

The sawdust thermal station from Tasca village

Case study

Short description:

- The village is situated in the Eastern Carpathians, at an altitude of 600m above sea level
- The number of inhabitants is 2715, leaving on a surface of approx. 9.5 km².
- The climate conditions: the average annual temperature is 8 degrees Celsius, the coldest month is January (-4 degrees Celsius), and the warmest month of the year is July (19 degrees Celsius).





The thermal station



The thermal station from Taşca was built in 1999 through a co-financed project by the Danish Environmental Protection Agency (70%), and the County Neamt Council and the Local Tasca Council (30%). The initial goal of the plant was to use wooden waste from the area for producing warm water and heat.

Centrala Termică cu rumeguș – Tașca

Această centrală termică a fost construită în 1999 cu scopul de a reduce problemele de mediu generate de depozitarea necontrolată a rumegușului în zonă și totodată de a furniza agent termic locuitorilor din Tașca.

Capacitatea centralei este de 2,5 MW iar consumul de rumeguș este de aproximativ 3000 tone/an.

Cofinanțarea pentru implementarea proiectului a fost asigurată de Agenția Daneză de Protecție a Mediului, Consiliul Județean Neamț și Consiliul Local Tașca.

Tasca sawdust fired boiler plant

This boiler plant was erected in 1999 as a project aiming a reduction of the environmental problems caused by uncontrolled dumping of sawdust in the area and at the same time to provide heat to the citizens in Tasca.

The heat capacity of the plant is 2.5 MW and the sawdust consumption is approximately 3000 t annually.

The project has been implemented through a co-financing between the Danish Environmental Protection Agency, the Neamt County Council and Tasca Local Council.

Danish Environmental Protection Agency

Danish Ministry of Environment and Energy

The station provides heat and warm water for 100 apartments and public institutions, like the school, the town hall, the police station, the church (approx. 500 people).

The elementary school from Tasca



The Church St Nicholas



- The distance between the station and the consumers is of approx. 1000 m.
- The thermal transfer in the thermal points is made with the help of plate heat exchangers
- The temperature of the water that emerges from the station is of 90°C
- The temperature of the water used for heating at the thermal points is of 87°C
- The temperature of the warm water for household consumption is 50°C

Characteristics of the thermal station:

- Fuel- sawdust
- The maximum heat capacity is 2.5 MW
- The water pressure in the installation- 2 bars
- The capacity of the boiler - 7600 liters
- The temperature in the firebox- 700⁰ C
- The sawdust consumption - 1300 tones/ year
(3000 tones/year established in the project)

