The Bosnia & Herzegovina *Fostering Interventions for Rapid Market Advancement* (FIRMA) Project is a 5-year $20 million activity co-financed by the United States Agency for International Development (USAID) and the Swedish International Development Cooperation Agency (Sida). The goal of the project is to stimulate substantial increases in sales, export, employment and financing in its three focus sectors: wood processing, fabricated metal products and tourism. These three sectors represent over a quarter of manufacturing GDP in B&H and nearly 40% of the country’s export earnings. Through its established partnership with a network of local economic development agencies, the FIRMA Project supports private sector development across the entire country. FIRMA develops action plans to assist its focus sectors and manages activities conducted through local organizations and businesses that address key obstacles to competitiveness.

FIRMA collaborates closely with the government in BiH at the state, entity and cantonal level and with municipal government agencies, associations and other donors that support economic development.

FIRMA has its principal offices in Sarajevo and Banja Luka. [www.firmaproject.ba](http://www.firmaproject.ba)
Contents:

1. EXECUTIVE SUMMARY ........................................................................................................... 4
2. COUNTRY PROFILE .................................................................................................................. 5
2.1. Trade Policy and Investment Agreements ............................................................................. 5
2.2. Investment Environment – Key Facts .................................................................................. 6
3. WOOD PELLET INDUSTRY OVERVIEW ................................................................................. 7
  3.1. Residential Pellet Stoves and Boilers ............................................................................... 7
  3.2. Co-firing .............................................................................................................................. 8
  3.3. Combined Heat and Power generation (CHP) .................................................................... 8
4. WOOD BIOMASS SOURCES ..................................................................................................... 9
5. PELLET MANUFACTURING PROCESS .................................................................................. 10
  5.1. Drying ................................................................................................................................. 10
  5.2. Grinding ............................................................................................................................... 11
  5.3. Pressing – Pelletizing ......................................................................................................... 11
  5.4. Cooling ............................................................................................................................... 11
  5.5. Packaging ........................................................................................................................... 11
6. GLOBAL PELLET PRODUCTION CAPACITY .......................................................................... 12
7. MARKET DRIVERS: EU DEMAND ......................................................................................... 13
8. GLOBAL MARKET SUPPLY AND DEMAND FORECAST ..................................................... 13
9. TARGET MARKET ANALYSIS - ITALY .................................................................................... 14
10. BIOMASS AVAILABILITY IN B&H ......................................................................................... 16
  10.1. Forest Stock in B&H ......................................................................................................... 16
  10.2. Harvesting ......................................................................................................................... 17
  10.3. Available Biomass Feedstock in B&H ............................................................................. 18
  10.4. Wood Biomass Prices in Bosnia and Herzegovina ............................................................ 19
  10.5. Forest Certification and Protection .................................................................................. 19
11. CURRENT PELLET PRODUCTION CAPACITY IN B&H ...................................................... 20
References ....................................................................................................................................... 21
1. EXECUTIVE SUMMARY

The purpose of this document is to review the potential for investment in wood pellet production in Bosnia and Herzegovina. Wood pellets are a heating bio fuel produced from forestry and wood processing residue compressed and ground into wood biomass. Wood pellets have a positive environmental impact as a renewable energy source, if produced in accordance with forestry protection standards. There has been an explosion in global demand for wood pellets over the past ten years, driven predominantly by government policies in the EU member countries that support stimulating the use of renewable energy sources.

Government support measures in the EU include subsidies and tax relief for the installation of biomass boilers and stoves, leading to a sharp increase in the number of installed facilities that use pellets as a heating fuel. Some EU member countries have also introduced incentives for co-firing wood pellets in their coal-fired power plants in order to decrease CO2 emission, which has also contributed to increased demand for wood pellets. Such developments have lead to an expansion of the production capacity yet a lack of available wood biomass in the EU has made it increasingly dependent on imports.

The technology for wood pellet production is well developed and tested for different types of raw wood material input. After drying and milling the forestry and wood processing residue is pressed into dense wood pellets that are packaged in plastic bags for the retail market or sold in bulk via wholesalers. High quality production equipment is available from a number of producers in the EU that offer turnkey solutions as well as maintenance support.

Since domestic production capacities within the EU are unable to meet the rapid increase in demand EU suppliers are tuning to markets outside the EU, in particular those in close proximity such as Bosnia and Herzegovina. B&H has a long tradition of forestry and wood processing, since forest covers more than half the country. Although some sawmill wood residue in B&H is utilized for energy purposes most of the forestry residue is left in the forest and not used as an energy fuel. The harvesting methods also need to improve in this country in order to improve efficiency in the utilization of forestry residue.

