin regions of the Sakha Republic. The operating area comprises 617,900 km². Amur RDU generates 4,340 MW. The largest power plants are Bureiskaya hydropower plant and Zeiskaya hydropower plants, Neryungrinskaya and Raichikhinskaya condenser type electricity-only thermal power stations. Electricity generation in Amur RDU in 2012 amounted to 16.7 TWh, while consumption equaled to 9.6 TWh.

Regional Power Grid of Khabarovsk (RDU)

The power grid performs supervisory control in Khabarovsk Krai and the Jewish Autonomous Oblast. The operating area comprises 787,600 km². Khabarovsk RDU generates 2,240 MW. The largest power plants are Amur heat and power plant-1, Komsomolskaya heat-and-power plant 2 and 3; Khabarovskaya heat and power plants 1 and 3. Khabarovsk RDU is also in
charge of 5-V transmission lines 500 kW. In 2012 there was generated 7.7 TWh and consumption comprised 9.6 TWh.

**Regional Power Grid in Primorye (RDU)**

The operating area includes 164,700 km². The main power plant in the region is the Primorskaya condenser type electricity-only thermal power station. In 2012 there was generated 10.7 TWh and 12.1 TWh was consumed.

The power plants of Sakha Republic, Magadan Oblast, Kamchatka Krai, Sakhalin Oblast and Chukotka Autonomous Okrug are isolated.

The total length of electrical grid is 102,000 km. Installed capacity of the powerhouse in the Far East is 11.5 GW, of which 7.4 GW is connected to the unified east energy system. The largest share of energy is produced by Thermal Power Plants (70%). At the same time, there is a great demand for developing wind generators and hydrothermal systems, as well as alternative energy sources. Currently, these tasks have been managed at a slow pace.

### 1.5 Social Infrastructure

The average literacy in Russia according to the UNDP (Figure 1.9) in 2011 comprises 99.4%, while average education index for Russia is 0.9 (Figure 1.10). Distribution in the Far East is slightly lower in some regions and higher in the others. In Magadan, it was as high as 0.946, exceeding the average Russian education index. However, in the Chukotka Autonomous Okrug and Jewish Autonomous Oblast these indicators are 0.877 and 0.880, respectively. All these show a generally high level of education in Russia and the Far East. Regional discrepancies are still evident.

**Figure 1.9   Literacy Index in the Russian Far East Regions**

![Literacy Index in the Russian Far East Regions](chart)

Source: UNDP, 2011.
There are several universities in the Russian Far East. The Far East Federal University, North-eastern Federal University in Yakutsk, the Pacific National University, Maritime State University, and the Pacific State Medical University are the largest.

**Figure 1.10 Education Index in the Russian Far East Regions**

![Education Index in the Russian Far East Regions](image)

Source: UNDP, 2011.

### 1.6 Demography

Over the last decades, Russia has benefited from the large share of young population in its labour market. However, the projection of decreasing population in Russia to 126 million people by 2050 implies a shrinking workforce. The number of elderly is forecasted to double from 2010 to 2050 (World Bank). Russian demographic situation has been featured by fluctuations in fertility, with the baby boom after the World War II and a decline in birth rate in the 1990s. Decreasing labour force may lead to lower economic activity and lower private savings, which in turn, worsens investment climate (World Bank). In the Far East, the problem of declining population has been intensified by high mortality (Figure 1.11) (UNDP).
1.6.1 Ethnic Structure of Population

According to the statistical information provided by Rosstat, the overall number of Russians living in the Far East comprises 4.96 million people, which is 79% of the total population of 6.36 million people. Other ethnic groups residing in the region are Yakut (7.5%), Ukrainians (2.5%), Koreans (0.9%), Tatar (0.6%). Other nationalities and those, not mentioning their nationality, accounted for about 10% in 2010.

1.6.2 Population Growth and Age Structure

The situation is featured by continuous outflow of people from the region in search of better employment opportunities and less severe climate. In 2011 population growth was negative and comprised -19,099 people. Infant mortality in the district remains to be higher than the Russia’s average indicator, even though recently it showed some improvement.

The life expectancy in the Far East is low both for men and women – 56 years and 69 years, respectively. The main factors affecting people’s longevity are poor social infrastructure and severe climatic conditions (World Bank). The life expectancy among indigenous people is low due to alcoholism. Marginalization among indigenous people is a common problem. Tremendous declines in the longevity have been registered in the Jewish Autonomous Oblast, where 90% of the population are non-Jewish Russians. Life expectancy is 54 years for men and 67 years for women.

1.6.3 Population Density

Despite the Far East Federal District covering more than a third of Russia, the population in the region is quite small and may be compared to the number of inhabitants in the Moscow Region, excluding the metropolitan area (UNDP). Most of the population is concentrated in the southern part with more than 50% of people residing in Primorsky Krai and Khabarovsk Krai. Meanwhile, population density in the Sakha Republic, Magadan Oblast and Chukotka Autonomous Okrug is about 1 person per km² (UNDP).
1.6.4 Rural and Urban Development

The overall number of citizens in the Far East is reducing annually, though the decline in the number of people has slowed down over the last few years both for rural and urban population (Figure 1.12).

Figure 1.12 Population in the Russian Far East Regions in 1989, 2002 and 2010

The number of urban population in the Far East is reducing as a result of excessive emigration to other more developed districts of Russia. However, this tendency has slowed down since 2010 (Figure 1.13).
Figure 1.13  Urban Population in the Russian Far East Regions in 1989, 2002 and 2010

Source: Rosstat, 2013.

Rural population has also been decreasing since 1989 (Figure 1.14). However, since 2002, the trend has stabilized. Most problems regarding rural areas relate to high unemployment rates, poor access to medical services, and low incomes. Small share of rural population in the working age makes it difficult to find forestry workers. This results often in migration labour force in the large mining, forestry and other industrial projects.

Figure 1.14  Rural Population in the Russian Far East Regions in 1989, 2002 and 2010

Source: Rosstat, 2013.
1.6.5 Age Distribution and Employable Population

In addition to rapid decline of the total population in the Russian Far East, there have been registered severe problems with the aging population. Thus, due to low birth rates (except for Sakha Republic), as well as excessive migration, number of children has declined by 2.4% in 2002-2010. As a result, average age in 2010 totalled 35.5 years, whereas still in 2002 it was 33.9 years. Moreover, at the same time number of retirees has grown by 3.7%, leading to shortage of the working population and a decline in the unemployment rate. Figure 1.15 demonstrates disproportion of different age groups, where children under 14 years account for only 16% of the population in the region.

Figure 1.15 Age Distribution in the Russian Far East, 2010

![Age Distribution in the Russian Far East, 2010](image)


Aging has brought changes into the size of employable population. Hence, number of employable inhabitants was at its lowest point of 61.5% in 1990, it kept growing until 2005, reaching its peak of 65.7% in 2005 (Figure 1.16). Thereafter there has been registered constant decline in employable population, with as low as 62.7% by 2011. Most importantly, 20% of the people were above employable age in 2011, which is twice as much as in 1990, while number of population under employable age accounted for 17.6% vs. 27.6% in 1990.
Figure 1.16  Employable Population in the Russian Far East, 1990-2011

Source: Rosstat, 2012.

1.7  Socioeconomic Situation

1.7.1  Income Level

The general level of dollar wages in Russia has been increasing gradually between 2007 and 2012 (Figure 1.17) with a slight downturn in 2008. The general trend shows that incomes of the Russian citizens are growing and poverty is reducing. However, regional discrepancies are still present. In all regions of the Far East there are some 30% of households living below the poverty line. In Sakhalin Oblast and Magadan Oblast this indicator is under 20% (World Bank, 2013)

Figure 1.17  Average Wage in Russia, 2007-2012

Source: Rosstat, 2013.
Income level and income inequality indicators have improved significantly. At the same time, a great number of people leaving the district show that the economic situation is still quite unstable and requires redistributive policies from the Russian government (World Bank). Due to a high concentration of individuals living on a marginal lifestyle, the goal to eliminate poverty in the region in a short time is quite unrealistic and will require more effort and expenditures.

The highest income index has been discovered in Sakhalin Oblast, which is close to the level of St. Petersburg and the lowest is the one of the Chukotka Autonomous Okrug (Figure 1.18).

Figure 1.18 Income Index in the Russian Far East Regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chukotka Autonomous Okrug</td>
<td></td>
</tr>
<tr>
<td>Jewish Autonomous Oblast</td>
<td></td>
</tr>
<tr>
<td>Kamchatka Krai</td>
<td></td>
</tr>
<tr>
<td>Khabarovsk Krai</td>
<td></td>
</tr>
<tr>
<td>Magadan Oblast</td>
<td></td>
</tr>
<tr>
<td>Moscow Region</td>
<td></td>
</tr>
<tr>
<td>Primorsky Krai</td>
<td></td>
</tr>
<tr>
<td>Amur Oblast</td>
<td></td>
</tr>
<tr>
<td>Sakha Republic (Yakutia)</td>
<td></td>
</tr>
<tr>
<td>Sakhalin Oblast</td>
<td></td>
</tr>
<tr>
<td>St. Petersburg</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
</tr>
</tbody>
</table>


1.7.2 Income Distribution

Interregional income discrepancies are quite large particularly between regions with export industries and agriculture. To illustrate this, the Sakha Republic with a well-developed diamond industry and Sakhalin Oblast with oil and gas industry are considered to be the most prosperous regions in the district. Medium development has been registered in the Khabarovsk Krai with its manufacturing capacity and Magadan Oblast, where gold-mining is developed. However, development of other regions, which are more focused on agriculture and fishery, is far from satisfactory. The main reason for this is not only economic recession but also poor statistical records. As stated by the World Bank (Figure 1.19), poverty level has been shrinking steadily from 2000 onwards in all regions of the Far East.
1.7.3 Unemployment Rate

In spite of the recent economic slowdown, unemployment rate in Russia has been declining from 2007 (World Bank) and increased slightly to 6% in January 2013 (Figure 1.20).

In the Far East, unemployment was declining from 2007 and levelled off at 6.9% in 2012. The rate is relatively high, particularly in the Jewish Autonomous Oblast, Sakha Republic and Primorsky Krai (Figure 1.21). The overall unemployment rate in the Far East is slightly higher than average Russian indicators (Table 1.2).
1.8 Skills and Capabilities

Despite low Human Development Index due to high mortality, low fertility, emigration of workforce to other regions of Russia with more developed social infrastructure, the Far East has a great potential due to a large amount of investments from the Russian state, close geographical location to Asian markets and natural resource base, which determines interest of foreign investors. All these contribute to development of economic activities and require highly qualified workforce.

The Far East has a great scientific potential. The list of research centres relevant for forestry activity and of crucial importance to the District, are presented in Figure 1.22.
Figure 1.22  Research Centres in the Russian Far East


The human development index (HDI) is an indicator which assesses incomes of population, education level and life expectancy. The index increased slightly from 2008 until 2009, which is a positive trend for the Russian labour market (Figure 1.23) (UNDP, 2011).

Figure 1.23  Human Development Index in the Russian Far East Regions, 2008-2009

Source: Adopted from UNDP, 2011.

1.9  Description of the Selected Regions

1.9.1  Khabarovsk Krai

Khabarovsk Krai is one of the largest regions in the Russian Federation. In the north it borders with Magadan Oblast and Sakha Republic, in the west – with Jewish AO, Amur Oblast and China and in the south - with Primorsky Krai. Khabarovsk Krai is washed by the Sea of Okhotsk and the Sea of Japan (the Gulf of Tatary). It possesses air, land and water routes,
through which it connects with Pacific Harbours, as well as CIS and Western European countries to Asia and the Pacific Rim. The areas suitable for harbour construction are situated in the coastline of the Gulf of Tatyry: the Chikharev and Vanino bays and, most importantly, the unique complex consisting of several highly-protected vast deep-water bays forming the Sovietkaya Gavan Bay. The Sovietkaya Gavan and Vanino are open for the marine transport also during the winter season. Moreover, there are about 210 000 rivers (584 000 km in length), belonging mainly to Amur river system.

Khabarovsk Krai is number 4 economy in the Far East in terms of GRP and is considered the most diversified economy and the centre for manufacturing in the Far East. The region is rich with natural resources, such as timber, fine fish and fur species, ferrous, base and noble metals (silver, gold, platinum, zirconium), as well as water resources. As for forest resources, it possesses some 25% of forest resources in the Russian Far East and some 6% of the whole Russia. Such abundance in natural resources has been attracting growing, but still relatively low amount of foreign direct investment in different industries. Thus, over USD 2 billion has been invested into the region since 1991 and more than 600 companies (mostly SME) with foreign investment currently operate in the region. Also, the region is one of the leaders in decreasing investment risks in Russia. The administration of Khabarovsk has set up an Advisory Council to promote foreign investment in the region, providing adequate support to create more room for investment by the foreign investors and thriving to enhance the investment climate in the region and eradicating any kind of negative influence that will hamper the investment activity in the region. EBRD is one of the members of the Foreign Investments Advisory Council of Khabarovsk Krai.

The forestry-related problems of Khabarovsk Krai include shortage of processing facilities and high-tech equipment at woodworking factories, which puts the focus on the export of raw material, limited investments and underdeveloped industrial infrastructure. In addition, availability (Annex 2, Annex 3) and efficiency of the workforce hinders further development of Khabarovsk Krai.

1.9.2 Primorsky Krai

Primorsky Krai is situated in the southernmost part of the Russian Far East and is called ‘Russian gates to Asia’. The region has favourable geographical location with milder climate than Northern regions of the Far East and borders in the north with Khabarovsk Krai, in the south with North Korea, in the west - with China and is washed by the Sea of Japan (marginal sea of Pacific Ocean) in the east and southeast. About 30% of the entire social and economic potential of the Russian Far East is concentrated in this region (population, GDP, industrial and agricultural production). Primorsky Krai has growing economic ties with its neighbouring countries (Japan, China, South Korea), but also with Taiwan, Thailand, Singapore and the US. Similarly to other regions of Russia Far East, official average salary in Primorsky Krai is higher than on average in Russian Federation (Annex 3). The official unemployment rate, however, is reported to be considerably higher compared to Russian average level (Annex 2).

Leading sectors of the region include communications (over 20%), trade (over 20%), as well as transportation (16%). Raw materials still predominate in the overall export structure and include: fish and sea products, wood, non-ferrous metals, chemical products, transit of ferrous metals and fertilizers. During five-year-period the region has demonstrated stable growth of economic and social indicators: external trade grew by 20%, industrial output – by 60% and capital investments – by 370%, driven by state investments towards preparation to APEC Summit in 2012.

According to the web portal invest-in-primorye.ru, Primorsky Krai and its capital, Vladivostok, are regularly included in the list of the most attractive investment destinations by Forbes, as it provides access to the Asian markets. Also, the region possesses quite developed railway network with direct access to Trans-Siberian line, as well as non-freezing harbours. However, the region is characterised with high investment risks, due to its high degree of criminalization.
1.9.3 Amur Oblast

Amur Oblast is situated in south-east of Russian Federation and borders with China, Chitinskaya Oblast, Sakha Republic, Jewish AO and Khabarovsk Krai. Amur Oblast possesses quite developed infrastructure. Trans-Siberian and Baikal railways cross the region and connect it with major sea harbours in Primorsky Krai and Khabarovsk Krai. In addition there are four river harbours, which also operate internationally (mainly to China). Road transportation is the major mode for both passenger and cargo streams. Apart from its favourable geographical location, Amur Oblast is rich in natural resources (coal, gold, ferrous metals, forest) and ranks 13th in the Russian Federation, according to Federal portal protown.ru. Most important sectors, accounting for some 70% of GDP, are transportation, industry, trade and construction. Agriculture is an important segment of Amur economy as it is the largest soya bean producing province in Russia overall (about 70%).

Amur Oblast holds 9th position in terms of investments volumes per capita in Russian Federation. Main advantages of the region include proximity to China and other regions of the Russian Far East, developed infrastructure, availability of area for establishing production facilities, vast mineral resources stock, as well as favourable climate and surplus of energy resources. Construction of new heat generation station ‘Yerkovetskaya’ (capacity 3 600 MW) is projected to be completed by 2020. In general, the unemployment rate is higher than average country-wide (Annex 2). At the same time, Amur Oblast is similar to average Russian level in terms of salary (Annex 3).

1.9.4 Sakha Republic

Sakha Republic (Yakutia) is located in Eastern Siberia. It is the largest entity of Russian Federation by area and the majority of the region is located in the permafrost zone. Sakha Republic is reported to be the coldest region on the planet. Its climatic conditions are characterised as extreme and there are only 13 cities in the whole Sakha. The Republic borders with land (Amur Oblast, Magadan Oblast, Khabarovsk Krai, Chukotka AO, Krasnoyarsk Krai and Irkutsk Oblast) and only in the north it is washed by the East-Siberian and Laptevykh Seas. Largest rivers include Lena, Yana and low Kolyma rivers.

The poor condition of infrastructure of Sakha Republic is a critical factor that restraints economic and social development of the region. The largest part of the Republic does not have access to the main transport network of Russian Federation and until recently river navigation was the most advanced mode of transportation. There are currently number of ongoing projects on building and reconstruction of transportation network. For example, the close-to-be-completed Berkakit-Tommot-Yakutsk railway (ca. 900 km) is a part of the planned Amur-Yakutsk railway, which connects Sakha Republic to Trans-Siberian and Amur-Baykal railways.

