



Socio-economic and climate impact of the forestry and wood processing industries in Romania

The synthesis of the study on the socio-economic and climate impact of the forestry and wood processing industries in Romania aims to provide an overview of the most important indicators specific to the forestry sector, as well as a quantitative dimension of the contribution of these industries to Romania's economy and, respectively, of the climate impact.

Synthesis
08 November 2022



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According to the National Institute of Statistics (INS), the area of the forestry fund is of 6.6 million hectares, while the second cycle of the National Forest Inventory (IFN) indicated a forest area of 6.9 million hectares, including also vegetation areas located outside the forestry fund. With a forest coverage of 29% of the total country area, Romania ranks eighth in the European Union, below the EU average of 38%. In addition to the area of land covered by forests at the national level, another 2 million hectares of unused land (without agricultural or forest usage) may represent an important resource for afforestation.

The data obtained from the last two national forest inventories show an increase in volume of (standing) timber of over 133 million cubic meters in the 5 years period between the inventories, thus resulting in a gross annual increase in the stock of (standing) timber of 26 million cubic meters. Moreover, the average volume per hectare of forest increased from 322 cubic meters per hectare to 340 cubic meters per hectare. Concomitantly with the growing stock of (standing) timber, the areas of land intended for afforestation (bare areas or in the process of regeneration) registered a decrease of over 21 thousand hectares, reaching 56.7 thousand hectares at the end of the IFN cycle II.

According to European statistics, Romanian forests' removals account for 33% of volume of timber over bark exploited by the economic operators, while EU average is around 63%, with the removals of the first three countries being over or close to 100%.

National forestry statistics present a volume of approximately 20 million cubic meters (gross volume) of wood removals in 2021, with 342 thousands cubic meters more than the previous year, Romania being the seventh most important wood producing country at EU-27 level.

However, the total production of roundwood (wood in rough) is of only 2.3 cubic meters of roundwood exploited by economic operators per hectare in 2019, among the lowest in Europe, countries with similar conditions to Romania having a much higher harvest index.

About a third of the roundwood exploited is used as fuelwood, which places Romania, according to official statistics, among the countries with a high consumption of fuelwood, being surpassed only by France among the countries with a higher production than Romania.

From an economic perspective, more than 14,900 active companies in the forestry and wood processing industries generated a turnover of more than EUR 9.7 billion in 2021 (higher with more than 20 pp as compared to the previous year, mainly on the back

of price increases) and exports of over 7% of Romania's total exports, with a total net foreign contribution of around EUR 2.2 billion of the wood processing and furniture sectors, each sector with relatively equal weights.

The gross value added generated by the direct activity of the forestry and wood processing industries increased in the last 5 years, from EUR 2.9 billion in 2016 to EUR 3.5 billion in 2020, resulting in a direct contribution to the gross domestic product (GDP) formation of close to 1.6% in 2020, while the total impact of these economic activities, including broader indirect and induced effects, is much higher, reaching 4.5% of GDP. The analysis shows that for each EUR 1 of direct value added, the forestry and wood processing industries generate an additional EUR 1.8 in the economy (EUR 1.1 along the value chain and EUR 0.7 through the additional impulse created in the economy by employees spending).

At the same time, the analysed sectors directly employ more than 157 thousand people, while when considering the indirect and induced effects, the jobs created or supported in the economy amount to more than 330 thousand.

Also, the forestry and wood processing industries contribute with over EUR 1.2 billion to the state budget directly, in the form of tax revenues and social health insurance contributions, to which another approx. EUR 2 billion are added as contribution from the rest of the economy.

The impact of the sector in combating climate change is annually equivalent to more than 50 million tons of CO₂ sequestered or avoided (taking into consideration the emissions saved through the avoidance of the usage of fossil fuels for residential heating (biomass represents 62% of the total renewable energy produced by Romania for heating), the use of wood products which leads to avoiding the use of other materials with a higher carbon footprint such as plastic, non-biodegradable packaging, concrete or steel).

In the context of the EU commitments and the targets assumed by Romania, the forestry sector has a significant potential to contribute towards reducing the climate impact by using biomass as a raw material in various industries, by replacing coal from SACET, by increasing the forested areas and the roundwood harvest from forest.

Other opportunities include increasing the collection rate of wood-based waste from the current 50%, in line with European targets, as well as the use of innovative biomass materials such as wood cellulose that fixes carbon and replaces other materials with a large carbon footprint.