The availability of unused wood biomass in Bosnia and Herzegovina is still very high. It is estimated that approximately 1,000,000 tons of wood biomass in B&H remains unused. As an example, Italy is one of the largest importers of wood pellets and reported to import 1.2 million tons of pellets; B&H therefore has the potential to meet most of Italy’s demand. Yet B&H only exported around 40,000 tons of pellets to Italy in 2012, while total pellets production output is currently about 150,000 tons per year.

Considering the above facts, it is clear why wood pellets production is currently considered one of the most attractive investment opportunities in Bosnia and Herzegovina. Huge market demand in the neighboring EU market countries and the proven availability of the raw material are the key factors that drive investment opportunities in the production of wood pellets in B&H.

The USAID-Sida FIRMA Project has supported the development and expansion of several pellet production projects in Bosnia and Herzegovina that have proven the market development assumptions described above to be accurate. Wood pellet production represents a considerable export potential as well as an opportunity for employment and the development of local communities in B&H. This review describes in detail the market forces that drive pellet consumption as well as the production technology and availability of the raw material in Bosnia and Herzegovina.
Bosnia and Herzegovina signed the Stabilization and Association Agreement in 2008 and was subsequently received the status of potential candidate country for EU-membership. This status provides a political framework for further trade liberalization and financial support through EU Pre-accession funds for economic development.

2.1. Trade Policy and Investment Agreements

According to the preferential export regime with the EU, all goods originating from BiH which fulfill EU technical requirements can be imported to all EU27 member countries without any restrictions or customs duties. This free access to the EU market also includes wood pellets.

B&H has signed free trade agreements with Albania, Croatia, Macedonia, Moldova, Montenegro, Serbia, UNMIK/Kosovo and Turkey. In addition to these, B&H has preferential export regimes with Australia, Canada, Japan, New Zealand, Norway, Russia, Switzerland and the USA.

Bosnia and Herzegovina has signed or ratified 36 bilateral agreements to promote and protect investment with the following countries: Austria, Belgium, Luxembourg, Belarus, Croatia, the Czech Republic, China, Denmark, Egypt, Finland, France, Greece, the Netherlands, Hungary, Indonesia, Iran, Italy, Serbia, Montenegro, Qatar, Kuwait, Libya, Macedonia, Malaysia, Moldova, Germany, Pakistan, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey, UAE, Ukraine, United Kingdom and the United States as well as the OPEC Fund.
2.2. Investment Environment – Key Facts

Macroeconomic Stability

Actual GDP in B&H increased in 2013 by 1.9% with industrial exports being the main driver of the economic recovery. The most important macroeconomic stability factor was the stable domestic currency (BAM), which is pegged to the Euro. A firm monetary policy provides protection against currency devaluation and inflation, which is a very important consideration for foreign investors. The annual inflation rate in January 2013 was 1.3%. The ratio of External Public Debt to GDP in 2012 estimated at 27.2% classified B&H as a moderately indebted country.¹ The banking sector in B&H offers a full range of modern services adding to the stability of the investment environment in the country. Foreign ownership within the private banking sector in B&H is 86%, including some of the leading European and regional banking groups such as Raiffeisen, Hypo, Sberbank BH, UniCredit, Turkish Ziraat, Intesa Sanpaolo and Sparcasse.

Foreign Direct Investment

The Law on Foreign Direct Investment (FDI) in Bosnia and Herzegovina regulates the same treatment for foreign and domestic investors. The same Law protects foreign investors against nationalization, expropriation or similar measures and allows for the full repatriation of profits. Foreign companies and individuals are able to invest freely in almost any sector, subject to the same administrative procedures as domestic investors. Foreign investors are free to invest solely or through a joint venture with domestic partners without any preconditions. There are no restrictions on employing foreign nationals, subject to the labor and immigration laws in B&H. There are no restrictions on foreign nationals becoming members of management and supervisory boards of companies registered in B&H.

Tax system

Bosnia and Herzegovina has a flat rate of 17% VAT on all products and services. Corporate income tax is 10% for profits on goods and services sold in the domestic market. However, according to the Law on corporate profit tax in the Federation of B&H all companies that make more than 30% of their income on products and services exported outside B&H are entirely exempt from corporate income tax.² The withholding tax rate in the FB&H is 10% (with a 5% tax rate on dividends) and 10% in RS. Personal income tax is only 10% in both the FB&H and RS.

