

TAL TECH

THE FUTURE OF WOOD AND LIGNOCELLULOSIC BIOMASS VALORIZATION IN ESTONIA AND LATVIA

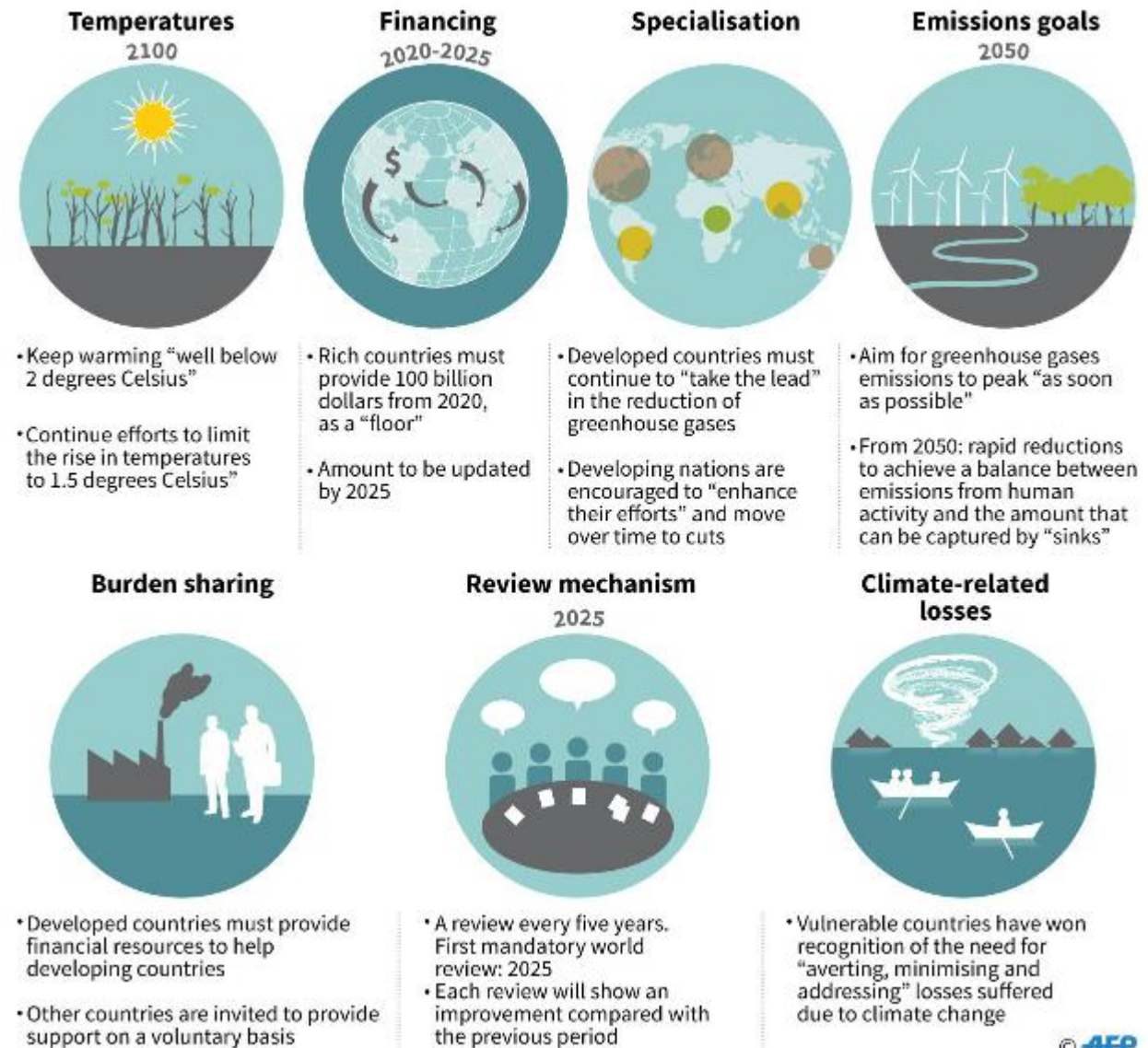
Prof. Jaan Kers



OUTLINE

- **Background: Climate agreements, LULUCF**
- **Four steps in wood and wood based biomass valorization**
- **Current situation with wood and wood based products valorization**
- **Four steps in Estonia, Latvia and Finland**
- **Future perspective**

The Paris climate agreement: key points





What is LULUCF?

- LULUCF includes all impacts on GHG of human management of vegetation and soils
 - cropland, grassland, forests, wetlands
- Both emissions and removals
- LULUCF today is approx. 10% removal of the EU's total GHG budget
- The forest sink, however, is projected to decline in some Member States and the EU
- Additional effort can maintain these removals

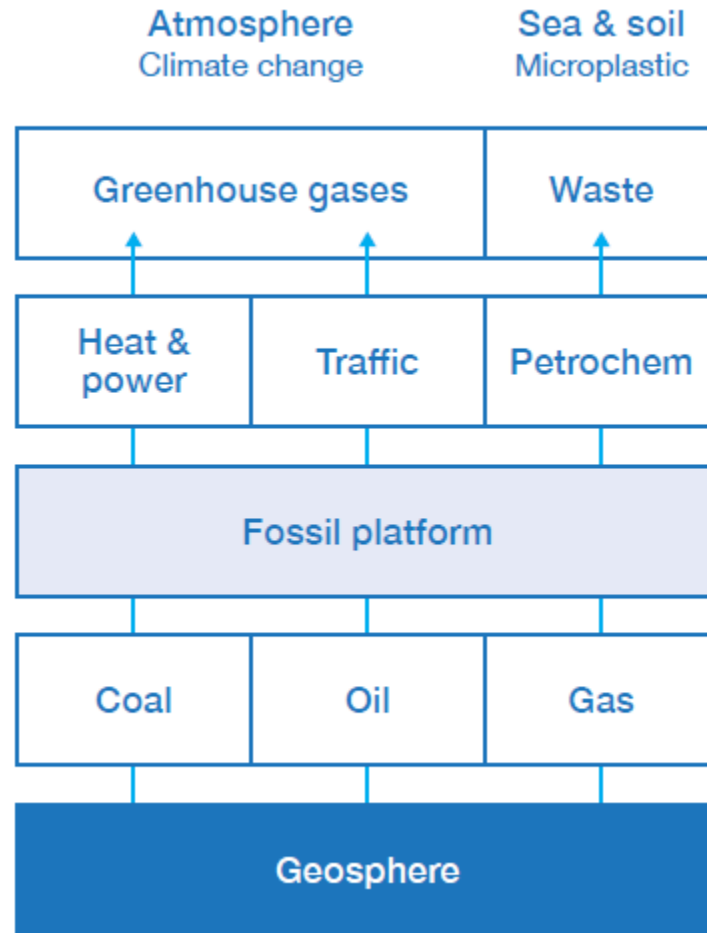




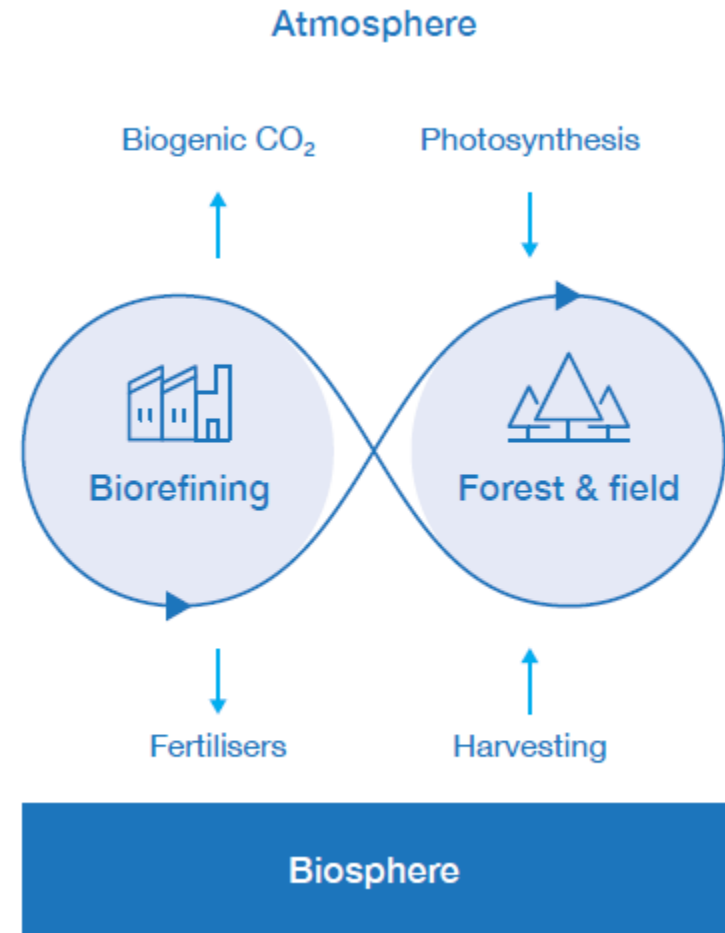
- Incentives for pro-active, sustainable forest management
- Need to ensure coherence with national bio-energy and bio-economy plans

Option		Benefits in:
Increase in C stock	In existing forests 	LULUCF
	In wood products 	LULUCF
Substitution effects by wood	Material  → 	Other GHG sectors
	Fossil-fuel energy  → 	Other GHG sectors

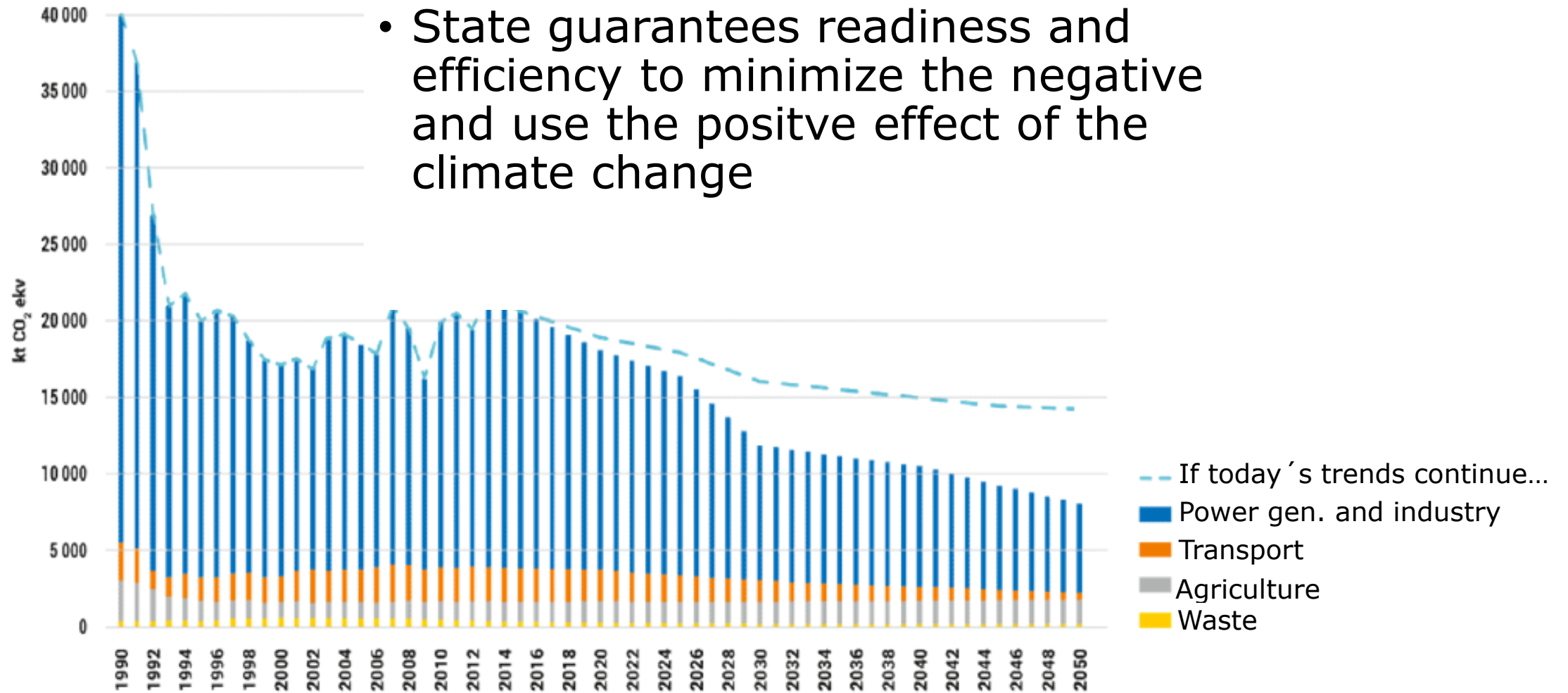
REPLACEMENT OF FOSSIL CARBON CYCLE WITH BIOGENIC ONE



