THE CONCEPT OF CASCADED USE OF WOOD IN SLOVAKIA

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Introduction

•A significant increase in logging can cause over extrapolation of the forest resources.

•A lot of studies assume increasing demand for wood and non-wood products in the EU mainly due to an expected increase of energy consumption of the renewable resources.

•The future the increase in prices of energy wood may have a negative impact on the prices of industrial wood.

•A price increase may consequently decrease the competitiveness of the wood processing industry (WPI).

•The WPI also produces significant amounts of wood residues
(30-50% of the volume of processed wood)
- energy purposes.

•It is important to prefer outputs with higher added value, creating jobs and contributing to a better carbon balance
- resource efficiency.

• A different way of potential wood and wood residues utilization in the value chain is described in the concept of cascading use of wood products.

Cascading use

• Cascading use of biomass can be defined as multiple use of the wood from trees by using residues, recycling (utilization in production) resources or recovered.

• The more often by products and recycling products are used the higher cascade factor gets.

•The cascade principle means to use wood from forest in an effort to increase added value of wood.

•The wood should be primary used in the products with a long life cycle and energy should primarily be generated from waste or recycled products.

- The concept of cascading use of biomass can be defined as:

  - ❖cascading in function,
  - ❖cascading in value,
  - ❖cascading in time.

Methodology

Analysis of cascading use of wood is based on the methodology of the analysis of the wood balance.

Research focuses on analysis of wood supply in Slovakia

- The quality of the final wood resource balance depends on the quality and availability of data.
- wood resource balance data can be compiled as a mix of officially published and empirically collected data.
- Official statistics are available for highly concentrated sectors.

Methodology

Resources ⟷ Utilisation

- The resource side is represented by the production and import of wood, recycled material and waste from the WPI.

- The research focuses on the primary wood processing as a major producer of generates wood waste.

- Flows of waste are used in different levels of wood processing (industry and energy sector).

Methodology

•A cascade analysis describes flows of wood focused on the identification and quantification of the waste and roundwood use.

•The flows of wood as raw material and flows of wood residues as a waste from the process of wood products production are identified separately.

•The flows of wood residues are complemented by recycled wood and paper (post-consumer material).

•The production of roundwood was analysed in the structure corresponding to the main groups of assortments in terms of their use and quality (logs, pulpwood and energy wood).

Methodology – concept of cascading

•The concept of cascading is focused on the domestic utilization and therefore it was necessary to estimate the domestic consumption (apparent consumption).

•Based on wood balance of the available resources and the description of wood flows it was possible to describe and quantify cascading use of wood.

•Cascading use is defined as multiple use of wood from the forest with wood residues from the forest industry.

Methodology – concept of cascading

• The more times the wood residues and by-products are produced during industrial processing of wood the higher factor cascade gain.

• The sectors of the WPI are interconnected.

•Wood and residues can be used outside the WPI (the production of energy in other sectors, heating plants and households).

• In case that the inputs to the process is only roundwood without additional other sources, the cascade factor takes the value 1,00.

Results

Results – wood resources in Slovakia

•Slovakia belongs among the most forested countries in Europe with forest cover 42%.

•Annual wood production in 2013 was over 8 million M3. The significant proportion of incidental felling, which reached 3.2 million M3 (38.57% of total).

•The WPI has processing capacities sufficient to process all harvested volume of softwood in Slovakia.

Results – wood resources in Slovakia

- The export of roundwood is three times higher than import

Wood assortments	Export		import	
	M3	%	M3	%
Coniferous logs	1 444 000	46.3	78 000	8.5
Coniferous pulpwood	525 000	16.8	64 000	6.9
Non-coniferous logs	238 000	7.6	105 000	11.4
Non-coniferous pulpwood	455 000	14.6	549 000	59.5
Energy wood	460 000	14.7	126 000	13.7
Total	3 122 000	100.0	922 000	100.0

Results – wood resources in Slovakia

•The share of top quality assortments is almost 54% (mainly softwood logs with a share of 46.3%).

•The imports are dominated by lover quality assortments with a share of 66.4% of pulpwood (almost all non-coniferous).

•The WPI consume about 6 million M3 of wood (except energy wood).

•The increased demand for coniferous logs and broadleaves pulpwood is visible in Slovakia. The most significant consumers are sawmills with a volume of 2.5 million M3 of processed wood.

Results – wood resources in Slovakia

•There is a low level of production of wood products with higher added value

- veneers and plywood and lacking production of soft and medium density wood based panels.