Labor

B&H offers a highly competitive workforce price in comparison with EU countries: the average net wage in 2014 is 428 EUR. A technically skilled labor force for industrial production is available in B&H particularly in traditional industries such as the wood processing, metal processing, construction, textiles and food processing sectors.

3. WOOD PELLET INDUSTRY OVERVIEW

Wood pellets are densified biomass fuel made from wood processing and forestry residue. By milling and pelleting small trees, branches, tops, sawdust, planer shavings and other kinds of wood biomass millions of tons of waste is transformed into bio-fuel, which enhances the environment by reducing greenhouse gas emissions. Wood Pellets can be burned in stoves or can be co-fired in industrial or electric generation boilers that currently burn coal.

Properties such as low moisture content and relatively high energy density make wood pellets easily transportable from forested areas to anywhere in the world. The advantages of wood pellets over other solid biomass, such as wood chips and agricultural residues, are their storability, relative ease of handling and typically lower transport costs for units larger than 50 to 100 km³.

3.1. Residential Pellet Stoves and Boilers

Wood pellets are a very convenient fuel compared to other types of biomass fuel. Buildings using pellet boilers have their fuel delivered by trucks able to blow pellets directly into storage with the minimum of disruption, typically just once a year. Home appliances, such as stoves, usually have an integrated fuel hopper typically filled from a bag containing 15 kg of pellets.

Compared to logs and wood chips, pellets have a high energy density which means less storage space is required. Pellet heating systems also produce much less ash than their wood chip and log counterparts.

Pellet stoves are available in a range of sizes ranging from small room heaters to larger units that incorporate a boiler able to supply heat to a number of radiators or domestic hot water systems. Pellet boilers are usually physically smaller than their wood chip fired equivalents because they need less robust feed and burning systems.

Many countries throughout Europe have experienced a substantial increase in residential wood heating, especially in the form of pellet stoves and boilers, due to strict policy measures combined with generous incentives. Such programs in countries like Germany, Austria and France include grants, subsidized loans and tax incentives for installing residential heating systems that use biomass.

---

3.2. Co-firing

Wood pellets have several desirable features for co-firing with coal. By removing most of the moisture from the fiber, wood pellets burn much like coal. The pellets are a consistent product with a specific diameter and a narrow range of lengths. They have a hard outer surface that makes handling them similar to coal. They are also friable like coal, meaning they break into small particles when processed. This means that pellets can be mixed with coal without the need for a separate system.

Coal is the largest contributor to the human made increase in CO2 in the atmosphere. Biomass co-firing consists of combusting biomass and fossil fuels in the same power plant. Biomass co-firing with coal has enormous potential for reducing CO2 emissions because biomass can replace between 20-50% of coal. A substitution of just 10% of coal in the currently installed coal-fired electrical capacity would result in about 150 GW of biomass power capacity, which is 2.5 times higher than the currently installed biomass power capacity globally. In line with EU renewable energy policy, some member countries, including the UK, Denmark, Belgium, Holland and Germany, have introduced incentive schemes for co-firing their coal-fired power plants; this is currently one of the main drivers for increased production of wood pellets.

Apart from cogeneration, several new large power generation plants are being developed in Europe. One example is RWE, the German energy production group, which is currently working on converting Tilbury Power Station in the UK into the world’s largest wood pellet-based biomass power plant. Tilbury Biomass Power Station would consume around 2.7 million tons of sustainably sourced renewable wood pellets each year, sourced primarily from the south east of the USA, Canada and Europe (including the Baltic States, Portugal and Russia).

3.3. Combined Heat and Power generation (CHP)

Cogeneration is a technology for the simultaneous production of electricity and useful heat. Potential sites for the application of cogeneration are everywhere where there is the simultaneous need for electricity and thermal energy. In addition to power plants, in various industries cogeneration is suitable for system distance heating for hotels, hospitals, shopping centers, sports halls and swimming pools. Denmark recently became a leading market for CHP using wood pellets as a fuel. The Danish district heating system is based on 80% co-production for electricity and in 2012 up to 52% of the Danish district heating system reported using pellets as an alternative to coal. The projected target is to replace coal fully with biomass by 2035.

---


4. WOOD BIOMASS SOURCES

Potential sources of wood biomass can be classified as shown below.

