



EFORWOOD

Sustainability Impact Assessment
of the Forestry - Wood Chain



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EFORWOOD

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Summary

This is the *Summary report of the EFI-GTM tasks*. The report is project deliverable PD4.3.6 of the EFORWOOD project.

This report and the work described in it belong to WP 4.3. “Development of industry dynamic models”, co-ordinated by Pöyry and it is linked to the work of the WP 1.3 “Forestry-wood chain markets and trade – from local to global”, co-ordinated by EFI.

The purpose of this report is to give information to other Eforwood partners on the work that has been carried out in “specific data collection and support in refining the EFI-GTM model”. For obvious reasons, it closely reflects the report PD 1.3.2 “*Specification of data requirement and sources*” written by EFI.

The work described in this report started in month one of the Eforwood project and it continued until month 46.

The author of this report is Pöyry Forest Industry Consulting.

Summary

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1 INTRODUCTION

This report belongs to European Commission’s EFORWOOD project, contract number 518128-2. Module 4, who is responsible for this report, is a partnership of European companies focusing on the manufacturing and processing (“gate to gate”) stage of the Forestry Wood Chain (FWC) in Europe. This is the *Summary report of the EFI-GTM tasks*. The report is project deliverable PD4.3.6 of the EFORWOOD project.

The purpose of this report is to give information to other Eforwood partners on the work that has been carried out in specific data collection and support in refining the EFI-GTM model.

To make it absolutely clear how the roles of the players in the chain from WP 4.3 upwards are defined, we can give the following role table.

ToSIA is in the *lead role*.

EFI is responsible for the *model EFI-GTM and the model runs*. EFI’s role is, in this chain of work, *provide scenario calculations in the form required by ToSIA* – and also act as a *benchmark/verifier of realism in ToSIA* in the area where the EFI-GTM model operates.

Pöyry Forest Industry Consulting *provides data to EFI for inclusion into EFI-GTM*, in the format and specifications required by EFI. *Pöyry also provides support in the shape of advice on the use of the data*, although EFI of course makes the decisions. In this advice is included efforts to make work and data in 4.3 as consistent as possible with the other Module 4 data tasks.

This report and the work described in it belong to WP 4.3. “Development of industry dynamic models”, co-ordinated by Pöyry and it is linked to the work of the WP 1.3 “Forestry-wood chain markets and trade – from local to global”, co-ordinated by EFI.

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WHAT HAS BEEN DONE

Following the structure of the PD 1.3.2, this report is subdivided into three main parts corresponding to the main parts of EFI's GTM-model: demand of final products, supply of wood and fiber, production of forest products.

NOTE: On the level of detail in ToSIA and EFI-GTM

Due to the development history of EFI-GTM (which is quite long, starting in the 80's and even earlier), the model has its own regional, product etc. hierarchy. It is our understanding that this hierarchy is continually developed – but that it does not get simpler.

Now, as the role of EFI-GTM is to provide scenario calculations for input into ToSIA, EFI-GTM requires a different granularity of data from ToSIA. Of course, the EFI-GTM output is then fitted by EFI into the ToSIA-required format.

Thus:

*** the data structure described below is what EFI-GTM requires for its operations, due to many reasons**

*** it has nothing directly to do with the ToSIA data structure**

*** naturally, in EFORWOOD WP 4.3, every possible effort has been undertaken to match data input into EFI-GTM and data output from EFI-GTM to ToSIA with as little processing as possible**

2.1 Demand: Regions

In EFI-GTM, the term region means the smallest geographical area which the data refer to (like country in Europe). An aggregation of regions is called aggregated region (like Western Europe, North America).

Table 2-1 shows the regions used as demand regions (regions with defined base year, 2005, consumption of final products).

Table 2-1
Demand Regions (Please note our comment on the level of detail in ToSIA and EFI-GTM)

Europe	North America
Austria	USA
Belgium	Canada
Denmark	
Finland	Latin and Central America
France	Argentina
Germany	Brazil
Greece	Chili
Ireland	Mexico
Italy	Rest of L.America
Netherlands	
Norway	Asia
Portugal	China
United Kingdom	Japan
Spain	India
Sweden	Asia-Pacific
Switzerland	Middle East
Belarus	Rest of Asia
Bosnia-Herz.	
Bulgaria	Africa
Croatia	Africa-East
Czech R.	Africa-North
Estonia	Africa-South
Hungary	Africa-West
Latvia	
Lithuania	Oceania
Poland	Australia
Russia	New Zealand
Romania	
Serbia	
Slovakia	
Slovenia	
Ukraine	

2.2 Demand: Products

Table 2-2 shows the products specified in the EFI-GTM model. The model sees pulp as an “intermediate product”, not as a “final product” and thus it is not include in the “demand” side but can be found from “supply”-tables.