Forestry fund area



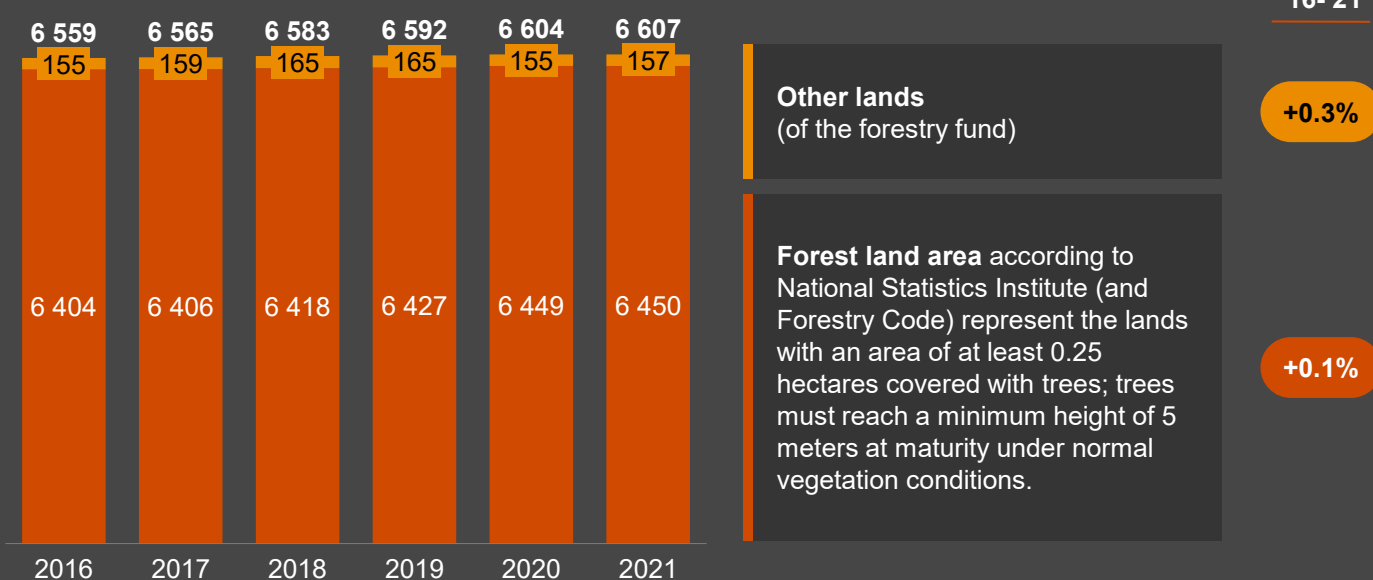
The forestry fund at national level covers an area of 6.6 million hectares (according to INS), respectively 7 million hectares of forest area according to the cycle II results of the IFN (which presents the data collected in the period 2013-2018), of which the area covered with trees is over 6.4 million hectares, respectively 6.9 million hectares according to the IFN, depending on the definition of the term "forest" and the methodology used for assessing forest resources.



Overall, forest area is slightly growing, both statistical surveys showing increases in the area of land covered by forests (46 thousand hectares in the period 2016-2021 according to INS, respectively 28 thousand hectares of land covered with forests between the two IFN cycles, completed in 2012 and respectively, 2018).

Evolution of forestry fund area in Romania

2016-2021, thousand hectares



According to the National Forest Inventory (IFN) completed in 2018 (Cycle II 2013 – 2018), the area covered with forests is of 6.9 million hectares, which includes as well areas of forest vegetation located outside the forestry fund, included in the "forest" category, according to the definition of FAO¹.

¹ Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ.

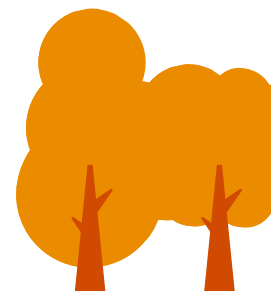
Source: Forests statistics in 2021 – National Institute of Statistics, National Forest Inventory

Over a third of the area of the forestry fund at national level is concentrated in the Central and North-East development regions (37.4% in 2021), while at the county level, the largest areas covered with forest are in Caraș-Severin (426.0 thousand hectares), Suceava (425.8 thousand hectares) and, respectively, Hunedoara (310.0 thousand hectares).

Considering the ownership structure, 64.2% of the area of forestry fund is in public ownership (administered mainly by Romsilva), while, considering the distribution of forests by landforms, the data published after the IFN cycle II shows an uneven distribution, with mountain areas accounting for 59.0% of the total area covered by forests, while only 6.6% is situated in lowland areas.

According to the European Environment Agency, the surface of Natura 2000 protected areas in Romania amounts to over 5.4 million hectares², while 2.6 million hectares of forests are located in protected areas, according to information published by FAO (approximately 40% of the surface of Romania's forests).