Transition
towards
renewables



ESTONIA'S AIM FOR 2050 – COMPETITIVE ECONOMY WITH LOW CARBON EMISSION (REDUCTION - 80%)



FOUR STEPS IN WOOD AND WOOD BASED BIOMASS VALORIZATION

Four upgrading steps for wood and woody biomass valorization are:

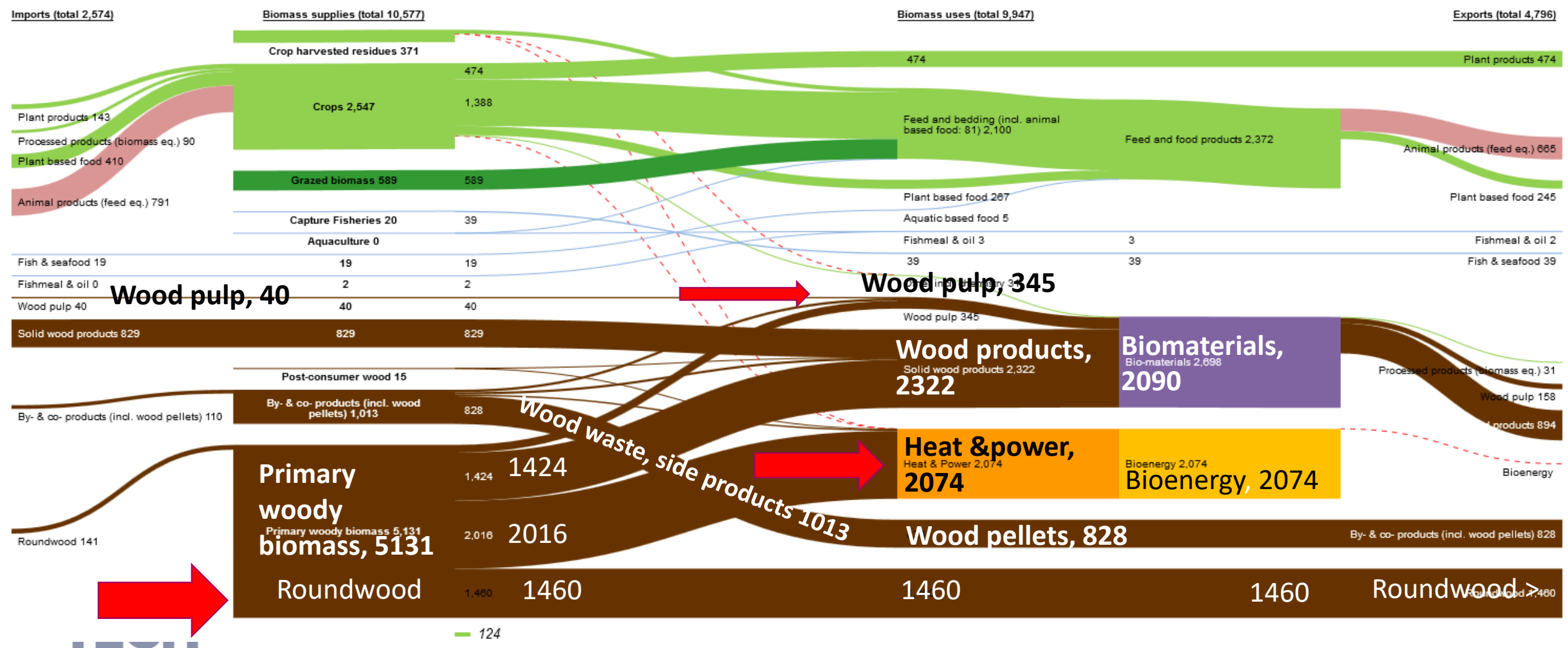
1. Step: Forest and wood residues for energy production.
2. Step: Logs and timber for production of sawn timber, GLT, CLT, Plywood etc
3. Step: Wood fibres: pulp, paper, tissue, biocomposites, packaging materials
4. Step: Molecular level: drop in chemicals, pharmacy products, biopolymers, biofuels.

(Adapted from UPM Kymmene OY)

Current situation with wood and wood based products valorization

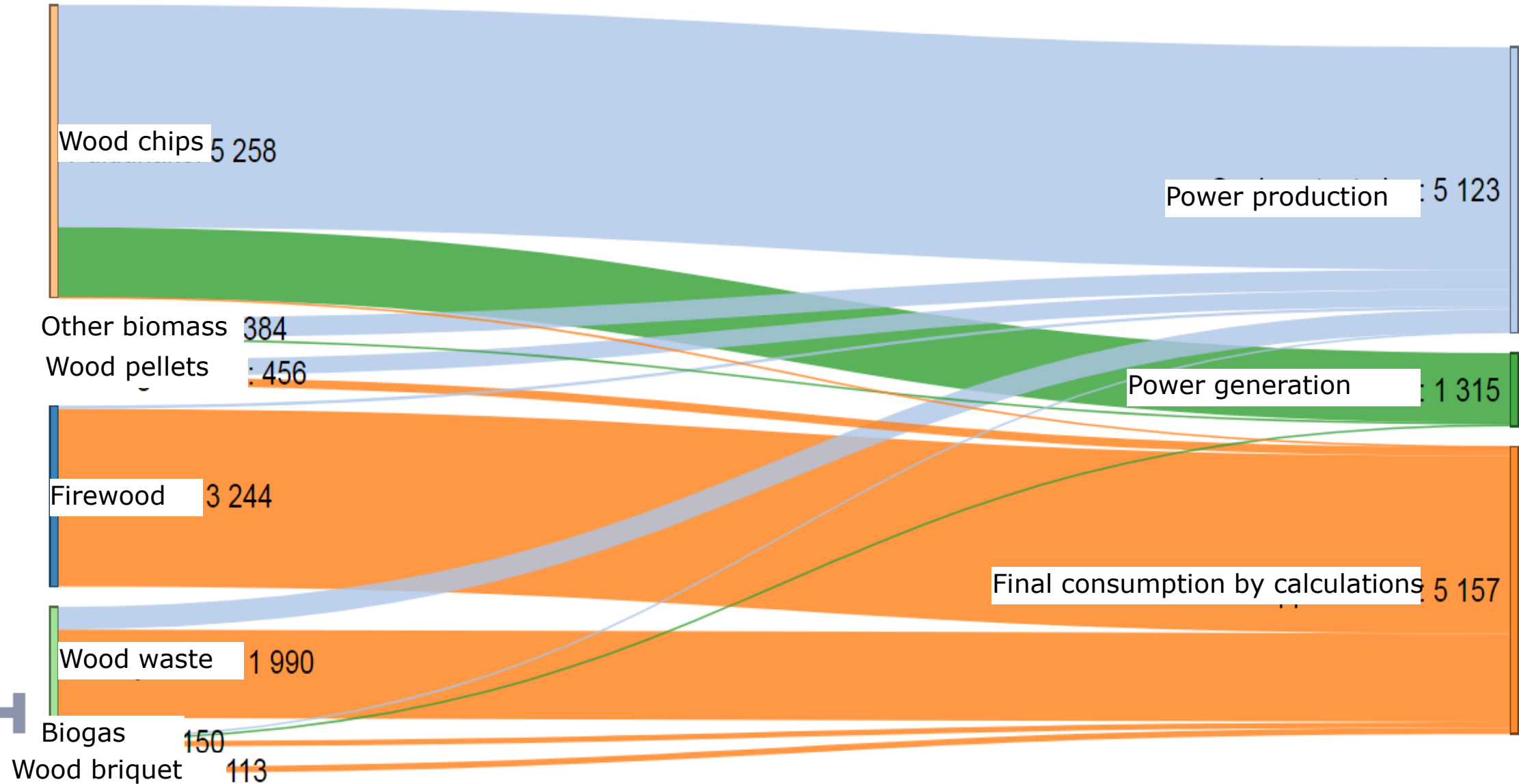
Biomass balances in Estonia (1000 T of dry matter) full trade