However, despite poor infrastructure and extreme climatic conditions, Sakha Republic is the leading region in Russian Federation in terms of natural resources stock. The overall minerals and resources potential is estimated at RUB 78.4 trillion. Thus, the region is the largest Russian producer of diamonds (98%), tin (40%), gold (15%) and the monopolist producer of antimony. Moreover, Sakha Republic is in the Top 6 regions of Russian Federation in terms of Gross Regional Product per capita and Foreign Direct Investment per capita. As for energy resources, Sakha Republic accounts for 35% of natural gas and oil resources of Eastern Siberia and the Far East, in addition to 22% of water supply of whole Russian Federation.

There has been registered strong growth in the leading sectors of Sakha Republic during the last 10 years. Such industrial growth resulted into significant rise in average salaries, which are considerably higher than overall in Russian Federation (Annex 3). While official unemployment rate stays on a very low level, the unofficial data is close to Russian average (Annex 2). The Republic holds the 2nd place in Russia Far East and 12th place in Russia in...
terms of foreign investments inflow. Favourable economic situation in the region has resulted into international investment ratings. Hence, in October 2013 Fitch agency confirmed Sakha’s rating in long-term local and foreign currency at BBB-, while S&P confirmed its rating in September 2013 at BB+/ Negative rating with outlook reassessed from Stable at the same time.

1.9.5  Jewish Autonomous Oblast

Jewish Autonomous Oblast is situated in the Southern part of the Russia Far East and borders with Amur Oblast in the west, with Khabarovsk Krai in the east and with China along the Amur river in the south. With its capital Birobidzhan, there are only 172 700 inhabitants in the whole region. The Jewish Autonomous Oblast is situated in proximity to the Pacific Ocean and trade partners in that region and connects with the seas of the Pacific through Amur river. Also, Transsiberian railway and road Khabarovsk-Blagoveschensk run across the Oblast.

Jewish AO possesses the best climatic conditions and most fertile land in the Asian part of Russia, making it suitable for growing vegetables and soybeans, as well as farming. Moreover, the region is characterised as one with the highest concentration of natural resources in the Russian Federation. The most important resources include gold, tin, iron and manganese and others. However, largest part of the natural resources is not currently processed in the region, but is exported elsewhere. Both official and unofficial unemployment rates, as well as average salaries stand at Russian average level (Annex 2, Annex 3).

According to Expert RA, investment rating of the Jewish Autonomous Oblast was declared at 3C2 (minor potential, high risk) in 2012. In order to support investment activities, the government of the region has set up several programs. The most attractive segments are processing, agriculture and forest sectors. The main target in the field of forest sector is utilization of the available forest resources, as well as their deep processing in the region.

1.9.6  Sakhalin Oblast

In general the geographical location of Sakhlin Oblast can be described as suburban, as the region does not have stable year-round connection with the continental part of Russian Federation and is situated far from the economic centre. The Oblast is comprised by the Sakhalin and Kuril islands, resulting in its mosaic composition and poor transportation connection. Sakhalin Oblast is washed by the Okhotsk and Japan seas, as well as Pacific Ocean. There are almost 500 000 people in the region and the urbanization rate of 80% is the highest in Russia.

The economic development of Sakhalin Oblast is mainly driven by the energy sector (oil & gas). The region holds 4th place in the Russian Federation in terms of foreign investments inflow (approximately USD 45 billion in the beginning of 2013). In particular, significant FDI have been carried during the realization of the shelf projects of Sakhalin-1 and Sakhalin-2. Another important segment of the economy is fishery and bioresources, though it comprises only 2% of the region’s GRP. While official unemployment rate is registered at considerably lower level than average in Russia, the unofficial data reveals similar unemployment level for the Sakhalin Oblast and Russia on average (Annex 2). Also, there have been registered significant differences between average salaries in Sakhalin, compared to Russian Federation on average (Annex 3).

The government of Sakhalin Oblast has been carrying out number of activities for supporting economic development, as well as for improvement of the investment climate of the region. Thus, founded in 2009, the Investment Council coordinates the activities between potential investors and all levels of the government. Moreover, the Program for Competitiveness development and Plan for special activities are directed to eliminate administrative barriers and creation of favourable conditions for stimulating investment activities. As of 2012, the Sakhalin Oblast holds the investment rating of 3B1 (decreased potential, moderate risk).
1.9.7 **Magadan Oblast**

Magadan Oblast is located in the north of Russia Far East and borders with Khabarovsky Krai in the south, Sakha Republic in the west, Chukotka Autonomous AO in north and Kamchatka Krai in the east and is washed by the Okhotsk sea in the west. The region is characterized by severe climatic conditions, poor accessibility, complicated land forms and its major part lies in the permafrost zone. Magadan Oblast population equals to some 160 000 people, whereas around 155 000 reside in urban areas. There is neither railway connection in the region, nor river harbors. The main gate to the region is the Magadan sea harbor.

Magadan Oblast is rich with natural resources. Hence, the region holds the 1st place in terms of discovered gold resources in Russian Federation, as well as processes 50% of country-wide silver. Industry accounts for about 65% in the region’s GRP. The boom of the precious metals mining industry has resulted into low unemployment rate (Annex 2), as well as considerably higher salary level, compared to other regions of Russia Far East and Russia in general (Annex 3).

Expert RA rated Magadan Oblast at 3C2 level (minor potential, high risk) in 2012. So far the largest part of the investments is directed to the mining industry (44%) and the energy sector (23%). The most attractive segments remain to be mining, as well as construction, fishing, processing industries and energy sector. The government of the region released the set of regional legislation, supporting investment activities. Moreover, the Special Economic Zone offers privileged tax regime and is also a duty free zone.

1.9.8 **Kamchatka Krai**

Kamchatka Krai borders with Chukotka AO and Magadan Oblast in the north and north-west, with Kuril Islands in the south; it is washed by Pacific Ocean in the east, by Beringov sea in the north-east and Okhotksk sea in the west. Due to its favourable location, the region is gaining its importance in the intercontinental transportation system. Availability of non-freezing harbour in the Northern route, as well region’s location close to the intersection of air routes grants opportunities for establishing a transportation hub connecting North America, south-east Asia and Europe.

The economic situation of Kamchatka Krai has been demonstrating positive dynamics with major economic indicators improving constantly, starting from 2002. The region possesses significant water biological resources. Thus, more than one fifth of all-Russian fish production originates from Kamchatka. Other major industries include natural resources mining and processing, energy sector, construction and tourism. The main disadvantages that hinder further economic development of the region include remoteness from the continental part of the country, underdeveloped infrastructure, severe climatic conditions, complexity of the land cover and absence of the construction sites, as well as high seismicity. While unemployment rate is similar to the Russian level (Annex 2), average salary level is considerably higher (Annex 3).

Just like Magadan Oblast, Kamchatka Krai was rated at 3C2 level (minor potential, high risk) in 2012. The region processes its own legislation for investments regulations. Moreover, Kamchatka Investment Council was established in order to assist investment infrastructure development, to strengthen competitive advantages of the region, to review investment projects in order to determine their priority, etc.
1.9.9 Chukotka Autonomous Okrug

Chukotka AO is situated in the very north-east of Russia and half of the region is located behind the polar circle. It borders with Magadan Oblast, Sakha Republic and Kamchatka Krai, as well as with US in the east along the sea. The region is characterised with extreme climatic conditions, whereas duration of winter often reaches 9 months/year. There are approximately 50 000 inhabitants in Chukotka AO and the population density stands at extremely low level. Accordingly, the infrastructure is poorly developed, the density of roads is low and there is no railway connection in the region. The major modes of transportation are sea and air.

The region processes significant natural resources, among which the most important are gold, tin, tungsten coal and mercury. Also, bioresources, such as fish, play an important role in the region’s development. However, extremely severe climatic conditions, as well as poor infrastructure and lack and cost of labour force disable utilization of the resources and industrial growth of the region (Annex 2, Annex 3). The investment rating of Chukotka AO stands at 3C2 (minor potential, high risk).
2. FOREST RESOURCES IN THE RUSSIAN FAR EAST

2.1 Annual Allowable Cut in the Russian Far East

The Russian Far East possesses some 25% of the total timber resources of Russia. As shown in Figure 2.1, total annual allowable cut (AAC) in the Far East reaches some 95.5 million m³. The Sakha Republic theoretically holds the largest permissible harvest volumes of the region (39%), followed by Khabarovsk Krai (29%) and Amur Oblast (19%). While the AAC in Primorsky Krai comprises 8%, other regions (Sakhalin Oblast, Kamchatka Krai, Jewish AO and Magadan Oblast) play a minor role with the combined share of less than 6%. However, AAC decreases significantly to some 58 million m³ when excluding the firewood and deciduous species (e.g., poplar, aspen, and linden) from the harvestable stock.

Figure 2.1 Annual Allowable Cut in the Russian Far East, 2012

Source: Regional forest management plans by lesnichstvos, 2009-2018.

Total 95.5 million m³
Figure 2.2 AAC by Species in Selected Russian Far East Regions

![Diagram showing AAC by Species in Selected Russian Far East Regions]

Coniferous species account for the largest share of the AAC in the regions of Russian Far East (Figure 2.2). Such species mainly include larch, spruce, and at a smaller extent pine, cedar and fir. In some regions, particularly in Khabarovsk Krai, Amur Oblast and Primorsky Krai, softwood species hold an important share in the overall AAC. Softwood species are presented mainly by birch, but also aspen, linden, poplar, willow, older and others. Harwood species (stone birch, oak, ash, maple and elm) comprise minor share of AAC, except for Primorsky Krai, where they account for 18% of the AAC of the region.

(Note: The following parts of the study follow the “international” classification of tree species, i.e., coniferous species are called softwood species and Russian softwood species and hardwood species are called the hardwoods.)

However, due to severe climatic conditions and underdeveloped infrastructure network, the utilization of AAC in the RFE stays on a very low level in general. Hence, harvesting volumes of all the regions of RFE equalled 12.4 million m$^3$ in 2011 versus total AAC as high as 95.5 million m$^3$, which corresponds to 13%. The situation varies greatly within the regions (see Figure 2.3). Thus, AAC utilization rate in Primorsky and Khabarovsk Krais was registered the highest, with 55% and 23% respectively. Despite tremendous forest resources in the Sakha Republic, only 2% of its AAC was utilized in 2011. In other regions the AAC utilization rate was on extremely low level, falling in the range of 4-9%.

Figure 2.4 shows harvesting volumes in the RFE in 2011. Two regions, Khabarovsk Krai along with Primorsky Krai accounted for more than 80% of all the harvested wood. Thus, roughly half of the harvested wood originated from Khabarovsk Krai and comprised 6.2 million m$^3$. The second largest region, Primorsky Krai, amounted for 32%, corresponding to some 4 million m$^3$. Despite the highest AAC in Sakha Republic, only 7% of the wood was sourced from this region. While 6% (0.8 million m$^3$) was harvested in Amur Oblast, other regions amounted for less than 4% of the total cut.
Figure 2.3  AAC vs. Actual Harvesting in the Russian Far East, 2011

Source: Forest management plans by lesnichestvos, 2009-2018; Rosstat, 2011.

Figure 2.4  Harvesting Volumes in the Russian Far East, 2011

Source: Rosstat, 2011.
Historical development of sourced volumes in the RFE is demonstrated in Figure 2.5. In general, there has been a strong growth of harvested wood in all the regions until 2008, with the peak in 2007 as high as 14.3 million m$^3$. The steady growth was interrupted by global recession of 2008, bringing the harvesting volumes at their lowest point of 9.6 million m$^3$ in 2009. Thereafter, the situation began to recover, but never reached the record level of 2007. While all the regions of the RFE followed the general pattern throughout 2005-2011, Sakha Republic experienced steady growth, from 0.36 million m$^3$ in 2005 to 0.91 million m$^3$ by 2011. Such an increase in harvesting volumes was driven by the development projects in the infrastructure of the region.

![Harvesting Volumes in the Russian Far East Regions, 2005-2011](image)

Source: Rosstat, 2011.

As presented in Figure 2.6, total leased area of the major harvesting regions currently comprises some 29 million ha. Hence, almost half of this leased forest area is found in Khabarovsk Krai, while roughly one fourth (6.8 and 6.5 million ha) is located in Primorsky Krai and Amur Oblast, respectively. Much lower leased area, 700 000 ha, is in the Sakhalin region and despite enormous forest cover area in Sakha Republic, only some 670 000 ha are currently under lease there.
2.2 Sources of Forestry Information in the Russian Far East

Forest lease areas in Khabarovsk Krai and Primorsky Krai are available in digital format. The available maps show both leased areas (name of the owner, size of the area) and areas that have not been leased. Identifying both idle concessions and unleased areas is therefore possible. The information is in database format and enables the user to modify the views.

Figure 2.6 Leased Area in Selected Regions of the Russian Far East

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khabarovsk Krai</td>
<td>48%</td>
</tr>
<tr>
<td>Primorsky Krai</td>
<td>24%</td>
</tr>
<tr>
<td>Amur Oblast</td>
<td>23%</td>
</tr>
<tr>
<td>Sakhalin Oblast</td>
<td>3%</td>
</tr>
<tr>
<td>Sakha Rep.</td>
<td>2%</td>
</tr>
<tr>
<td>Amur Oblast</td>
<td>23%</td>
</tr>
<tr>
<td>Sakhalin Oblast</td>
<td>3%</td>
</tr>
<tr>
<td>Sakha Rep.</td>
<td>2%</td>
</tr>
<tr>
<td>Primorsky Krai</td>
<td>24%</td>
</tr>
<tr>
<td>Total</td>
<td>28.8 million ha</td>
</tr>
</tbody>
</table>


Figure 2.7 Forest Lease Areas by Company in Khabarovsk Krai

Source: Scanex GeoMixer, Engineering Technology Center, 2013.
The lease areas are divided into kvartals, the base unit for forestry planning in Russia. The information can be obtained down to kvartal level (Figure 2.8). The forestry maps can also be overlapped with satellite image information (Figure 2.9).

**Figure 2.8** Kvartal Level Forest Lease Areas in Khabarovsk Krai

![Figure 2.8](image1.png)

Source: Scanex GeoMixer, Engineering Technology Center, 2013.

**Figure 2.9** Satellite Images on Kvartal Level in Khabarovsk Krai

![Figure 2.9](image2.png)

Source: Scanex GeoMixer, Engineering Technology Center, 2013.
3. RUSSIAN FORESTRY AND RUSSIAN FAR EAST FOREST INDUSTRIES

3.1 Role of Russia in the Global Roundwood Trade

The world's largest softwood log exporters are New Zealand, Russia, US, Canada and France. Russian log exports have decreased due to the state policy targeted at growing the export of forest products with high value-added (Figure 3.1).

In 2012 global trade of softwood logs fell by 8% and totaled 72 million m$^3$. The largest reduction in shipments of coniferous sawlogs was detected in Russia, where the indicators declined from 17.6 million m$^3$ to 12.6 million m$^3$ in 2012. As a result of this, New Zealand became the world's largest softwood log exporter.

Figure 3.1 TOP 5 Softwood Log Exporters, 2012


China remained the largest importer of both coniferous and non-coniferous industrial roundwood in 2011. Europe is the second largest importer of industrial roundwood with Germany being the largest importer of coniferous roundwood. South Korean imports of coniferous roundwood were the second largest after China in 2011 (Figure 3.2).
The global recovery of harvest level since 2010 may be explained by expanding manufacturing of wood-based panels in Russia and increasing sawnwood production in Europe and North America. These resulted in a 14% rise in consumption of industrial roundwood between 2010 and 2011. Significant increase in consumption of Russian logs concerned softwood industrial roundwood, whereas in Europe the increase was lower and almost has not changed in North America.

### 3.2 Roundwood Harvesting and Trade in Russia

In 2005-2007 roundwood harvesting in Russia was growing steadily, followed by a drastic decline in 2008 as a result of economic recession and overall downturn in production (Figure 3.3). Russian roundwood production decreased by 5% in 2012 and totaled at 112.8 million m³. Decline in production has been detected in all Russian regions, in particular, the Far East showed a decline of 5.2%. Softwood harvesting decreased by 4.5%, while hardwood harvesting showed some 10.6% improvement. Far East was the third largest softwood harvesting region in 2012 (Figure 3.4), while the share of hardwood harvesting is quite small in comparison to North West and Siberia (Figure 3.5).

Russian softwood log exports have decreased significantly since 2007, affected both by the log exports tariffs and the global financial crisis (Figure 3.6). China continues the primary destination for Russian logs.
Figure 3.3  Roundwood Production in Russia, 2005-2012

Source: Pyrabelisk, 2013.

Figure 3.4  Softwood Harvesting in Russian Federal Regions, 2012

Source: Pyrabelisk, 2013.
Figure 3.5  Hardwood Harvesting in the Russian Federal Regions, 2012

Source: Pyrabelisk, 2013.

Figure 3.6  Russian Softwood Log Exports, 2000-2011
3.3 Forest Industries in the Russian Far East

The following companies are the main forest industrial players in the Russian Far East. They are concentrated in a few regions. The companies are classified by the type of raw material (softwood/hardwood) and later shown on a map (Figure 3.7, Figure 3.8).