The sawdust deposit





The mechanism with sawdust alimentation



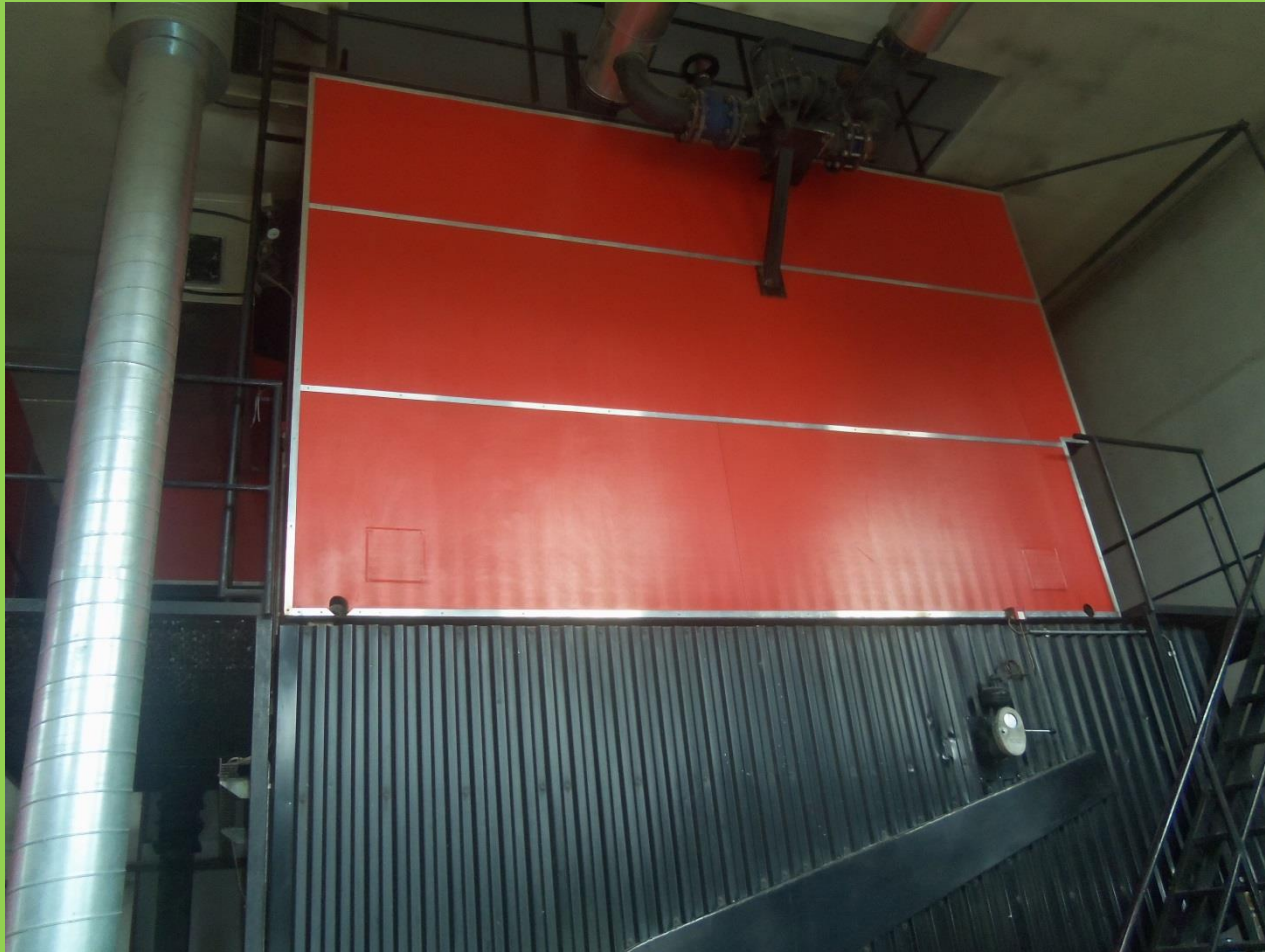
The transport of the sawdust in the station



The entrance of the sawdust in the boiler



The boiler of the station



The electric panel



The control panel



Water treatment plant



The water circulation pumps



The filtration of gases



The evacuation of gases



Chimney



The dryer







At the beginning, the sawdust was seen as waste, its price being very low or even it was free.

Starting 2005:

- The sawdust starts to be used, its economic value is perceived
- The quantity is becoming smaller
- The price rises

Problems in the present:

- The price very high 45 Euros/ton
- The low quality of the sawdust (the humidity 50%)
- The low consumption during summer (0.1 Mw)
- Foreign bodies (chops of wood and metal)
- The poor management

Solutions:

- Finding other resources of sawdust, even at a bigger distance (20 km)
- Buying some wooden waste hedger (branches, leaves) that can replace the sawdust
- Finding other solutions to use the heat over the summer when the consumption is very low, (installing more driers, to increase the profit)

Solutions:

- Installing some shelves in the dryer where the sawdust can be dried if the level of the humidity is very high.



Vasile Alecsandri University of Bacău
Faculty of Engineering

Biomass potential of Romania

Case Study: Bacau County

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Introduction



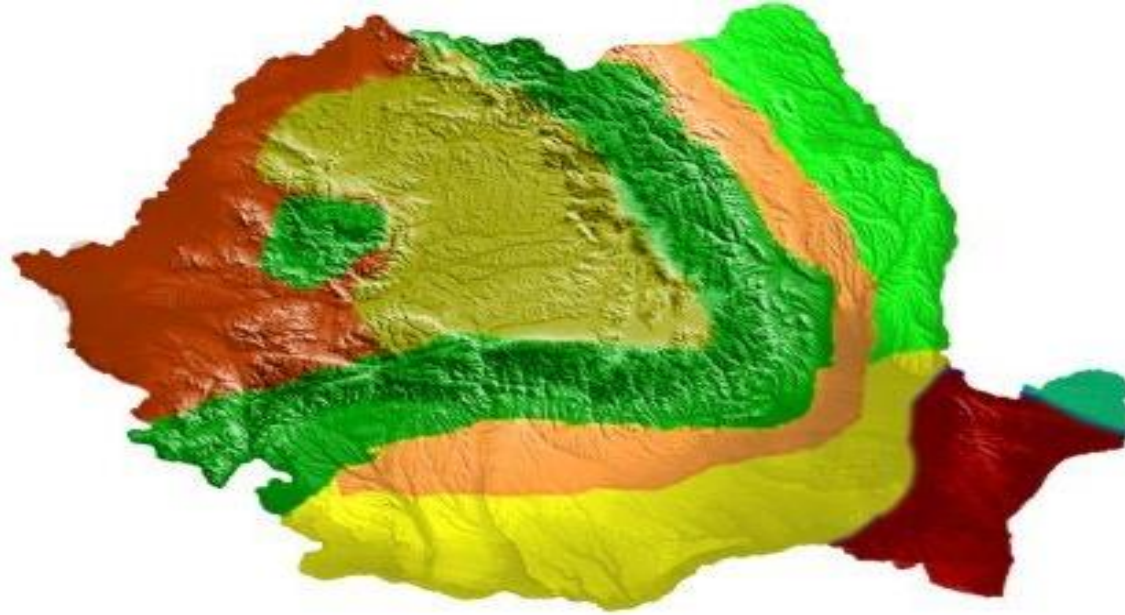
Biomass is the biodegradable fraction of products, waste and residues from agriculture, including vegetable and animal substances, forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