² Over 7 million hectares in 2021 according to the European Environment Agency
PwC



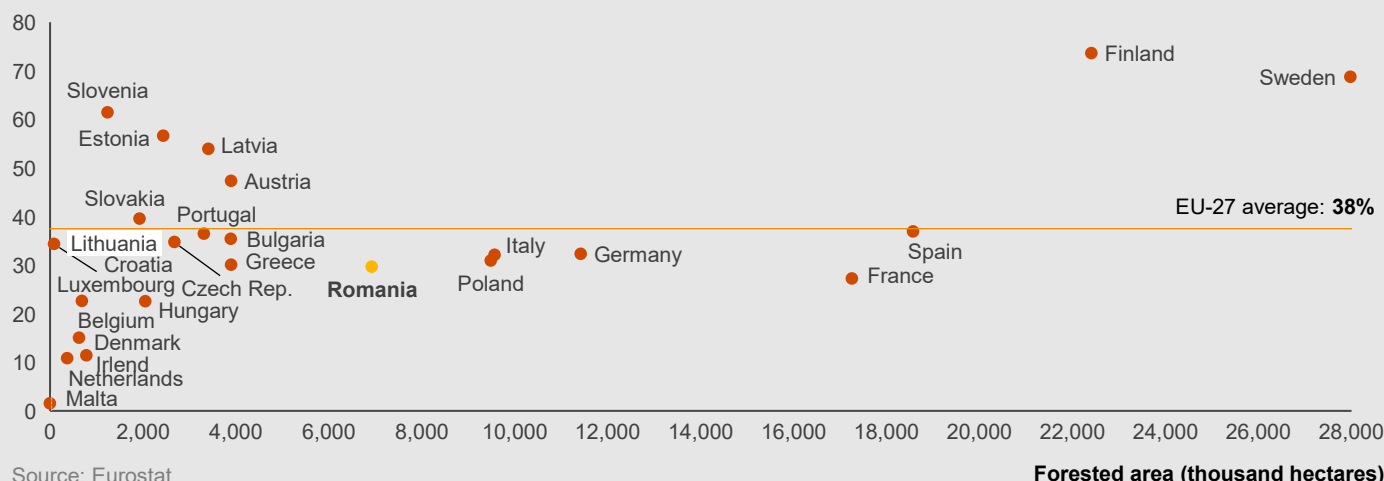
Forest coverage degree in the EU-27 member countries varies from 1.5% (Malta) to over 73% (Finland), this being primarily influenced by a series of characteristics such as relief, soil, climate, but also local policies and strategies. More than half of the territory of five member states is covered by forests (Finland, Sweden, Slovenia, Estonia and Latvia), at the opposite pole are countries such as Malta, the Netherlands, Ireland or Denmark.

Romania ranks 8th in the EU-27 by forested area and 19th by forest coverage, being positioned below the European average of forest coverage of 38% and below the afforestation percentages discussed at national level.

Forests benchmark by forested areas and forest coverage

2020, EU-27

Forest coverage (%)



The data obtained from the last two forest inventories at the national level show an increase in the volume of (standing) timber of over 133 million cubic meters, from 2.2 billion cubic meters in IFN cycle I completed in 2012, to 2.4 billion cubic meters in IFN cycle II completed in 2018, which could translate into an annual growing stock of (standing) timber of 26 million cubic meters over the last 5 years.

Moreover, the average volume per hectare of forest increased from 322 cubic meters per hectare to 340 cubic meters per hectare in IFN cycle II. The areas of land intended for afforestation (bare areas or in the process of regeneration) reach 56.7 thousand hectares, the results obtained after the IFN cycle II indicating a decrease in the afforestation areas (of more than 21 thousand hectares compared to previous results).



The main indicators resulting from the National Forest Inventory

2008-2012, 2013-2018

		IFN Cycle I	IFN Cycle II	Variation
Area covered with trees	Hectares	6 900 962	6 929 047	+28 085
Afforestation areas	Hectares	78 457	56 653	-21 804
Volume of (standing) timber	Cubic meters	2 221 593 469	2 354 789 867	+133 196 397
Volume of recurrent losses	Cubic meters	unavailable	63 973 111	n/a
Average volume per hectare of forest	Cubic meters per hectare	322	340	+18
Current annual forest increment	Cubic meters per year	unavailable	58 622 946	n/a