**Coniferous/softwood**

RFP Group
- small sawmills across the region
- veneer mill in Amursk, Khabarovsk Krai

Arkaim
- sawmill, particleboard mill, pellet mill and laminated wood mill in Vanino, Khabarovsk Krai

Amur Forest (subsidiary of Business-Marketing)
- sawmill, Beryozovy, Khabarovsk Krai

Terneyles
- sawmill, veneer mill, particleboard mill and CHP mill in Plastun, Primorsky Krai

Rimbunan Hijau
- MDF mill in Khor, Khabarovsk Krai

**Hardwood**

Lesexport
- parquet mill in Dalnerechensk, Primorsky Krai

Terneyslesstroy
- hardwood sawmill and veneer mill in Lezozavadosk, Primorsky Krai
Figure 3.7 Primorsky Krai Forest Industries

1. Plastun: Terneyles headquarters and 3 wood-processing mills
2. Amgu: logging site
3. Svetlaya: Primosklesprom sawmill; not operating
5. Roschino: Roschinsky KLPH (Terneyles holding) and its mill.
7. Lezozavadovsk: Terneylestroy sawmill and veneer mill
8. Spassk-Dal'ny: ForestStar mill
9. Sergeevka: Sergeevsky Lespromhoz mill
10. Chuguevka: Primosklesprom mill
11. Olga: Primosklesprom mill

Figure 3.8  Khabarovsk Krai Forest Industries

1. **Khabarovsk:** RFP Group headquarters; Business Marketing headquarters; Rimbunan Hijau headquarters
2. **Amursk:** RFP Group veneer mill
3. **Beryozovy:** Amur Forest (Business Marketing) saw mill.
4. **Vanino:** Arkaim headquarters and wood-processing complex
5. **Khor:** Rimbunan Hijau MDF mill

4. SAWNWOOD INDUSTRY AND MARKETS

4.1 Global Overview of Sawn Softwood Industry

In 2010 the largest exporters of sawn softwood were Canada followed by Russia, Sweden, Finland, Austria (Figure 4.1), while most sawnwood was imported by the US, China, the UK, Italy, France, the Netherlands, Algeria, Saudi Arabia, Uzbekistan and Denmark (Figure 4.1).

After two years of steady growth, there was a decline in the global trade of sawn softwood in 2012 by approximately 2.5% due to decreased demand. In China, in spite of reduced imports of sawn softwood at the beginning of 2012, demand was relatively stable due to housing activity. Japan increased its softwood sawnwood imports by 15% in the fourth quarter of 2012.

Figure 4.1 Top 5 Sawn Softwood Exporters, 2011

4.2 Sawn Softwood Producers and Consumers within the Study Area

4.2.1 Russia

Sawn softwood production in Russia has been growing steadily since 2000 until 2007 with a slight downturn during the financial crisis. The general trend was that over the last three years, production of sawn softwood was growing slowly followed by a decline in production in 2012. An increase in production could be explained by recovery in economy as well as introduced tariffs for roundwood. However, production recovers quite slowly and in 2012 there was slightly over 29 million m³ of sawn softwood manufactured, which is 2.2% less than the indicator of 2011. Therefore, situation on the sawn softwood market is not overly optimistic (Figure 4.3).

Regional distribution shows that in 2012 most sawnwood was produced in Siberia, followed by North-West, Volga-Vyatka and Far East (Figure 4.4). Production fell in all regions compared to 2011. The general trend in 2013 seems to be slightly more optimistic with significant improvement in North West (11.7%), Siberia (3.2%), Far East (3%), but a dramatic downturn in the Volga-Vyatka region (-19.3%).
4.2.2 Russian Far East Regional Production and Exports

Production of sawnwood in the Far East was growing since 2005 from 1.2 million m$^3$ until 2007 to slightly under 1.4 million m$^3$ with a substantial decline in 2008 to 1.2 million m$^3$. Recovery
started in 2009 with a continuous upward trend. Since 2011 there has been a significant increase in production equalling 1.7 million m$^3$ and slightly over 1.8 million m$^3$ in 2011 and 2012 respectively. In the first quarter of 2013 production totalled 373 930 m$^3$.

**Figure 4.6 Sawnwood Production in the Russian Far East, 2005-2013 Q1**

Sawn softwood output equalled almost 1.9 million m$^3$ in 2012 with the largest volumes in Khabarovsk Krai (920 300 m$^3$), followed by Primorsky Krai (469 600 m$^3$), Sakha Republic (183 240 m$^3$), Amur Oblast (142 100 m$^3$) and other Far East regions.
Figure 4.7  Sawnwood Production in the Russian Far East, 2012

Source: Regional information, 2013.

Export of coniferous sawnwood from the Amur Oblast shrunk in 2012 compared to 2010. The largest export destinations are China, Germany and Japan.

Figure 4.8  Coniferous Sawnwood Exports from Amur Oblast, 2010-2012

The Jewish Autonomous Oblast (AO) showed an increase in coniferous sawn softwood exports in comparison with 2010. According to FAO, all of the region’s sawnwood is exported to China due to close location to the market.

**Figure 4.9** Coniferous Sawnwood Exports from Jewish Autonomous Oblast, 2010-2011

![Bar chart showing coniferous sawnwood exports from Jewish Autonomous Oblast, 2010-2011.](chart)


Having a close location to the Asian markets and a good raw material base, Primorsky Krai has a high production capacity, and exports most of its coniferous sawnwood to China, South Korea, Japan, Malaysia and the United States. Since 2011 there was an overall decline in exports. However, China continues to increase imports of Russian sawn softwood.
Figure 4.10  Coniferous Sawnwood Exports from Primorsky Krai, 2010-2012


Khabarovsk Krai exports most of its sawn softwood to China, South Korea, Germany, France and other countries. China and South Korea increased their imports from the regions, while Japan and France imported less sawnwood in 2012.

Figure 4.11  Coniferous Sawnwood Exports from Khabarovsk Krai, 2010-2012

In Sakhalin Oblast most sawnwood is exported to Japan and Korea. Total export volume in 2011 decreased in comparison to the indicator of the previous year. However, Japanese exports improved slightly in 2011. Overall the level is very small.

**Figure 4.12  Coniferous Sawnwood Exports from Sakhalin Oblast, 2010-2011**

![Graph showing coniferous sawnwood exports from Sakhalin Oblast, 2010-2011](source: FAO, 2013)

In 2010 the Sakha Republic exported most of its sawnwood to China, some sawnwood was also sold to Latvia. The level is insignificant.
Figure 4.13  Coniferous Sawnwood Exports from Sakha Republic, 2010

![Coniferous Sawnwood Exports from Sakha Republic, 2010](image)


4.2.3 Housing Construction in Russia and the Russian Far East

There was a steady growth in construction of low-rise buildings in 2011, which has almost reached the level before the economic crisis. Their share in total construction is growing, and comprised slightly more than 43% in 2011. The results of a market analysis show that construction of new houses is increasing very rapidly. Republic of Buryatia has the largest amount of house construction with around 96% of wooden houses. The other areas, where wooden construction is widespread, is Volga and Ural Federal Districts.

Increased level of housing construction has resulted from national projects such as ‘Available and Comfortable Housing for Russian Citizens’. Housing construction accounts for the largest part of sawnwood use and its share is projected to grow by 2030 (Figure 4.14). The total amount of housing construction in Russia equalled 58.4 million m². The share of housing construction is 43.6%. The vast majority of construction is performed in the European part of Russia, where most of its population is concentrated. The largest wooden housing markets are Moscow, Moscow Region, Saint Petersburg and its suburbs.
The number of build apartments in the Far East District had been increasing since 2005 until 2011 (Figure 4.15), which shows a positive trend in housing construction. The main explanation for this is the policy of the state targeting to attract more people in the area in order to foster human potential of the District and improve its competitive attractiveness.

Source: Rosstat, 2013.
Apart from local consumption, a great share of sawn softwood is exported abroad. The policy of the state promotes export of goods with high value-added. Weak global economic activity had a negative impact on the industry in 2008 as exports dropped from 16.7 million m$^3$ to 14.8 million m$^3$. Recovery started in 2009 with exports amounting to 15.8 million m$^3$ and growing further to 18.8 million m$^3$ in 2011.

4.2.4 China

Production volumes of sawnwood have been increasing steadily since 2005 onwards reaching a plateau in 2007 with a significant rise in 2009-2011 (Figure 4.16). In spite of increased production, imports of sawnwood are also growing and in 2011 reached its maximum of almost 16 million m$^3$ (Figure 4.17). However, in 2012 there was a small decline in demand for sawnwood in China, and consequently, smaller volumes of sawnwood were imported.

Figure 4.16 China Sawn Softwood Production, 2005-2011

As a result of decreased demand for wood products, imports of logs and sawnwood fell in 2012. Significant changes were registered in North American exports, which reduced by 17%.
Figure 4.17  China Sawn Softwood Imports, 2005-2011

Most sawn softwood is supplied from North America with a market share for sawnwood comprising 53% in January 2013. Canadian exports of sawnwood have also increased surpassing Russia already in 2010 and are projected to grow further in 2013 (Figure 4.18). Canadian sawnwood producers have shifted their market orientation from US to China, making it a very important market.
Among the exported sawn softwood, white pine has the largest share followed by Korean pine, other coniferous wood, Douglas fir and Radiata pine (Figure 4.19).
In the first half of 2012, lumber prices were decreasing, though since May 2012 an upward trend was prevailing with a dramatic decline after September. Despite this, prices stabilized at the level higher than the preliminary indicator.
Figure 4.20  Average Price of Sawn Softwood in China, 2012

Source: BOABC, 2013.

Housing starts in China are to be the main driver until 2015. Chinese government targets at affordable housing for the population by increasing the number of state financed homes. According to the five-year plan of 2010, 36 million affordable houses are going to be built between 2011 and 2015.

From January 2007 housing starts were fluctuating with a dramatic decline in 2009. The recovery started in July 2009 and continued until July 2010. However since then the figures have been reducing and continue to shrink.
Figure 4.21  Development of Housing Starts in China, 2007-2012


4.2.5 South Korea

South Korea mostly depends on imports for wood products from Indonesia, Malaysia, US, Chile, New Zealand and other countries. Coniferous forests prevail in Korea, comprising around half of the total forest area. In spite of this, wood processing in South Korea is expensive and relies largely on imported raw material. Sawn softwood is purchased and processed further into secondary products, which are usually consumed on the domestic market.
Local production of sawn softwood has been reducing since 2005 onwards with the largest decline in manufacturing in 2009 (Figure 4.23).

The residential construction market in South Korea has a great potential. In the past in the 1990s concrete apartment structures dominated the market due to high land costs in urban areas. However, the recent trend encourages construction of single-family wood-frame houses in suburbs and interest in using wood as construction material is increasing.

The attempt to promote wood construction was made at the policy level, to specify, in August 2004 the Ministry of Construction and Transportation (MOCT) increased construction from three stories to five stories (Korea Trade-Investment Promotion Agency).

Survey results (Forestry Innovation Investment) show that even though usage of wood in structural applications is restricted, there are opportunities to use wood within lodgings, resorts, educational facilities and religious buildings. According to the Forth Comprehensive National Territorial Plan (2006-2020), the South Korean government aims to develop regional cities to improve their competitiveness with the metropolitan area. Therefore, sufficient investments in infrastructure and housing should be allocated, which create new market opportunities for wood use.

4.2.6 Japan

Consumption of sawn softwood in Japan is among the largest on the Asian market. Quality requirements for sawnwood are very high due to high specialization of end-use products. Production of sawn softwood has been reducing since 2005 from 12.5 million m$^3$ to 9.3 million m$^3$ with the most drastic decline during the economic recession in 2008-2009. The output started to recover after 2009, though has not reached the level before crisis (Figure 4.24). While domestic production experiences slow recovery, the amount of imports is also decreasing as a result of a decline in housing construction (Figure 4.25).

Figure 4.24 Sawn Softwood Production in Japan, 2005-2012

Sources: FAO, JLR, 2013.

Housing starts have been reducing since 2005 with a fluctuating trend and reached its minimum in 2009 as a result of low economic activity. However, reconstruction of the country after the natural disaster in 2010 encouraged housing construction. As a result of this, the trend improved since 2010 onwards. However, the number of housing starts recovers very
slowly and has not reached the level of 2005. Decreasing population and economic instability in Japan have a negative impact on the housing starts, which in turn, decreases consumption of sawn softwood.

**Figure 4.25 Development of Housing Starts in Japan, 2005-2012**


Housing construction is the largest consumer of sawn softwood in Japan. There are three types of the most common construction methods applied in the Japanese market, which are post and beam (P&B), 2”x4” (2x4) and prefabricated houses construction. The share of post and beam comprised around 74% in 2012, while prefabricated and 2x4 accounted for 22% and 4% respectively. Post and beam occupy the largest segment in housing construction (Figure 4.26).
Most sawn softwood consumed in Japan is imported. Import of sawnwood has been reducing since 2005 and plunged in 2009. After 2010 the amount of imports is recovering, though at a very slow pace (Figure 4.27). The overall downturn has been from slightly under 8 million m³ in 2005 to 6.7 m³ in 2012.
The largest exporters of sawn softwood to Japan are North America, Europe, Russia, Chile and New Zealand. Most sawn softwood imports to Japan originate from North America, Europe and Russia respectively (Figure 4.28).

**Figure 4.28 Main Exporters of Sawn Softwood to Japan, 2012**

![Diagram showing main exporters of sawn softwood to Japan, 2012](image)

In 2012 Russia exported 767,425 m³ of softwood sawnwood, of which 98% is pine/fir. In spite of the fact that Russian sawnwood is easy to use, its unreliable deliveries and difficulties in forecasting prices makes it less attractive for the Japanese market (Japan Lumber Journal).

Prices for Russian lumber are growing following the trend of European and North American lumber products. The average price for larch and fir decreased by 13.3% in 2012 and comprised approximately 302 USD/m³ and 397 USD/m³ respectively (Japan Lumber Journal).

Lumber prices were increasing steadily since 2006. However, the trend of 2012 showed that there was a decline in prices for sawn softwood, as a result of Yen weakening against the US dollar. The price decreased by 5-10% in US dollars (Wood Resource International). Russian Pine showed the highest price growth rate since 2006 with a slight decline in 2012. For other products the prices have also increased, though the growth rate has been considerably smaller.
4.2.7 United States

Sawn softwood production in the US has been traditionally driven by the housing construction sector. Followed by a consecutive decline since 2005 with an output plunge in 2009 (due to the economic recession and collapse on the housing market), there has been an improving trend since 2010. However, production of sawn softwood is recovering very slowly similarly to housing starts, which serve as the indicator for activity on the sawn softwood market.

In 2012 sawnwood production increase in the US was 8% higher than in 2011. Sawmills in the West coast performed better than the rest of the country, as they were able to ship sawnwood to the Asian markets and within the US (Wood Resources International, 2012). Foreign companies target to increase sawnwood exports to the US due to increased demand and significantly higher prices on the US markets.
Historically, demand for sawn softwood has been mostly driven by housing construction. The negative trend on the US housing market is still prevalent. The new housing starts are in a slump that started in 2006-2007. The general trend shows a decrease in housing sales with the lowest quantity over the last 47 years. New home construction equaled 6.7% of the residential sales in 2011 (UNECE, 2012). In February 2013 the housing starts were at 917 000 level, of which 618 000 were single family starts. These indicators have increased since January 2013, which proves that total housing starts are headed upwards after the crisis period. The housing market is healing, but there are still many negative factors affecting it such as consumer confidence, lack of well-paying jobs, strict lending standards etc. (Virginia Tech). According to National Association of Home Builders (NAHB), housing starts are projected to increase by 2014 (Figure 4.31). The main component for housing starts has been multi-family housing, where softwood is widely used. Therefore, US market has a great potential to utilize softwood products.
Figure 4.31  Development of Housing Starts in the US, 2005-2012

Source: NAHB, 2013.

Figure 4.32  TOP 5 Exporters of Sawn Softwood to US, 2010


The Random Lengths Price Index, which evaluates 15 key lumber grades, has grown by 60% from 2011 to February 29013 (Wood Resource International). The price for Southern Yellow Pine lumber grew up by 80% from USD 150/m$^3$ to USD 270/m$^3$ (Figure 4.33).
Figure 4.33  Sawnwood Prices in the US, 2005-2013

Source: WRQ, 2013.
5. SOFTWOOD PLYWOOD INDUSTRY AND MARKETS

5.1 Softwood Plywood Producers and Consumers within the Study Area

5.1.1 Russia

There are some 50 plywood plants in Russia with a total annual capacity of 3 million m$^3$. Older mills have a smaller capacity but the more recent investments have an annual capacity exceeding 100 000 m$^3$/a. Increase in production volumes may be explained by growing export markets while domestic market has had a smaller impact on production output.

Russian plywood manufacturers are forced to adapt to the requirements on foreign markets, which show growing demand for large format plywood as well as laminated plywood. Recently, almost all manufacturers increased production of 2 440 x 1 220 mm, 3 050 x 1 525 mm, and 3 500 x 1 500 mm plywood. Global consumption of this type of plywood is approximately 70%. Many of the above mentioned products are exported to the US, which has specific requirements not only for the plywood sizes, but also sets high standards for the quality of the products. Some other requirements for plywood on the US market include atmospheric resistance and water-resistance, as well as non-toxicity.

