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Present value flows in Swedish forest-based industry

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Abstract

Forest biomass represents large physical as well as economic flows through the forest industry value chains. This paper presents the results from a survey of economic values related to the forest biomass flows from the forest through the forest-based economy in Sweden. The study is based on published market and industry data as well as information from stakeholders in the forest industry value chains. The flows are illustrated graphically.

Introduction

Large changes of the energy systems on both global and local scales are necessary in order to accomplish a transition from an economy based on fossil raw materials to a renewables-based bioeconomy. A larger share of nationally available renewable energy in the energy supply is also advocated as a means to increase energy security and reduce dependence on imported energy. Forest resources are economically important in forest-rich countries such as Sweden and Finland. Today, forest biomass is used as raw material mainly for production of sawn products and pulp and paper for the global market. Waste-products from forest industries as well as some of the residual forest biomass that can be extracted directly from the forest are being utilized for e.g. heat and electricity production.

The Swedish forest industry is under pressure to change; part of its infrastructure is coming of age and competition from other regions with newer production units and faster-growing feedstock increases. Also, the traditionally important market segment of printing and writing paper is in decline. Hence, the industry is looking to develop new value-added products, while at the same time there is a call for new, renewables-based solutions to replace fossil resources.

The objective of the present study is to give an overall view of the economic values related to the main physical biomass flows through the Swedish forest industry. Thereby it aims to provide a better understanding for the bioeconomy structure and the values added within it.

Data collection

The approach has been to combine existing information on physical feedstock flows with economic data from available statistics and literature. Existing market and forest industry production statistics on timber and pulpwood as well on many energy assortments (logging residues, stumps, young trees from pre-commercial thinnings and energy wood) were compiled.

The data collected comprised of three levels of information:

- Level one: Overview based on national economic accounts
- Level two: Aggregated values for key flows and product groups, based on published market data, trade statistics, stakeholder survey and assumptions.
- Level three: Increased detail for certain products

The surveyed data sources included information from authorities, industry organizations and individual industry representatives. Organizations included the Swedish forest agency (www.skogsstyrelsen.se), the Swedish forest industries federation (www.skogsindustrierna.org), Trä- och möbelföretagen – TMF (www.tmf.se), the forest industry's IT company (www.sdc.se), the Swedish energy agency (www.energimyndigheten.se), the Forestry research institute of Sweden (www.skogforsk.se/), Statistics Sweden (www.scb.se), the Swedish petroleum and biofuels institute (www.spbi.se). A survey was sent to representatives from forest companies and forest owners associations. Forest industry representatives were interviewed.

Delimitations

Data were collected for the year 2009. In general, the study is not complete in the sense that it does not include all costs and revenues, but rather focuses on the values of the main forest products flows. For example, it includes the value of paper produced by the paper industry and the cost that the industry has for wood feedstock. However costs for other inputs, such as pulping chemicals and filler materials are not included, nor are labor and capital costs. The studied flows of forest products may also contain significant amounts of non-wood materials, for example, paper products often contain varying levels of mineral fillers and coatings. This study does not attempt to provide a full account of the cost and income structure of the studied sectors.

The sectors included are; forestry, (i.e. wood production and supply), the wood products industry, the pulp and paper industry, the pellets industry and the wood-based panels industry. Further use and refining of the wood in sectors such as construction, furniture manufacture, newspaper and print industry, packaging industry etc., was not covered in the study. The information collected for wood

supply is more complete as it covers the most relevant forestry costs. Also, a complete picture of the forest-based industry is given on a much more aggregated level by input-output data from the Swedish national accounts.

Results

The results of the value flow analysis are shown in tables and illustrated with Sankey diagrams¹.

Figure 1 gives an overview of the economic flows to and from key sectors of the forest-based economy in Sweden in 2009, based on the symmetric input-output table from the national economic statistics. The values generated (1), which drive the system, are manifest in three groups: 1a) Final domestic consumption, i.e. what consumers spend on products and services to satisfy the needs and wants, 1b) exports, i.e. the income from goods that are exported for final consumption or further refinement outside the Swedish border, and 1c) gross capital formation, i.e., domestic values that are created but not consumed, such as constructed buildings. On the other end of the diagram (2), the value flowing through the economy ends up in two main categories: 2a) imports, where money leave the system as compensation for imported goods and 2b) an aggregated class composed of added value such as compensation to employees, operating surplus and taxes paid to society. The values generated also have to compensate for the consumption of fixed capital. The flows in the input-output tables are defined by products and services and aggregated into groups of related products and services, roughly reflecting different sectors of the economy. All net input and output flows to and from selected sectors were included in the diagram: 3) The primary production of wood in forestry and related services; (4) the primary wood processing industry divided into 4a) wood and products of wood, including for example the production of sawn wood products and 4b) paper and paper products, including the products of the pulp and paper sector; and (5) important downstream users of wood and paper products: 5a) construction and construction works, 5b) furniture and other manufactured products and 5c) printing, recording and publishing services. In addition, the net flows between these sectors and other parts of the economy (6) were included and grouped into: 6a) Energy, including electricity, gas, steam, air conditioning, coke and refined petroleum products; 6b) Transport services; 6c) Chemicals; 6d) other products; and 6e) other services. The diagram shows net flows. Flows with a magnitude smaller than 1000 MSEK are not shown.