Biomass balances in Estonia, Last data available
1000 T of dry matter



1. Step: Forest and wood residues for energy production

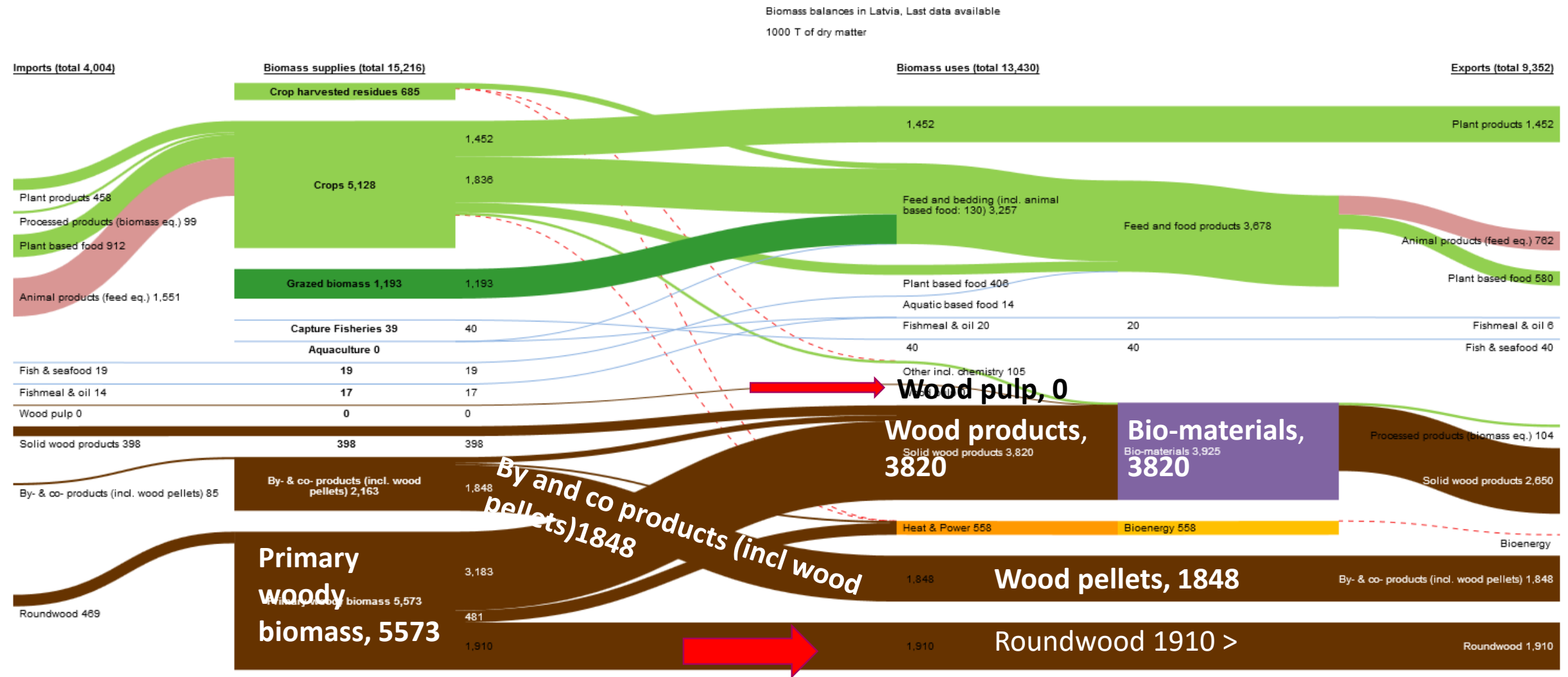
Final consumption of the biomass for heat production and power generation in Estonia (2017, GWh)



Estonias biomass based primary energy ressources, production, export and supply 2017, GWh

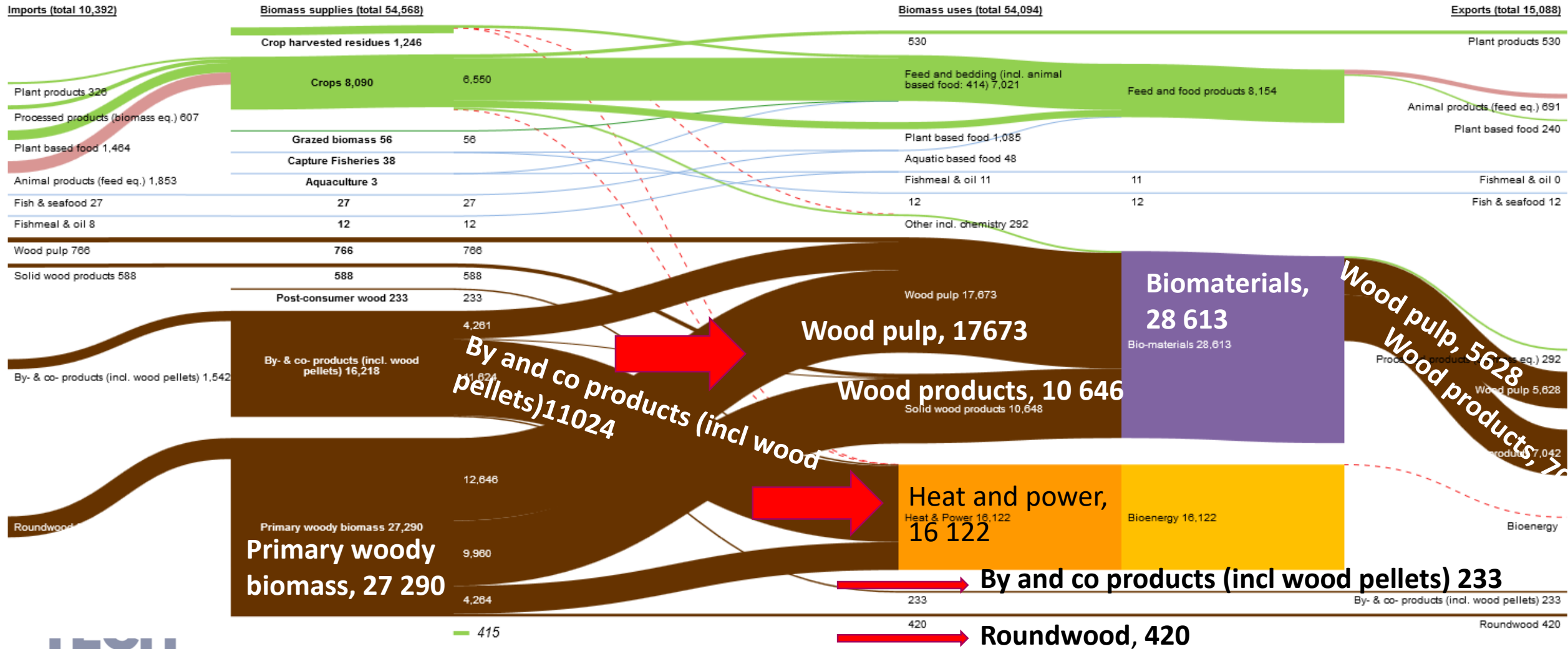


Biomass balances in Latvia (1000 T of dry matter) full trade



Biomass balances in Finland (1000 T of dry matter) full trade

Biomass balances in Finland, Last data available
1000 T of dry matter

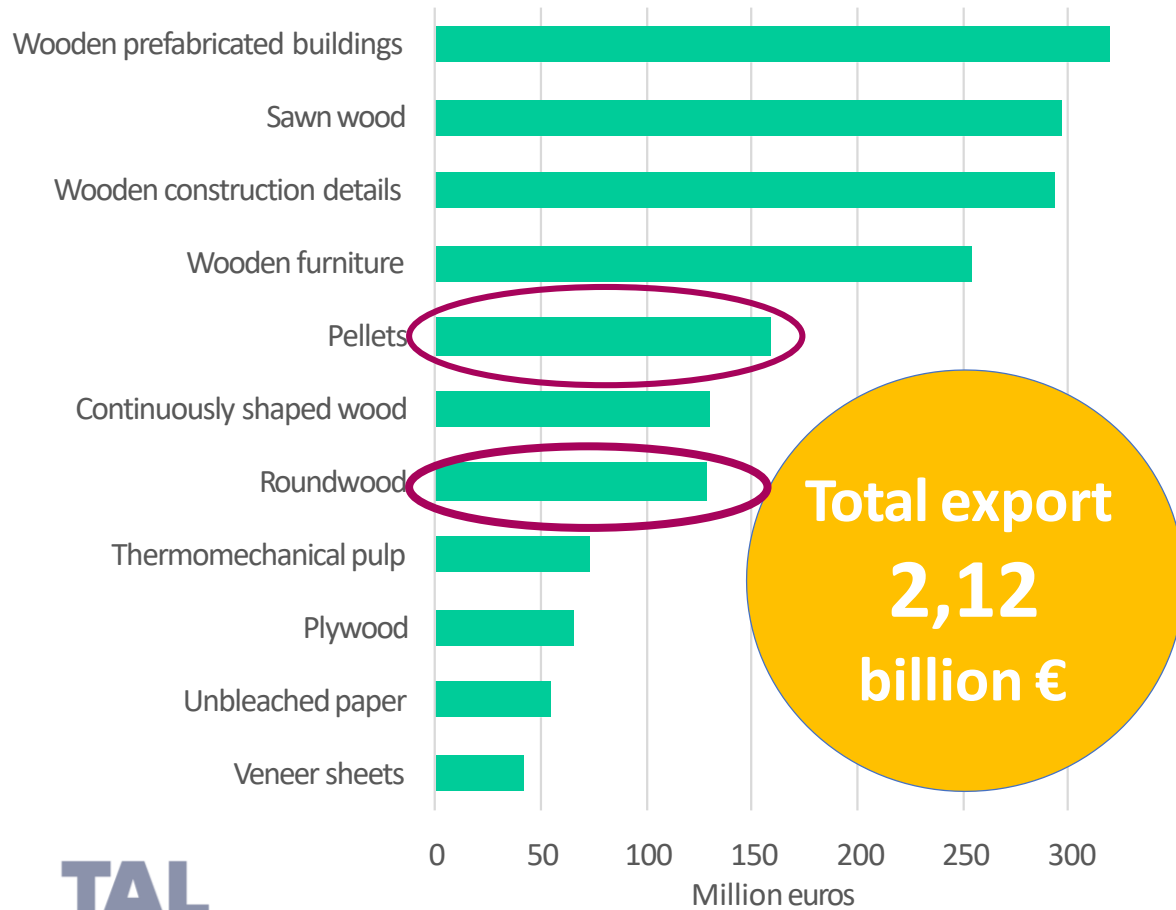


https://datam.jrc.ec.europa.eu/datam/mashup/BIOMASS_FLOWS/index.html

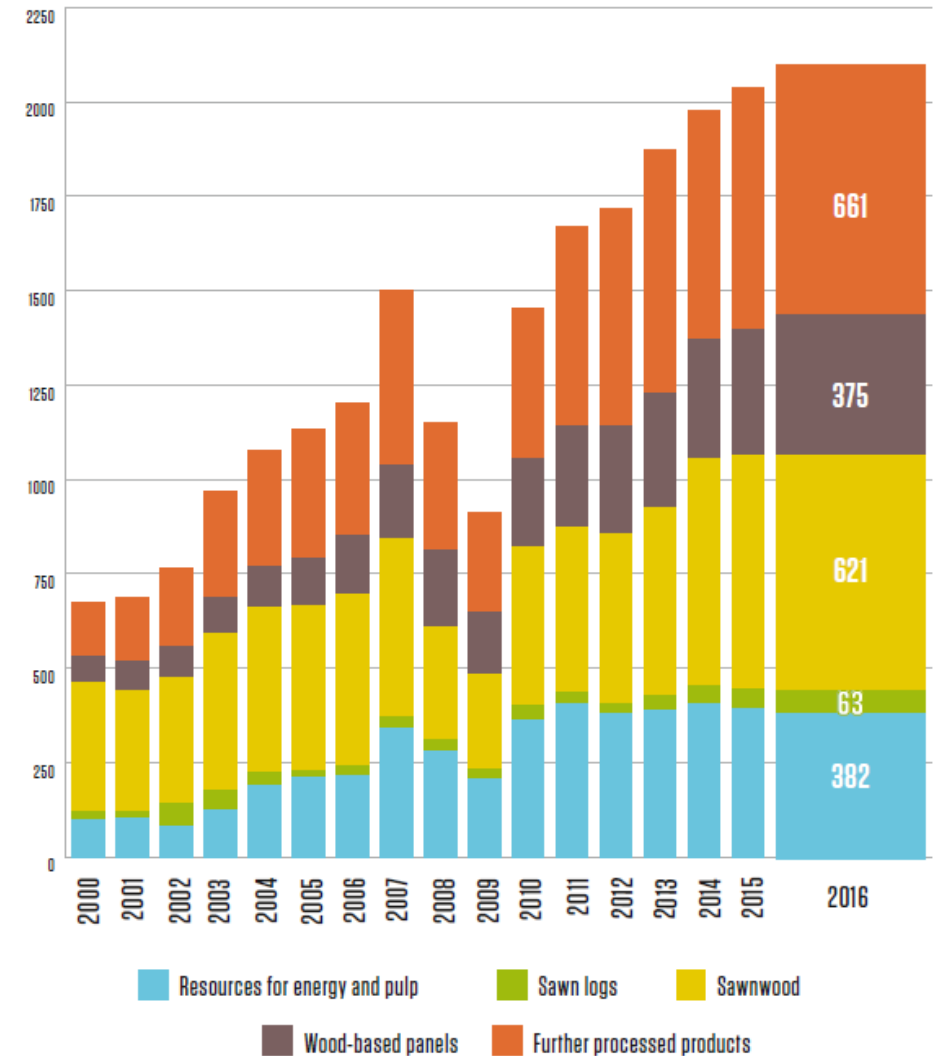
2. Step: Logs and timber for production of sawn timber, GLT, CLT, Plywood etc