1. Heating wood
2. Forestry cutting residue
3. Sawmill residue
4. Furniture production residue
5. Any part of a tree can be used for energy production. Residual parts of trees left after forest harvesting constitute from 25 - 50% of the total volume of the harvested wood. Most of the wooden tree part can be harvested yet certain quantities, particularly the small branches and leaves, have to be left behind in the forest for ecological reasons. Forestry management operations in the Nordic countries for example have the highest utilization of residue harvesting in the EU.

The processing of byproducts is an important production activity for sawmills complementary to the main production of sawn wood. The bark, sawdust, shavings etc are used internally for fuel or can be sold externally as fuel or raw material for pellet production or raw material for the wood-based panel industry. Residue from dried wood is particularly in demand as raw material for pellet production since it does not require additional drying during the pellet production process. Wood residue emanating from the production of wooden houses, windows, doors and furniture is primarily used internally as fuel but can be sold for fuel or as raw material for the wood-based panel industry.

| Bark from pulp mills               | Today almost 100 % is used for fuel within the pulp and paper industry. |
| Bark from debarking of saw logs at sawmills. | Primarily used by the sawmills for energy production: heating of buildings, drying of sawn wood etc. |
| Wood chips produced from slabs, cuttings and other residue from the sawing process. | The major part is sold to pulp mills as raw material for pulp production. |
| Shavings, cutter dust and sawdust from the sawing process. | Commonly sold for energy purposes – production of pellets or briquettes – if not used internally, some volume is sold to the wood-based panel industry. |
| Shavings and sawdust from other mechanical wood processing industries. | Commonly sold for energy purposes – production of pellets or briquettes – if not used internally. |
5. PELLET MANUFACTURING PROCESS

Securing a regular supply of the required amount of raw material is the most critical part of the pellet production process. Wood biomass must be available locally because their low bulk density and high moisture content makes them too costly to transport over long distances. Feedstock availability is therefore obviously a limiting factor in the determination of plant location and capacity.

From the point where the raw material is received at the pelletizing factory to the point where the pellets are ready to deliver the raw material goes through several processes, as illustrated and explained below.

Pellet Manufacturing Process

5.1. Drying

If the water content of the raw material is higher than 10% then it has to be dried. The raw material with water content higher than 15% is difficult to pelletize so drying is an important part of the pellet production process. Forest residue usually contains 25% to 50% of water, unlike dry planer shavings that do not need drying at all. The extent to which a material needs to be dried before pelletizing makes a big difference to the energy required in the manufacture of wood pellets. After drying, the heat generated by the remaining pelletizing processes will further reduce moisture to about 5%. It is important not to over dry the feedstock because a small amount of moisture is required to help bind the wood fiber.
5.2. Grinding

After drying, the wood biomass raw material goes into a hammer mill used to grind the dried feedstock to a size no bigger than the diameter of the pellet (~6 mm). The raw material is then filtered before grinding in order to remove unwanted material such as stone or metal.

5.3. Pressing – Pelletizing

Wood pellets are produced by pressing the grinded wood through holes in the die. A small amount of steam is passed through the ground wood before the wood pellets are pressed then it is additionally heated until the lignin in the wood is released to ensure that the biomass particles bind into pellets.

5.4. Cooling

The cooling process is important for the strength and quality of the pellets. After pressing the pellets are still hot and quite soft and therefore must be gradually air cooled in order to allow the lignin in the pellets to solidify. The moisture content of the final wood pellet product should be less than 8 per cent.

5.5. Packaging

Pellets are usually packed in plastic bags weighing 15 - 50 kg or transported in bulk by special tankers.
6. GLOBAL PELLET PRODUCTION CAPACITY

Driven by rising demand the global production capacity for wood pellets has more than doubled over the past 10 years. Global production of pellets estimated at 6-7 million tons in 2006 rose to more than 14.3 million tons\(^6\) by 2010.

According to a report published by the International Energy Agency (IEA) in September 2013, global wood pellet production in 2011 was estimated at 18.3 million metric tons. However, only 52% of the estimated 35 million metric tons of global production capacity was in use in 2011. The US is the largest producer of wood pellets producing 4.7 million metric tons in 2011 and covering 26% of global production, followed by Canada at 17.5 million tons and Germany at 17.41 million tons. Other significant producers in 2011 included Russia, Sweden and Austria.

Chart 1: Wood pellet production and consumption by country in 2010.

![Graph showing wood pellet production and consumption by country in 2010.]

Source: Eurostat.