At the same time, the demand for water-resistant plywood manufactured from phenol-formaldehyde resin is reducing, as it contains phenol, which is a carcinogenic product. Simultaneously, there is a growing demand for melamine resins, which are harmless for human health and resistant to the rain, light and temperature variations.

The domestic market is featured by a demand for square format plywood (1 525 x 1 525 mm), the application for which is in construction and furniture manufacturing. The share of the square format plywood is 69%.

Production of softwood plywood was increasing since 2005 until 2007. However after economic recession, the output started to decrease gradually and equaled 190 000 m$^3$ in 2012 (Figure 5.1), which is 6% higher than in 2011.

**Figure 5.1  Russian Coniferous Plywood Production, 2005-2012**

![Graph showing Russian Coniferous Plywood Production, 2005-2012](image-url)
Consumption of plywood was growing since 2005 soaring at 1.4 million m$^3$ in 2008 followed by a downturn mainly caused by weak demand on foreign markets. The recovery started in 2010 continued further in 2011 with consumption equalling 1.3 million m$^3$ (Figure 5.2).

**Figure 5.2 Russian Plywood Consumption, 2008-2011**

![Graph showing plywood consumption, 2008-2011](image)


The imports of Russian softwood plywood were growing since 2005 plunging to 50 000 m$^3$ in 2009. The recovery of imports started in 2010 with 100 000 m$^3$ imported, which was still below the record high indicator of 115 000 m$^3$. 

© INDUFOR: 6872 FOREST SECTOR STUDY OF THE RUSSIAN FAR EAST – ROAD MAP FOR VALUE ADDED INVESTMENT IN FOREST INDUSTRY (ID 42255) – December 31, 2013
Figure 5.3  Russian Softwood Plywood Imports, 2008-2011


Figure 5.4  Russian Plywood Exports, 2005-2012

Note: Includes hardwood plywood. Source: Pyrabelisk, 2013.
5.1.2 **Russian Far East Regional Production and Exports**

Regarding the Russian Far East, in 2011 there were 25,946 m³ of plywood imported from China, while major export destinations were US (210,645 m³), Germany (148,987 m³) and Egypt (209,498 m³). The main exporting regions for coniferous plywood are Primorsky Krai and Khabarovsk Krai.

In 2012 there were some insignificant amounts of coniferous plywood exported from Sakhalin Oblast mainly to Cuba, which was also the only destination.

**Table 5.1** Softwood Plywood Exports from Sakhalin Oblast, 2012

<table>
<thead>
<tr>
<th>Importer</th>
<th>Unit</th>
<th>Quantity 2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>m³</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cuba</td>
<td>m³</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>


Primorsky Krai mainly supplies China with coniferous plywood as in 2010 there were 3,000 m³ exported followed by lack of exports in 2011 and some small amounts in 2012.

**Table 5.2** Softwood Plywood Exports from Primorsky Krai, 2012

<table>
<thead>
<tr>
<th>Importer</th>
<th>Unit</th>
<th>Quantity 2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>m³</td>
<td>3,000</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>m³</td>
<td>3,000</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>


Khabarovsk has the largest exports of coniferous plywood in the Far East Federal District which has been decreasing since 2010 from 678,000 m³ to 385,000 m³.
5.1.3 China

Plywood production continues to be on the upwards path (Figure 5.6). Thus production volumes have been growing since 2005 and increased from 25 million m$^3$ in 2005 to 66 million m$^3$ in 2012. The majority of Chinese plywood is poplar with a share of 60%, followed by Eucalyptus plywood (20%). Exterior gluing comprises about one third of Chinese plywood. Furniture sector continues to be an important consumer of plywood in China. Production costs continue to grow in 2010 as wood costs increased by 15 %, while with other costs grew by 5%.
In line with production volumes, consumption levels increased accordingly and totalled almost 50 million m³ in 2011 (Figure 5.7).

Chinese exports of plywood have been increasing steadily in 2005-2007, followed by a significant decline in 2008 and further in 2009. However, the volumes began to rebound and in 2011 reached record level of 9.6 million m³ (Figure 5.8). Major importing countries were US, holding one third of total exported plywood, followed by Japan (10%), UK (9%), Belgium (5%) and UAE (5%) (Figure 5.9)
With rapid development of production volumes, Chinese imports experienced downwards trends in 2005-2011 and declined from 560 000 m³ in 2005 to as low as 190 000 m³ in 2011 (Figure 5.10). Most of the plywood is imported from Malaysia and Indonesia.

**Figure 5.9** Chinese Plywood Exports by Country, 2010

- **US**: 34%
- **Others**: 37%
- **Japan**: 10%
- **UAE**: 5%
- **Belgium**: 5%
- **UK**: 9%

**Total 7.5 million m³**

Source: FAO.

**Figure 5.10** Chinese Plywood Imports, 2005-2011

Source: FEIC, 2011.
5.1.4 South Korea

According to the Korea Wood Panel Association, the plywood industry is represented by five mills and employs some 850 people. Thus, three mills hold the annual capacity of more than 100,000 m$^3$, while two smaller mills can annually produce 30,000 – 100,000 m$^3$ of plywood. However, the production capacity has been decreasing continuously, when, for example, it shrank by 59,000 m$^3$ in 2009. As demonstrated in Figure 5.11, capacity reduction resulted in a significant drop in production volumes. Hence, plywood output has been declining constantly in the recent years from as high as 764,000 m$^3$ in 2007 to its lowest point of 455,000 m$^3$ in 2010-2011. As there are no domestic wood resources for coniferous plywood manufacturing in South Korea, radiata pine logs are mainly imported from New Zealand and tropical logs from Salomon Islands. Moreover, the country imports large amount of veneers for further processing.

Figure 5.11 South Korean Plywood Market, 2005-2012

Following the pattern of drastic decline in coniferous plywood production, the consumption volumes have been shrinking accordingly from 2.2 million m$^3$ in 2007 to 1.7 million m$^3$ in 2011. Traditionally the construction industry is the largest consumer of all kinds of plywood in South Korea, holding a share of 82% of the overall consumption. However, as a leading plywood consumer segment, construction activity has been contracting at a rapid pace. At the same other segments, such as furniture, packaging, flooring and others combined account for 18%.

The overall Import volumes of all kinds of plywood have stayed on similar level in 2005-2011, falling in the range of 1.2-1.3 million m$^3$. Despite negative trends in production and consumption of coniferous plywood, import volumes have been growing throughout 2007-2012, but still remained on a low level and comprised 25,000 m$^3$ in 2012. It is likely that significant amount of coniferous / softwood plywood is accounted under the mixed / hardwood plywood.
Malaysia, China and Indonesia are the largest exporters of hardwood plywood to South Korea, accounting for some 80% of all import volumes. Figure 5.12 reveals major importing partners of coniferous plywood to South Korea. Hence, while almost half of the imported volumes in 2012 originated from China, slightly more than a quarter was supplied from Vietnam. Both Finland and Chile hold 8% of overall imports (2 100 m³ each), whereas Russia’s share totalled 5% (1 100 m³). Also, other partners combined accounted for 5% (1 100 m³).

**Figure 5.12  South Korean Coniferous Plywood Imports by Country, 2012**

<table>
<thead>
<tr>
<th>Country</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>47 %</td>
</tr>
<tr>
<td>Vietnam</td>
<td>27 %</td>
</tr>
<tr>
<td>Finland</td>
<td>8 %</td>
</tr>
<tr>
<td>Chile</td>
<td>8 %</td>
</tr>
<tr>
<td>Russia</td>
<td>5 %</td>
</tr>
<tr>
<td>Others</td>
<td>5 %</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>25 000 m³</strong></td>
</tr>
</tbody>
</table>

Note: only coniferous plywood. It is likely that a large share of softwood plywood is accounted under hardwood plywood. Source: KITA, 2013.

At the same time, South Korean export volumes of coniferous plywood remain on a low level, especially starting from 2008. Hence, 1 075 m³ of coniferous plywood was exported from South Korea in 2012.

### 5.1.5 Japan

There are 33 plywood mills with combined annual capacity of ca. 4 million m³ in Japan, where the majority of them manufacture coniferous plywood. About 82% of the domestically produced plywood has a thickness exceeding 12 mm for construction applications in dwellings, public facilities and interior finishing. Plywood consumption in furniture, packaging, transportation and other segments is presented to a lesser extent.

As demonstrated in Figure 5.13, production volumes mainly followed global economic situation, with stable moderate growth in 2005-2007 from 2.3 million m³ to 2.4 million m³, followed by a rapid saturation in 2008-2009 to as low as 1.9 million m³ in 2009. However, production volumes began to recover again in 2010, reaching 2.3 million m³ in 2010. As a result of devastating tsunami and earthquake in 2011, north-eastern Japan experienced severe damages, whereas apparently some 800 000 m³ of all kinds of plywood was lost as a result of natural disasters. Also, unaffected mills suffered from power outage for electricity conservation reasons. Domestic production managed to recover completely only by mid-2012. However, despite challenging environment, production volumes in 2011-2012 remained on 2010 level, totaling some 2.3 million m³.
Consumption of coniferous plywood in Japan has been developing in line with the production volumes and totalled 2.5 million m³ in 2012. The largest decline was registered in 2009, when the consumption dropped to its lowest point of 2 million m³. The main reason for a sharp decline in plywood consumption in 2008-2009 has been caused by a weak construction activity and low number of new housing starts.

Export volumes have been on a very low level and totalled 4 000 m³ in 2012. Japan imports considerable amount of coniferous plywood. Hence, import volumes have been fluctuating throughout 2005-2012, with lowest volumes registered in 2008-2009 (some 50 000 m³). The exceptionally high imports were in its turn recorded in 2011 and totalled as high as 205 000 m³, but they were caused by consequences of force major. Average import volumes fall in the range of 100 000-130 000 m³ and totalled 127 000 m³ in 2012.

As of 2012, main trading partners, accounting for over 100 000 m³, included New Zealand, holding 38%, Korea (26%) and the Philippines (20%) (Figure 5.14). At the same time, lower volumes of 7 000 m³ and 6 000 m³ were imported from Canada and Chile, respectively. Other countries combined accounted for a small share of 5%.
Figure 5.14  Japanese Coniferous Plywood Imports by Country, 2012


5.1.6 United States

With an installed annual capacity over 11 million m$^3$, the United States is world’s second largest producer of plywood after China. However, due to continuous housing recession followed by capacity reduction, there have been registered a significant drop of production volumes starting from 2006 (Figure 5.15). Thus, while 12.7 million m$^3$ of coniferous plywood was produced in 2005, already in 2007 the output declined to 10.8 million m$^3$ and further to 7.6 million m$^3$ in 2009. Followed by a moderate growth of 6% in 2010, production volumes fell again to the level of 2009 in 2011 and totaled 7.65 million m$^3$. 
Downturn of construction activity, as a major plywood consuming sector, brought drastic changes in consumption levels of coniferous plywood. Some volumes of plywood are used in repair and remodelling, as well as in construction of non-residential buildings in public and private sectors (e.g., schools, hotels, and stores). At the same time, other sectors, such as furniture, packaging and transport managed to increase their shares in relative terms. Consumption volumes of coniferous plywood declined from their highest point of 14.5 million m$^3$ in 2005 to as low as 7.6 million m$^3$ in 2011.

As a result of a weak domestic demand, the United States rely less on imports in the recent years and the volumes collapsed compared to 2005 level. Unlike 2005-2006, when 2 million m$^3$ of coniferous plywood was imported on average into the country, way below 0.5 million m$^3$ were imported annually in 2010-2012.
The United States traditionally exports large amount of coniferous plywood and the volumes have been increasing in the recent years. While 350 000 m³ was exported in 2005, over 500 000 m³ went overseas in 2012. Canada was the major destination for US plywood, amounting for over 55% (280 000 m³). This is mainly border trade. Some 23% (120 000 m³) was directed to the southern neighbor, Mexico, and 6% (34 000 m³) to China. Other countries, particularly countries of EU/EFTA, hold 16% share in the total export volume and imported 81 000 m³ of coniferous plywood from the US in 2012 (Figure 5.17).
Figure 5.17  US Coniferous Plywood Exports by Country, 2012

Source: USITC, 2013.

Canada 55 %
Mexico 23 %
China 6 %
Others 16 %

Total: 522 000 m³
6. RECONSTITUTED PANELS INDUSTRY AND MARKETS

6.1 Reconstituted Panels Producers and Consumers within the Study Area

6.1.1 Russia

The wood-based panel market is developing quite rapidly in Russia with strong production and high demand for particleboard, growing share of MDF and OSB, and well-established plywood manufacturing (note: plywood is discussed separately in the plywood chapter). Consumption and production of wood-based panels was increasing since 2005 followed by a sharp decline in 2009 (Figure 6.1). Increase by 12% in 2012 both in production and consumption of OSB, MDF, plywood and particleboard shows that there has been a recovery after the recent crisis.

Figure 6.1 Production of Wood-Based Panels in Russia, 2005-2012

[Bar chart showing production of PB, Plywood, MDF, and OSB from 2005 to 2012]

Note: Plywood is discussed separately in the plywood chapter. Source: Lesprominform, 2013.

Consumption of wood-based panels was growing since 2005 with a dramatic decline in 2009. Particleboard has the largest share followed by plywood, MDF and OSB. Recovery in consumption started in 2010 and continued until late 2011 (Figure 6.2).
Figure 6.2 Consumption of Wood-Based Panels in Russia, 2005-2012

Note: Plywood is discussed separately in the plywood chapter. Source: Lesprominform, 2013.

Particleboard

Over the last decade production of particleboard has increased by 2.5 times, and consumption doubled. Production of particleboard was growing rapidly from 3.9 million since 2005 with a slowdown in 2008 and subsequent downturn to 4.5 million m$^3$ in 2009. The recovery of output in 2010 continued its trend until 2012. According to estimates, the growth in production in 2012 should be slower than in 2011 (Figure 6.3). Production in 2012 was at the level slightly below 6.5 million m$^3$. Rapid growth in demand for particleboard led to a shortage in supply in 2012-2013 (Russian Forestry Review, 2013).

Particleboard factories with capacity over 400 000 m$^3$/a per line are located mainly in Volga and Ural District. One of such projects is Kastamonu Entegre in Tatarstan (with capacity over 720 000 m$^3$), Kronospan in Bashkortostan, Uvadrev in Udmurtia (500 000 m$^3$) and Sveza (500 000 m$^3$). Implementation of these projects may increase capacity of particleboard in Russia by 30%. However, similarly to other forest products, most machinery is out-of-date with an average age of 47 years old (Russian Forestry Review, 2013).

Russian particleboard production has been growing since 2005 from 3.9 million m$^3$, totaling at 6.5 million m$^3$ in 2012. In 2009 there was a decline in production to 4.5 million m$^3$ caused by economic recession.
6.1.2 Russian Far East Production and Trade

In the Russian Far East, particleboard production is developed in Khabarovsk Krai, where manufacturing peaked at 90,600 m$^3$ in 2011 followed by a decline in 2012 to 57,700 m$^3$.

Figure 6.4 Particleboard Production, Khabarovsk Krai 2007-2013 Q1

Source: Minvostokrazvitiye, 2013
Consumption of particleboard in Russia has been growing steadily since 2005 from 4.2 million m$^3$ to 6.9 million m$^3$. The decline of 2009 was caused by slowdown in the economy and generally weakened demand (Figure 6.5).

**Figure 6.5** Russian Particleboard Consumption, 2005-2012

In the Russian Far East, the major exporter of particleboard is Khabarovsk Krai, with 35 243 m$^3$ exported in 2012, which is 26 783 m$^3$ less than in 2011. The main export destinations are South Korea, China and Japan. Exports to Japan were quite insignificant until 2012, when exports totaled at 2 800 m$^3$ (Figure 6.6).
MDF

MDF production and consumption indicators have been growing quite fast since 2000. Overcapacity in Tomsk (Russia) and Korosten (Ukraine) dumped the prices in 2012. New production factories such as Kastamonu (480 000 m³/a), PDO Apsheronsk in Krasnodar (330 000 m³/a) are set to launch in 2013-2014. Together they will add up to 50% to the MDF capacity in Russia. However, oversupply in the market will continue to drag the prices down in the medium term.

Production of MDF was growing in Russia since 2005 from 446 000 m³ and amounted to 1.1 million m³ in 2012. After soaring to over a million in 2007 and continuing further in 2008 to 1.1 million, particleboards output started to decline steadily during the crisis period reaching its minimum in 2010. Since 2011 figures are climbing back and the output of 2012 shows that production is catching up with the level of 2008.

Statistics available for the Far East includes both MDF and hardboard production. In the Far East, most production of fibreboards is concentrated in Khabarovsk Krai. In 2012 it totaled at 23 500 m$^3$, compared to the indicator of 2011, which was 6 000 m$^3$. However, in the first quarter of 2013, there were no fibreboards produced in Khabarovsk Krai (Table 6.1).

In Amur Oblast, in 2007 some 20 600 m$^3$ of fibreboards were produced. However, manufacturing was brought to a halt in subsequent years.

