

National Forest Centre



**PRESENT STATE AND
PERSPECTIVES OF WOOD
BIOMASS ENERGY
UTILIZATION IN SLOVAKIA**

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BASIC CHARACTERISTICS

- **Fuel biomass altogether with the water energy are considered in Europe as the most significant renewable energy sources (RES).**
- **Gradual drawdown of the fossil fuels, prices rise, ecology impacts, their utilization and political risks represent the motivation for the energy self-sufficiency by the way of RES exploitation.**
- **Wood biomass is substantial component of the fuel biomass, qualitatively not answering to the conditions for other utilization.**

PRIMARY CHARACTERISTICS

- **Share of the own fossil fuels sources of the primary energy sources (PES) of domestic consumption has been decreased since 1990 from 10 to cca 7 %, i.e. own fossil fuels sources were not significant competitor for the wood biomass and other RES energy utilization.**
- **Domestic usable potential of the wood biomass suitable for the energy utilization in Slovakia regarding the relation to the total annual PES consumption belongs among the largest in the EU member states.**

Main influencing factors of the future development in SR

Main factors influencing the future development of the production and fuel wood biomass utilization regarding forest and non forest land in the SR conditions:

- **Area forest percentage, wood stock and assortment structure of the felled wood,**
- **Domestic wood-processing capacities development as well as prices of the particular wood assortments,**
- **Consumption and fuels and energy prices development,**
- **Quantity of the own fossil fuels stock,**

Main influencing factors of the future development in SR

- **State energy policy and its relation to the RES utilization,**
- **Measure of the production technologies development, necessary for the production, processing and energy utilization of wood biomass,**
- **Way of the non forest land utilization,**
- **Domestic usable potential of the wood biomass suitable for the energy utilization,**

FUEL WOOD BIOMASS PRODUCERS

Forest management - industrially not utilized or difficult utilized parts of the tree biomass, in the form of the chips and fuel wood.

Wood-processing industry – technologically difficult utilized waste of the mechanical wood processing in the form of the pieces waste, chips, sawdust particles, briquets and pellets, wood shavings and abrasive dust and of chemical wood processing – black lye.

Agriculture – wood biomass, growing at non used constant grass stands, line plantings, chop of the fruit orchards and vineyards.

Other sources – wood biomass of the shore stands, shelterbelts, line plantings around the road communications, municipal green areas, municipal wood waste, wood wast of other industrial branches.

FUEL WOOD BIOMASS PRODUCTION DEVELOPMENT IN THE FOREST MANAGEMENT AND THEIR PRICES SINCE 1990

Parametres	Year				
	1990	1995	2000	2003	2006
Fuel wood:					
- annual production, th. t	368	406	471	546	640
- price Sk.t ⁻¹	266	330	482	545	882
Fuel chips:					
- annual production, th. t	2	3	5	14	160
- price Sk.t ⁻¹	350	480	950	1050	1400
Total annual production, th. t	369	409	476	560	800

Remark.:Fuel wood price is given on the basis of EXW parity supplier stock.

Fuel chips price is given on the basis of EXW parity customer stock.

BASIC FACTORS INFLUENCING THE DEVELOPMENT IN THE WOOD PROCESSING INDUSTRY

- **Total annual processing capacity of the wood-processing industry increased since 1990 from 4,18 mil. to 6,80 mil. m³, i.e. 63 %. Wood-processing industry capacity of it increased from 2,3 mil. to 4,4 mil. m³ i.e. 91 %.**
- **Development of the processing capacity of this branch is responding to the development of the domestic wood felling, reacting to the changes in its assortment structure.**
- **Paper and cellulose production, agglomerated materials and wood cut of low finalization measure are prevailing.**

BASIC FACTORS INFLUENCING THE DEVELOPMENT IN THE WOOD PROCESSING INDUSTRY

- **Annual production of the solid and liquid waste suitable for the energy utilization was increased from 1,4 mil. to 1,75 mil. tons, i.e. 25%. There are fine-grained waste and cuttings of the mechanical wood processing and liquid waste of the paper and cellulose production.**
- **Liquid waste of energy purpose for the own producers consumption has been used since 1990 in the full extent.**
- **Approximately 24 % of the solid wood waste is created from the dried wood processing.**

BASIC FACTORS INFLUENCING THE DEVELOPMENT IN THE WOOD PROCESSING INDUSTRY

- **Energy utilization of the wood waste for own energy consumption cover regarding medium and large wood processing enterprises intensively increased since 1990 due to the rapid investment recoverability. The development was slowed down by the branch crisis and frequent changes of the ownership relations.**
- **Small wood processing enterprises of low own energy consumption are selling wood waste mostly for different utilization.**