Although production capacity has risen strongly since 2008 demand has significantly surpassed domestic production in the EU. Increasing imports from non-EU countries, including the US, Canada and the Russian Federation as the largest exporters of pellets to the EU, cover the additional demand in the EU. EU27 imported more than 4.4 million tons of pellets from non-EU countries in 2012\(^7\).

Since the transportation of biomass over large distances is not cost-effective, pellet production capacities need to be located close to the source of raw material. Therefore, any increase in the production capacity in the EU will be limited by the domestic availability of wood biomass as well as general production costs. This is why it is expected that imports of wood pellets to the EU will continue to grow in order to meet the projected demand growth over the coming period.

---


7. **MARKET DRIVERS: EU DEMAND**

The wood pellet market in Europe is currently thriving, predominantly driven by the EU 2020 target for renewable energy. Yet the European Union currently meets only around 4% of its energy needs through biomass. EU member states agreed to a binding 20% target for renewable energy in 2007 that includes 10% from biomass by 2020 as well as a 20% reduction in greenhouse gas emissions. Wood pellets are the most available form of biomass in the EU and this is why they have a crucial role to play in achieving the 2020 target.8

According to Eurostat, the consumption of wood pellets in Europe more than tripled from 4.6 to 14.3 million tons between 2006 and 2012 and the same applies to the production capacity increasing from 4.4 to 10 million tons; imports increased fivefold reaching 4.4 million tons in 2012. Around half of the 14.3 million tons of total EU pellet consumption was allocated for industrial use and about half for household heating in 2012.

Different market segments, including co-firing and district heating, are the drivers of the strong growth in pellet consumption in the EU. Co-firing and CHP demand is driven by the availability of feed in premiums for electricity produced from renewable sources in the Northern European countries as well as biomass emissions allowances. The competitive price of wood pellets compared to other heating fuels together with government support measures for the installation of pellet stoves and boilers are the main market drivers for the residential heating segment. The most important EU countries in this market segment include Germany, Italy, Austria and Denmark.

Despite the global economic crisis and subsequent budget restrictions in most EU countries, there has been no cancelation of the substitution policy and it is expected to continue. This is why prevailing opinion concerning the potential of the EU market is that it has not yet reached its limit and that future expectations surpass any of the recent evolutions.

8. **GLOBAL MARKET SUPPLY AND DEMAND FORECAST**

Several recent market studies completed by the relevant international organizations have estimated the global demand growth potential for wood pellets over the next period. The projected demand ranges from 30 to 50 million tons by the year 2020. This strongly depending on EU support policies on renewable energy, since the EU is the main market driving the accelerated demand levels globally. According to the European Biomass Association, the expected demand for wood pellets in the EU could even reach 80 million metric tons per year by 2020.9

Where industrial pellets are concerned, it is most important that support measures for co-firing and CO2 emissions allowances continue. Projections for the residential demand segment in the EU are dependent on the additional support measures for the installation of pellet stoves and boilers.

Projected demand in Asia is expected to increase, driven by market growth in Japan, South Korea and China, and reach 5 to 10 million tons by 2020. Since in the US there are no planned government policies aimed at stimulating domestic industrial consumption demand it is likely to be driven by domestic users. Government policy on co-firing in Canada, which also determines the export capacity, will strongly affect demand.

---


9. TARGET MARKET ANALYSIS - ITALY

The Italian National Renewable Energy Action Plan (NREAP) target for renewable energy in the heating sector is 17.09% by 2020. Wood used for heating plays an important role in the projection with an increase from 1.6 million tons in 2010 to 5 million tons in 2020.10 The Italian Government has introduced a number of support measures aimed at stimulating the use of biomass for heating, including installations that use pellets as heating fuel. Additional support measures for biomass heating in Italy include energy efficiency certificates for energy saving projects, tax relief for energy efficiency improvements in buildings, installation of solar panels, biomass boilers and heat pumps as well as energy consumption for hot water production in new buildings.

Due to the target measures, Italy has become one of the largest importers of firewood in the world. The residential heating market generates most of the demand. The number of pellet stoves and boilers in Italy amounted to more than 1.4 million units in 2011. Some of the drivers behind the expansion of the residential heating market include the price competitiveness of wood pellets compared to other fuels, especially in areas not covered by the natural gas network, the availability of tax incentives and grants, and a developed sector of stove manufacturers. However, the cost competitiveness of pellet heating is the main market attraction, since the annual costs of a pellet stove is lower than that of a natural gas boiler.