ESTONIAS (2017) AND LATVIAS (2016) **EXPORT** of WOOD PRODUCTS

Largest export product groups

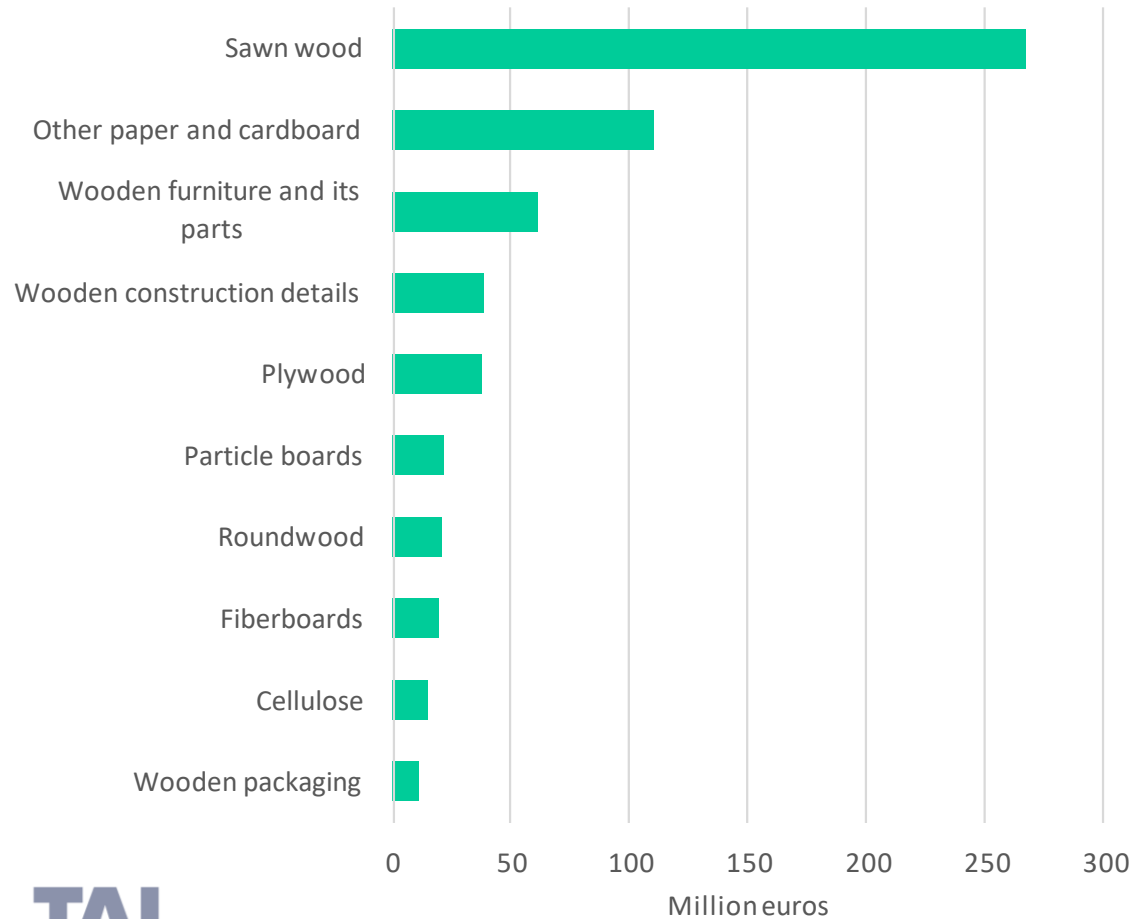


Forest Sector Export development (Million EUR)

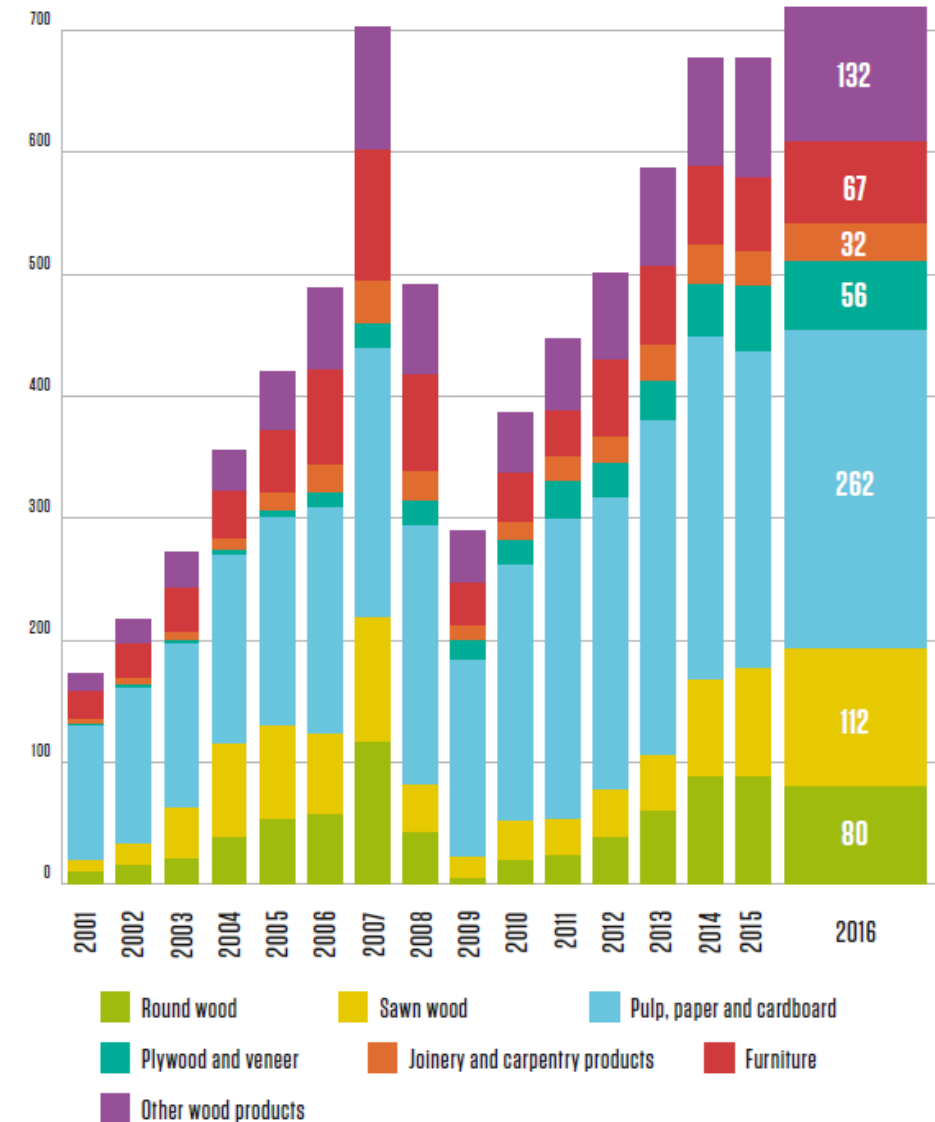


ESTONIAS (2017) AND LATVIAS (2016) **IMPORT** of WOOD PRODUCTS

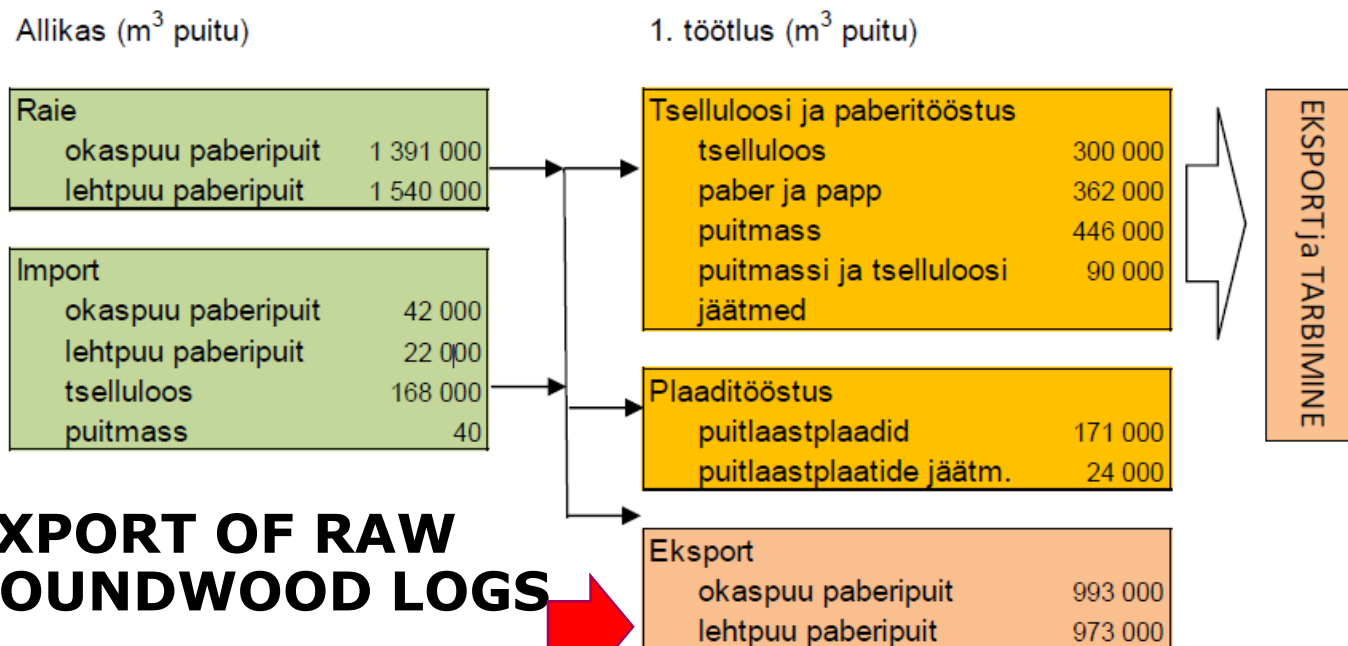
Largest import product groups



Forest Sector import development (Million EUR)