Source: National Forest Inventory

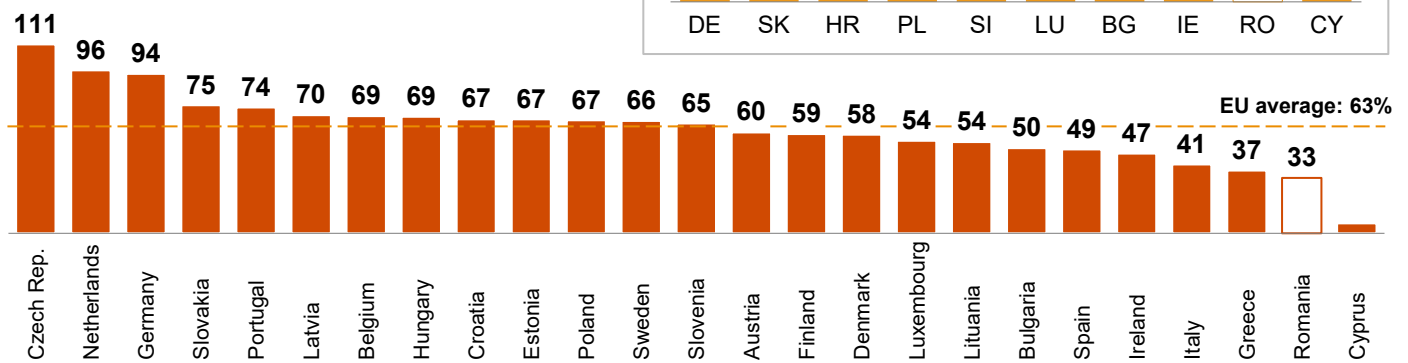
From the perspective of forests age class, more than half of the total forest area (58%) is in the age classes between 21 and 80 years, while the forest under 20 years has a share of 11%.

Note: Within the IFN, the statistical inventory of the entire forest vegetation from the territory of the country is carried out (the national forestry fund, the forest vegetation outside the national forestry fund, the lands with trees).

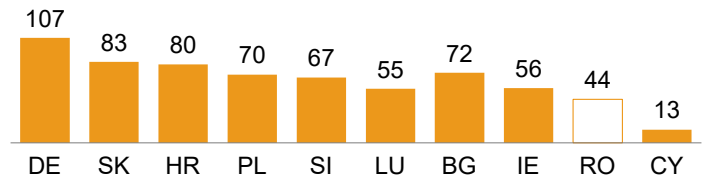
Wood removals

2019, EU-27, percentage of timber over bark

Removals of timber over bark (without losses) vs. total annual growth of forest



Removals of timber over bark (with losses) vs. total annual growth of forest available for wood supply¹



¹ FAWS – Forest available for wood supply represents forests where there are no environmental, social or economic restrictions that could have a significant impact on the current or potential supply of wood, according to TBFRA-2000

Source: Eurostat

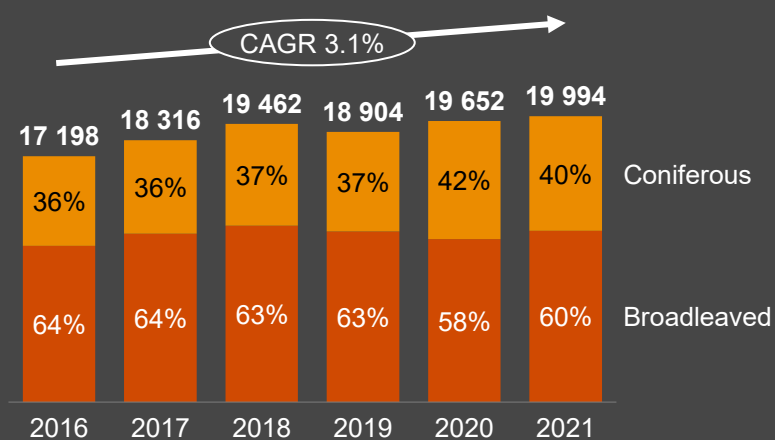


According to European statistics, Romanian forests removals account for 33% of volume of timber over bark (exploited by the economic operators), while EU average is around 63%, with the first three countries removals being over or close to 100% (Czech Republic, Netherlands, Germany). On the other hand, the volume of removals of timber over bark (including losses) from the annual growth of the forest available for wood supply (FAWS) in Romania is around 44%. It is important to mention that the two European datasets show the volume of wood exploited by economic operators, which is slightly lower than the volume of harvested wood reported according to the statistical forestry reports (i.e. the gross volume of standing timber).

Besides to the percentages of 33%-44% registered by Romania according to European statistics, at the national level there was also mentioned a share of 65% of wood removals in total annual growth, mentions referring to the results of IFN Cycle II (the current annual growth of the forest of about 58 million cubic meters, and respectively 38 million cubic meters harvested annually from the forests, volume of wood being presented in some communications of the authorities following the IFN cycle II, but which is not available in the dataset of the National Forestry Inventory).