- The Romanian National Forest Fund occupies 6.5 mio. ha, representing 27.3% from the national territory. This locates Romania close to the European and global averages (31 respectively 29.6%). Also, an average of 0.3 ha per citizen locates Romania close to the European situation (0.31 ha/citizen).
- However, wood has been disregarded as a major source of energy from the development strategies of Romania. In this respect, Romanian authorities plan to increase the use of “clean” energy (from renewable sources).

Forms of energy recovery of biomass (biofuels)

- Direct combustion for heat energy generation;
- Pyrolysis combustion with syngas generation($\text{CO} + \text{H}_2$);
- The fermentation, with generation of biogas (CH_4) or bioethanol ($\text{CH}_3\text{-CH}_2\text{-OH}$); biogas can be burned directly and bioethanol mixed with gasoline, can be used in internal combustion engines;
- Chemical transformation of the biomass by treatment with vegetable oil and alcohol generating esters;
- The enzymatic degradation of biomass to ethanol or biodiesel production;
- Cellulose can be degraded enzymatically from its monomers, carbohydrate derivatives, which can then be fermented to ethanol.

Geographical location of the biomass potential



Legend :



Solar energy



Wind and Solar energy



Biomass and Wind energy



Biomass and Microhydro



Microhydro



Geothermal energy



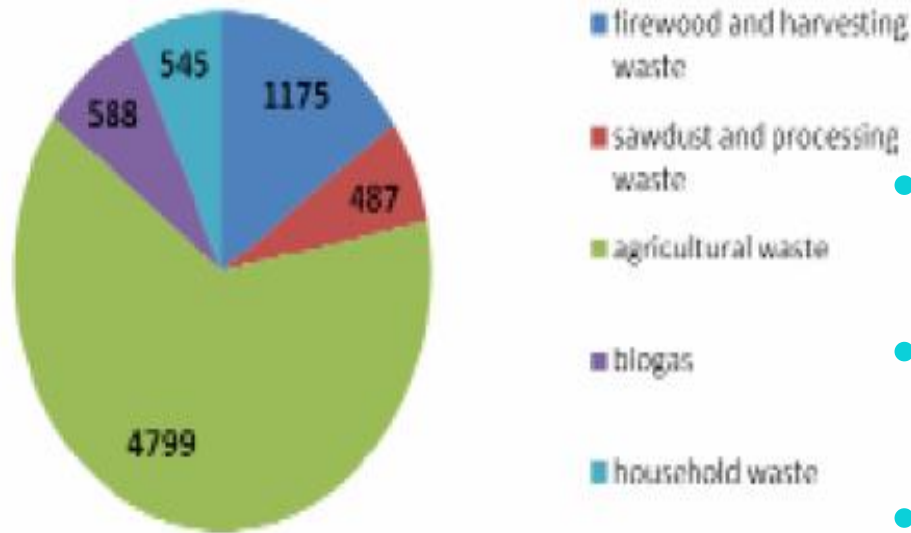
Biomass and Microhydro



Biomass, solar and geothermal energy

Biomass resources

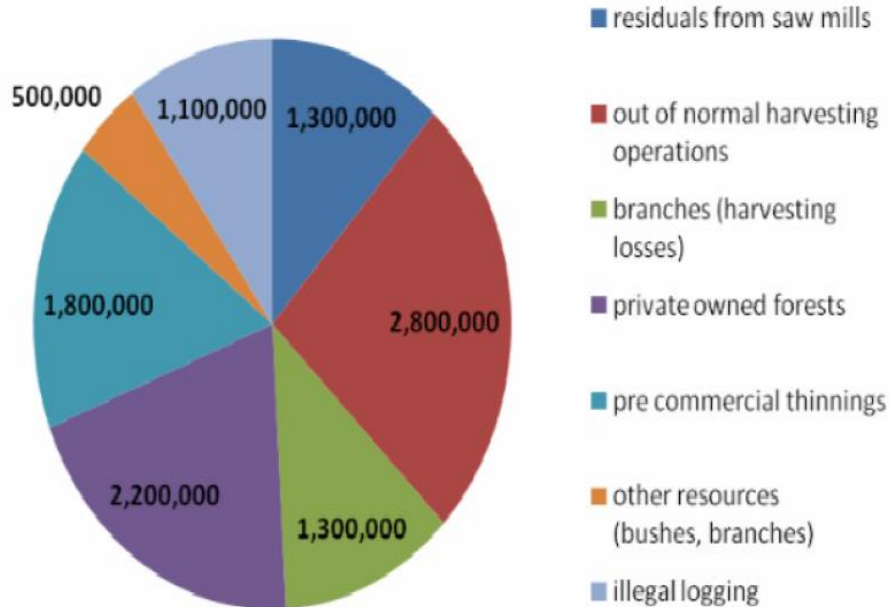
Biomass energy potential, 1000 tep



Romania is estimated to have a biomass energy potential of 7,594,000 toe/year corresponding to some specialists 19% of the total average is from:

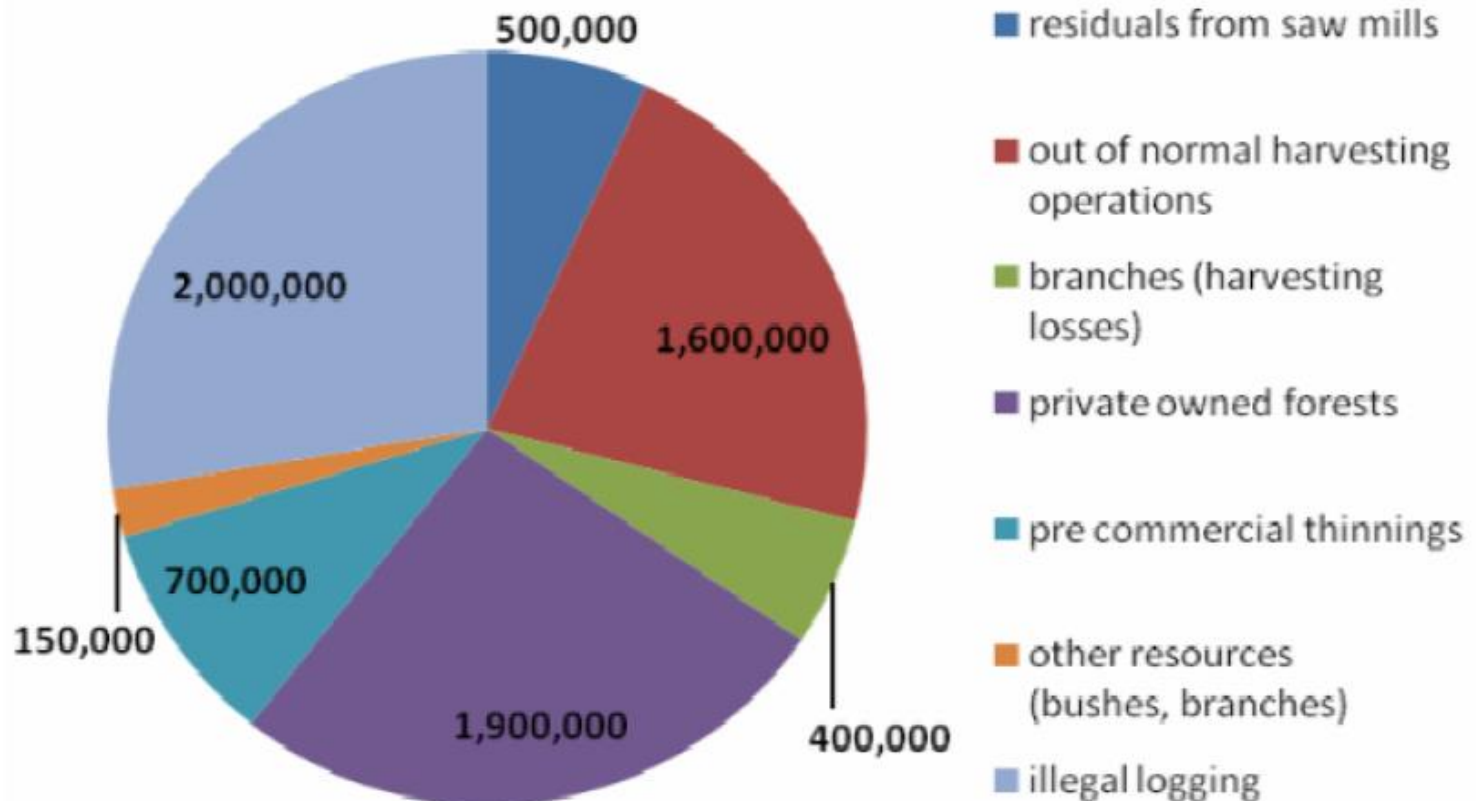
- - Firewood and wood waste from harvesting operations: 1,175,000 tonnes of oil equivalent .
- - Sawdust and wood waste from wood processing operations: 487,000 toe.
- - Agricultural waste: 4,799,000 toe
- - Biogas: 588,000 toe
- - Household waste: 545,000 toe