EXPORT, PROCESSING and MOVEMENT OF RAW ROUNDWOOD LOGS (PULPWOOD) IN ESTONIAS WOOD BALANCE



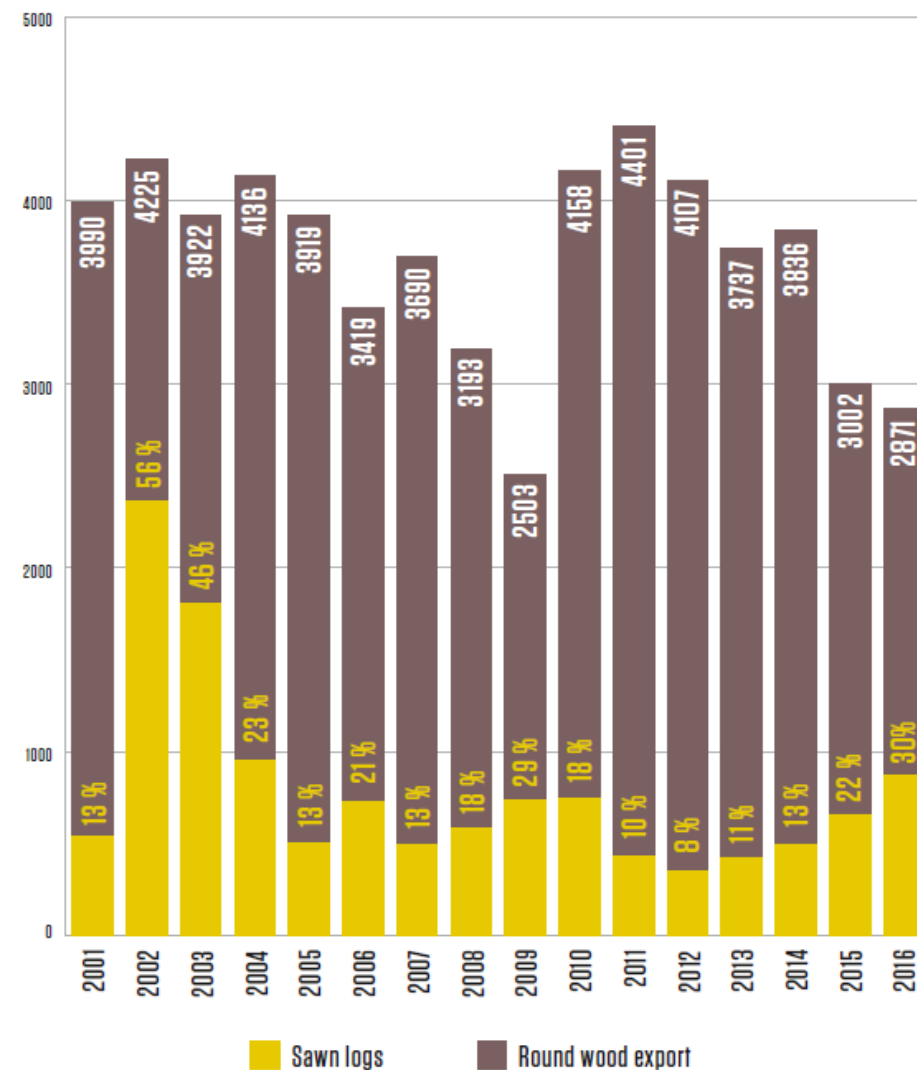
EXPORT OF RAW ROUNDWOOD LOGS

903 000 m³ softwood for pulp

973 000 m³ hardwood for pulp

PROPORTION OF SAWN LOGS IN ROUND WOOD EXPORT IN LATVIA

Proportion of sawn logs in Round wood export (Thousand m³)

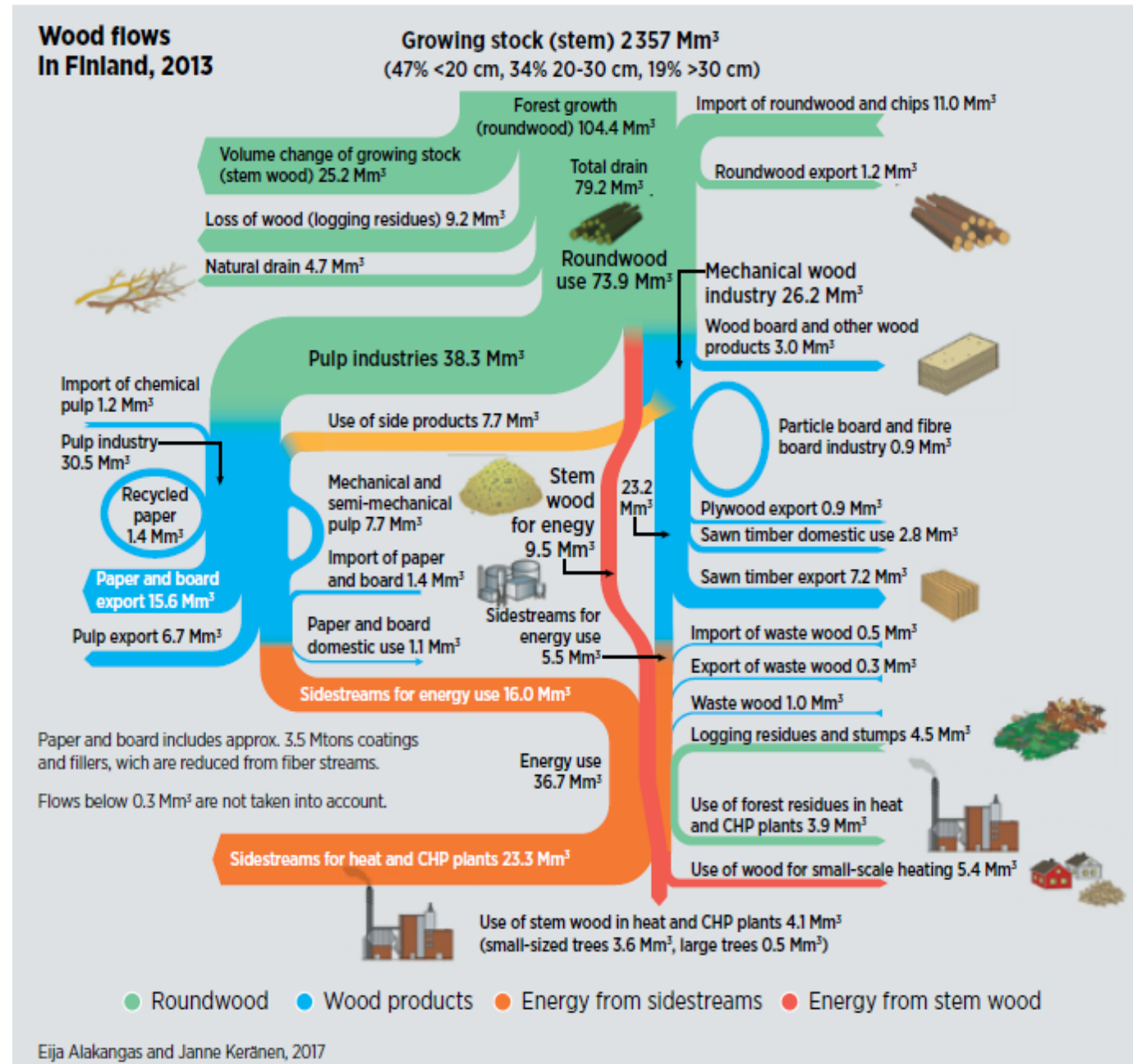


3. Step: Wood fibres: pulp, paper, tissue, biocomposites, packaging materials

- Sustainable, efficient and modern use of wood!

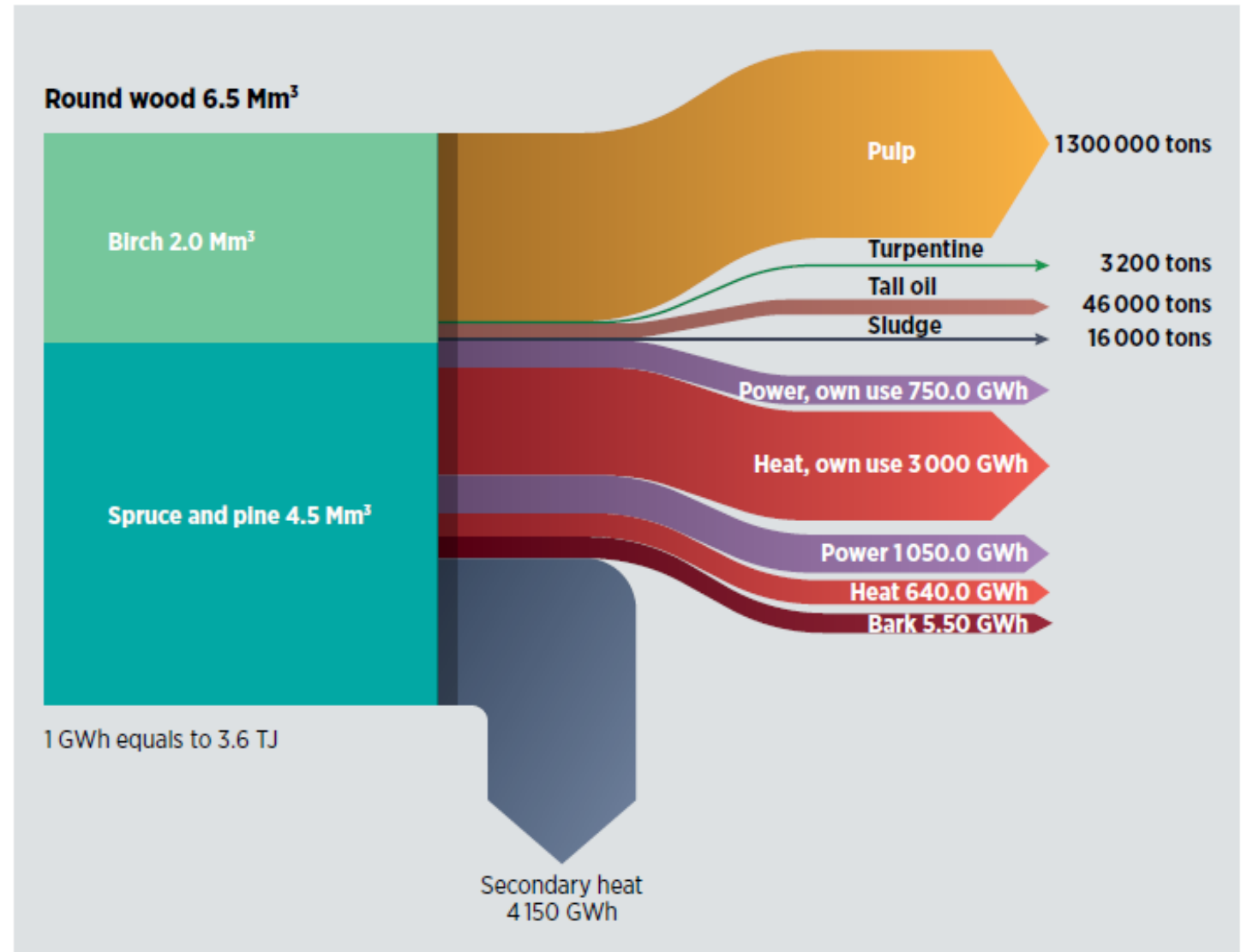
IRENA (2018), Bioenergy from Finnish forests: Sustainable, efficient and modern use of wood, International Renewable Energy Agency, Abu Dhabi.