Table 6.1  Production of Fibreboard in Khabarovsk Krai, 2005-2012

<table>
<thead>
<tr>
<th>Production, 1 000 m$^3$</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibreboard</td>
<td>6 000</td>
<td>23 500</td>
</tr>
</tbody>
</table>

Note: Production includes hardboard. Source: EPF, 2013.

The situation with consumption of MDF is quite dramatic, as climbing since 2005 from 779 000 m$^3$ the demand started to weaken as a result of oversupply on the market caused by various investment projects in the field as well as aggressive Chinese expansion on the Russian market. Therefore, what we have at present is weakening demand totaling at slightly over a million, which is considerably lower than the indicator of 2007 (Figure 6.8).
However, as stated by Wood Based Panels International, the Russian MDF market may experience a serious crisis as a result of Russia’s accession to WTO and increased imports. The price level decreased on the domestic market, which threatens the survival of local businesses. The prices for MDF on the Russian market dropped last year by 30% from EUR 340-370 per m$^3$ to EUR 250-270 per m$^3$. The crisis has also worsened by the recent launch of new plants such as the Partner-Tomsk with a capacity of 260 000 m$^3$/year and the Ukrainian Korostenskyi MDF plant with the capacity of 300 000 m$^3$. An increase in Chinese exports has a negative impact on the local production level.

In the Far East District, an additional capacity of 150 000 m$^3$ was made operational in Khabarovsk Krai when Malaysian company Rimbunan Hijau investmented into a new mill. The plan is to export MDF mainly to China, Japan and South Korea. The mill is currently shut down due to high raw material costs and low market prices for end products.

The largest producers of MDF in the Far East are located in Primorsky Krai and Khabarovsk Krai. Main export destinations of MDF from Primorsky Krai are South Korea (79%), Japan (18%) and China (3%) (Figure 6.9).
89% of exported MDF has thickness below 5 mm, followed by 9% of exports of MDF with thickness exceeding 5 mm, but smaller than 9 mm, while only 4% of MDF with thickness over 9 mm are exported. MDF of 5 mm thickness is exported to Japan and South Korea.

In 2012 around 134 813 m³ was exported. Out of this amount 89% of exported MDF has a thickness below 5 mm, while MDF with thickness exceeding 5 mm but smaller than 9 mm comprises 9% in the total export. MDF with thickness over 9 mm has a share of just 4%. The main export destinations of MDF with 5 mm thickness are Japan and South Korea (Figure 6.10).
In 2012 around 551,000 m³ was exported from Khabarovsk Krai. Around 46% was sold to South Korea, 31% to India, 12% to Vietnam, 4% to Philippines and 5% to Pakistan. Chinese exports did not exceed 2% in 2012 (Figure 6.11).


Figure 6.10  Export Share of MDF by Thickness, Primorsky Krai, 2012


Figure 6.11  MDF Exports from Khabarovsk Krai, 2012

In 2012 the largest share (47%) of MDF out of 551 000 m³ was registered for the products with the thickness below 5 mm, followed by the product category of between 5 mm and 9 mm (34%), while the export of MDF with the thickness above 9 mm accounts for 19% of exports (Figure 6.12).

Figure 6.12 Export Share of MDF by Thickness, Khabarovsk Krai, 2012

According to Russian MDF producers, Chinese imports are undermining local production as most Chinese products are imported through ‘grey schemes’ and sold at considerably lower prices than of the Russian producers. The price of Chinese manufacturers may be 20% lower on the Russian market. Kronospan and Kronostar are experiencing smaller sales volumes, which is particularly notable in the segment of boards for flowing. As a result of this, local producers are forced to shift their capacities to other less profitable products such as furniture facades and interior doors. However, even on these markets the supply exceeds demand, which leads to falling prices. If in Moscow the price level is still quite high, the situation in other regions is quite pessimistic. For instance, the state of affair is particularly unfavourable in the Far East and the South of Russia, where Chinese imports control 90% of the domestic markets (Wood Based Panels International).

Further dumping of prices will continue due to Russian WTO accession, which will lead to reduced duties on imports of MDF from 15 to 5%. According to the Russian magazine Furniture Business, some investment projects may be postponed for the future. Among these projects are the launch of the MPC ‘Apsheronsk’ plant in Krasnodar, Igorevskaya woodworking integrated plant in Smolensk and Kastamonu Entegre.

OSB

After the collapse of Soviet Union, the production of OSB was brought to a halt. The first batches of OSB appeared on the Russian market in 2000, when about 2 000 m³ of panels were imported. The amount of imports had increased by 7 times in 2006 as a result of housing construction and booming economy. Until 2012, all OSB in Russia was imported, the current volume of which is 380 000-400 000 m³/a. The major imports of OSB derive from Latvia followed by Canada and Germany. At present, the demand for OSB remains to be low as no
major producers have occupied the market. Furthermore, Russian market does not have much experience in using such materials (Wood Based Panels International).

Production of OSB started in 2012 and totaled at approximately 80 000 m$^3$ (EPF), while consumption increased tremendously to slightly less than 500 000 m$^3$/a over the last decade (Figure 6.13). Price level for OSB is quite high, as domestic market is featured by small-scale production. The main new start-ups are expected to appear in Kronospan mill in Yegoriyevsk in the Moscow Region (440 000 m$^3$/a) and the Kalevala mill in Petrozavodsk, Karelia (500 000 m$^3$/a). The mills are likely to be launched during this year, however, they have been delayed several times already. The other mills are located in Kirov and Vladimir with a cumulative capacity of 130 000 m$^3$/a. Other investment projects include new mills in Eastern and Western Russia (Russian Forestry Review).

**Figure 6.13  Russian OSB Consumption, 2005-2012**

![Graph showing Russian OSB Consumption, 2005-2012](image)

Source: EPF, 2013.

The largest importers of OSB in Russia are as follows:

- St. Petersburg - 209 000 m$^3$ (USD 278/m$^3$)
- Moscow/ Moscow Region - 136 000 m$^3$ (USD 293/m$^3$)
- Nizhegorodksya Oblast - 68 000 m$^3$ (USD 34/m$^3$)
- Sverdlovskaya Oblast – 34 000 m$^3$ (USD 310/m$^3$)
- Kaliningradskaya Oblast – 17 000 m$^3$ (USD 316/m$^3$)
- Primorsky Krai – 17 000 m$^3$ (USD 184/m$^3$)
- Brianskaya Oblast – 7 000 m$^3$ (USD 311/m$^3$)
- Tatarstan – 7 000 m$^3$ (USD 286/m$^3$)
- Novosibirskaya Oblast – 6 000 m$^3$ (USD 304/m$^3$)

Main exporters of OSB to Russia:

- Latvia (Sia Bolderaja) – 147 000 m$^3$ (USD 303/m$^3$)
- Canada (Luisiana Pacific Canada Ltd, Norbord Industries Inc) – 140 000 m$^3$ (USD 261/m$^3$)
Main exports of OSB from the Far East are directed to South Korea, China and Japan from Khabarovsk Krai. However, in 2012 there was a considerable decline of OSB exported from 62,026 m³ in 2011 to 35,243 m³ in 2012.

In 2012 some 50% out of 35,243 m³ from Khabarovsk were sold to South Korea followed by China (42%) and Japan (8%) (Figure 6.14, Figure 6.15).

**Figure 6.14  Exports of OSB from Khabarovsk Krai, 2010-2012**

![Exports of OSB from Khabarovsk Krai, 2010-2012](chart)

Wood-based panels production has been growing since 2005 onwards from 5.5 million m$^3$ to slightly over 150 million m$^3$ (Figure 6.16). Despite a slight slowdown in growth in 2009, the sector did not go through significant market decrease and the demand remains stable. However, it is vital to remember that the Chinese economy is maturing and it should be expected that growth will be gradually slowing down, and double-digit increases such as few years ago are unlikely to happen. Forecasted moderate growth indicates similar trends in construction and furniture markets. China’s wood fibre market will be quite tight pressing to drive the manufacturers’ costs down.

Rising production of wood panels was encouraged by a rebound in export markets in 2010-2011, which could be noticed particularly for MDF/HDF.

In 2012 there were around 152 million m$^3$ of wood-based panels produced in China with plywood having the largest share of 43%, followed by MDF/HDF (34%), blockboard (12%) and particleboard (11%) (Figure 6.17). Plywood is discussed in a separate chapter.
Figure 6.16  China Wood-based Panels Production, 2000-2012

![Bar Chart: China Wood-based Panels Production, 2000-2012](chart)


Figure 6.17  China Wood-based Panels Production by Panel Type, 2012

![Pie Chart: China Wood-based Panels Production by Panel Type, 2012](chart)

Figure 6.18  China Wood-based Panels Imports, 2000-2011


Figure 6.19  China Wood-based Panels Exports, 2000-2011

Figure 6.20  Chinese Wood Based Panels Consumption, 2005-2012

![Chinese Wood Based Panels Consumption, 2005-2012](chart)


**Particleboard**

Production of particleboard has been raising from 5.8 million m³ in 2005 to 13.5 million m³ in 2012 with visible fluctuations during the whole period and slight downturn in production in 2007 and 2010 (Figure 6.21). According to Wood based Panels International forecast, production volume of particleboard is expected to grow further in 2013. However, this will happen under the condition that particleboards are going to be accepted among the customers in furniture industry. Apparently, there may be limitations in particleboards growth. As well as these, Chinese particleboards producers are experienced an increase in chips, sawdust and resin costs in 2011.
Since 2005 consumption of particleboard in China increased more than twice soaring to 13.8 million m³ (Figure 6.22). Consumption in China mainly benefits from wages increase, which is corrected by the growing inflation rate. The general depressed economy is visible as both production and consumption of particleboards are quite stable.
Imports of Chinese particleboard have been declining since 2005 reaching its minimum of 374 000 m$^3$ in 2008 (Figure 6.23). Afterwards, there was a steady growth in particleboard imports from 446 000 m$^3$ to 574 000 m$^3$, while most other particleboard markets were reducing their imports in response to economic recession.

**Figure 6.23**  Chinese Particleboard Imports, 2005-2012

Exports of particleboards to China has been growing from 95 000 m$^3$ in 2005 to 193 000 m$^3$ in 2008, followed by a drastic decline in 2009 to 125 000 m$^3$ and climbing back steadily since 2010 to 255 000 m$^3$ in 2012 (Figure 6.24).

MDF

MDF will remain the second largest panel after plywood on the Chinese market. The competition on the MDF market and worsening market conditions did not hinder the development of China on MDF market as production continued to increase at a double-digit rate in 2012, and amounted to almost 50 million m$^3$ (EPF). To meet rising demand for MDF in China, production capacity was increased by 15% in 2011.

The product range on the Chinese market includes MDF with a thickness higher than 9 mm, while panels with a thickness between 5 and 9 mm accounted for 15% of output. Around 55% of MDF is consumed by the furniture industry, 25% by construction sector including laminate flooring, 11% is purchased by interior fitments and 9% is sold for other usage including packaging. The main source of raw material (90%) is industrial residues, although the costs for this type of material are growing.

Production of MDF was growing steadily between 2005 and 2012 reaching its maximum of 49 million m$^3$ in 2012 (Figure 6.25).
Consumption of MDF was growing since 2005 showing a slightly stagnating growth until 2009 with a sharp increase in 2010 to 37.3 million $m^3$. Further increase was quite significant with consumption totalling 47 million $m^3$ in 2012. Consumption of MDF is projected to climb by 30% in 2013 to over 55 million $m^3$ reaching the consumption level of plywood (Figure 6.26).

Source: EPF, 2013.
MDF imports were reducing since 2005, plunging in 2007 with substantial decrease to 323 000 m³ in 2007 (Figure 6.27). In 2008 imports reached its minimum at 255 000 m³. However, the period of recovery started in 2009. As a result of this, the amounts of import increased to 440 000 m³ in 2012.

**Figure 6.27  Chinese MDF Imports, 2005-2012**

Source: EPF, 2013.

Export of MDF was growing since 2005 from 747 000 m³ and reached its maximum in 2008 at 2.3 million m³ with a downturn in 2009 to 1.9 million m³. The recovery started in 2010 and continued until 2012 with exports equalled 2.4 million m³. However, the export level before 2008 had not been reached until now (Figure 6.28).
6.1.4 South Korea

South Korea is largely dependent on exports, and the recent economic crisis had a negative impact on its economic growth. Consumer confidence has been greatly influenced by soaring personal and private debt, and served as the main driver for the economic slowdown. In spite of decreasing economic growth, South Korea has withstood the recession relatively well, mainly due to depreciated Korean won, demand on the Chinese markets and adequate fiscal and monetary policy.

As Korea's greenhouse gas emissions reached its maximum since 1990, the target of reducing emissions by 30% was set by 2020 from the 1990 level. A mandatory cap-and-trade scheme is planned. This would evolve new opportunities for development of wood industry in South Korea, where wood could find application in many sectors, of which housing could be one of the largest consumers.

Development of the Housing Sector

According to Korean Comprehensive National Territorial Plan, more population and businesses are expected to shift outside the capital region of Seoul. Housing density in the regions is promoted to decrease by building smaller multi-family buildings with five stories or less (Forestry Innovation Investment).

Renovation of aging housing stock

Most Korean apartments require renovation, which is further encouraged by the state policy instead of demolition of older buildings. As a result of this, building materials such as flooring, doors, windows and cabinets are going to be in demand for home renovation (Forestry Innovation Investment).
Particleboard

Manufacturing of particleboard in South Korea has been quite stable with insignificant increases in production volumes and targeted at the domestic market. Main imports originate from Thailand and Malaysia. Previously, all Canadian imports were coming from British Columbia, with reducing imports since 1990s.

Between 2005-2012 particleboard output was fluctuating reaching its maximum between 2007 and 2010. After 2010, South Korea started to follow a downward trend with production dropping to 835 000 m$^3$ (Figure 6.29). The particleboard industry had a particularly difficult year in 2011 as production decreased by 13.5%. Imports and consumption had also experienced a decline of 4.1% and 9.1% in 2011 respectively. The main end-users include furniture industry (90%), door manufacturing (2%), packaging (5%) and other (3%).

Around 69% of all raw material is derived from recycled wood, industrial residues made up 20%, while roundwood comprised 11%. There was also an increase in costs for recycled wood by 33%, for roundwood by 6% and industrial residues by 10%. Wood availability and growing costs is going to be an important issue for Korean producers as well as increasing costs for resins.

Figure 6.29  South Korean Particleboard Production, 2005-2012

![Graph showing South Korean Particleboard Production, 2005-2012](source: EPF, 2013)

Consumption of particleboard was fluctuating between 2005 and 2012 with a peak in 2010 totaling at 1.7 million m$^3$ followed by a sharp decline in 2011 to 1.5 million m$^3$. In 2012 consumption is estimated to rise to 1.6 million m$^3$ (Figure 6.30).
Climbing to 955 000 m$^3$ in 2006, imports of particleboards dropped to 768 000 m$^3$ in 2007. Further decline was registered in 2009 at 677 000 m$^3$. The imports have stabilized in 2010 at 805 000 m$^3$ with a slight increase to 849 000 m$^3$ in 2012. Lack of raw material will be the main driver for increasing imports to South Korea and this trend should prevail in the coming years (Figure 6.31).
Exports of particleboard from South Korea are insignificant. Since 2005 there was a gradual decrease in exports from 1 000 m$^3$ to 500 m$^3$ in 2007, recovering to the level of 2005 of 1 000 m$^3$ in 2008. Since 2008, exports were growing steadily reaching the maximum of 3 000 m$^3$ in 2010 (Figure 6.47).

**Figure 6.32  South Korean Particleboard Exports, 2005-2012**

![South Korean Particleboard Exports, 2005-2012](image)

Source: EPF, 2013.

**MDF**

After 2006, production of MDF was on the rise until 2007 amounting to 1.7 million m$^3$, followed by a subtle downward trend until 2009. The recovery started in 2010 and soared to 1.8 million m$^3$. In 2012 it totalled at 1.9 million m$^3$ (Figure 6.48).
Consumption of MDF was growing continuously since 2005 and reached 2.1 million m$^3$ in 2008 before falling drastically in 2009 to 1.8 million m$^3$. Afterwards, South Korean MDF consumption followed a fluctuating trend totalling 2 million m$^3$ in 2012 (Sources: EPF, Wood Based Panels International, 2013. Figure 6.49).
Figure 6.34  South Korean MDF Consumption, 2005-2012

Imports of MDF were at the level of 416 000 m$^3$ in 2005 and 468 000 m$^3$ in 2008. Since 2009 the trend turned downwards and imports fell to 185 000 m$^3$ continuing falling even further to 130 000 m$^3$ in 2012 (Figure 6.50).
Exports of MDF were falling gradually since 2005 until 2011, when the indicator increased to 52 000 m$^3$. In 2012 there was a slight decrease to 50 000 m$^3$ (Figure 6.51).

Source: EPF, 2013.
6.1.5 Japan

Japanese government has made tremendous efforts in order to rebuild the country after the massive East Japan earthquake hit in March 2011. Production output declined significantly after the disaster. Economic rebound started in May 2011. However, by 2012, GDP had recovered to almost pre-earthquake levels.