Table 2-2
Demand Products (Please note our comment on the level of detail in ToSIA and EFI-GTM)

Mechanical forest industry products	For the paper and paperboard products:	Bio-energy:
Coniferous sawnwood	Newsprint	Pellets
Non-coniferous sawnwood	Uncoated mechanical	Wood based electricity * *
Plywood	Coated mechanical	Wood based heat * *
MDF	Uncoated wood free	
OSB	Coated wood free	
Other wood based panels	Carton board (virgin fibre based)	
	Carton board (recycled fibre based)	
	Kraftliner	
	Fluting	
	Testliner and recycled fibre based fluting	
	Tissue	
	Sack paper	
	Other paper & paperboard	
<i>Data provider: Pöyry</i>	<i>Data provider: Pöyry</i>	<i>Data provider: VTT and Pöyry</i>

** When applicable, no data available for all countries / regions

2.3 Demand: Other data

- Apparent consumption (production + import – export) for specified regions and products
- International prices for few selected countries/regions with consistent prices in 2005
- Rough estimates on long run income and prices elasticities

(Data provider: Pöyry)

2.4 Demand: Work done

Pöyry provided EFI with data listed in points 2.1-2.3.. In addition, Pöyry delivered pellet, heat and power demand data to EFI. VTT worked with its share of the bioenergy data.

2.5 Supply: Regions

The countries and regions used as supply regions (regions with defined base year, 2005, production of final products) are listed below.

Table 2-3
Supply Regions (Please note our comment on the level of detail in ToSIA and EFI-GTM)

Europe	North America
Austria	Canada-West
Belgium	Canada-East
Denmark	US-North
Finland	US-South
France	US-West
Germany	
Greece	Latin and Central America
Ireland	Argentina
Italy	Brazil
Netherlands	Chili
Norway	Mexico
Portugal	Rest of L.America
United Kingdom	
Spain	Asia
Sweden	China
Switzerland	India
Belarus	Indonesia
Bosnia-Herz.	Japan
Bulgaria	Korea
Croatia	Malaysia
Czech R.	Thailand
Estonia	Turkey
Hungary	Middle East (incl. Iran)
Latvia	Rest of Asia (incl. Taiwan)
Lithuania	
Poland	Africa:
Russia Europe	Africa-East
Russia Siberia	Africa-North
Russia Far East	Africa-South
Romania	Africa-West
Serbia	
Slovakia	Oceania:
Slovenia	Australia
Ukraine	New Zealand

2.6 Supply: Products

Table 2-4 lists the products specified in the EFI-GTM model.

**Table 2-4
Supply Products (Please note our comment on the level of detail in ToSIA and EFI-GTM)**

Mechanical forest industry products:	Paper and paperboard products
Coniferous sawnwood	Newsprint
Non-coniferous sawnwood	Uncoated mechanical
Plywood	Coated mechanical
MDF	Uncoated wood free
OSB	Coated wood free
Other wood based panels	Cartonboard (virgin fibre based)
<i>Data provider: Pöyry</i>	Cartonboard (recycling based)
	Kraftliner
Pulp products:	Fluting
BSKP	Testliner and Rec.based fluting
BHKP	Tissue
Unbleached kraft pulp	Sack paper
Sulphite	Other paper & paperboard
BCTMP	<i>Data provider: Pöyry</i>
<i>Data provider: Pöyry</i>	
Bio-energy products:	
Pellets	
Wood based electricity	
Wood based heat	
<i>Data provider: VTT * *</i>	

** When applicable, no data available for all countries / regions

2.7 Supply: Technological vintages

For the existing capacities in European regions and most important producing regions outside Europe, three technological vintages are specified: *low, average and high production cost technologies*.

2.8 Supply: Raw material and cost input

Table 2-5 shows the studied raw material cost inputs. The costs data is from 2005/ IV quarter. Data is given with regards to technological vintages.

Table 2-5
Raw Material Inputs (Please note our comment on the level of detail in ToSIA and EFI-GTM)

Exogenous inputs:	Endogenous inputs:
Electricity (net) kWh/output unit	
Fuel (net) GJ/output unit	For mechanical forest industry products:
Labour, hours/output unit	- sawlogs (pulplogs) input (m3/m3)
Other variable costs, \$/output unit	- wood chips input (m3/m3)
Variable maintenance costs, \$/output unit	
Investment costs, \$/output unit	For pulp products:
	- coniferous pulpwood input (m3/t)
	- non-coniferous pulpwood input (m3/t)
	- wood chips input (m3/t)
	For paper & paperboard products:
	- recycled paper by grade input, t/t
<i>Data provider: Pöyry</i>	- wood pulp by grade input, t/t
	- coniferous pulpwood input, m3/t
	- non-coniferous pulpwood input, m3/t
	<i>Data provider: Pöyry</i>

2.9 Supply: Work done

Pöyry provided EFI with data listed in points 2.5-2.8. VTT is worked with the bioenergy data.

3 CONCLUSIONS

Pöyry has delivered data to EFI in EFI-GTM format. In addition, bioenergy products have been defined and some data has been collected for them. The GTM- model has its own regional, product etc. hierarchy. When the model is used to provide scenario calculations for input into ToSIA, EFI-GTM output is adapted by EFI into the ToSIA-required format.

In addition to the direct support, WP 4.3 helped in matching the data input into EFI-GTM and data output from EFI-GTM to the ToSIA data needs.