Forest biomass



- The total wood stock in Romania (total standing volume) was estimated to about 1350 mio. m³ of which 39% is coniferous, 37% is beech, 13% oak and 11% other species. The average wood stock is of 217 m³ per ha.
- An estimate of the wood available for producing energy through burning process is shown in figure 3 , while the current utilization of wood for producing heat and electricity is shown in figure 4. The real utilization of wood is less than the natural potential.

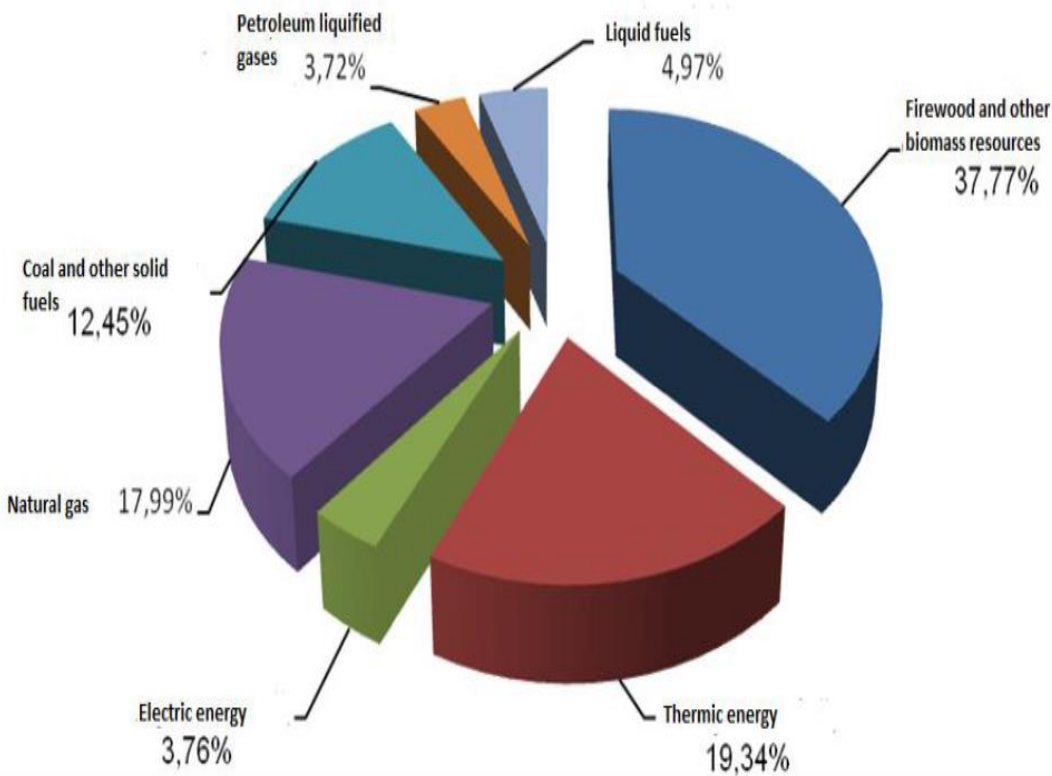
Potential sources of wood available for producing heat and electricity



Energetic use of Biomass

Biomass is used in Romania mostly for thermal energy generation. According to various studies, more than 50% from the generated heat had as source forest biomass burning.