Japanese wood products market is maturing and the main focus in the industry is to develop niche opportunities in elderly care facilities, post-and-beam and 2x4 wood-frame construction, as well as value-added products (Forestry Innovation Investment). In 2012 there was a short-term increase for panel products as production on the domestic market had dropped as a result of earthquake and tsunami. Prospects in the home building market are quite promising, as high-end elderly care facilities are gaining a larger market share.

Over the last few years, significant progress has been made to introduce Oriented Strand Board (OSB) into the Japanese market. Particularly high demand was registered for OSB in 2011 (a record 300 000 m³, up from 213 000 m³ in 2010) as a result of softwood plywood shortages and high prices following the earthquake and tsunami.

The downward trend of particleboards production started in 2007 from 1.2 million m³ reaching its minimum of 934 000 m³ in 2010 and stabilized at the level of slightly over 1 million m³ in 2012 (Figure 6.37).

Figure 6.37 Japanese Particleboard Production, 2005-2012

![Bar chart showing Japanese particleboard production from 2005 to 2012.](chart)

Source: EPF, 2013.

Decreasing wood availability and growing prices will stimulate usage of renewable energy such as biomass. The share of post-consumer wood as raw material increased to 80% versus 70% in 2010. Industrial residues comprise 17%, while roundwood accounts for some 3%.

Consumption of particleboard was growing between 2005-2007 dropping to 1.5 million m³ in 2008. Rebound in consumption started in 2010 from 1.3 million m³ to 1.5 million m³ in 2012 mainly due to reconstruction caused by the natural disasters in 2011 (Figure 6.38).
Growth of 70 000 m$^3$ in imports of particleboard was registered in 2006. Afterwards, the trend turned downward and hit bottom of 354 000 m$^3$ before increasing sharply to 563 000 m$^3$ in 2011. In 2012 there was a small decrease in imports to 535 000 m$^3$ (Figure 6.39).

Source: EPF, 2013.
MDF

Production of MDF was growing since 420,000 m³ in 2005 to 475,000 m³ by 2007. The trend turned downward in 2008 and reached its minimum of 320,000 m³ in 2009. The period of recovery started in 2010 and by 2012 production amounted to 380,000 m³ (Figure 6.40).

Figure 6.40 Japanese MDF Production, 2005-2012

Source: EPF, 2013.

Consumption of MDF was fluctuating until 2007 and amounted to a million in 2007. Afterwards, Japanese consumption started to decline steadily and reached its minimum of 624,000 m³ in 2010. By 2012 consumption had reached 765,000 m³ (Figure 6.41).
Japanese imports of MDF were declining since 2005. However, in 2007 the amount of imports increased and amounted to 566,000 m³. Afterwards, the trend turned downward and totalled at 282,000 m³ in 2010. By 2012, there were 385,000 m³ of MDF imported to Japan (Figure 6.42).
The largest amount of MDF was imported from New Zealand (54%), Malaysia (31%), South Korea (4%), China (4%) and others (7%) (Figure 6.43).

Figure 6.43  Japanese MDF imports by country of origin, 2012

Production of wood-based panels has exhibited considerable improvement recently as FOB mill prices for forest products are growing similarly to housing starts (Figure 6.44). OSB prices have shown the greatest strength as prices soared 142% between the end of February 2011 and the end of February 2013 (Wood Based Panels International).

Figure 6.44  North American Panel Prices, February 2013

The improvement in producer's pricing has a great impact on industry profitability. After several years of efforts to reach the break-even levels, most North American panel producers are profitable.

According to the forecasts, US housing starts will remain below the peak level for some time. The units built will be also less wood intensive multi-family units. However, an increase in housing starts will drive the demand for wood products up, at a moderate rate though.
The recent change in legislation impacting wood-based panel sector includes The California Air Resources Board (CARB) legislation, which targets reduction of formaldehyde emissions in wood-based panels. As of January 2011 the law moved into Phase II for particleboards and medium-density fibreboards.

Production of wood-based panels was at the highest level between 2005 and 2007 with a subsequent decline after 2008. After plunging to less than 16 million m$^3$ in 2009 and 2010, the recovery started in 2011 with a total production of wood-based panels being above 23 million m$^3$ followed by further growth to almost 24 million m$^3$ in 2012 (Figure 6.45).

**Figure 6.45  US Wood-Based Panels Production, 2005-2012**

Consumption of wood-based panels has been reducing since 2006 from over 36 million m$^3$ to slightly under 20 million m$^3$ in 2009. The recovery period, which started in 2010, displays that production has not reached the output level before the recession and totalled at about 22 million m$^3$ (Figure 6.46).
Particleboard

Particleboard industry is experiencing weakening demand with growing wood costs, and limited wood resources. Furthermore, the competition between raw material and subsidized energy use of wood is becoming fiercer. The costs for resins have also grown resulting from an increase in petroleum prices.

Production of particleboards was declining since 2005 from 7.2 million m$^3$ and reached its minimum of 3.8 million m$^3$ in 2009. The output started to recover since 2010 and totalled at 4 million m$^3$ in 2012 (Figure 6.47).
In 2005 consumption of particleboard equalled at 7.5 million m$^3$, followed by a growth in 2006 to 7.9 million m$^3$. Afterwards, the downward trend was prevailing until 2012 with reduction from 7.9 million m$^3$ to 3.2 million m$^3$ in 2012. Declining consumption resulted in a similar trend for particleboards imports, which dropped from 1.1 million m$^3$ in 2006 to 681,000 m$^3$ in 2012 (Figure 6.48, Figure 6.49).
Exports of particleboards climbed to 356,000 m$^3$ in 2006 from the minimum of 18,000 m$^3$ in 2005. After this, particleboard exports dropped sharply to 233,000 m$^3$ in 2007 with a further gradual decline in subsequent years amounting to 181,000 m$^3$ in 2012 (Figure 6.50).
MDF

The very first MDF were launched in the US during the 70s. Annual production growth of MDF is about 10-20%. The share of MDF among other wood-based panels is nearly 15% with the leading players concentrated in North America, Europe and Asia. In the 90s there was a rapid growth of production capacity for MDF, and in 2000 the world has faced the first signs of oversupply. In 2005 production of MDF equalled 3.1 million m$^3$ and then continued steady growth to 3.3 million m$^3$. During the period of economic recession, production started to fall from 3 million m$^3$ in 2008 to 2.5 million m$^3$ by the end of 2012 (Figure 6.51).
Figure 6.51  US MDF Production, 2005-2012

After soaring to 5.6 million m³ in 2006, consumption of MDF on the US market started to decline very rapidly plunging to 3 million m³ in 2010, followed by a slow recovery in 2011 and 2012, which has not reached the level of production before crisis yet (Figure 6.52).

Figure 6.52  US MDF Consumption, 2005-2012

Imports of MDF in the US has soared to 2.7 million $m^3$ in 2006 and was following a downward trend since 2007 reaching its minimum at 877 000 $m^3$ in 2010. Recovery started in 2011 continues its trend until present with MDF imports totalling at 982 000 $m^3$ in 2012 (Figure 6.53).

**Figure 6.53  US MDF Imports, 2005-2012**

![Graph showing US MDF Imports, 2005-2012]


Export of MDF grew by around 2% in 2012. The principal export markets for US in 2011 were Canada and Mexico. Exports to Russia increased by 65%, to Australia by 52%, to India 166%, to Republic of Korea by 299% (Figure 6.54).
Figure 6.54  US MDF Exports, 2005-2012

7. **ENGINEERED WOOD PRODUCTS INDUSTRY AND MARKETS**

7.1 **Glulam Producers and Consumers within the Study Area**

7.1.1 **Russia**

Production and consumption of glulam in Russia remains quite low. Russia’s share in European production of glulam is less than 2%. The major consumers are concentrated in the European part of Russia, Moscow region, St. Petersburg and the Urals. Further growth of the glulam market in Russia is closely linked to the construction sector, state promotion of the wooden housing, development of the wood industry with high value added, growth in the mortgage market and increasing personal incomes. Wooden houses production volumes have been increasing constantly, with an absolute peak registered in 2008. Interrupted by the financial crisis of 2008, the volumes have not achieved the peak period (Figure 7.1).

**Figure 7.1  Wooden Houses completion in Russia, 2008-2012**

![Area, million m² (bar) Quantity, 1000 pcs (line)](image)

Consumption of glulam is growing very rapidly. The size of the Russian market is still very limited, particularly, compared with European, North American and Japanese markets. Most Russian glulam manufacturers focus on glued wall boards, which are easy to produce and do not require large investments.

Overall production capacity of Russian players is estimated at some 450 000 m³/a. The Russian glulam market is quite fragmented with a few big players and large number of small companies with an annual capacity of 5-10 000 m³ (Table 7.1).
Table 7.1  Russia’s Largest Producers of Glulam

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Annual Capacity, m³/a</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Glulam Structures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAUS Concept</td>
<td>Saint-Petersburg</td>
<td>40 000</td>
</tr>
<tr>
<td>ZAO Timber</td>
<td>Mari El Republic</td>
<td>20 000</td>
</tr>
<tr>
<td>OOO Safonovdrev</td>
<td>Smolensk region</td>
<td>18 000</td>
</tr>
<tr>
<td>ZAO 78 DOK NM</td>
<td>Nizhegorodsk region</td>
<td>10 000</td>
</tr>
<tr>
<td><strong>Estimated total capacity</strong></td>
<td></td>
<td>106 000</td>
</tr>
<tr>
<td><strong>Low-Houses Construction Elements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STS Teknowood</td>
<td>Primorsky Krai</td>
<td>60 000</td>
</tr>
<tr>
<td>ZAO Krasnoyarsklesomaterialy</td>
<td>Krasnoyarsk region</td>
<td>30 000</td>
</tr>
<tr>
<td>ZAO Tamak</td>
<td>Tambovsky region</td>
<td>25 000</td>
</tr>
<tr>
<td>OOO Stilwood</td>
<td>Novosibisk region</td>
<td>15 000</td>
</tr>
<tr>
<td><strong>Estimated total capacity</strong></td>
<td></td>
<td>190 000</td>
</tr>
<tr>
<td><strong>LVL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OOO MLT</td>
<td>Tver region</td>
<td>120 000</td>
</tr>
<tr>
<td>OAO LVL-Yura</td>
<td>Tyumen region</td>
<td>39 000</td>
</tr>
<tr>
<td><strong>Estimated total capacity</strong></td>
<td></td>
<td>159 000</td>
</tr>
</tbody>
</table>

STS Teknowood and PTS Hardwood have the largest market share in the Far East.

The core export of Russian glulam consists of glulam straight construction beams (68%), and glulam window frames (16%). The largest export volumes originate from the Russian Far East, Siberia, and the Central District. Primorsky Krai is the leading region, where most glulam is sold to Japan. Other important markets are Kazakhstan, Italy, Germany, Finland and Denmark. Over the last three years, Russian manufacturers are increasing the output of glulam. However, their capacities are still lagging behind European companies.

In 2005, there were 70 000 m³ of glulam produced in Russia, out of which 33 000 m³ were exported (if the density of raw material is 650 kg/m³). The imports totalled to 2 200 m³ in 2005 and in 2006 – 3 500 m³.
Figure 7.2 Glulam Production in the Russia, 2005-2009

![Glulam Production in the Russia, 2005-2009](image)

Source: Rosstat, 2013.

Glulam is applied in bridge construction, compositional structures, where various types of glued wood is utilized such as arches, beams, frames, farms etc. Glulam is also very widespread in attic construction, reconstruction of old buildings, and structures with chemically-active environment (Figure 7.3, Figure 7.4).

Figure 7.3 Construction of a Sports Hall in Podmoskovye

![Construction of a Sports Hall in Podmoskovye](image)

7.1.2 Japan

Japan is the largest producer and consumer of glulam in the Pacific Rim. Rapid market growth of glulam is linked with increasing domestic consumption. Around 60% of all new houses are made of wood. The housing market is regulated by JAS (Japanese Agricultural Standard) standard for glulam manufacturers. Japanese housing sector has several strict requirements for the size of the beams, wood quality as well as adhesives used in glulam. Therefore, the standards for imported products are very high. Glulam has various applications in Japan and mainly used in construction of bridges and in housing sector (Figure 7.5).

The Japanese glulam industry increased its production by 5% in 2012 to 1.54 million m$^3$ versus 1.46 million m$^3$ in 2011. However production in 2012 has not reached the level of 2006, which amounted to 1.68 million m$^3$. Roughly 98% of all glulam produced in Japan were medium and small dimensions, and 67% were imported from Europe. As yen is weakening against the euro, the amount of Japanese lumber for glulam manufacturing is projected to increase this year.
Figure 7.5 Glulam Truss Highway Bridge, Hiroshima, Japan, 2012.


There is less Japanese lumber used for the glulam production. However, because of the weakness of the yen, the amount of glulam produced from Japanese lumber is going to increase again.

Imports of glulam in Japan have been fluctuating since 2005 with the trend turning downward in 2007, reaching its minimum of 404 104 m$^3$ in 2008. After hitting rock bottom, imports started to recover in 2009 amounting to 674 063 m$^3$ in 2012 (Figure 7.6).

Figure 7.6 Imports of Glulam, Japan, 2006-2013

Source: JAWIC, 2013.
Around 31% of all imports come from Austria, 29% originate from Finland, 16% of all glulam imported comes from Romania, other importers are China (7%) Sweden (4%), while the rest of glulam (13%) comes from various countries. The sharpest reduction in imports was registered in those from Germany with a decline by 41% in 2012 (Figure 7.7).

**Figure 7.7 Imports of Glulam by Country, Japan, 2012**

![Graph showing imports of glulam by country, Japan, 2012](image)

Source: JAWIC, 2013.

### 7.1.3 US

Future prospects of engineered wood products are still quite vague. In 2011, there was a slightly lower growth of the US economy and smaller consumption of wood products than expected. However, in 2012 consumption was estimated to grow as a result of stabilizing housing starts and recovering economy.

Production of glulam was declining since 2006 from 461 000 m$^3$ to 167 000 m$^3$ in 2009. Housing collapse had a negative impact on stock beam manufacturers. The weak demand on the residential market was balanced with a better performance in the non-residential construction segment. This situation lasted until 2009, when non-residential construction started to experience recession. After recovering in 2010, the output of glulam amounted to 298 500 m$^3$ (Figure 7.8).
Non-residential sector is the largest consumer of glulam, followed by residential and industrial sectors. Apparently, markets for glulam are less dependent on housing activity (Figure 7.9).
Exports of US glulam have been quite insignificant amounting to around 1,000 m³ annually since 2006 (APA, 2010).

When analyzing the market of glulam, it is important to consider that the sector of wooden housing construction predominantly uses LVL and other wood products than glulam. The share of US on the global glulam market is around 20% (Trade Marketing Research). However, glulam is currently being replaced with other composites such as LVL and OSB, which expand design opportunities. Therefore, glulam is losing its market share not only because of housing collapse, but also because the market share of I-beams is growing. The cost and time efficiency of I-beams ensure their competitiveness compared to glulam. Transportation costs is another competitive advantage of I-beams as the distances between manufacturers of composites and construction sites may be quite significant. Transporting I-beams is not only cheaper, but also much easier than large prefabricated elements.
8. PULP MARKETS

Wood pulp is fibrous material used mainly to produce paper and paperboard. Bleached softwood kraft pulp (BSKP), hardwood bleached kraft pulp (BHKP), dissolving pulp (DIP) and bleached chemithermomechanical pulp (BCTMP) are the main pulp categories. More than 70% of the world's pulp is used within the pulp and paper integrates or transported within the same company to produce paper or paperboard in another location. The remaining 30% is market pulp that is mainly produced by stand-alone pulp companies selling their products on the free market.

Chemical pulping is based on the principle of liberating fibres from the wood matrix by dissolving, so the fibres are freed undamaged without any or only minimum mechanical action. Chemical pulping can be divided to sulphate (kraft) and sulphite pulping. The kraft pulping process is particularly good at producing strong and flexible fibres from softwood; it is also efficient for hardwood pulping because of its ability to handle extractives efficiently. A comparatively low pulp yield is the drawback of this process. The sulphite process has almost disappeared in the favour of the kraft process, since it provides substantial economic, environmental and product quality advantages.

In mechanical pulping process, the wood and fibres are strained by frequent forces caused by the grindstone or disc patterns, until they achieve a desirably loosened structure. Mechanical pulps have certain good paper properties such as a high opacity, a sufficient brightness, good formation characteristics that result in a paper with a smooth surface and high bulk. On the down side the bonding capacity of mechanical pulp fibres is lower than of chemical pulp fibres, which makes overall strength properties lower. Mechanical pulp cannot be bleached to the same extent as chemical pulp, and its brightness stability is poor. Mechanical pulps quite often also contain impurities. Compared to a chemical pulping process, mechanical pulping offers many advantages, such as high yield (approx. 97%), low capital costs and simple technology. One of the major drawbacks of mechanical pulping process is a high consumption of electric energy.

Chemi-mechanical pulping involves a gentle chemical treatment stage combined with mechanical defibration, such as disc refining, in order to fibreise the wood. Chemimechanical pulps are generally defined as pulp with a yield in the range of 80-95%. Their properties are intermediate between those of high-yield chemical pulps and mechanical pulps. Chemimechanical pulps can be further divided into two subgroups: CTMP and CMP (CMP is also used as the general name for all chemimechanically produced pulping). The chemical treatment stage in CMP in more severe than in the CTMP process, and the yield is typically below 90%. CTMP process is today the predominant chemimechanical pulping process.