DEFINITIONS

BCTMP: Bleached Chemo-ThermoMechanical Pulp

BHKP: Bleached Hardwood (non-coniferous) Kraft Pulp (see also Kraft pulp)

BSKP: Bleached Softwood (coniferous) Kraft Pulp (see also Kraft pulp)

Cartonboards: Generic term for stiff paper usually made in several layers, widely used for packaging (e.g. folding cartons) and graphic applications.

Coated mechanical paper: This group can be split into two sub-categories - Lightweight Coated (LWC) and Medium Weight Coated (MWC). These papers can have either a glossy or matt finish, and are used mostly for catalogues, magazines and advertising material using rotogravure or offset printing. They are made from a blend of chemical and mechanical pulp with a content of fillers and are mineral coated on both sides, either on or off machine. LWC has a basis weight of up to 72 g/m² and anything above 72 g/m² is classed as either MWC or Heavy Weight Coated (HWC). (Source: CepiPrint)

Coated woodfree paper (or coated fine paper): Fine papers are printing and writing papers, which are made of chemical pulp and may also contain recycled fibers. Coated fine paper grades use uncoated fine paper (jumbo) reels as the base material, upon which one or more thin mineral coatings are added to smooth the surface and improve printability. CWF is used for printing for instance high quality books, e.g. art books, and also high quality magazines, annual reports, company magazines, catalogues and brochures. (Source: CepiFine)

Fluting: Papers used as fluting/corrugating medium for the production of corrugated board. See also "Kraftliner" and "Testliner".

Kraft liner: Board generally made from bleached or unbleached sulphate pulp and used as an outer ply or as facing for corrugated board.

Kraft paper: (see Sack paper)

Kraft pulp: or sulphate pulp is chemical pulp produced by cooking wood in a liquor containing sodium hydroxide and sodium sulphide as active chemicals. Originally a strong, unbleached coniferous pulp for packaging papers, kraft pulp covers today also bleached pulps from both coniferous and deciduous woods used in manufacturing of e.g. printing and writing papers.

MDF: Medium Density Fibreboard is a wood-based panel made of wood fibres bonded together with resin. The board is relatively homogenous throughout its thickness without distinctive surface or core layers. MDF is easily moulded, painted or overlaid and it is used mainly in the furniture industry.

Newsprint: An uncoated paper that is mainly used for printing newspapers. In the past, it has been made largely from mechanical pulp, but today, an increasing amount of recovered paper, mainly old newspapers (ONP) and old magazines (OMG), also goes into the production. The weight of a sheet of newsprint usually ranges from 40 g/m² to 52 g/m², but can be as high as 65 g/m². Newsprint is white or slightly coloured (eg, pink Financial Times), and is supplied in reels for rotogravure, offset or flexo printing. (Source: CepiPrint)

OSB: Oriented Strand Board is a wood-based panel made of wood strands bonded together with exterior grade resin. The board has a three-layer construction where surface strands on both sides are oriented to the same direction while the core strands are oriented cross-wise to surface strands. OSB panels are mainly used in construction purposes, mainly residential single- and multi-family houses. Typical residential construction end-uses are sub-flooring, roof sheathing, ceilings and wall sheathing.

Plywood: Plywood panels are made of thin sheets of wood veneers. Veneers are stacked together with the direction of each veneer's grain differing from its neighbours by 90 degrees. The plies are bonded together under heat and pressure which adhesives, most commonly phenol formaldehyde resin. There is a number of varieties of plywood and their end-uses vary widely depending on quality and wood raw material. Main end-use areas are furniture, construction, packaging and transport.

Recovered paper: Used paper that can be collected and re-used. Does not include e.g. tissue or paper recycled internally by the paper industry

Sack paper (or Kraft paper): is a high-strength paper made almost entirely of unbleached kraft pulp. Sack paper is used for the production of paper sacks and paper bags

Sulphite (pulp): is a chemical pulp produced by cooking wood in a liquor containing sodium, magnesium, ammonium or calcium bisulphite

Testliner Board mainly produced from recovered paper and used as even facing for corrugated board or as liner of solid board.

Uncoated mechanical paper: This category covers a wide a range of publication paper grades, including directory paper, thin printing grades and book paper. The basic furnish is the same as for newsprint, but the basis weight starts at 28 g/m². *Supercalendered Magazine Paper (SC)* is primarily used for the publication of consumer magazines, catalogues and advertising material using rotogravure, offset or letterpress printing. It is made from mechanical pulp with a large content of mineral filler. This grade is split into sub-categories based on brightness: SC-A+, SC-A, SC-B. (Source: CepiPrint)

Uncoated woodfree paper (or uncoated fine paper): Fine papers are printing and writing papers, which are made of chemical pulp and may also contain recycled fibers. The majority of the *UWF cut-size paper* is A4, which is used in offices at work and home for printing and copying purposes. *UWF folio sheets* are used for printing books, direct mailings and materials for corporate communications. *UWF reels* are used for producing writing pads, envelopes, books or business forms, for instance. (Source: CepiFine)