Volume of wood removals in Romania

2016-2021, thousand metric cubes (gross volume), main species



According to forestry activities statistics, 19 994 thousand cubic meters (gross volume) of wood was harvested in 2021, with 342 thousand cubic meters more than the previous year, broadleaved species representing 60% of the total volume of harvested wood. The wood harvested in 2021 was destined in proportion of 96.4% to legal entities certified in forestry activities and in proportion of 3.6% to natural persons who can exploit wood from the forests they own, the proportion remaining identical with the one from 2016.

Source: Forests statistics in 2021 – National Institute of Statistics

According to European statistics, Romania was the 7th most important wood producing country in 2020, with approximately 20 million cubic meters of wood. Although the European statistics indicate a volume of approximately 6.5 million cubic meters of fuelwood, the volume presented in various studies and reports is considerably higher, taking into account the fact that 3.5 million homes (mostly in rural areas) are heated mainly with firewood, the draft of the Romania's Energy Strategy 2022-2030, with the perspective of the year 2050 (document under public consultation) indicating a domestic consumption of wood biomass (firewood, including biomass) of approximately 14 million tons.

Forestry and wood processing industries attained in 2021 a share of more than 7% in total exports at national level, the largest contribution to the export value being given by finished products (furniture), with a share of more than 46% of total exports of forestry and wood processing industries, followed closely by wood, timber and articles of wood (41.5%), out of which approximately 53% are exports of wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness of more than 6 mm as well as chipboard, OSB and similar panels and only 0.3% wood in the rough and 3.2% fuelwood. On the other hand, imports attain a share of 4%, imports for paper products having the largest weight.

In addition, the analysis of the exports and imports values indicate a total net contribution of around EUR 2.2 billion in case of wood processing and furniture sectors respectively, each with relatively equal weights.

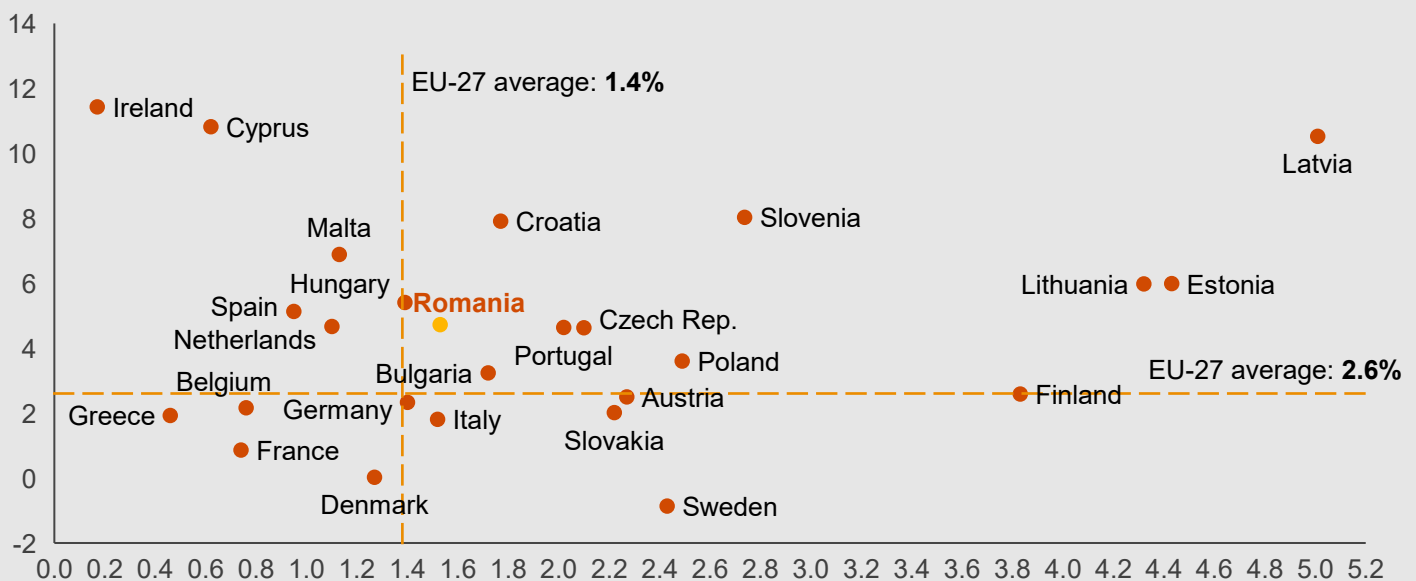


Total production of roundwood (wood in rough) of only 2.3 cubic meters of commercial roundwood per hectare in Romania is among the lowest in Europe, countries with similar conditions to Romania having a much higher index (Poland 4.6 m³/year/ha, Austria 4.9 m³/year/ha, Germany 6.8 m³/year/ha).

