

# **Sustainable wood construction chains and cascading approach in the circular economy**

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# Brief introduction

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The construction sector uses half of extracted materials and energy, and one third of water in Europe. The sector with demolition, packaging and bulky waste generates one third of all wastes in Europe.

1

European construction sector provides 18 million direct jobs contributing about 9% of the EU's GDP. Wood construction holds shares of 19% of the labour and 15% of turnover in all construction business. About 70% of woodworking products are used in construction and furnishing. Wood working sector is manufacturing to a larger extent recyclable products and provides substantial side streams for raw materials and bioenergy throughout the value chain.

3

In EU27, roughly one third of wood wastes are recycled as materials, incinerated and landfilled (each).

4

Big differences between the EU member states: wood cascading and recycling performance, value chains and technology readiness, end-uses and market demand, legal, policy and socioeconomic framework.

5

Construction, demolition and new bio-based products represent two of the five priority areas in the EU action plan for the Circular Economy.



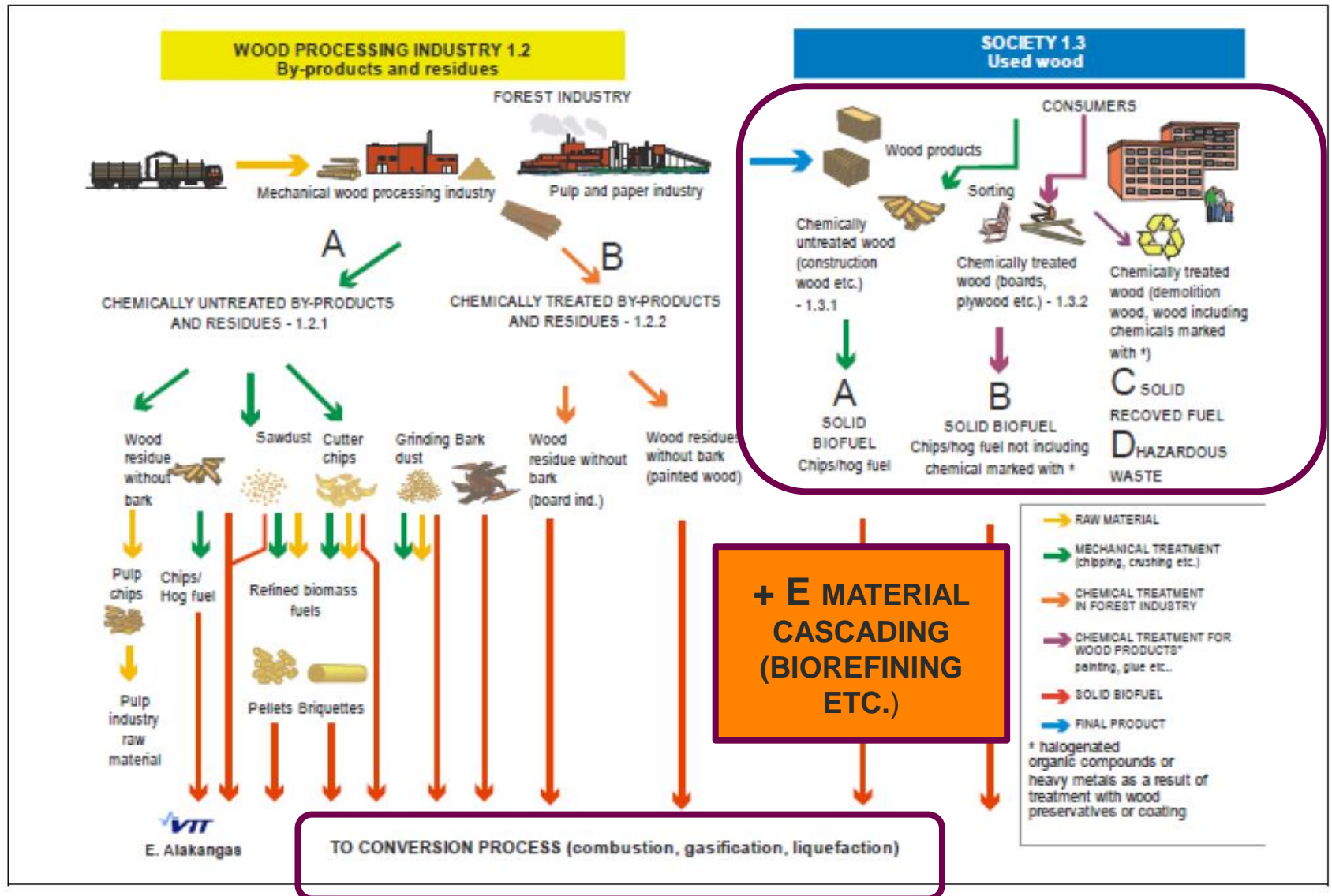
# Wood as construction material in circular economy approach