¹ A Sankey diagram is a graphical illustration of flows, where each flow is represented by a line and the width of the line reflects the magnitude of the flow. We have opted to show where the money comes from and where it goes, i.e. the direction of the value flow is opposite to the physical flow (of, for example, wood).

The diagram is dominated by the large capital formation in construction and construction works. The flow from construction to other products was in total about 63000 MSEK out of which 27% to wood products. Wood and paper products have their main economic inflow from exports. The main net economic inflows to forestry came from wood products industry (14000 MSEK), from pulp and paper industry (9000 MSEK) and from capital formation (11000 MSEK). Compared to the production of wood products, the production of paper products have a more diversified cost structure, and the economic flow to the forestry sector is relatively small in comparison to the total value flow from the sector. The value flows to the forest industry sectors from the sectors of furniture and other manufactured goods and printing, recording and publishing services are small compared to the total turnover of these two sectors.

Figure 2 shows the value flows for the forest-based economy sectors in greater detail. The magnitudes of the flows were calculated by combining data on physical flows with economic data. Unlike Figure 1, Figure 2 is not complete, in the sense that it focuses on the part of the economic flows directly referable to biomass-containing physical flows. Costs for non-wood feed-stock and energy, personnel etc. are not shown. Hence, the in- and outputs do not balance.

Summary and conclusions

This paper has presented a graphical view of the economic values related to forest-based flows through the economy in Sweden. The objective is to improve the understanding of the forest-based economy and its value creation processes. This could serve as a starting point in efforts to transform the forest industry sector that are called for, both to improve the competitiveness of the sector and to contribute to a transition from a fossils-based economy to a bioeconomy. Further details and conclusions from the study will be described in a forthcoming report [1].

Acknowledgements

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References

[1] Joelsson, J.M., Athanassiadis, D., *Where is the money? - Value flows in the present Swedish forest-based sector*. Report to f3 – the Swedish knowledge centre for renewable transportation fuels. www.f3centre.se. **Forthcoming**.