Contribution of forestry and wood processing industries to GDP

2016-2019, EU-27

CAGR 2016 - 2019



Note: The contribution to GDP for EU-27 member states also includes NACE 32 Other manufacturing, while in case of Romania it is not taken into account. If we were to take NACE 32 into account as well, Romania's contribution to GDP would be 1.69%.

Source: Eurostat



Romania is ranked relatively low from the perspective of the forestry and wood processing industries direct contribution to GDP, while top countries such as Latvia (5%), Estonia (4.4%) and Lithuania (4.3%) have a contribution to GDP of almost or even more than three times that of Romania. However, Romania's contribution is above the European average.

Looking at the evolution of the gross value added of the analysed sectors, Romania registered a positive evolution of 6% compound annual growth rate¹ (CAGR), positioned within the top 10 member states, with almost a double growth rate when compared to the European average.

The comparative analysis of the contribution of the four economic activities to GDP also reveals differences between EU member countries regarding the importance of each industry (assessed through the weight of the gross value added to GDP), with countries as Finland, Sweden where the manufacture of paper and paper products have a significantly higher share compared to furniture manufacturing, with a dominant share in the case of Lithuania.

Note: ¹ If we were to consider also NACE 32 for Romania, for the period between 2016 and 2019.

Socio-economic impact

More than 1.5% of GDP is directly generated by the forestry and wood processing industries, the cumulative contribution attaining approximately 4.5% of GDP, when considering the broader indirect and induced effects on the economy.



Forestry and wood processing industries contribution to the Romanian economy

Total contribution in 2020

- EUR **9 868** million gross value added of the forestry and wood processing industries
 - EUR **3 480** million direct gross value added (equivalent of 1.6% of GDP), of which wood processing industry and furniture manufacturing hold the largest shares
 - EUR **3 834** million gross value added (equivalent of 1.8% of GDP) generated along the value chain by goods and services purchased from other economic agents
 - EUR **2 554** million gross value added (equivalent of 1.2% of GDP) resulting from the additional impulse created in the economy by employees spending

EUR **3 225** million revenues to the state budget, in the form of tax revenues and social health insurance contributions

over **330** thousand jobs, of which 158 thousand jobs directly sustained

Source: Eurostat, National Institute of Statistics, PwC analysis



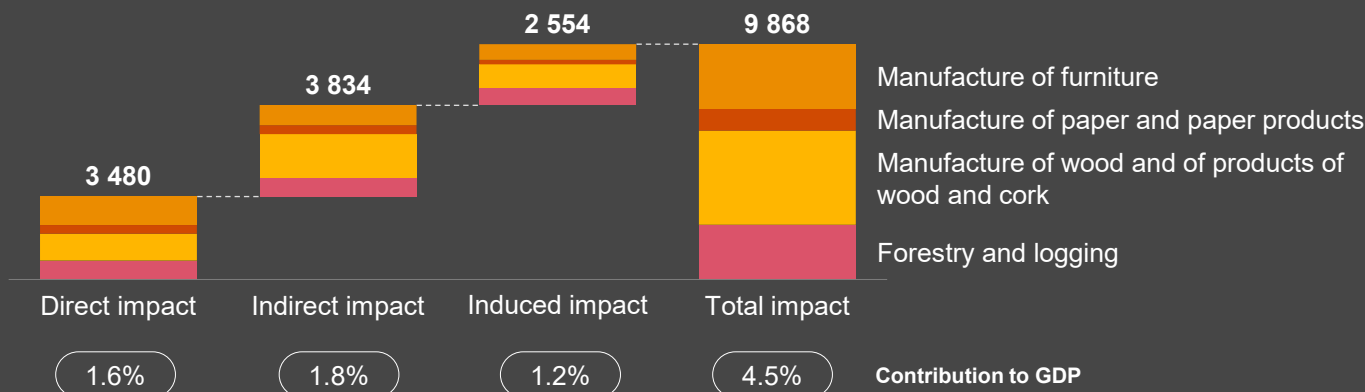
The gross value added of the forestry and wood processing industries has been steadily increasing over the past 5 years, including in 2020. In terms of direct contribution to GDP, the gross value added of the analysed economic activities has fluctuated between 1.53% and 1.75% within the analysed period.

Overall, for every euro generated as gross value added in the forestry and wood processing industries, an additional EUR 1.8 was generated in the economy (EUR 1.1 along the value chain and EUR 0.7 through the additional impulse created in the economy through employees spending).