BASIC FACTORS INFLUENCING THE DEVELOPMENT IN THE WOOD PROCESSING INDUSTRY

- **Briquettes are produced in Slovakia since 1990 mostly for the export. The production is within the range from 9 to 25 thousand tons, depending on the foreign demand.**
- **Pellets production started in SR in 2001, since then the annual production increased from 8 thousand to 45 thousand tons. odkedy vzrástla ich ročná výroba z 8 tis. na 45 tis. ton. Majority of the production is exported due to the relatively high price of this fuel.**
- **Wood waste pieces are either dimensionally modified by the stationary reaping machines, resp. crushers or they are sold in the original state.**

Development of the annual quantity of energy utilized fuel wood biomass in the wood processing industry since 1990

Parameters	Years			
	1990	1995	2000	2006
Solid waste:				
- annual production, th. t	255	390	485	615
- price Sk.t ⁻¹	196	243	355	650
Liquid waste:				
- annual production, th. t	420	435	460	510
Totally, thousand tons	665	825	945	1125

Remark.:Price of the solid waste is given on the basis of EXW parity supplier stock.

Total annual production of the fuel wood biomass in Slovakia

Parameters	Years			
	1990	1995	2000	2006
Annual production of the fuel wood biomass, th.t	1 039	1 244	1 421	1 945

Development of fuel wood biomass annual consumption in Slovakia

Parameters	Years			
	1990	1995	2000	2006
Annual consumption of the fuel wood Biomass , th. t	970	1 126	1 233	1 706

BASE FOR PROGNOSIS OF THE FUTURE DEVELOPMENE IN THE FOREST MANAGEMENT

- **Area of the forest land will be increased from the present 2,006 mil. ha to 2,045 mil. ha in 2025 and 2,091 mil. ha in 2050.**
- **Area of the stand land will be increased from the present 1,932 mil. ha to 1,939 mil. ha in 2025 and 1,951 mil. ha in 2050.**
- **Total wood stock will be increased from the present 439 mil. m³ to 446 mil.m³ in 2025. However in 2050 there will be decrease to 446 mil.m³. Wood stock per 1 ha will be increased from the present 227 m³ to 230 m³ in 2025. Only 214 m³ per 1 ha will be in 2050.**

WOOD BIOMASS USABLE POTENTIAL IN THE FOREST MANAGEMENT

Usable potential of the forest fuel wood biomass consist of the raw material not meeting the quality criteria for the industrial processing as for the parameters (dimensions, shape, damage).

Fuel forest wood biomass components:

- fuel wood,**
- smallwood and not used trees crowns thick wood,**
- waste after the mechanical wood processing in the forest institutions and the manipulating waste,**
- Cleaning mass,**
- Stumps and the roots.**

- Development of the forest fuel wood biomass within the predicted period taking into the consideration the mentioned quantity and assortment structure of the wood supplies will be influenced especially by the stands wood species change and by the way of their management (stands establishment, breeding stock, logging technologies).

WOOD BIOMASS USABLE POTENTIAL IN THE FOREST MANAGEMENT

- **Usable potential increase is the impact of the deciduous trees logging increase as well as technologies implementation enabling complex wood utilization due to the economic efficiency improvement preserving the ecological restrictions in the forest biomass utilization.**
- **Due to the technologies development regarding the wood biomass energy utilization there is assumption of the fuel wood consumption stagnancy and at the same time the chips production increase.**

WOOD BIOMASS USABLE POTENTIAL IN THE FOREST MANAGEMENT

Year	Existing development			prognosis					vision
	1990	1995	2000	2005	2010	2015	2020	2025	2050
Indicator	(tis. ton)								
Fuel wood of the registered logging	348	381	407	480	337	380	396	370	286
Manipulation waste of the registered logging	312	338	365	430	463	445	443	406	346
Waste of the mechanical wood processing in the forest management	140	130	110	130	140	160	180	200	240
Stumps and the roots	35	35	40	40	40	40	40	40	40
Cuttings	25	26	28	30	50	60	70	80	110
Smallwood and not used thickwood	842	913	985	1160	1402	1587	1684	1715	2083
Forest fuel biomass totally	1702	1823	1935	2270	2432	2672	2813	2851	3105