Figure 3 Wood flows in Finland 2013



Products of Äänekoski modern pulp mill

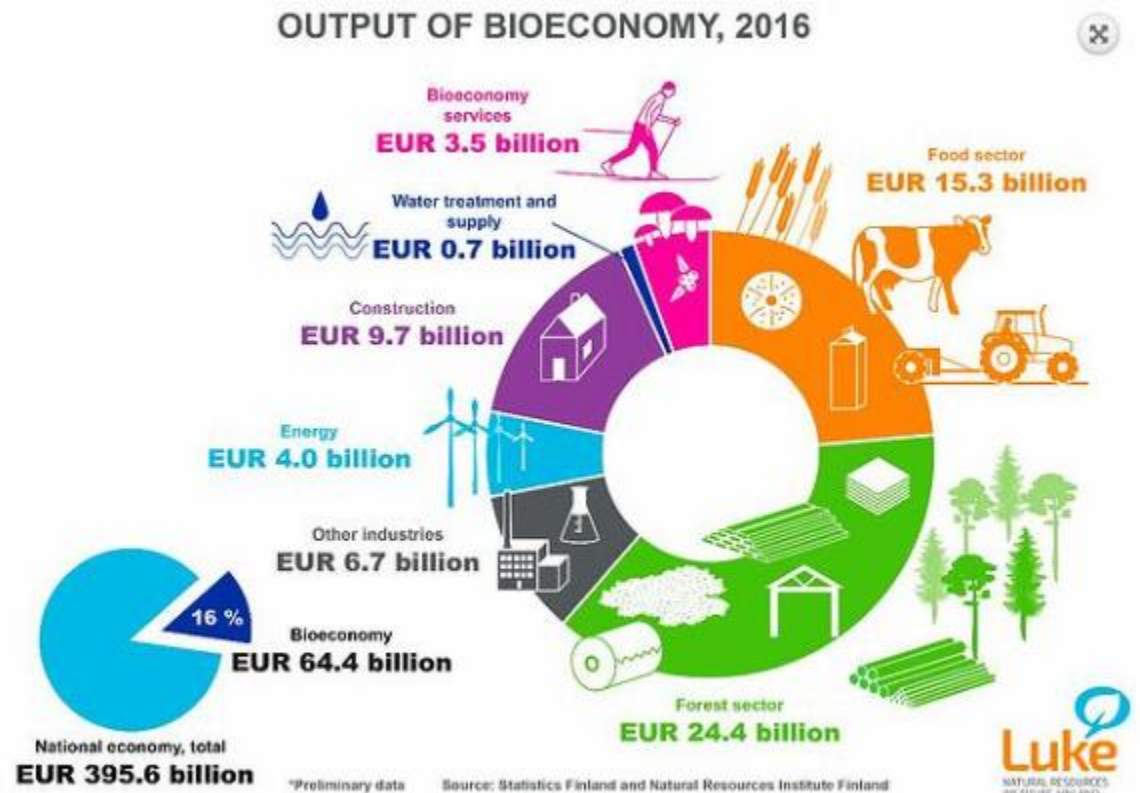
Figure 9 Sankey diagram of Äänekoski mill roundwood use and bioproducts



Source: VTT and Metsä Fibre

FINLAND'S BIOECONOMY SECTOR GROWTH CONTINUES

- The €64.4 billion total represented an increase of 7% from the previous 5-year period in real terms.
- Bioeconomy products represented almost 1/3 of total goods exported from Finland.
- The food and forest sectors represented more than 50% of the total value added by Finland's bioeconomy.
- The highest growth rates in 2016 were in: chemical industry, production of renewable energy and the pharmaceutical industry.



<https://www.forest2market.com/blog/as-global-bioeconomy-continues-to-grow-finlands-forest-sector-leads-the-way>

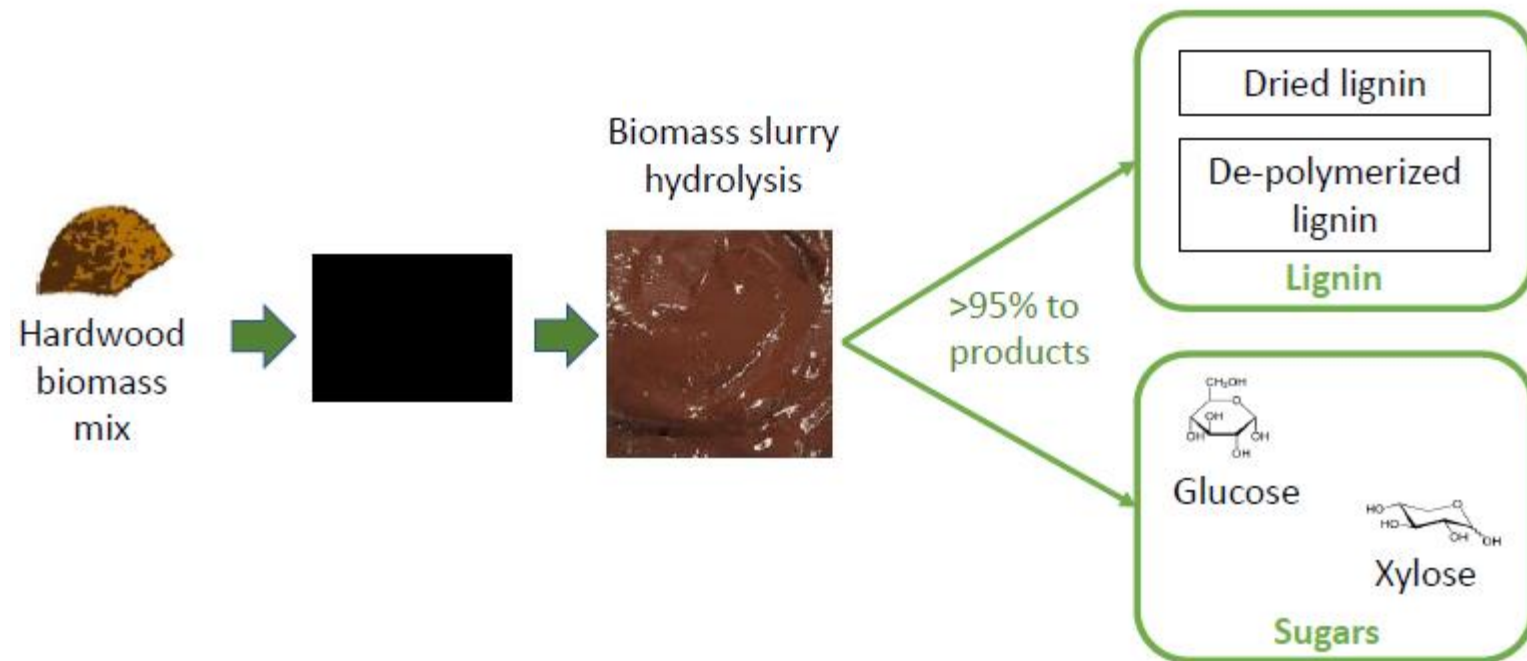
3rd step in Estonia and Latvia

- Horizon pulp and paper old unbleached kraft pulp mill in Kehra
- Estonian Cell launched 2006 BCMP mill (aspen) in Kunda
- Plans in Latvia for pulp mill near to Ozolsala with capacity 0,6Mt (2000....2007 – did not realise...).
- EstFor Invest 0,7Mt biorefinery project is in the nest of drawers waiting for future opportunity...

3rd or 4th step attempt in Estonia

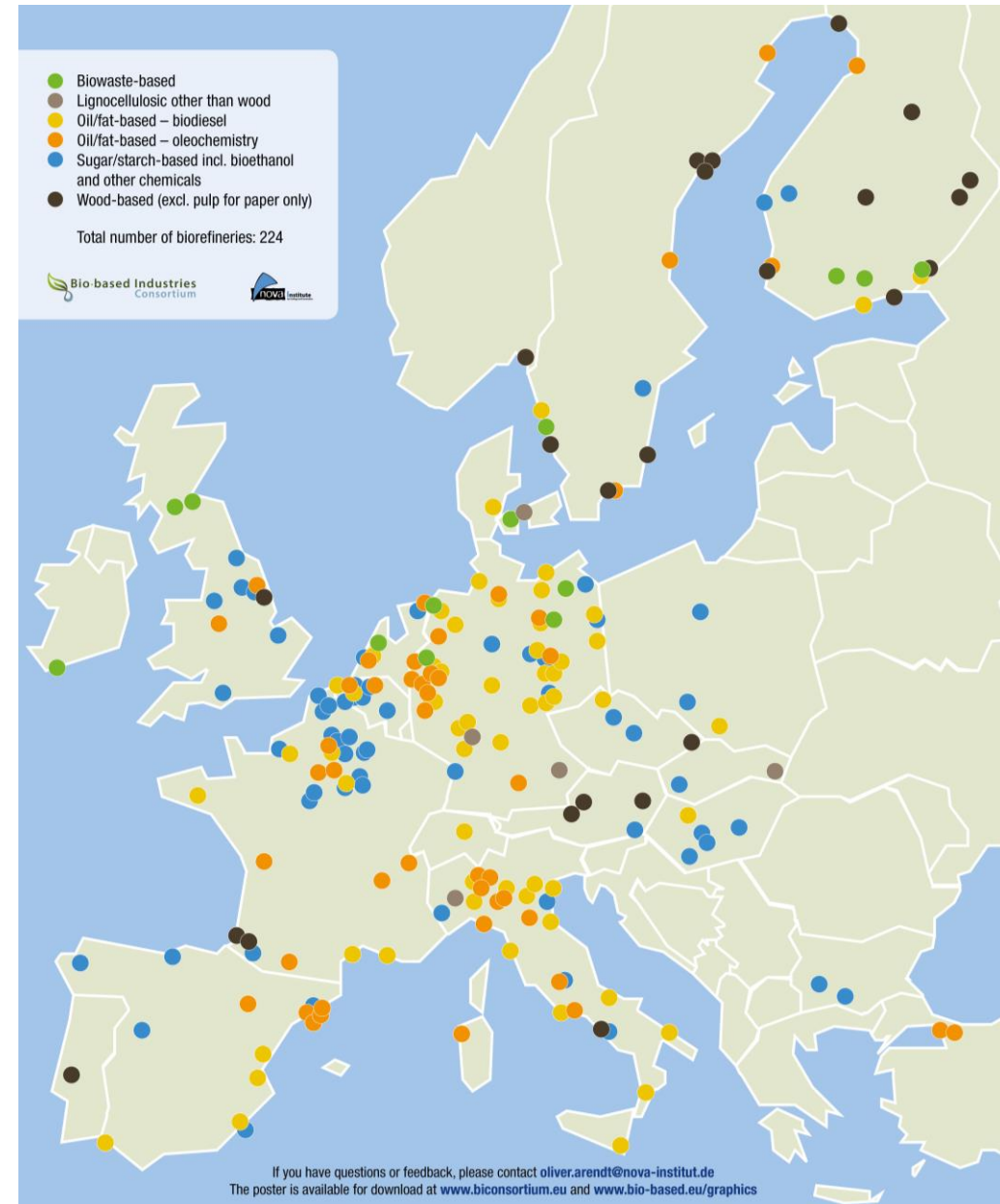
- Granul Invest is developing the pilot plant in Imavere for extracting sugars and lignin from low quality wood