Forestry and wood processing industries contribution

GDP contribution in terms of gross value added

2020, million EUR, percentage of GDP



Source: Eurostat, National Institute of Statistics, PwC analysis

Note: Aggregate values may differ slightly from the sum of individual values due to rounding.

Activities of the forestry and wood processing industries (direct impact)

EUR 1 direct contribution to GDP

Propagated effect on the economy (indirect and induced impact)

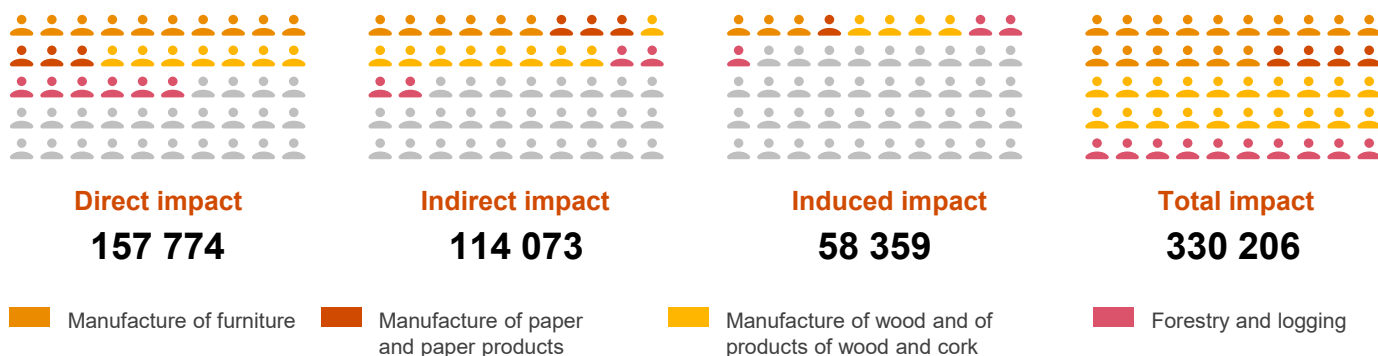
EUR 1.8 additional contribution along the value chain and through the additional impulse created by employees spending

In addition to the contribution to the formation of the gross domestic product, the forestry and wood processing industries contribute with more than EUR 1.2 billion directly to the state budget, in the form of tax revenues and social health insurance contributions, to which adds approximately EUR 2 billion contribution from the rest of the economy, as a result of the interaction with the analysed sectors, thus generating a total contribution of more than EUR 3.2 billion, representing approximately 5.9% of total tax revenues and insurance contributions. An important part of tax revenues is generated through contributions to social insurance, showing the social impact that the analysed sectors have, both through job creation and wages paid, and through social contributions further used by the state.



Impact on employment

2020, employed persons



Source: Eurostat, National Institute of Statistics, PwC analysis

The socio-economic footprint of the forestry and wood processing industries on the national economy was prepared using the methodology developed by Wassily Leontief and the input-output tables published by the Romanian National Institute of Statistics for 2019, quantified by summarizing the direct impact, as a result of the sector's own contributions, the indirect impact, as a result of the procurement of goods and services in the forestry and wood processing industries and respectively the purchases of suppliers of goods and services throughout the entire value chain, as well as the induced impact, represented by the additional impulse created in the economy by employees spending.

Total impact

Gross value added (GVA) EUR 9.9 billion (4.5% GDP)	Employment 330 thou. persons (6.6% out of total national employment)	State budget EUR 3.2 billion
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Direct impact

GVA: EUR 3.5 billion (1.6% GDP)
Employment: 157 thou. persons
State budget: EUR 1.2 billion

Indirect impact

GVA: EUR 3.8 billion (1.8% GDP)
Employment: 114 thou. persons
State budget: EUR 1.3 billion

Induced impact

GVA: EUR 2.5 billion (1.2% GDP)
Employment: 58 thou. persons
State budget: EUR 0.7 billion

Note: Aggregate values may differ slightly from the sum of individual values due to rounding.



The forestry and wood processing industries comprise the entire value chain of the wood industry, starting from the forestry sector up to the tertiary processing of wood-based products. Economic activities considered in scope for the assessment of the socio-economic impact (according to the classification of activities in the national economy) are: Forestry and logging (NACE 02), Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (NACE 16), Manufacture of paper and paper products (NACE 17) and Manufacture of furniture (NACE 31).



Climate impact

In the context of EU commitments, the Land Use, Land-Use Change and Forestry (LULUCF) sector must contribute to the emission reduction target of at least 55% compared to 1990 levels and to eliminate these emissions entirely by 2050.

The LULUCF sector in Romania contributes to the assumed targets related to CO2 sequestration and share of energy from renewable sources, with -25.7 million tons annual CO2 sequestration from LULUCF and 30.7% energy from renewable sources.