BASE FOR THE FUTURE DEVELOPMENT PROGNOSIS IN THE WOOD PROCESSING INDUSTRY

- **There is assumption of the gradual synchronise of the size and the structure of the capacities with the assortment structure of the felled wood in Slovakia.**
- **Progressive wood export elimination is taken into the consideration.**
- **Consecutive balancing of the domestic as well as foreign prices of the particular assortments cause the considerable decrease of the interchangeable assortments (log, pulpwood, fuel wood).**

BASE FOR THE FUTURE DEVELOPMENT PROGNOSIS IN THE WOOD PROCESSING INDUSTRY

- Annual log supplies within the predicted period 2010 – 2025 will be in the range 4,387 to 4,745 mil. m³ with the increase tendency. There is assumption of 5,272 mil. m³ log supply in 2050.**
- Annual supplies of the pulpwood within the period 2010 – 2025 will be in the extent 2,904 to 3,244 mil. m³ with the increase tendency. There is assumption of 3,599 mil. m³ pulpwood supply in 2050.**

USABLE POTENTIAL AND THE WOOD BIOMASS CONSUMPTION IN THE WOOD PROCESSING INDUSTRY

Indicator	Present	Prognosis				Vision
	2006	2010	2015	2020	2025	2050
	thousand tons					
Waste of the mechanical processing	1300	1365	1415	1490	1540	1710
Liquid waste	450	470	485	505	520	560
Totally	1750	1835	1900	1995	2060	2260

BASE FOR THE PROGNOSIS OF THE FUTURE DEVELOPMENT AT THE NON FOREST LAND

White areas

- **Stands of the white areas created especially by the wood species succession are nowadays at the area of cca 275 000 ha with total wood stock 36,6 mil. m³ h.b.k.**
- **Present wood stock of the conifer is 12,7 mil. m³, hard deciduous trees 9,1 mil.m³ and soft deciduous trees 14,8 mil. m³.**
- **Wood stock in the stands of the age 40 years is 15,1 mil. m³, of the age 41 - 80 years 17,4 mil. m³ and 4,1 mil. m³ represent the stock of older stands.**

BASE FOR THE PROGNOSIS OF THE FUTURE DEVELOPMENT AT THE NON FOREST LAND

- **Assortment stands structure within the white areas comparing with the stands of the forest land with the higher share of the pulp wood and wood for energy utilization, especially from the crown tree parts.**
- **Stands of the white areas are available due to their location and the terrain conditions enable utilization of the efficient technologies.**
- **There is assumption of the white areas increase, in the same intensity as the forest land areas.**

USABLE POTENTIAL OF THE FUEL WOOD BIOMASS IN THE WHITE AREAS

Year	Present	Prognosis				Vision
	2007	2010	2015	2020	2025	2050
Indicator	(thousand tons)					
Fuel wood of the registered logging	84	86	88	90	93	103
Manipulation waste of the registered logging	36	37	38	39	40	44
Smallwood and not used thick wood of the logged area	218	224	230	237	245	272
Fuel biomass of the white areas totally	338	347	356	366	378	419

BASE FOR THE FUTURE DEVELOPMENT PROGNOSIS AT THE NON FOREST LAND

Intensive stands of fast growing wood species

There are wood species poplar, aspen, willow and partly acacia.

- Cutting period from 5 to 20 years and annual wood production from 8 to 15 t.ha⁻¹, in average 10 t.ha⁻¹ are taken into the consideration.**
- Nowadays there are no energy stands at the agriculture land suitable for the logging in Slovakia.**
- No legislative and support mechanisms are determined for the management of these stands.**
- Fuel chips will be produced.**

WOOD BIOMASS ENERGY UTILIZATION

– PRODUCTION AND CONSUMPTION OF THE FUEL WOOD BIOMASS IN THE INTENSIVE STANDS OF THE FAST GROWING WOOD SPECIES AT THE AGRICULTURE LAND

Year	prognóza				vision
	2010	2015	2020	2025	2050
Indicator	(thousand tons)				
Fuel chips	0	15	150	450	1300

Energy production from the fuel biomass

Fuel wood biomass produced in the agriculture and other branches will be utilized for the energy purposes in the SR conditions by the following ways:

- **Heat production by the combustion,**
- **Combined electricity and heat production by the combustion using steam resp. gas turbine,**
- **Combined electricity and heat production by using the gas motors,**
- **Heat production by the biomass aerobe decomposition,**
- **Liquid fuels production as Výroba kvapalných palív ako secondary product of the chemical wood processing (cellulose-paper industry)**

AIM

➤ EU

To reach the share of the electricity produced from renewable energy sources within the total electricity consumption at the level of 21 % and share of the energy produced from the renewable sources within the total consumption at the level of 12 %

SR

During the EU preaccession negotiations Slovakia accepted the obligation to increase the production share of the renewable energy sources till 2010 to 19 % and the RES share within the total PES consumption to 10 %.