On national level, the last assessment regarding the firewood and other biomass resources consumptions was made in 2009. Based on the published results (Figure 5) it is obvious that the biomass plays and will play an important role in the Romanian energetic sector.



Biomass resources in Bacau

Wood residues

- In what concerns the wood residues, there is estimated that the amount available for each year is approximately 36 000 tons for each county. No available statistics were found regarding the utilization of this biomass category, but the transition to large wood processors brought also the integration of wood residues in their own processing activities.

Urban waste

- An important quantity of biomass may be obtained from urban residues. According to the Romanian Strategy for the Valorization of Renewable Energy Resources, the annual potential is about 109 000 tones for each county.

Agricultural biomass

- The use of agricultural biomass for energy purposes in our country is insignificant, despite the fact that an increased potential exist . According to the Romanian Strategy for the Valorization of Renewable Energy Resources, which was approved by a Government Decision, the potential of agricultural biomass for the county of Bacau is about 307 000 tones × year which corresponds to approximately 4,9 PJ. However, more recent studies indicated that the amount of agricultural biomass would be of about 3,75 PJ, with significant annual variations. The last study refers only to the amount of biomass which is available for bioenergy by considering the agricultural biomass consumptions for other related agricultural activities.

Future biomass demand

- Romania has a wide range of primary energy resources (fossil and mineral): oil, coal, uranium , but they are coming in small amounts or are near depletion. In the most optimistic scenario, the production from non-renewable primary energy sector will not increase in the next 2-3 decades, putting this way Romania in the situation to be dependent by imports.
- On the other hand, the renewable resources have an important theoretic potential, but the usable potential is smaller due to technological, economic and environmental issues. According to the National Action Plan in Renewable Energy Resources Domain (PNAER, 2010) biomass is and will be regarded mostly as a thermal energy resource. Also, future demand in biomass domain from Romania will be greater.

Forest statistics at the end of 2013

- Forest areas in Romania at the end of 2013 reached nearly 6.54 million hectares, growing with 1% from the previous year, of which about 6.38 million hectares (97.6%) represent the surface forests show provisional data released by the National Statistics Institute . According to the source in 31 December 2013, the total forest area of Romania was 6,538,522 hectares, 9356 hectares more compared to the same period in 2012.
- Meanwhile, forest area increased by 7,776 hectares to 6,380,599 hectares, equivalent to almost 98% of the national forest. In 2013, the volume of lumber harvested was smaller with 1% than the previous year, reaching nearly 19.064 million cubic meters.

Romania's virgin forests, it's natural treasure



- Romania has a real treasure: the largest and best preserved virgin forests of modern Europe. These are the most important temperate forests around the world, from a biological perspective. We have about 300,000 hectares of virgin forests, or about 5% of the total area of forest, according to a study by the Institute of Forest Research and Silviculture Management.
- In the past virgin forests have survived because of their inaccessibility and the low economic value of the wood . But now, these virgin forests are more vulnerable than ever due to the economic and social needs.



- Most virgin forests are situated in the mountains, at altitudes ranging from 600 to 1,400 meters, but also along the great rivers, near the Black Sea coast and in the Danube Delta. Recent studies show that the virgin forests of Romania are unique in Europe.
- Even after death, these "giants" remain several decades in the ecosystem growing the land and helping to install a lot of creatures.

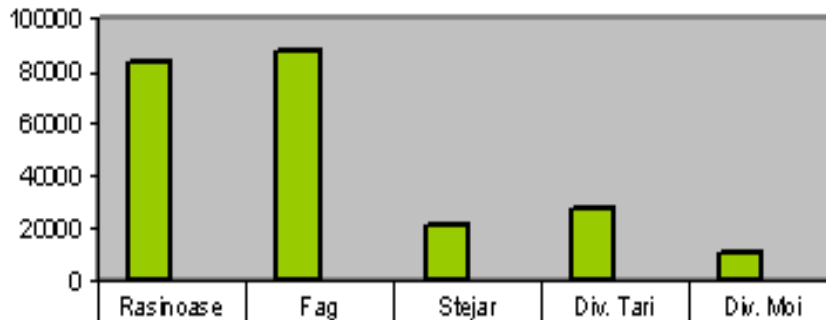
Presentation of existing forests in the Bacau County

- The total area of forests cover 242 440 ha. This area is relatively unevenly spread on the three relief groups in the county - plains, hills, mountains - a significant percentage being in the mountains (44%). Across the county of Bacau forests occupy 40.4% of the total area.
- The geographical distribution of the relief stage is 44% forest in the mountains, 43% in the hill - 13% plateau and plain.