Wood fractionation and hydrolysis platform

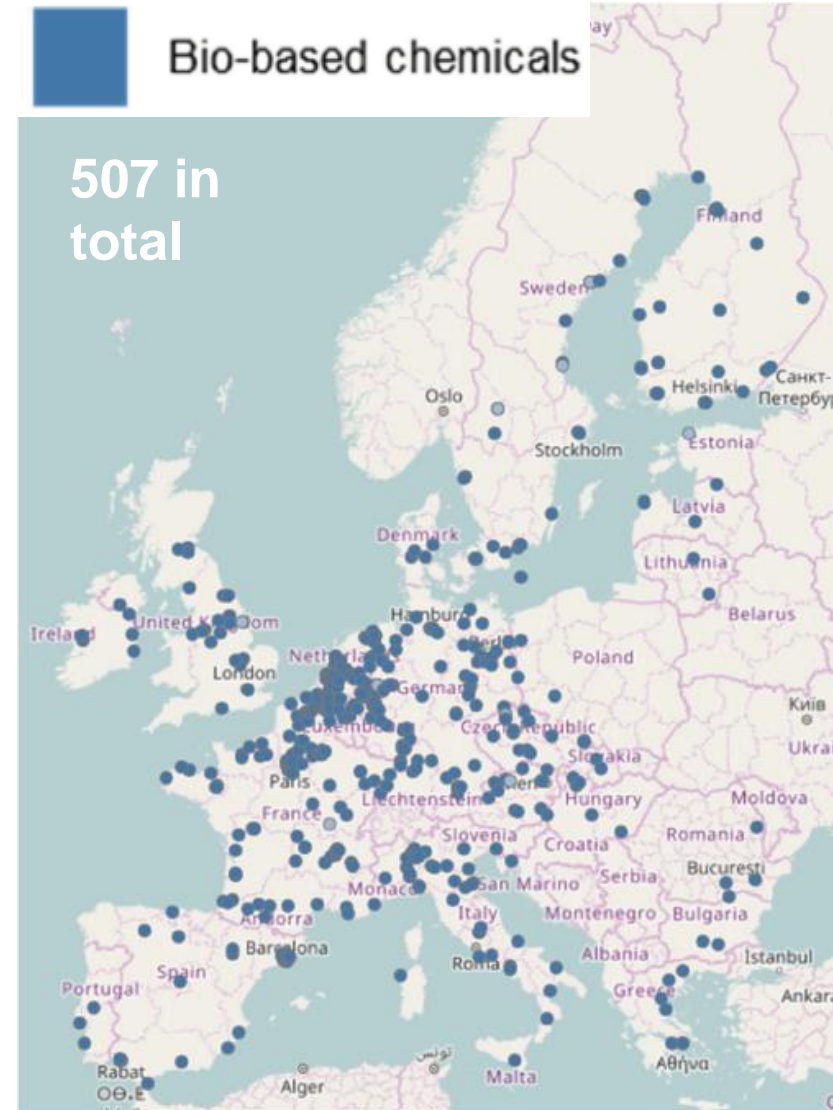
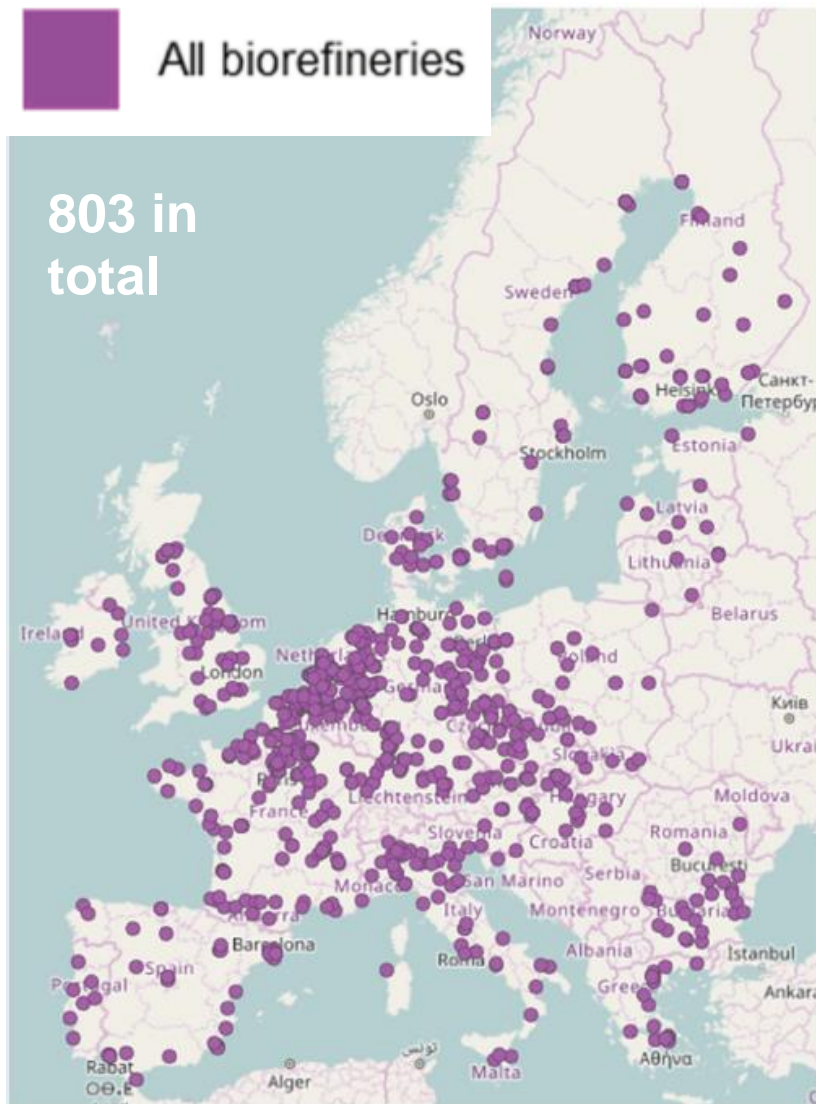


BIOREFINERIES IN EUROPE 2017

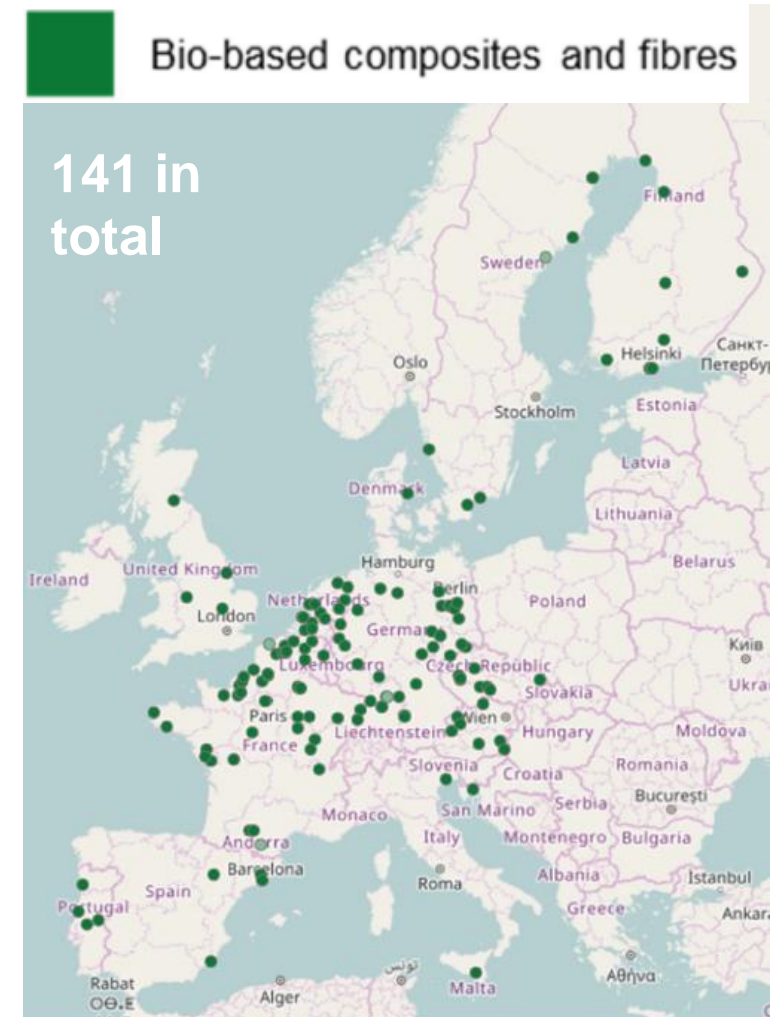
- **An initial study identified 224 biorefineries operating in the EU at the end of 2017** and reports several dozens more biorefineries currently under construction.
- Approximately 300 biorefineries will need to be deployed in Europe by 2030 in order to meet the growing EU market demand in this sector.



BIOREFINERIES DISTRIBUTION IN THE EU (03/2018)

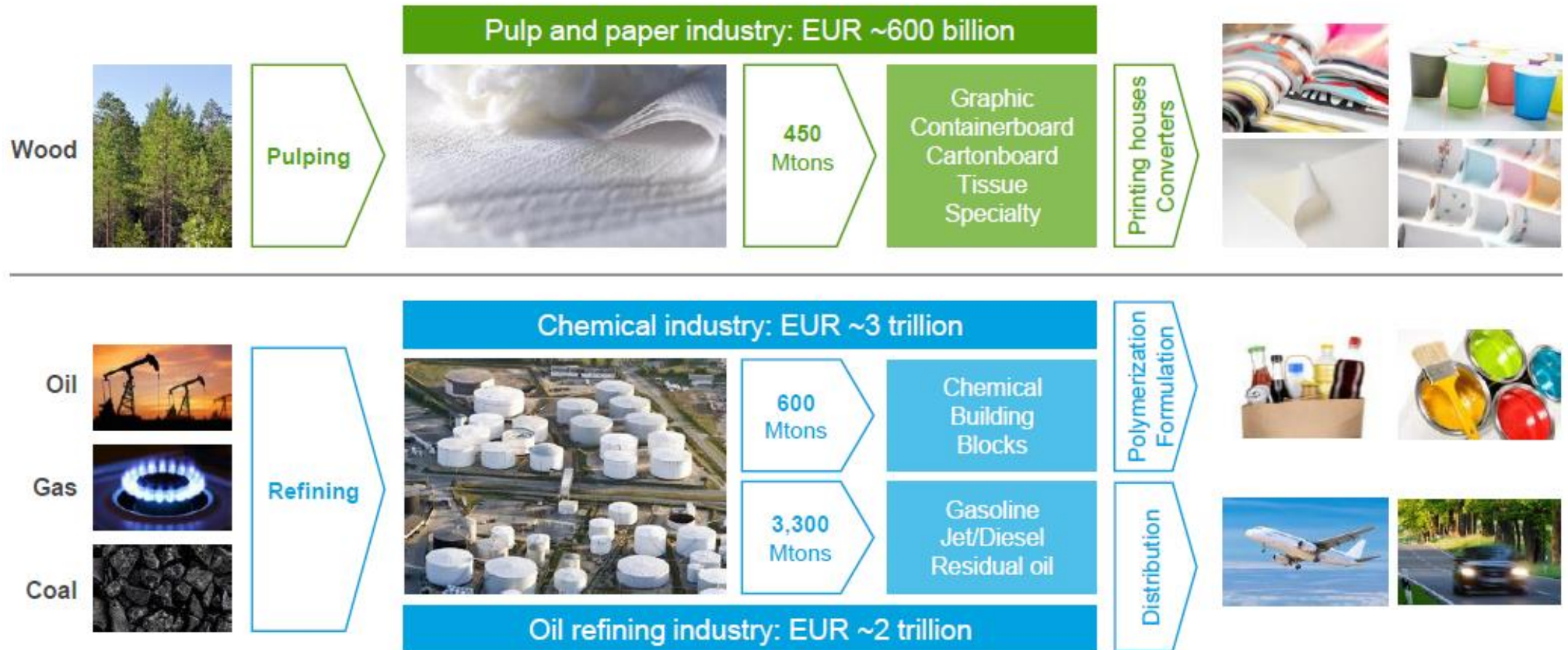


BIOREFINERIES DISTRIBUTION IN THE EU (03/2018)