REAL STATE

In Slovakia there was no created integrated legislative and conception framework systematically supporting the production of the fuel wood biomass at forest and non forest lands and their energy utilization. System of financial support for the fuel wood biomass producers, customers, technologies producers, science and research in this field was neither created nor efficiently implemented. These facts influence considerably Slovakia lag as for the RES utilization.

REASONS OF SLOVAKIA SLOWING COMPARING TO ADVANCED STATES WITH THE COMPARABLE CONDITIONS

- **Lack of interest from the side of the state regarding the utilization of renewable energy sources, with the exception of the water energy since 1990**
- **Very slow implementation of the legislative measures supporting the RES utilization**
- **Absence or non use of direct or not direct financial mechanisms supporting the RES utilization**
- **Slow liberalization of the basic fuels and energy prices**
- **RES ignore (with the exception of the water energy) in the existing state and regional energy conceptions**
- **Dependence on the technologies imports and the price differential among the domestic and foreign fuels and energy prices**
- **Lack of the own financial sources of the potential customers, resp. disadvantages of the bank credits**
- **Lack of the information and negative experience of incorrectly prepared and implemented projects**
- **Insufficient support of the scientific-research and professional activities**

AIMS

- **Increase of the energy self-sufficiency of the state as well as the institutions within the agriculture branch by the wood biomass and other RES utilization development; costs decrease and stabilization regarding the energy production, preserving the safety of their supplies, with favourable impact to the environment and forests management.**
- **Optimization of the fuel wood biomass utilization of the forest management till 2015, reaching the energy and economy efficiency comparable with the advanced EU states, by the implementation of suitable financial and legislative instruments and research results.**
- **Production utilization and wood biomass energy utilization as significant factor of the sustainable development of the regions, especially rural areas, supporting the creation of the stable work opportunities, improvement of the environment, infrastructure development and alternative utilization of the forest areas.**

PROPOSAL OF THE APPROPRIATE MEASURES FOR THE SUPPORT OF THE PRODUCTION AND WOOD BIOMASS ENERGY UTILIZATION AS COMPONENT OF THE ACTION PLAN

As for the wood biomass production within the agriculture branch:

- To create the system of direct financial support for the wood biomass producers at the forest and not subsidized agriculture land, aimed at their equalization with the other producers and the improvement of the stands hygiene, stability and the trees production potential,
- To create the system of direct financial support of all forests managers for the purchase of the machines and equipment (export sets, cable systems, chippers, transport means of the large capacity), enabling ecologically advantageous and efficient production of the fuel wood biomass,
- To create the legislative assumptions for the ecologically acceptable and efficient stands management at white areas with gradual transition to the system of the forest stands management

- To provide direct financial support for the fast growing wood species intensive stands establishment,
- To update the categories of the agriculture land from the point of view of its future utilization for the food production, wood and other biomass production,
- To work out, resp. to update the branch conception of the fuel wood biomass conception and its utilization within the agriculture branch.

Energy production areas within the agriculture branch:

To create the system of direct financial support for all institutions within the branch of agriculture, for the construction resp. reconstruction of the energy sources for the wood biomass energy production.

In cooperation with other branches:

- To ensure the purposeful spend of financial public sources support in all involved branches, supporting the investment projects, in connection with the verifiable sufficiency of fuel wood biomass sources in the interested area (statement of the relevant producer and the branch)
- in cooperation with the involved branches to work out the conception of the energy utilization of the wood biomass in SR,

- In cooperation with the Ministry of Economy SR to ensure the adequate increase of the purchase prices and appropriate share from the purchase price and energy for the wood biomass in the amount of the costs of the fuel component of total production costs including the appropriate profit. (It can be used for the producers within the agriculture branch),
- In cooperation with the Ministry of Environment SR to involve the carbon bind of the tree biomass into business with emission credits CO₂.

In the field of the research and consultancy:

- To prepare and financially ensure the research of the production and wood biomass energy utilization of the agriculture branch and its ecological and economic impacts within the period 2008 – 2013,
- To establish Consultancy centre in National Forest Centre for the production and wood biomass energy utilization.