Softwood pulp grades have been considered for production in the Russian Far East but no mills exist today. The kraft pulp mills can produce their own energy and also power to the grid or neighbouring companies. A competitive bleached softwood/hardwood kraft pulp requires, however, large volumes of wood and high investments (as a greenfield investment EUR 2 billion or even more) and production volume. This is not seen a viable option for the Russian Far East at the moment.

Mechanical pulp mills require lower investments. Mechanically processed pulp, also known as "high-yield" pulp, is characterized by a very high percentage of the original wood components are retained in the final product. The mechanical processes include groundwood, refiner mechanical, thermomechanical and chemithermomechanical. They are products with high bulk, opacity and absorbency, some qualities that are particularly advantageous in certain use applications, like in the production of newsprint and in publication grades of printing and writing paper. Of different mechanical grades only BCTMP is sold as market pulp and others are produced in paper mill integrates.
The demand for BCTM market pulp is estimated at 4 million tonnes. The main end uses include printing and writing papers, coated multi-ply bleached board (folding boxboard) and tissue and sanitary products. In printing and writing papers BCTMP gives bulk is certain speciality paper grades and is often used to improve the runnability of the sheet when recycled fibre is the main furnish component. In multiply bleached board the high-yield pulp is used in middle layer to give stiffness and bulk to the board. In tissue it is used for its bulk and absorbency characteristics.

The development of the paper machine technology, requiring less strength and enhancing printing properties, supports the use of market hardwood BCTMP. Further development of the grades of paper, especially of lower basis weights and the improvements in the BCTMP pulping technology are further drivers for market hardwood BCTMP use. With softwood CTMP a risk of a colour reversion is higher than with hardwood BCTMP. Therefore, it is mostly used in papers which are disposed of or soon recycled. This includes papers like tissue and coated and uncoated wood-containing grades.

Some of the softwood CTMP has been sold, until lately, as fluff pulp for baby diapers and other hygiene products. This end-use area is declining in importance. Mechanical fluff pulps generate more dust than chemical fluff pulps. There may also be supply restrictions, if a further share of the CTMP fluff capacity is converted for the production of hardwood BCTMP.

Compared to the other grades of market pulp the market size on BCTMP is small and slowly growing until the last three years, when part of the more expensive pulp components have been replaced by less expensive BCTMP. It is very challenging for a BCTMP producer to serve the different end use markets, which require different freeness level; the winning concept is to concentrate on certain client sectors with high volume to secure efficient production at the pulp mill. The demand for high yield market pulp has increased 1 million tonnes equalling 33% in last five years.

**Figure 8.1 Global BCTM market pulp demand 2001-2011**
The main market today is China with 1.7 million tonnes or 43% of the total consumption of BCTMP. Between 2005 and 2010 the Chinese market has grown by 800,000 tonnes. During the same period the demand in Western Europe has not changed and no significant growth is expected in Europe.

BCTMP, whose main end use is printing and writing papers, is a not traditional market pulp and thus the global market is only about 4 million tonnes. One of the main weaknesses is the fact that it is difficult to serve different end uses due to varying freeness requirements. Furthermore, after paper mill closure(s), captive pulp could be sold to the open market.

Grinding and/or refining of mechanical pulp requires a lot of power and steam, which is not produced in the process, but must be provided from the on site CHP (combined heat and power) plant or alternatively, from the on site steam producer and power from the grid. The refiners are large and can easily disturb the local power grid in mill start-up and shut-down situations.

Consequently, BCTMP, or any other pulp grades, are not recommended for further analysis.

Another option is to consider a kraftliner mill, which would include linerboard machine and a kraft pulp mill of the respective size. This requires investments to both the pulp mill and linerboard machine. The investment could also be feasible in smaller capacity than BSKP or BHKP mill, because of several reasons:

- the pulp yield would be higher than for BSKP resulting to smaller recovery side equipment
- no bleaching would be needed
- no bleaching chemical plants would be needed
- smaller water and effluent systems would be needed as the mill could be built almost as a closed cycle
- no pulp drying plant would be built but a linerboard machine instead
- the mill would be capable in producing its own power.

Kraftliner is a product to be used for corrugated board in packaging products, the market of which is still growing. The competing product is testliner, which is produced of waste paper and board. There is a clear price premium for kraft liner when compared with test liner. The availability of waste paper is decreasing along decreasing paper consumption in several markets. For example China has imported recovered paper from North America.

A kraftliner machine with high-yield pulp mill (NSSC or respective) could have a capacity of 350,000 t/a and it would consume 1.5 million m$^2$ of softwood. At this stage the raw material volume cannot be secured in the Russian Far East, but in the medium-long term this could be an alternative to consider.

Production of deinked pulp is not a choice because of missing waste paper.
Indufor developed a scoring matrix to evaluate the possible forest industry investment projects in the Russian Far East. The scoring matrix was done separately for the 9 Russian Far East regions. The scoring was based on scale 1 to 5, 1 being the lowest score and 5 the highest score. The scoring matrix had 8 criteria which were:

1. Availability of wood raw material / specific fiber
2. Sufficient infrastructure
3. Institutional environment
4. Regional cost advantage
5. Markets and logistics
6. Availability of production inputs, apart from wood/fiber
7. Efficient use of forest resources
8. Sustainability

Each criterion was assessed against the following forest industry products:

- Sawnwood
- Plywood
- Reconstituted panels (OSB/Other panels)
- Bleached chemical pulp
- Paper and paperboard
- Bioenergy
- Biofuels

Summary of the results is shown in Table 9.1. Scores of less than 2 points are highlighted with red color, scores between 2 and 3 in yellow color and the scores of over 3 points in green color.

<table>
<thead>
<tr>
<th>Product</th>
<th>Amur</th>
<th>Jewish AO</th>
<th>Kamchatka</th>
<th>Magadan</th>
<th>Primorsky</th>
<th>Sakha Rep.</th>
<th>Khabarovsk</th>
<th>Chukotka AO</th>
<th>Sakhalin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood</td>
<td>2.7</td>
<td>2.5</td>
<td>1.7</td>
<td>1.5</td>
<td>3.3</td>
<td>2.5</td>
<td>3.7</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Plywood</td>
<td>2.8</td>
<td>2.3</td>
<td>1.4</td>
<td>1.4</td>
<td>3.1</td>
<td>2.2</td>
<td>3.5</td>
<td>1.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Reconstituted panels</td>
<td>2.8</td>
<td>2.6</td>
<td>1.7</td>
<td>1.7</td>
<td>3.4</td>
<td>2.6</td>
<td>3.6</td>
<td>1.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Other panels</td>
<td>2.8</td>
<td>2.5</td>
<td>1.7</td>
<td>1.7</td>
<td>3.3</td>
<td>2.5</td>
<td>3.6</td>
<td>1.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Bleached chemical pulp</td>
<td>2.8</td>
<td>1.6</td>
<td>1.5</td>
<td>1.4</td>
<td>2.7</td>
<td>2.3</td>
<td>2.7</td>
<td>1.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Paper and paperboard</td>
<td>2.8</td>
<td>1.6</td>
<td>1.5</td>
<td>1.4</td>
<td>2.5</td>
<td>2.1</td>
<td>2.5</td>
<td>1.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>3.0</td>
<td>2.5</td>
<td>1.7</td>
<td>1.6</td>
<td>3.5</td>
<td>2.9</td>
<td>3.9</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Biofuels</td>
<td>2.5</td>
<td>1.9</td>
<td>1.6</td>
<td>1.5</td>
<td>3.3</td>
<td>2.5</td>
<td>3.5</td>
<td>1.6</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Primorsky and Khabarovsk Krais had the highest scores for several products / projects, but also bioenergy projects in Amur Oblast and Sakha Republic received over 3 points in the ranking. Other areas / products / projects did not receive 3 points in the ranking.
10. POTENTIAL INVESTMENT PROJECTS

10.1 Feasible Sources of Raw Material

There are 5 possible sources of raw material that can be considered for new forest industry investments:

1. By-products of the existing forest industry installations
2. Currently non-utilized small diameter logs (3-5 million m³)
3. Large diameter logs currently exported to Asia (5 million m³ from the RFE)
4. Currently underutilized / idle forest lease areas
5. Acquisition and opening of wholly new forest lease areas.

Currently the by-products of solid wood processing operations, consisting mainly of wood chips, sawdust, are underutilized or not utilized at all in the region. This raw material is economical and currently has low or no market price in the region. Amount is estimated to be less than 0.5 million m³. Several possible investments to utilize this raw material have been tentatively identified.

Small diameter logs (pulpwood) is currently not harvested at all in many forestry operations in the Russian Far East as there is no demand for this wood. Total amount is estimated at 3 – 5 million m³ given the total amount of harvesting.

Some 15 million m³ of logs are currently being exported to China, Japan and Korea from Russia. From the Russia Far East this amount is 5 million m³. Given the competitiveness of Russian forest industry production can be improved, requiring full utilization of wood resources and capital investments to production sites, an increasing share of this raw material could be processed within Russia. Wood paying capability has to equal that of export markets / Chinese mills. Several possibilities for investments have been tentatively identified.

Existing lease holders in the area are not fully utilizing the AAC of the lease areas and some of the lease areas are not being harvested at all. Intensified harvesting of the existing lease areas can provide new raw material for the forest industry investments in the area. Likewise, the wood paying capability has to match that of the Chinese log export markets. Several investment opportunities have been tentatively identified.

There are large forest areas that are currently not leased and are not being used. Opening these new areas for harvesting require both significant investments to infrastructure and due care in environmental aspects. Main species with potential are larch and spruce. Limited opportunities to harvest secondary growth birch, aspen and oak exist in the RFE which could provide a new source of raw material for forest industry investments. Several investment opportunities tentatively identified.

10.2 Long List of Potential Investment Projects

1) Integrated wood processing complex, consisting of a (1) large sawmill, (2) sawnwood further processing to gluelam, (3) reconstituted panels mill (particleboard/MDF), (4) combined heat and power (CHP) production facility and (5) liquid biofuel production facility. Located either in a port (Khabarovsky Krai or Primorsky Krai) or adjacent to railroad line (Khabarovsk Krai). Estimated wood consumption 1-1.5 million m³ of logs, can be based on either a new lease area or acquisition of existing lease areas from the current lease holders. Optionally some products, such as 2 and 5, can be left out.

2) An existing wood processing facility as a base for developing an integrated complex. This strengthens the existing production and investment to a different product line enables the efficient use of all wood resources. This investment would partially use existing by-products and in some cases enable the harvesting of pulpwood, and in some cases
increase the use of sawlogs. Many companies in the area export sawlogs and additionally have underutilized lease areas. Several alternative options:

a) Existing reconstituted panel mill added with a (1) sawmill and a (2) CHP plant.
b) Existing reconstituted panel mill added with a large sawmill.
c) Existing veneer mill added with a (1) sawmill and a (2) CHP plant.
d) Existing veneer mill added with a large sawmill.
e) Existing sawmill added with (1) a veneer mill, (2) reconstituted panels mill and (3) CHP plant.
f) Existing sawmill added with a reconstituted panels mill.

3) Standalone sawmill on the coast opening a new harvesting area with a deep port loading facility for sawnwood and chips. Chips exported to Japan / China in 40 000 + ton vessels. Coast of Khabovsk Krai, Primorsky Krai or Sakhalin Island.

4) Small log sawmill line adjacent to an existing sawmill / veneer mill to process small logs / pulpwood into mining timber. Several possible locations in the area.

5) New (1) sawmill in Yakutia in connection with a mining operation. Chips and sawdust to (2) CHP plant to provide electricity for the mining operation.

6) Liquid bio fuel production facility adjacent to an existing sawmill / integrated wood processing unit. Preferred location a port with loading facilities. Only a few possible companies/locations.

7) Liquid bio fuel production utilizing local wood waste from local sawmills.

During the project meeting in London, held June 19th 2013, the following 5 projects were chosen for the conceptual feasibility studies:

1) Liquid biofuel production facility, independent location with suitable characteristics (adjacent to other facilities).

2) Gluelam production facility, independent location with suitable characteristics (good supply of quality sawnwood).

3) Particleboard mill, independent location with suitable characteristics (adjacent to other facilities).

4) Medium size sawmill, independent location, suitable for example for the Sakhalin project.

5) Small sawmill concept for mining timber, independent location with suitable characteristics.
11. **PRIORITY INVESTMENT PROJECTS IN THE RUSSIAN FAR EAST**

**Table 11.1**  Investment Projects in Primorsky Krai

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harvesting operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sawnwood &amp; Wooden housing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primorsklesprom JSC</td>
<td>Two sawmills (130 000 m³/a) and glued-timber factory (50 000 m³/a). Raw material consumption – 360 000 m³/a</td>
<td>Sawmills in Terneisky and Olgisky districts; glued-timber factory in Chuguevsky district</td>
<td>RUB 309 million</td>
<td>2008-2013</td>
<td>Apparently not in operation in 2013; meeting rejected.</td>
</tr>
<tr>
<td>GOK-AIR JSC (Primorsky GOK)</td>
<td>Wooden housing</td>
<td>Krasnoarmeysky district</td>
<td>RUB 350 million</td>
<td>2013-2017</td>
<td>Mining company with small forestry and forest industry operations</td>
</tr>
<tr>
<td>Gefest JSC</td>
<td>Wooden housing</td>
<td>Krasnoarmeysky district</td>
<td>RUB 100 million</td>
<td>2013-2017</td>
<td>No information</td>
</tr>
<tr>
<td><strong>Pulp &amp; Paper</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration of Primorskij Kraj</td>
<td>Pulp &amp; Paper mill Pulp output – 400 000 t</td>
<td>Ussuriysk</td>
<td>USD 300 million</td>
<td>N/A</td>
<td>No investor identified.</td>
</tr>
<tr>
<td><strong>Wood-based panels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Bioenergy

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotopwood JSC</td>
<td>New production facilities utilizing low-quality wood, firewood and wood residues</td>
<td>Dalnegorsk</td>
<td>RUB 508 million</td>
<td>Until 2015</td>
<td>Scarce information. Said to be a cover to attract more AAC in the region.</td>
</tr>
<tr>
<td>Chuguevskaya LPK CJSC</td>
<td>Production of briquettes and pellets</td>
<td>Chuguevka</td>
<td>RUB 300 million</td>
<td>2013-2017</td>
<td>No information</td>
</tr>
<tr>
<td>GOK-AIR JSC (Primorsky GOK)</td>
<td>Wood based heating facility and power supply production</td>
<td>Krasnoarmeysk y district</td>
<td>RUB 300 million</td>
<td>2013-2017</td>
<td>Mining company with small forestry and forest industry operations</td>
</tr>
<tr>
<td>Terneyles JSC</td>
<td>Wood based heating facility and power supply</td>
<td>Plastun village</td>
<td>RUB 250 million</td>
<td>2013-2017</td>
<td>Implemented</td>
</tr>
<tr>
<td>Group of local companies</td>
<td>Pellets</td>
<td>Chuguevka</td>
<td>RUB 100 million</td>
<td>2013-2017</td>
<td>No information</td>
</tr>
</tbody>
</table>

### Other products

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOK-AIR JSC (Primorsky GOK)</td>
<td>Alimentary and medical products from non-wood forest resources</td>
<td>Krasnoarmeysk y district</td>
<td>RUB 100 million</td>
<td>2013-2017</td>
<td>No information</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.

### Table 11.2 Investment Projects in Khabarovsk Krai

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood and wooden housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ros-DV Ltd.</td>
<td>Elements for wooden housing</td>
<td>Lezo district</td>
<td>RUB 1.2 billion</td>
<td>Until 2016</td>
<td>No information</td>
</tr>
<tr>
<td>DalEuroLes Ltd. – BM Group</td>
<td>Sawn wood – 200 000 m³/a. Plywood - 190 000 m³/a Raw material consumption – 850 000 m³/a</td>
<td>N/A</td>
<td>RUB 3.8 billion</td>
<td>2009-2015</td>
<td>No investor identified, ex Cathay Forest project</td>
</tr>
<tr>
<td>N/A</td>
<td>Sawn wood and wood pellets</td>
<td>Solnechny district</td>
<td>RUB 2.8 billion</td>
<td>Until 2016</td>
<td>No information</td>
</tr>
</tbody>
</table>

<p>| Pulp and Paper            |                                                                              |                  |                 |                 |                                                                                  |
| Khabarovsk krai's Administration | Paper mill Annual output: pulp ~390 000 t; paper &amp; paperboard ~ 410 000 t | Amursk city      | RUB 23.5 billion | Till 2014       | No investor identified                                                           |</p>
<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wood-based panels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dallesprom JSC</td>
<td>Wide product range: sawn timber – 230 000 m³/a; veneer – 300 000 m³/a; MDF – 300 000 m³/a; wood chips – 750 000 m³/a</td>
<td>Vanino village</td>
<td>RUB 12 billion</td>
<td>2009-2019</td>
<td>No information</td>
</tr>
<tr>
<td>Rimbunan-Khidzhau International Ltd.</td>
<td>MDF/TDHF – 150 000 m³/a. Raw material consumption – 300 000 m³/a The mills are built, but not fully operational yet</td>
<td>Berezovy</td>
<td>RUB 2.4 billion</td>
<td>2008-2009</td>
<td>Mill is built but temporarily shut down</td>
</tr>
<tr>
<td>The Ministry of Forestry of Khabarovsky Krai</td>
<td>OSB – 150 000 m³/a</td>
<td>Amursk</td>
<td>RUB 2.1 billion</td>
<td>N/A</td>
<td>no investor identified</td>
</tr>
<tr>
<td>Vyazemskiy lesozavod</td>
<td>Veneer – 80 000 m³/a (larch)</td>
<td>Vyazemsky</td>
<td>USD 18 million</td>
<td>N/A</td>
<td>No information</td>
</tr>
<tr>
<td>RFP Group</td>
<td>Veneer – 200 000 m³/a</td>
<td>Komsolomsk na-Amure</td>
<td>N/A</td>
<td>N/A</td>
<td>Mill is built</td>
</tr>
<tr>
<td>N/A</td>
<td>Veneer – 200 000 m³/a</td>
<td>Khor</td>
<td>RUB 500 million</td>
<td>Until 2015</td>
<td>No information</td>
</tr>
<tr>
<td>Dallesprom JSC</td>
<td>Bleached softwood sulfate processing</td>
<td>Amursk</td>
<td>RUB 29.7 billion</td>
<td>N/A</td>
<td>No information</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>Value-added wood processing complex; woodchips production facility</td>
<td>Amursk</td>
<td>RUB 331 million</td>
<td>Until 2014</td>
<td>No information</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.