Forests Composition

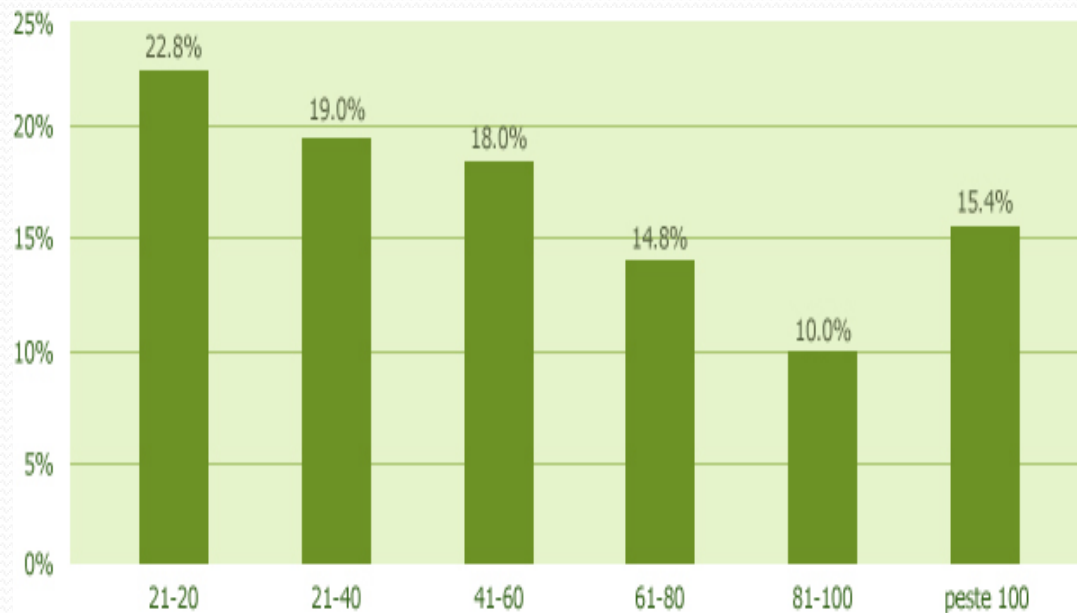
- From the structural point of view, a significant share is held by conifers and beech (74%), a direct result of the focus areas of forest in the mountains and high hills of the county.
- Stationary, most of the trees (53%) limit themselves in the mountain level and floor-goruneto hill evergreen and beech forests (36%).

Compozitia padurilor administrate de D. S. Bacau



Suprafata (ha)	Rasoaze	Fag	Stejar	Div. Tari	Div. Mbi
	83671	88143	21623	27563	10678
	36%	38%	9%	12%	5%

Age class structure

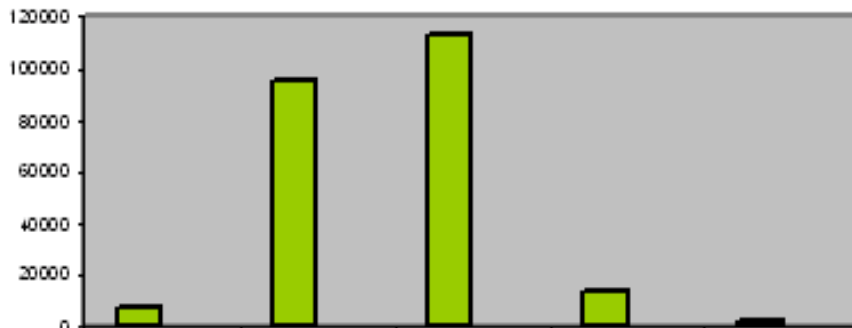


Analysing the structure we can see the balance in the distribution of age classes, this will provide relatively constant production of wood in a long-term perspective.

Class structure of production

It is possible that by applying the principles of sustainable forest management and appropriate techniques to be able to reach a better correlation between the proposed station and production class stands.