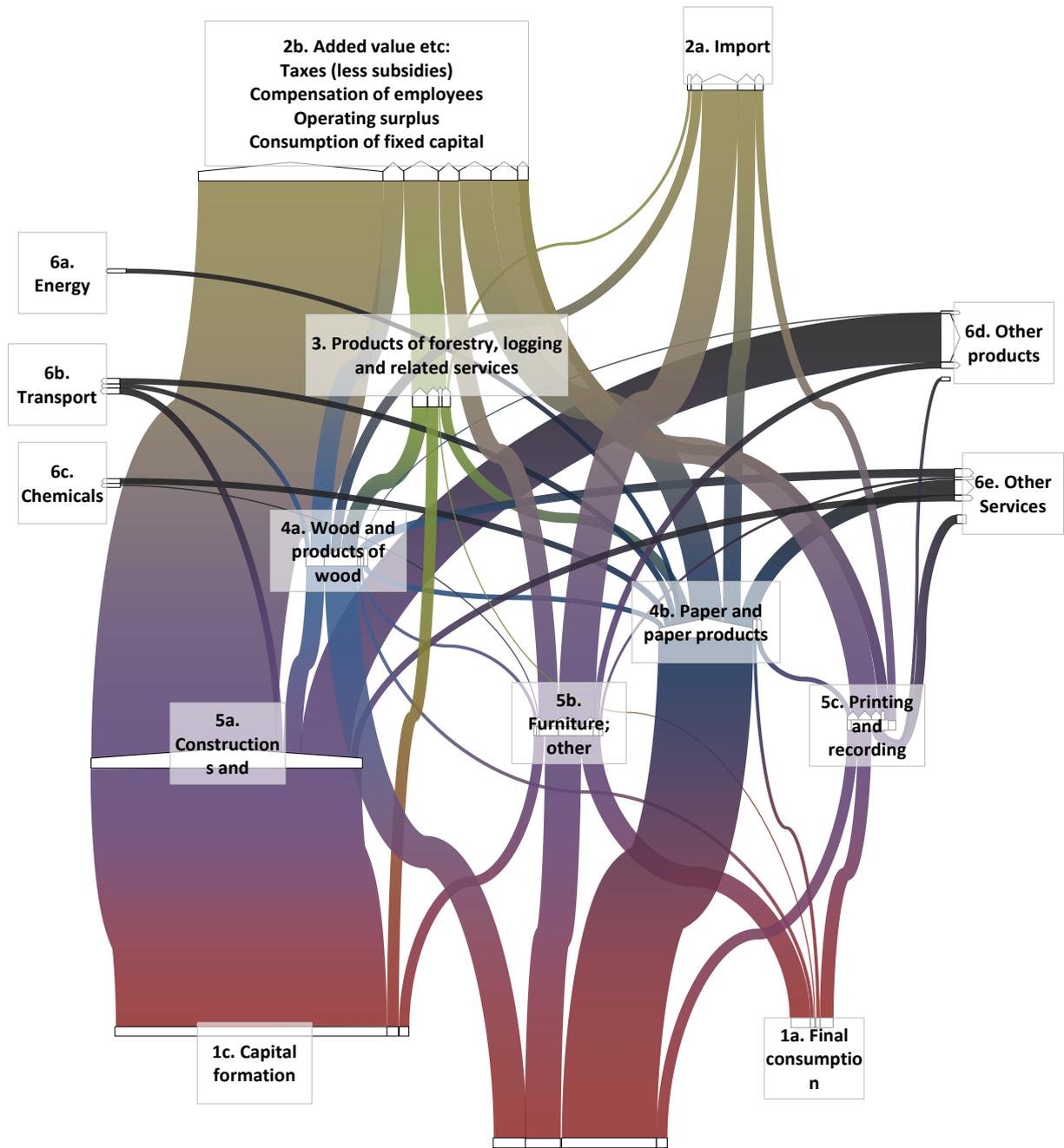


Figure 1. Overview of economic flows through the forest-based economy based on the Swedish national accounts

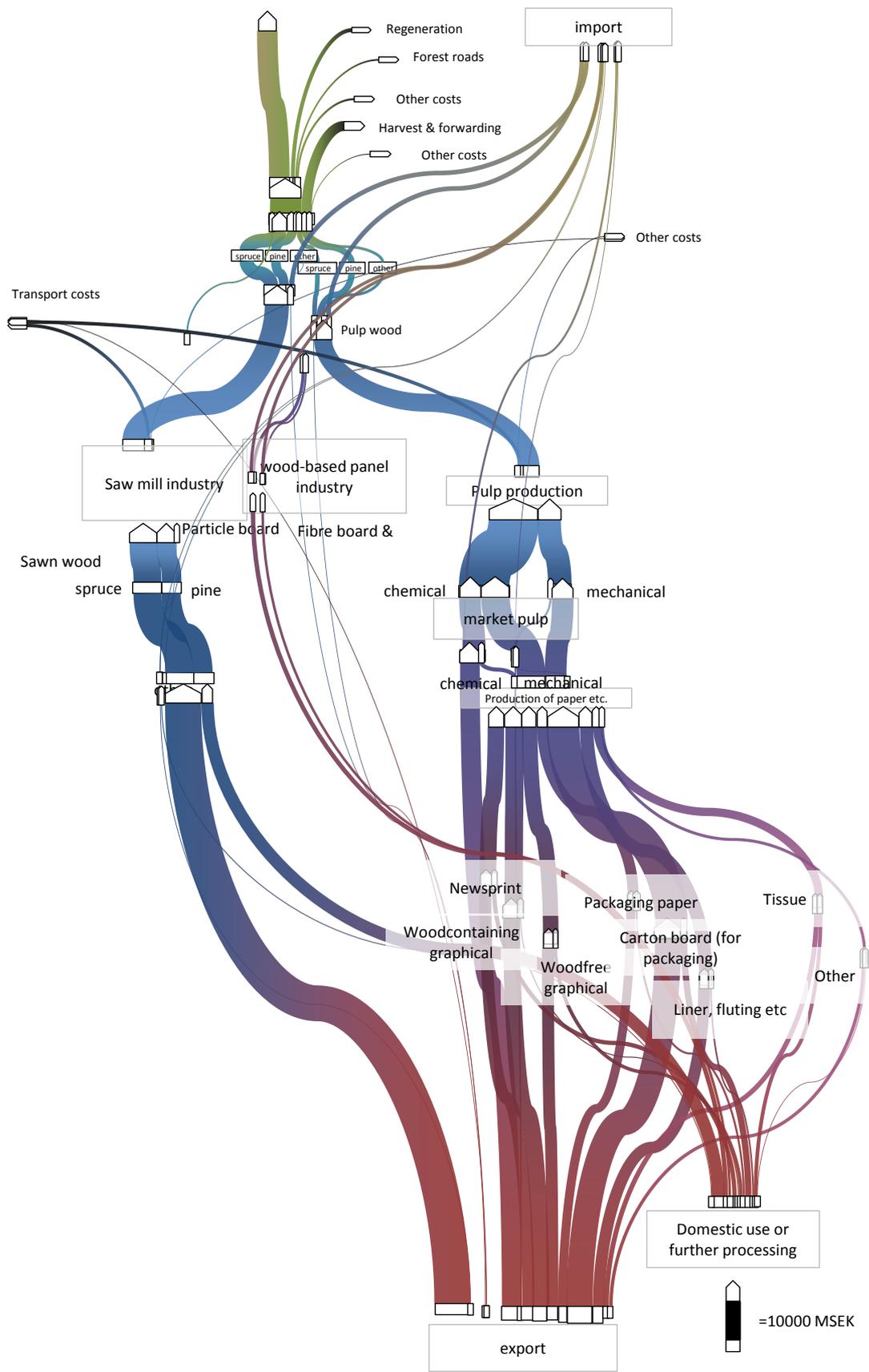


Figure 2. Economic flows divided by product groups