• The volume of best quality logs processed is also low.
(the potential of a special quality logs is about 40 thousand. M3 of coniferous wood and 260 thousand. M3 of non-coniferous wood annually).

• The exception is pulp and paper industry with the capacity of 2.9 million M3 processed wood. (total of 11 big companies cover 100% of paper production).

•The furniture industry as an important consumer of wood.
In 2013, this sector processed 876 thousand M3 of roundwood.

Results – sawmill industry

•In Slovakia main wood assortments are coniferous and non-coniferous logs and non-coniferous pulpwood.

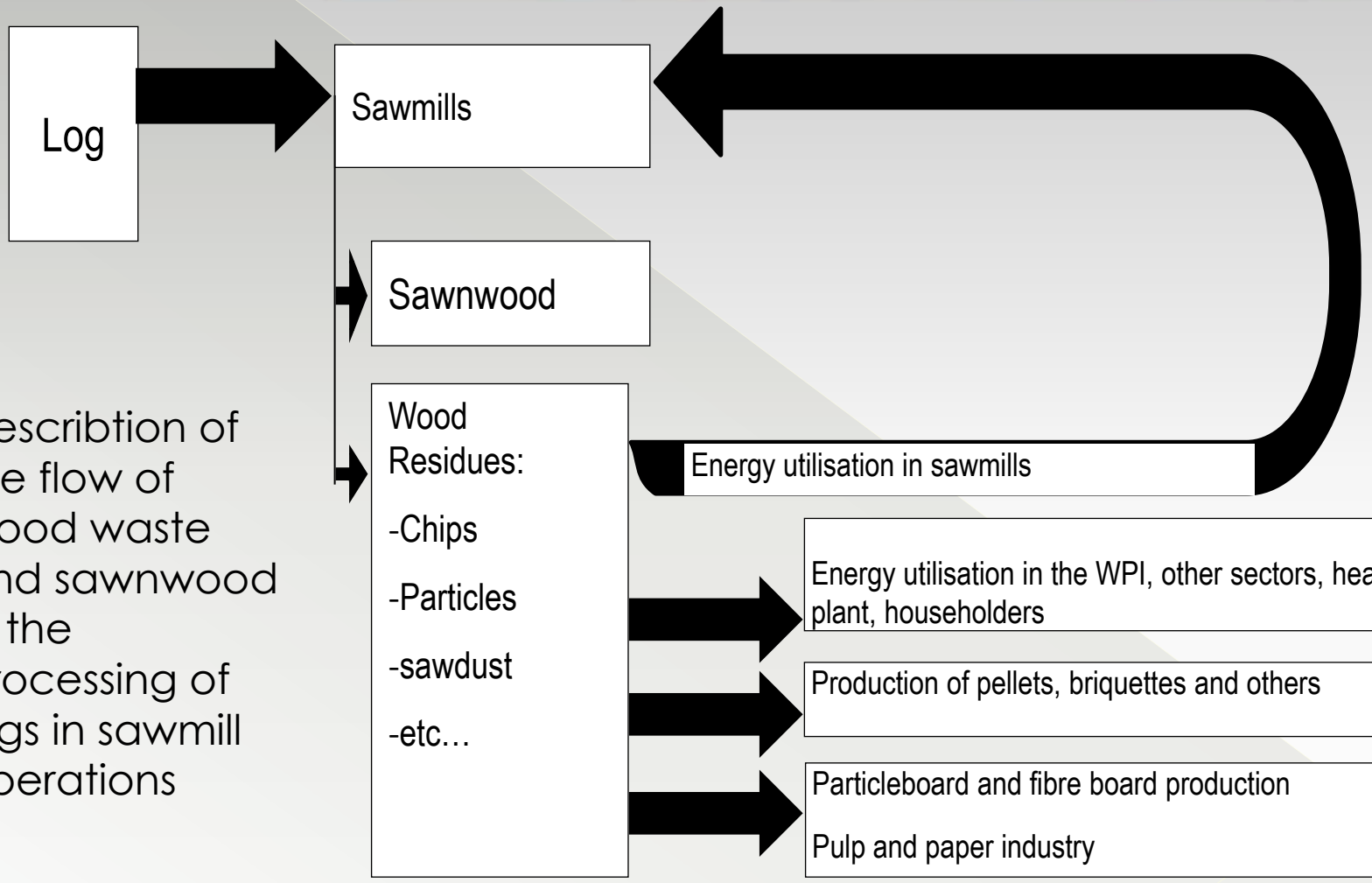
• The main part of coniferous logs is consumed by the sawmill industry.