Structura claselor de productie



Suprafata (ha)	6950	94988	113522	13901	2317
	3%	41%	49%	6%	1%



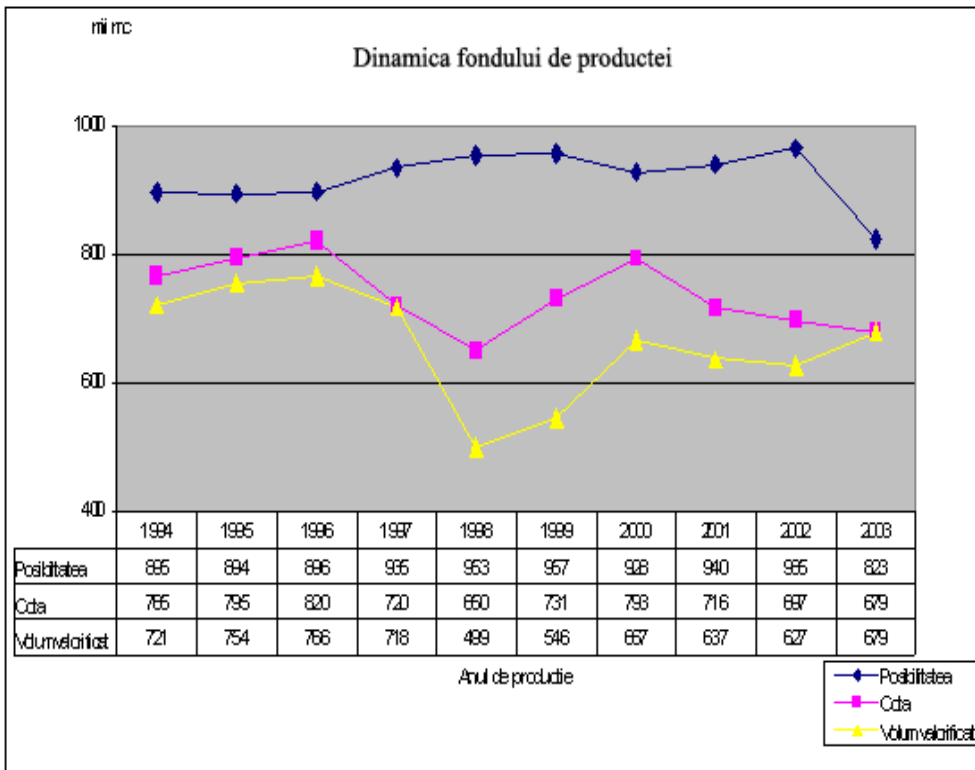
**Case study on the
characteristics of the forest in
Bacau County**

Productivity

- The current average of annual growth in the county of Bacau is 6.9 m³/ha. By applying intensive treatments we hope on obtaining superior varieties - veneer on one side and on the other hand, the promotion of valuable species able to use the conditions effectively.
- Growing annual productivity includes restoring the forest ecosystems affected by various destabilizing factors (pollution, landslides, storm damage and rupture of snow, etc. .).

Dynamics of production found

- If in 1990, the possibility managed forests was 1.087 million cubic meters, by reviewing management plans for all forest districts the possibility is greater today. The situation is due to the inclusion, during the redevelopment of exploitable stands in the category of special protection area, which are proposed to be run only for conservation works. These areas are generally located in the hydrological accumulations.



Annex 1: local SWOT

Standing Tree (Private/State Forests)

Internal strengths

- S1. Superior utilization of the wood
- S2. Standard contracting procedures
- S3. Relative control of quality and prices
- S4. Possibility to sell in any period of the year
- S5. Security services are assured
- S6. Strong position on the local market for fire wood
- S7. Well established business relations between actors

Internal weaknesses

- W1. Excessive bureaucracy
- W2. Great amounts of time for resource planning and contracting
- W3. Important delays between issuing and payments
- W4. Poor forest transportation infrastructure
- W5. Lack of adequate harvesting-logging technology
- W6. Unfair competition

External opportunities

- O1. Improvement of standardization (wood evaluation and assessment)
- O2. National programs targeting education and training for harvesting companies personnel
- O3. Market development for logging residues
- O4. Centralized web-platform for contracting issues
- O5. Possibility to present in real time wood supplies and the locations
- O6. Forest certification
- O7. Potential openness of new markets .

External threats

- T1. Unjustified increment of the price for standing tree wood
- T2. Lack of financial support from banks
- T3. Excessive bureaucracy in obtaining the documents needed for activity
- T4. Monopoly provoked by big companies
- T5. Changes in the legal framework

Pictures of the forest near Bacau













**Thank you for your
attention!**