The demand for wood pellets has increased steadily from around 200,000 tons in 2003, led by the growth of the pellet stove sector. Pellet consumption was estimated at in excess of 1.8 million tons in 2011, which is more than 10% of the EU pellet market. The potential for growth in residential heating pellet consumption in the Italian market is quite significant and driven by the demand for the replacement of old heating systems.


The main source of biomass for pellet production in Italy is residue from the furniture production industry; however, in the last few years pellet producers have had difficulty in sourcing the required quantities of raw material at competitive prices. This is why the production of pellets in Italy actually declined from above 700,000 tons in 2007 to around 500,000 tons in 2011.11

The market in Italy is dependent on a significant portion of imports because domestic production cannot satisfy the increasing demand. According to Eurostat, Italian imports of wood pellets in 2012...

---

were estimated at 1.2 million tons, which represents 80% of the market share. Austria remains the largest exporter country to Italy followed by Germany, Croatia, Romania and Canada.

The distribution channels for wood pellets in Italy include direct sale by domestic producers, distribution by stove and boiler providers and sale through wholesalers and retailers. Wholesalers and retailers distribute over 70% of pellets sold in plastic bags of 15 kg.

Chart 3: Pellets imported to Italy in 2010.

Source: Eurostat.

The price of wood pellets has remained relatively stable since 2009 with higher prices in the winter season and lower prices in spring/summer. However, the gap in seasonal pricing has been reduced along with the difference between the minimum and maximum market price.  


Source: AIEL.

The Italian wood pellet market is currently quite tight because of the extremely high rate of growth and insufficient domestic production capacity. The average price per ton of pellets in November 2013 was 255 Euro including VAT.

---

Estimates place Bosnia and Herzegovina pellet exports to Italy in 2012 at around 40,000 tons. Italy remains the most important importer of pellets produced in Bosnia and Herzegovina and the most perspective market for the coming period. According to information obtained on the export of pellets from B&H to Italy the off-season export price for retail packaged pellets in 2013 was around 135 Euros, while during the winter it reached a level of around 145 Euro per ton.

10. BIOMASS AVAILABILITY IN B&H

10.1. Forest Stock in B&H

Wood is one of the most important natural resources in Bosnia and Herzegovina. Forested land covers about 2.7 million ha or 53% of the total land area of Bosnia and Herzegovina, which is amongst the highest forest coverage in Europe.

State forests account for about 80% of the total forested land, while the remaining 20% is privately owned. High forests constitute about 55% out of the total 2.1 million ha of state owned forested land. The remaining 45% is divided equally between coppice and barren land. The total growing stock of state forests in 1990, estimated at 359 million m$^3$, is among the highest stock in European forests.\(^{14}\)

Figure 1: Forested areas in B&H.

The management of forests in the Federation of B&H is the responsibility of the cantonal ministries. The Federal Department for Forest Management, within the Federal Ministry of Agriculture, Water Management and Forestry, is responsible for development planning for forests and the administrative supervision of state and privately owned forests. Cantonal public forestry companies in each canton are responsible for the management of the publicly owned forests in each canton.

In Republic of Srpska the Department for Forest Management, which is accountable to the RS Ministry of Agriculture, is responsible for forestry management in the entire entity through the Public Forestry Company of Republic of Srpska.

Presently the surface of available forest of productive character is 2.1 million ha. The total wood stock of all forests in B&H is estimated at 340 million m$^3$ of which there are about 135 million m$^3$ coniferous and 205 million m$^3$ broadleaf. According to data acquired from the second State Forest Inventory in B&H (2006-2009) the annual increment of high forests is estimated at 9.1 million m$^3$, which is about 3% of the total standing volume. In addition to this, the annual increment of coppice forests in B&H, which are generally not harvested, is estimated at 2.1 million m$^3$.

### 10.2. Harvesting

The average annual harvesting level in B&H is estimated at 4.4 million m$^3$ comprised of 2.3 million m$^3$ coming from the FB&H and 2.1 million m$^3$ from RS, including an approximate 200,000 m$^3$ from private owners.

Table 1: Harvesting structure of state forests by canton in the Federation of B&H.