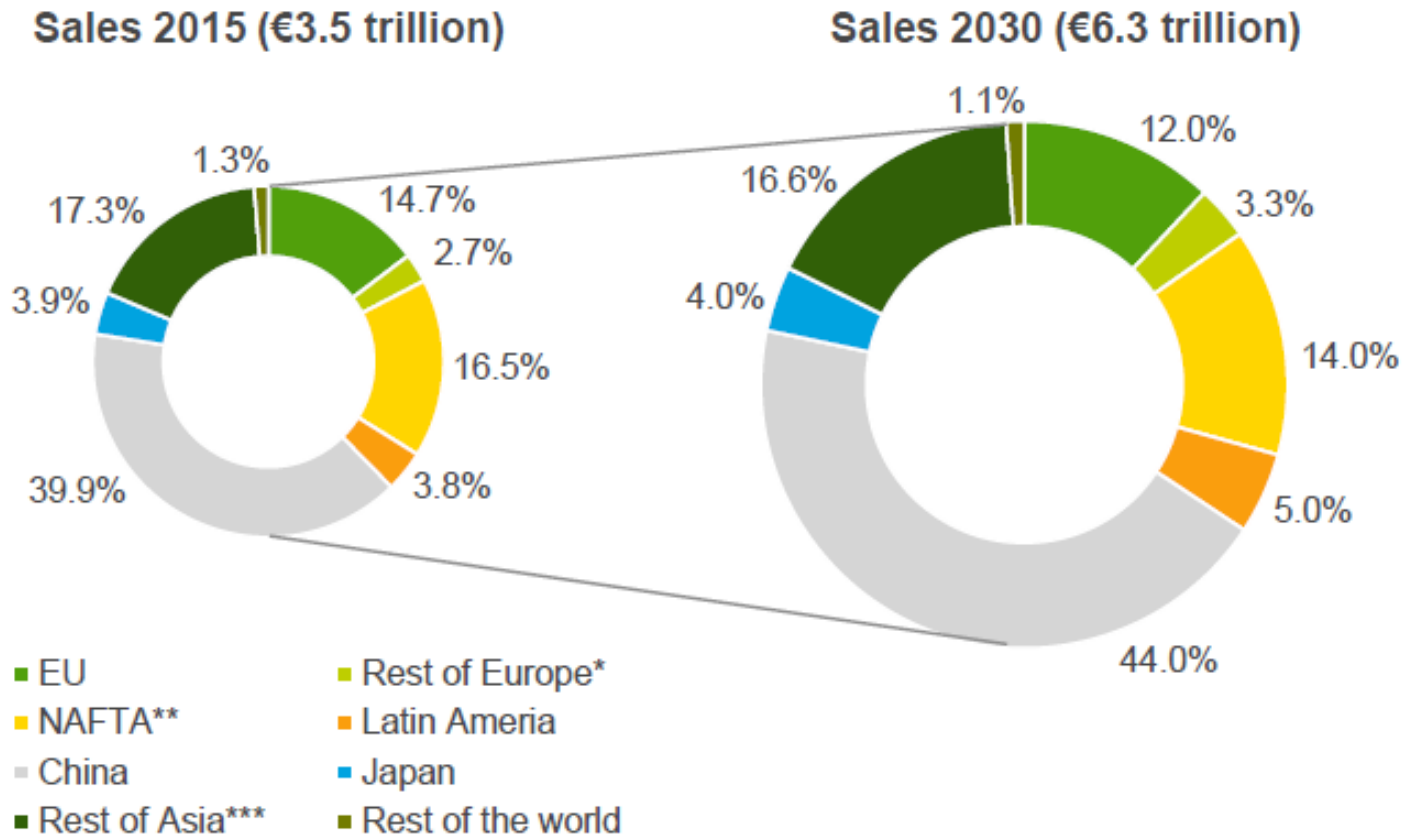


4. Step: Molecular level: drop in chemicals, pharmacy products, biopolymers, biofuels,

WOOD VALUE CHAIN FOR PULPING AND REFINING PRODUCTS IS MUCH LONGER...



3 | © UPM – The Biofore Company



Demand for sustainable solutions will drive the growth of bio-based chemicals faster than overall market

Source: Cefic Chemdata International 2016

* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine

** North American Free Trade Agreement

*** Asia excluding China, India, Japan and South Korea

Unless specified chemical industry excludes pharmaceuticals

Unless specified EU refers to EU 28

UPM Biochemicals

Biochemicals development towards industrial scale operations

Creation of
biochemicals **vision**
and **strategy**

2011



2012–15

Broad evaluation
of various **sites**,
technologies and
chemicals



2015–16

Commercial
assessments
of **different**
chemicals and
markets



2015–16

Feasibility
engineering
studies for
short-listed
concepts

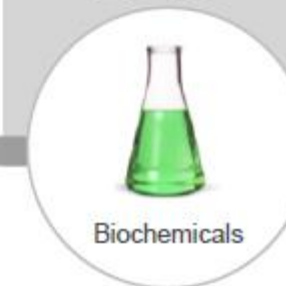
Basic engineering
for the potential
first biorefinery,
commercial
projects

2017–18

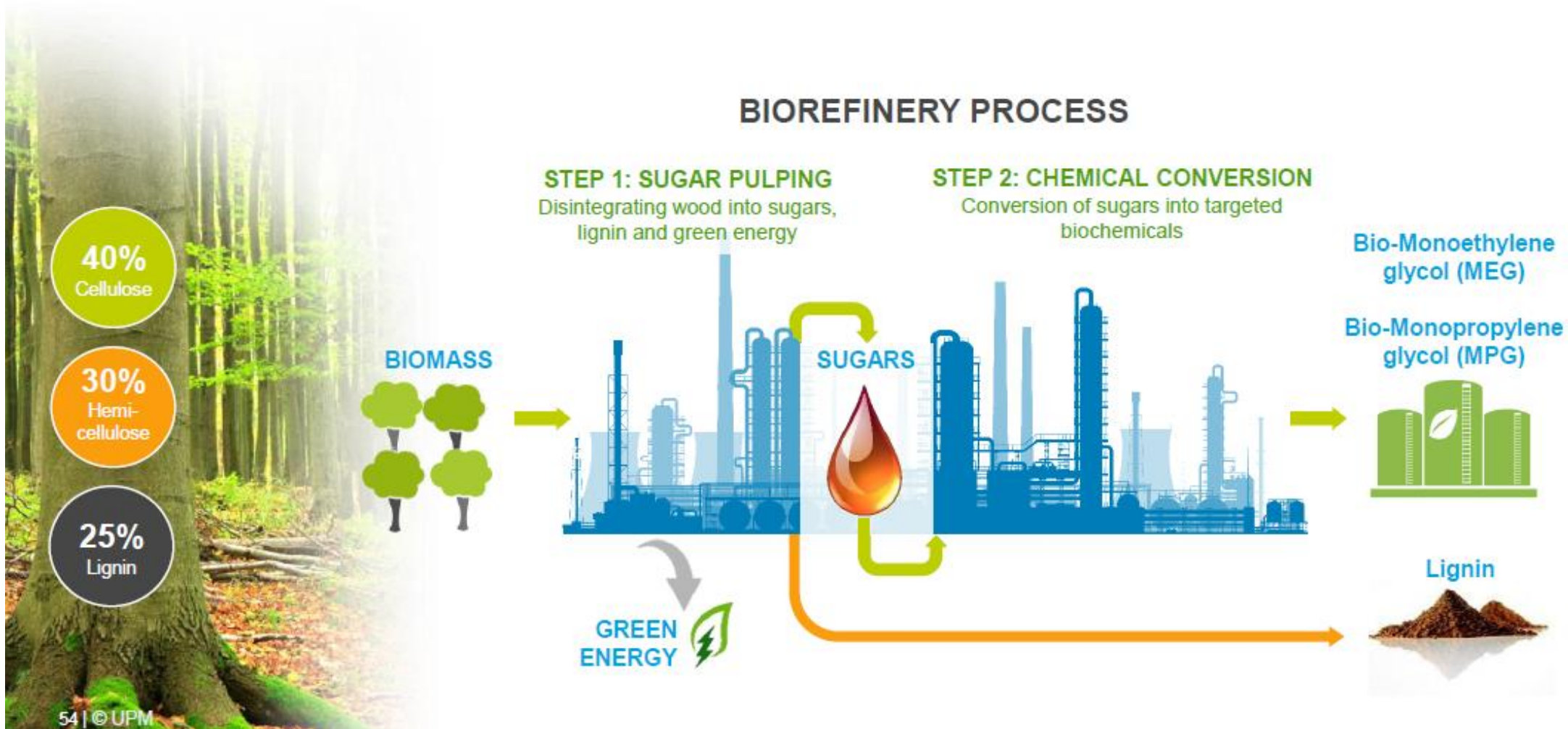


Preparation
continues, possible
implementation
of the first biorefinery

2019–



Biochemicals biorefinery targeting to produce bio-MEG, bio-MPG and lignin from hardwood



UPM-I BIOKEEMIATOOTUD KUI ALTERNATIIV FOSSIILSETELE TOODETELE

Biochemicals products are sustainable and competitive drop-in alternatives for brand owners



Mono Ethylene Glycol

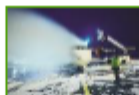
- Existing fossil-based market
- Market demand > 26 mio tons
- CAGR >3%
- Application examples:



Textiles



Bottles & Packaging



Deicing fluids



Mono Propylene Glycol

- Existing fossil-based market
- Market demand >2 mio tons
- CAGR >5%
- Application examples:



Composites



Pharma & Cosmetics



Detergents



Lignin

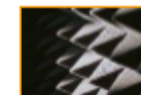
- Performance chemical
- Application driven
- Strong IP position
- Application examples:



Wood resins



Plastics



Foams & Coatings

THE FUTURE PERSPECTIVE

- Forestry and woodworking industry in Estonia and Latvia has achieved the excellent level in wood valorisation step 2
- If we want we can stop exporting round wood logs (approximately 4,0Mm³/y + wood scrap approx. 1,0Mm³/y) in form of pellets and we will get more added value from the products of modern biorefinery
- What if Estonia and Latvia will join initiatives, capital, best practice and good will in establishing new joint venture for new modern pulp mill project for 1Mt/y bioproducts production in future?

**TAL
TECH**

**THANK YOU VERY MUCH FOR YOUR
ATTENTION!**

TAL TECH

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