• In 2013, the total volume of produced coniferous and non-coniferous sawlogs was 3.9 million M3, but taking into account the high exports domestic consumption was over 2.7 million M3.

• In the processing of wood there is a high proportion (approx. 40%) residues such as sawdust, chips, dust, etc.

•The highest quality logs for veneer (veneer annual production approx. 19 thousand M3 per year) are produced on a small scale.

Describtion of the flow of wood waste and sawnwood in the processing of logs in sawmill operations



Results - Pulp and paper industry

•Pulp and paper industry (woodpulp annual production approx. 700 thousand tons per year) and production of wood based panels (particleboard annual production approx. 0.5 million M3 per year) primarily use wood fibres.

• Those sectors focus on non-coniferous wood species.

• Currently the production of pulp and paper is the second most important sector of wood processing in Slovakia with the total output of almost 2.4 million M3 tons per year.

•Taking into account foreign trade (import) Slovakia consumed more than 2.75 million M3 of pulpwood.

Chips

Recycled paper

Description of the flow of wood waste and pulp and paper products in the processing of non-coniferous pulpwood in Slovakia.

Non coniferous pulpwood

Pulp and paper industry

Woodpulp

Chemical

Semi - chemical

Wood residues:

-Black liquor

-Bark

Energy utilisation in PPI

Energy utilisation in the WPI, other sectors, heating plant, householders

Results

•The waste streams are represented by different types of waste generated during the logging operations (e.g., logging residues) as well as the waste generated during primary mechanical and chemical processing of wood (sawdust, chips, black liquor, etc.),

•In Slovakia energy industry is significant consumer of wood residues from sawmills.

•There are no official statistics in Slovakia on volume and flows of wood residues from sawmills available, we estimated volume of waste in the WPI about 1 million M3.

•Another important source of wood for domestic consumption is wood form non-forest land (especially abounded agricultural land production is estimated at over 580 thousand m3 of wood).

Results – cascading coeficients

•2 main cascade coefficients are calculated for the whole WPI sector.

• The coefficients were separately calculated for the wood processing industry and energy industry, as well as for particular flows of waste.

•According to total value of felling (more than 8.7 million M3) domestic consumption was estimated almost 5.9 million M3 based on the balance of wood.

Results – cascang coeficients

Cascade factors for the wood resource balance as a whole, and for the WPI

Utilizations factors	Volume (M3)	Cascade factors
Consumption of roundwood in the SR	5 931 159	1.00
Biomass from forest for energy	772 570	1.13
By-products and waste utilize in the industry	780 000	1.13
Recycled material (paper)	1 010	1.00
By-products and waste utilize in the energy	1 927 430	1.26
Utilization of waste	2 707 430	1.42
Wood processing industry	781 010	1.13
Wood for energy	2 700 000	1.42
Total cascaded coefficient of wood utilization	8 639 598	1.48

Results – cascading coeficients

•Based on available data flows of wood waste cascading coefficients in different ways of utilizations were determined.

• There is a significant difference in the value of coefficient in energy sector compared to industry sectors (cascade ratio represents a value of 1.42 in energy. In the WPI there is cascading coefficient only 1.13.

•Total cascaded coefficient of wood utilization in Slovakia is 1.48.

• It means, that with a consumption of 5.9 million m3 of wood in Slovakia the WPI returns about 2.8 million m3 in the form of waste and by-products back into the WPI, other industries, energy producers and households

Conclusion

•Wood cascading considers complete wood using cycle and recognizing the differences in wood flows.

•The concept of cascading can help to optimize the use of wood in the whole chain of its processing and utilization in Slovakia.

• Results of the analysis can help in many innovations to increase the efficiency of the cascade of wood processing.

Conclusion

•The utilisation of wood is continually changing, and the demand for roundwood is changing depending on the technologies and on the demand of final wood products.

•The applied concept of cascading can describe the actual consumption of wood in various forms. The outcome of the analysis of wood material flows and cascading concept in Slovakia go out the balance between the resources and the primary uses of wood and wood residues.

• The analysis describes in detail the relationships between resources (wood and waste), basic production indicators, foreign trade relations, and the use of raw wood material and waste in the domestic conditions.

Thank you for your attention!

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