<table>
<thead>
<tr>
<th>In 000m$^3$</th>
<th>Cut in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conifers</td>
</tr>
<tr>
<td>Una-Sana</td>
<td>171</td>
</tr>
<tr>
<td>Tuzla</td>
<td>62</td>
</tr>
<tr>
<td>Ženica-Doboj</td>
<td>204</td>
</tr>
<tr>
<td>Podrinje</td>
<td>0</td>
</tr>
<tr>
<td>Central Bosnia</td>
<td>214</td>
</tr>
<tr>
<td>West Herzegovina</td>
<td>2</td>
</tr>
<tr>
<td>Sarajevo</td>
<td>81</td>
</tr>
<tr>
<td>Canton 10</td>
<td>362</td>
</tr>
<tr>
<td><strong>Total Federation BiH</strong></td>
<td><strong>1,099</strong></td>
</tr>
</tbody>
</table>

*Source: Federal Ministry of Agriculture, Water and Forestry.*

The total high forest increment estimate in B&H is 9.2 million m$^3$ and therefore the current harvesting volume of 4.4 million m$^3$ comes below 50% utilization of the annual increment and is therefore lower than the EU average of about 60%. Such an increase in harvesting volume utilization in B&H would make more than 1 million m$^3$ of such wood available on the market. In addition, an estimated 2.1 million m$^3$ of increment from coppice forests remains unutilized.

According to forest management plans in B&H, the projected increase in the annual cut can grow up to 6.3 million m$^3$ on public land. However, an increase in the harvesting volume and utilization of the increment would require a significant improvement in forestry management practices as well as additional investment in equipment and access roads. There are also very clear signs that harvesting in coppice forests can increase, although this would also require additional investment.

---


the potential and projected growth, it can be expected that harvesting volumes in B&H will gradually increase over the next ten years.

10.3. Available Biomass Feedstock in B&H

The most significant source of biomass in B&H is forestry and wood processing residue. When assessing the available biomass feedstock the below conversion factors were assumed.

1. Sawmill processing of 1 m³ of wood produce the following amounts of residue:
   - 30% coniferous (15% sawdust and 15% cuttings);
   - 35% broadleaf (20% sawdust and 15% cuttings).

2. Veneer production produced 20% residue from wood inputs.

3. Total average portion of small branches (dependant on the log thickness and type of wood):
   - 15% coniferous;
   - 18% broadleaf.\(^\text{18}\)

Out of the total harvesting volume of 4.4 million m³ about 70% or 3.8 million m³ is round wood, including logs and poles, while firewood accounted for an additional 0.8 million m³. The harvesting residue accounts for the remaining 15% of the harvesting volume or 0.8 million m³, which is mainly left unused in the forest after harvesting.

The detailed harvesting structure for the FB&H is illustrated in the table below.

Table 2: Structure of forest harvesting in the Federation of B&H;

<table>
<thead>
<tr>
<th></th>
<th>Conifers</th>
<th>Broadleaves</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m³</td>
<td>%</td>
<td>m³</td>
</tr>
<tr>
<td>Logs for veneer</td>
<td>8,993</td>
<td>0.7</td>
<td>51,865</td>
</tr>
<tr>
<td>Industrial logs I, II and III</td>
<td>741,246</td>
<td>57.7</td>
<td>398,102</td>
</tr>
<tr>
<td>Electricity poles</td>
<td>73,225</td>
<td>5.7</td>
<td>0</td>
</tr>
<tr>
<td>Mining poles</td>
<td>124,612</td>
<td>9.7</td>
<td>0</td>
</tr>
<tr>
<td>Other logs</td>
<td>12,847</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>Logs for cellulose</td>
<td>107,911</td>
<td>8.4</td>
<td>306,987</td>
</tr>
<tr>
<td>Firewood</td>
<td>6,423</td>
<td>0.5</td>
<td>480,806</td>
</tr>
<tr>
<td>Cutting Residue</td>
<td>209,399</td>
<td>16.3</td>
<td>164,007</td>
</tr>
<tr>
<td><strong>Total net mass</strong></td>
<td>1,075,256</td>
<td>83.7</td>
<td>1,237,760</td>
</tr>
<tr>
<td><strong>Total gross mass</strong></td>
<td>1,284,655</td>
<td>100</td>
<td>1,401,767</td>
</tr>
</tbody>
</table>

Net mass (Conifers + Broadleaves) 2,313,016 m³

Gross mass (Conifers + Broadleaves) 2,686,422 m³

Source: Federal Ministry of Agriculture, Water and Forestry.\(^\text{19}\)