European Green Deal
 GHG emissions reduction by at least 55% until 2030
 Climate neutrality (net zero emission) by 2050

Romania's 2030 objectives

- 25.7 million tons of CO2 annual sequestration LULUCF
- 30.7% energy from renewable sources



Predictions for Romania show a decrease in CO2 absorption in the next decade. The current structure by age classes of the volume stock of (standing) timber reveals a large surplus of trees in the III and IV age classes, which explains the existence of an uneven production base (approximately 60% of the forestry area falls into the age classes of between 21-80 years, according to IFN, 2018) and a deficit in the first age class.

The National Forestry Strategy 2030 represents a milestone within the National Recovery and Resilience Plan (PNRR) that includes forest expansion through afforestation. The Ministry of Environment, Waters and Forests launched the draft forestry strategy for debate in August 2022.

Biomass is a source of renewable energy with zero net emissions with a potential to replace coal from SACET of up to around 11 million MWh of heat and electricity generated based on biomass and a net emission reduction of over 1.7 million tons of CO2. Biomass energy represents approximately 62% of the total renewable energy produced for heating by Romania.

Biomass is the main source of heating in households, between 39% and 45% of the total energy consumption of households coming from burning biomass. The forest-timber sector annually absorbs 30% of the emissions of all other economic activities, in the greenhouse gas balance, according to Romania's international reporting.

In the current geopolitical context, in which the supply of natural gas is uncertain and the price of gas to the consumer is significantly higher (more than double than the price of biomass), biomass heating cannot realistically be replaced by natural gas. The gas distribution infrastructure does not adequately cover the rural area, which requires significant investments.



The impact of the forest-timber sector in combating climate change is annually equivalent to more than 50 million tons of CO2 sequestered or avoided (taking into consideration the emissions saved through the avoidance of the usage of fossil fuels for residential heating, the use of wood products, which leads to replacing the use of other materials with a higher carbon footprint such as plastic, non-biodegradable packaging, concrete or steel).

Limitations: The presentation of the climate impact includes exclusively aspects related to the potential to retain GHG emissions, and does not include other aspects such as biodiversity or other environmental components.



24 million tons of CO2 retention in forests, official LULUCF reports

13 million tons of CO2 using wood biomass, by avoiding the use of fossil fuels, according to INCDS

14 million tons of CO2 saved from emissions by using wood instead of other materials, according to INCDS

Thus, the forestry sector has a significant potential to contribute to reducing Romania's climate impact by replacing coal from SACET, increasing the forested areas and roundwood harvest from the forest. Other opportunities include increasing the collection rate of wood-based waste from the current 50%, in line with European targets, as well as the use of innovative biomass materials such as wood cellulose that fixes carbon and replaces other materials with a large carbon footprint .



Potential for reduction of the CLIMATE IMPACT of materials by using biomass as a raw material in industry

- Chemical industry (celluloid, acetic acid, methanol, ethanol, hydroxyethyl-cellulose, etc.);
- Textile industry (viscose)
- Pharmaceutical and cosmetics industry (cellulose gum, nitrocellulose);
- Food industry (thickening and texturing agents based on MCC, CMC);
- Electronics industry (cellulose triacetate – TAC for LCD screens).



Potential of areas that can be forested

There are currently more than 2 million hectares of unused land.



Potential for sustainable management of high-harvest forests versus growth in forest timber.

About 33% of the annual increase in forest timber is currently exploited.



Potential for reduction of the CLIMATE IMPACT of coal in SACET

1.78 million tCO2 net emissions reduction.



About this summary of the study (report)

This document is a summary of the study (report) on the socio-economic and climate impact of the forestry and wood processing industries in Romania, prepared exclusively for the use of The Romanian Wood Industry Association – Prolemn ("Prolemn") under our engagement contract with Prolemn. We do not assume any liability or responsibility to anyone except Prolemn in respect of this summary or the related study and report.

The **study on the Socio-economic and climate impact of the forestry and wood processing industries in Romania** aims to provide an overview of the most important indicators specific to the forestry sector, as well as a quantitative dimension of the contribution of these industries to Romania's economy and, respectively, of the climate impact.

The methodology used to quantify the socio-economic footprint of the forestry and wood processing industries is described in this document. For more details, including the economic activities in scope, please see page 9 of this document.

Climate change and the regeneration capacity of forests are the only topics addressed. The study does not address other environmental components (for example, biodiversity, air quality from wood burning in households, etc.).

The report is based on information taken from a variety of public sources described in the report, being limited to official statistics. Such information have not been independently verified by us and therefore we make no representations regarding their completeness or accuracy.

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