Table 11.3 Investment Projects in Sakha Republic

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yakutskaya Timber-Processing Company Ltd</td>
<td>Sawnwood – 30 000 m³/a at the initial stage to 100 000 m³/a in 3 years.</td>
<td>Lensk district</td>
<td>RUB 1.15 billion</td>
<td>2008-2013</td>
<td>No information, difficult access to markets</td>
</tr>
<tr>
<td>Company</td>
<td>Industry</td>
<td>Location</td>
<td>Investment</td>
<td>Timeframe</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>-----------</td>
<td>------------------</td>
</tr>
<tr>
<td>Sonor Ltd.</td>
<td>Wooden housing</td>
<td>N/A</td>
<td>RUB 1.36 billion</td>
<td>Until 2020</td>
<td>No information</td>
</tr>
<tr>
<td>Bel’kachinsky Company, UK ZAO Kolmarproekt</td>
<td>Timber processing</td>
<td>N/A</td>
<td>EUR 845 000</td>
<td>Until 2020</td>
<td>No information</td>
</tr>
<tr>
<td>MHM (Massiv-Holz Mauer)</td>
<td>Wooden housing</td>
<td>Yakutsk</td>
<td>RUB 181 million</td>
<td>Until 2016</td>
<td>No information</td>
</tr>
<tr>
<td>N/A</td>
<td>Wooden housing</td>
<td>N/A</td>
<td>RUB 960 million</td>
<td>Until 2020</td>
<td>No information</td>
</tr>
<tr>
<td>N/A</td>
<td>Launch of existing non-operational wood-processing complex</td>
<td>Lensk district</td>
<td>RUB 565 million</td>
<td>Until 2017</td>
<td>Almazy Anabara?</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.
### Table 11.4 Investment Projects in Amur Oblast

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyndales Ltd.</td>
<td>Woodworking complex</td>
<td>N/A</td>
<td>RUB 2.14 billion</td>
<td>N/A</td>
<td>Part of Hambro (Peter/Leo) group</td>
</tr>
<tr>
<td>JSC Ametis</td>
<td>Bioflavanoids</td>
<td></td>
<td></td>
<td>2008-2017</td>
<td>No information</td>
</tr>
<tr>
<td>OOO Amurskaia</td>
<td>Waste-free woodworking facility</td>
<td>Norskoie lesnichestvo</td>
<td></td>
<td>2008-2017</td>
<td>No information</td>
</tr>
<tr>
<td>Amurskaia woodworking company “Kedr”</td>
<td>New facilities for the deep timber-processing</td>
<td>N/A</td>
<td>RUB 856 million</td>
<td>N/A</td>
<td>No information</td>
</tr>
<tr>
<td>N/A</td>
<td>Fiberboards</td>
<td>Bureysky district</td>
<td>RUB 632 million</td>
<td>N/A</td>
<td>No information</td>
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<tr>
<td>Bureyagesstroj</td>
<td>Reconstruction of the furniture factory</td>
<td>Raichinsky</td>
<td>RUB 510 million</td>
<td>N/A</td>
<td>No information</td>
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<tr>
<td>Amur Forest JSC</td>
<td>Annual output: sawnwood – 105 000 m³; pellets – 3 000 t; wooden houses: 50 units.</td>
<td>Zeya</td>
<td>RUB 352 million</td>
<td>2007-2013</td>
<td>No information</td>
</tr>
<tr>
<td>Turanles (<em>Vostochny woodworking factory</em>)</td>
<td>Annual output: sawnwood – 8 000 m³; glued-timber – 12 000 m³; floor boards – 1 400 m³; furniture panels – 200 m³. Raw material consumption – 116 800 m³/a</td>
<td></td>
<td>2006-2015</td>
<td>RUB 346 million</td>
<td>2006-2015</td>
</tr>
<tr>
<td>N/A</td>
<td>OSB – 148 500 m³/a</td>
<td>N/A</td>
<td>RUB 72 million</td>
<td>N/A</td>
<td>No information, too small</td>
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<tr>
<td>N/A</td>
<td>Waste-free industrial centre for the production of veneer, MDF and OSB</td>
<td>In the area of the railway road &quot;BAM&quot;</td>
<td>RUB 6.5</td>
<td>Until 2018</td>
<td>No information</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.
### Table 11.5  Investment Projects in Sakhalin Oblast

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sakhalinskaya oblast' administration</td>
<td>Pulp &amp; Paper mill Annual pulp output – 250 000 t.</td>
<td>Poronaisk</td>
<td>USD 380 million</td>
<td>N/A</td>
<td>No information, too small</td>
</tr>
<tr>
<td>Sakhalinskaya oblast' administration and BM group</td>
<td>Sawnwood: 200 000 m³/a; woodchips – 370 000 m³</td>
<td>N/A</td>
<td>USD 208 million</td>
<td>N/A</td>
<td>Not started operations yet, will move further up north</td>
</tr>
<tr>
<td>N/A</td>
<td>Wood-processing industrial centre</td>
<td>N/A</td>
<td>RUB 4.4 billion</td>
<td>Until 2020</td>
<td>No information</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.

### Table 11.6  Investment Projects in Kamchatka Krai

<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamchatsky farerny zavod ltd.</td>
<td>230 000 m³/a (charcoal, sawnwood, firewood, plywood, wooden construction elements, parquet board) Raw material consumption – 290 000 m³/a</td>
<td>N/A</td>
<td>RUB 1.4 billion</td>
<td>Duration – 3 yrs</td>
<td>No information</td>
</tr>
<tr>
<td>Kamchatskaya lesopromyshlen naya kompaniya</td>
<td>MDF Output – 50 000 m³/a Raw material – 80 000 m³/a</td>
<td>Petropavlovsk-Kamchatsky</td>
<td>RUB 700 million</td>
<td>Duration – 2.5 yrs</td>
<td>No information, too small</td>
</tr>
<tr>
<td>Torgovy Dom Ltd.</td>
<td>Pellets Raw material – 80 000 m³/a</td>
<td>Mil'kovsky district</td>
<td>RUB 600 million</td>
<td>Duration – 4 yrs</td>
<td>No information</td>
</tr>
</tbody>
</table>

Source: FAO, various sources.
<table>
<thead>
<tr>
<th>Project Initiator</th>
<th>Description</th>
<th>Location</th>
<th>Project costs</th>
<th>Project dates</th>
<th>Indufor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kompanya Ekoles JSC</td>
<td>Wood processing facilities Commercial wood – 150 000 m³/a; waste wood – 108 000 m³/a</td>
<td>N/A</td>
<td>RUB 665 million</td>
<td>2010-2014</td>
<td>No information</td>
</tr>
<tr>
<td>AmurLes JSC (Holding Business Marketing)</td>
<td>Raw material – max. 600 000 m³/a. Output: building materials – 100 000 m³/a; synthetic materials – 100 000 m³/a; wooden doors – 50 000 m³/a</td>
<td>Nizheleninsky lesopromyshlenny park, Nizheleninsky village</td>
<td>RUB 2.7 billion</td>
<td>2010-2014</td>
<td>No information</td>
</tr>
<tr>
<td>Khej-Khua JSC</td>
<td>Raw material – max. 400 000 m³/a. Output: Sawnwood – 120 000 m³/a; plywood – 100 000 m³/a; MDF – 80 000 m³/a.</td>
<td>Pashkovo village</td>
<td>RUB 1.3 billion</td>
<td>No information</td>
<td></td>
</tr>
</tbody>
</table>

Source: FAO, various sources
Annex 1

Scoring Matrix for Russian Far East Regions
ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION

Amur

<table>
<thead>
<tr>
<th>Product</th>
<th>Sufficient infrastructure</th>
<th>Availability of wood raw material / specific fibre</th>
<th>Availability of production inputs, apart from wood/fiber</th>
<th>Institutional environment</th>
<th>Regional cost advantage</th>
<th>Markets and logistics</th>
<th>Efficient use of resources</th>
<th>Sustainability</th>
<th>Total</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>22</td>
<td>2,7</td>
</tr>
<tr>
<td>Plywood</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>22</td>
<td>2,8</td>
</tr>
<tr>
<td>Reconstituted panels</td>
<td>3,0</td>
<td>3,0</td>
<td>2,0</td>
<td>3,0</td>
<td>2,0</td>
<td>3,0</td>
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<td>3,0</td>
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<td>2,8</td>
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<tr>
<td>OSB</td>
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<td>3</td>
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</tr>
<tr>
<td>Other panels</td>
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<td>3</td>
<td>2</td>
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<td>4</td>
<td>3</td>
<td>23</td>
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</tr>
<tr>
<td>Bleached chemical pulp</td>
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<td>2</td>
<td>22</td>
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</tr>
<tr>
<td>Paper and paperboard</td>
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<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>22</td>
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<td>3</td>
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</table>

\[
\text{weight} = \frac{\text{Total Score}}{\text{Number of Products}} = \frac{22 + 22 + 23 + 23 + 22 + 24 + 21}{7} = \frac{160}{7} \approx 22.86\
\[
\text{Weighted Score} = 18.2\% + 18.2\% + 9.1\% + 9.1\% + 9.1\% + 9.1\% + 9.1\% = 91.2\%
\]
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ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION
Jewish_AR

<table>
<thead>
<tr>
<th>Product</th>
<th>Sufficient infrastructure</th>
<th>Availability of wood raw material / specific fibre</th>
<th>Availability of production inputs, apart from wood/fiber</th>
<th>Institutional environment</th>
<th>Regional cost advantage</th>
<th>Markets and logistics</th>
<th>Efficient use of resources</th>
<th>Sustainability</th>
<th>Total</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood</td>
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<td>Other panels</td>
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<tr>
<td>Bleached chemical pulp</td>
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<td>1</td>
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<td>2</td>
<td>14</td>
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</tr>
<tr>
<td>Paper and paperboard</td>
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<td>2</td>
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<td>1</td>
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</table>

weight

18,2 % 18,2 % 18,2 % 9,1 % 9,1 % 9,1 % 9,1 % 9,1 %
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Forest Sector Study of the Russian Far East – A Road Map for Value Added Investment in the Forest Industry

ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION

Kamchatka

<table>
<thead>
<tr>
<th>Product</th>
<th>Sufficient infrastructure</th>
<th>Availability of wood raw material / specific fibre</th>
<th>Availability of production inputs, apart from wood/fiber</th>
<th>Institutional environment</th>
<th>Regional cost advantage</th>
<th>Markets and logistics</th>
<th>Efficient use of resources</th>
<th>Sustainability</th>
<th>Total</th>
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<tr>
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</tr>
<tr>
<td>Plywood</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>Other panels</td>
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<td>4</td>
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<td>Bleached chemical pulp</td>
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</tr>
<tr>
<td>Paper and paperboard</td>
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<td>15</td>
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</tr>
<tr>
<td><strong>Weight</strong></td>
<td>18,2 %</td>
<td>18,2 %</td>
<td>18,2 %</td>
<td>9,1 %</td>
<td>9,1 %</td>
<td>9,1 %</td>
<td>9,1 %</td>
<td>9,1 %</td>
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</tbody>
</table>
# European Bank for Reconstruction and Development EBRD

Forest Sector Study of the Russian Far East – A Road Map for Value Added Investment in the Forest Industry

## ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION

### Magadan

<table>
<thead>
<tr>
<th>Product</th>
<th>Sufficient infrastructure</th>
<th>Availability of wood raw material / specific fibre</th>
<th>Availability of production inputs, apart from wood/fiber</th>
<th>Institutional environment</th>
<th>Regional cost advantage</th>
<th>Markets and logistics</th>
<th>Efficient use of resources</th>
<th>Sustainability</th>
<th>Total</th>
<th>Score</th>
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<tbody>
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<td>3</td>
<td>3</td>
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<tr>
<td>Plywood</td>
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<td>1,0</td>
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</tr>
<tr>
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<td>2</td>
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<tr>
<td>Other panels</td>
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<td>1</td>
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<tr>
<td>Bleached chemical pulp</td>
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<td>1</td>
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<td>12</td>
<td>1.4</td>
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<tr>
<td>Paper and paperboard</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>12</td>
<td>1.4</td>
</tr>
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<td>Bioenergy</td>
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<td>1</td>
<td>1</td>
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<td>1</td>
<td>4</td>
<td>3</td>
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<td>1.6</td>
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<tr>
<td>Biofuels</td>
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<td>1</td>
<td>5</td>
<td>3</td>
<td>14</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Weight:**

- Sawnwood: 18.2%
- Plywood: 18.2%
- Reconstituted panels: 18.2%
- OSB: 9.1%
- Other panels: 9.1%
- Bleached chemical pulp: 9.1%
- Paper and paperboard: 9.1%
- Bioenergy: 9.1%
- Biofuels: 9.1%
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ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION  

Primorsky

<table>
<thead>
<tr>
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|                | 18,2 %    | 18,2 %    | 18,2 %    | 9,1 %     | 9,1 %     | 9,1 %     | 9,1 %     | 9,1 %     | 9,1 % |       |       |
Sakha_Rep

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## Analysis of Investment Opportunities by Region

**Khabarovsk**

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*Weight:* 18.2%  18.2%  18.2%  9.1%  9.1%  9.1%  9.1%  9.1%
A12-06872
European Bank for Reconstruction and Development EBRD
Forest Sector Study of the Russian Far East – A Road Map for Value Added Investment in the Forest Industry

ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION

Chukotka

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<th>Sufficient infrastructure</th>
<th>Availability of wood raw material / specific fibre</th>
<th>Availability of production inputs, apart from wood/fiber</th>
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**weight**

|                  | 2                          | 2                                             | 2                                                        | 1                         | 1                       | 1                      | 1                          | 1              | 18,2 | 18,2 | 18,2 | 9,1 | 9,1 | 9,1 | 9,1 | 9,1 | 9,1 |
**European Bank for Reconstruction and Development EBRD**

**Forest Sector Study of the Russian Far East – A Road Map for Value Added Investment in the Forest Industry**

**ANALYSIS OF INVESTMENT OPPORTUNITIES BY REGION**

**Sakhalin**

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Annex 2

Unemployment Rate in Russia Far East
Unemployment Rate in Russia and Russia Far East, 2005-2011

Source: Rosstat, 2012.

Unemployment Rate in Khabarovsk Krai, 2005-2011

Source: Rosstat, 2012.
Unemployment Rate in Primorsky Krai, 2000-2011

Source: Rosstat, 2012.

Unemployment Rate in Amur Oblast, 2005-2011

Source: Rosstat, 2012.
Unemployment Rate in Sakha Republic, 2005-2011

Source: Rosstat, 2012.

Unemployment Rate in Jewish Autonomous Oblast, 2005-2011

Source: Rosstat, 2012.
Unemployment Rate in Sakhalin Oblast, 2005-2011

Unemployment Rate in Magadan Oblast, 2005-2011

Source: Rosstat, 2012.
Unemployment Rate in Kamchatka Krai, 2005-2011

Source: Rosstat, 2012.

Unemployment Rate in Chukotka Autonomous Okrug, 2005-2011

Source: Rosstat, 2012.
Annex 3

Average Salary in Russia Far East
Average Salary in Khabarovsk Krai in Selected Segments, 2005-2011


Average Salary in Primorsky Krai in Selected Segments, 2005-2011

Average Salary in Amur Oblast in Selected Segments, 2005-2011


Average Salary in Sakha Republic in Selected Segments, 2005-2011

Average Salary in Jewish Autonomous Oblast, 2005-2011


Average Salary in Sakhalin Oblast, 2005-2011

Average Salary in Magadan Oblast, 2005-2011


Average Salary in Kamchatka Krai, 2005-2011

Average Salary in Chukotka Autonomous Okrug, 2005-2011

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