---


Based on information obtained directly from the forestry companies in the FB&H cutting residue is not collected by forestry workers during the harvesting because forestry companies do not have a demand for this product at the present time. However, if the demand were present from pellet producers they would be able to supply a significant portion of the cutting residue and sell it as a biomass. The UNDP published a report in 2011 on biomass potential in B&H wherein they estimated that up to two-thirds or up to 0.5 million m³ of the harvesting residue is available as a biomass.²⁰

Domestic heating using firewood is increasingly important in B&H since prices of other heating fuels are increasing significantly. Many parts of the country, particularly rural areas, have no access to natural gas and therefore wood and coal are traditional heating fuels. It is estimated that up to one-third of the harvested round wood or 1.2 million m³ is used to produce firewood so in total about 2 million m³ of harvested wood in B&H ends up as firewood for domestic heating. According to various estimates, current firewood consumption in B&H is about 1.6 million m³ per year²¹ and, according to data provided by the Foreign Trade Chamber of Commerce of B&H, about 0.5 million m³ is exported.

According to existing producers of pellets in B&H, currently the main source of biomass for pellet production is firewood. The prices for firewood biomass currently paid by pellet producers are competitive to prices for firewood export; therefore, exporters are ready to sell to local producers as an alternative to export. More firewood will become available for export or the production of pellets as local households switch to pellet heating systems, dependent on demand.

Currently about 2.5 million m³ of round wood goes into local sawmills for further processing. Since the sawmilling process produces more than 30% residue wood in the form of sawdust, cuttings and bark an additional 0.75 million m³ of sawmilling residue is also available. In addition, there are also residues from furniture and joinery production in B&H. Thus, according to various estimates, in total there is more than 1 million m³ of wood processing industry residue available annually. A large portion of this is used for drying and heating in the wood processing industry yet it is estimated that significant amounts of sawmill residue is also available for sale as biomass.

Based on the above analysis and various recent estimates by both domestic and international organizations, the conclusion can be drawn that currently there is a significant unused potential of biomass wood available that could be used for the further expansion of pellet production in the country.

10.4. Wood Biomass Prices in Bosnia and Herzegovina

According to information obtained from the public forestry companies in B&H, the price of firewood ranges from 25-50 Euros per m³. The price of bark and sawdust from sawmills is even lower, dependent on availability and location. Although, according to pellet producers in B&H, the price range is quite wide the cost of raw material wood inputs is 50 - 60 Euros per ton of produced pellets.

10.5. Forest Certification and Protection

The Forest Stewardship Council (FSC) certifies forests in accordance with the ten FSC principles and

---
criteria with the aim to protect forests and ensure responsible management practices. It is an internationally recognized standard for forestry management companies and the wood processing industry. Wood products manufacturers from B&H have been required to comply with the FSC CoC standard since 2013 in order to export to the EU.

In order to comply with the FCS CoC standard wood processing companies in B&H must obtain wood from sources that are FSC certified. In 2009, the RS State Forest Company certified its forest management according to the FSC system, while three cantonal state forestry companies in the FB&H became fully FSC certified, including the Tuzla, Una-Sana and Herceg-Bosnia cantons, with several others in the process of certification.

11. CURRENT PELLET PRODUCTION CAPACITY IN B&H

According to Eurostat, B&H exported 67,815 tons of pellets to the EU in 2012 and 170,389 tons in 2013 making an increase of 151%.

Therefore, during the last year B&H surpassed Croatia, Ukraine and Belarus and became the second largest non-EU European exporter of pellets after Russia.

Currently there are eight plants for the production of wood pellets with capacities ranging from 5,000 to 40,000 tons annually. Beside these plants, there are a certain number of smaller producers with an annual production capacity of 1,000 to 2,000 tons. Therefore, total annual production is estimated at about 200,000 tons of pellets.

The production capacity in B&H consists of up to ten larger size plants for the production of wood pellets with capacities ranging from 10,000 to 40,000 tons annually and an additional capacity of up to 20 smaller producers with production at 1,000 to 10,000 tons per annum. Some of the main active producers of pellets currently in B&H are shown below.

- Enernovi - Novi Grad
- ŠUICA TERNI d.o.o. - Šuica
- Ensa BH d.o.o. - Srbac
- SwissEco pellet RS d.o.o. - Zvornik
- Interwork - Bosanski Petrovac
- EU-PAL d.o.o. - Pale
- FIS d.o.o. - Vitez
- KOVAN M.I. d.o.o. - Gračanica
- Savox d.o.o. - Milići

---

References


7. FIPA website: www.fipa.gov.ba