## Wood-based products the only construction materials that

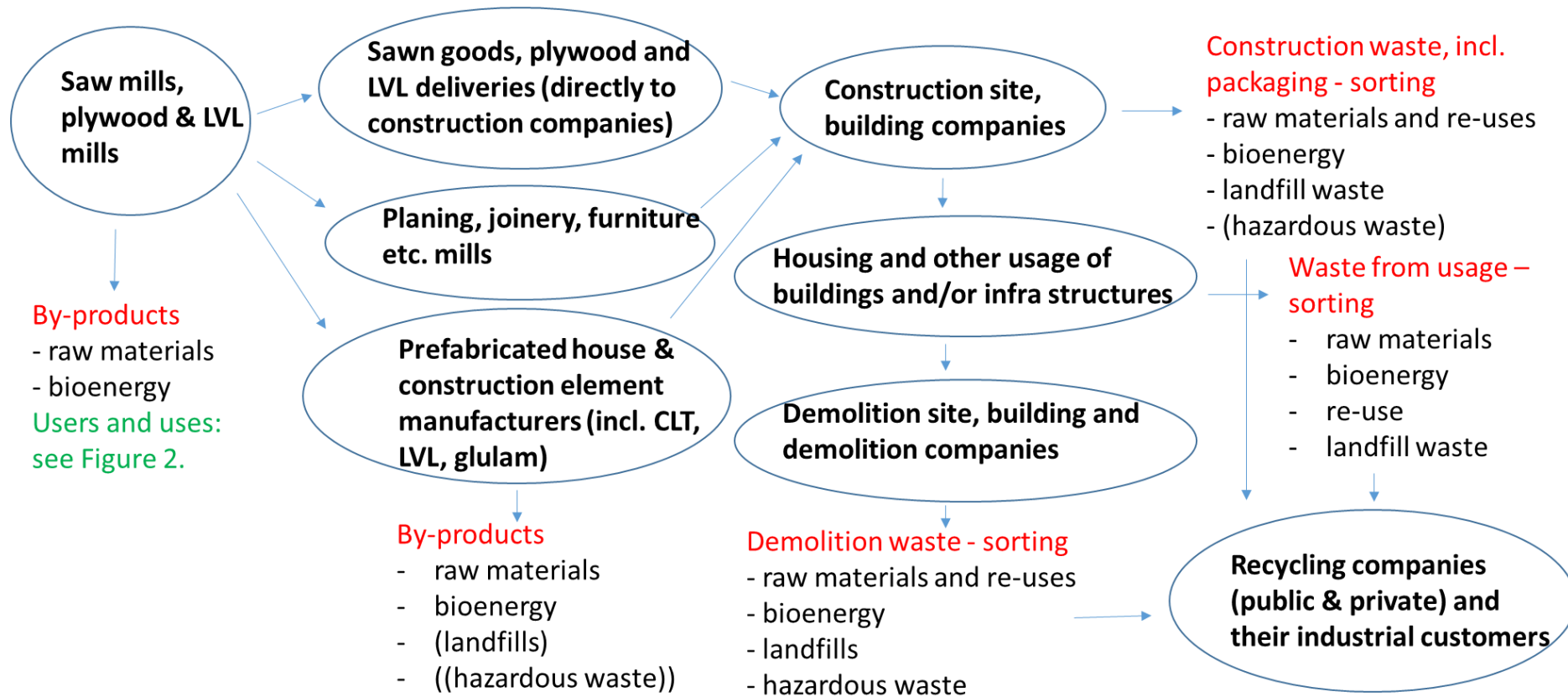
- are both renewable, largely recyclable and available for uses in industrial scale
- can be manufactured with the energy obtained from its own residuals
- provide largely closed-loop manufacturing and utilization processes
- provide simultaneous weather protection, insulation and load carrier
- help climate in three ways: wood growth of one cubic metre results in 0.8 t of carbon sequestration (CO<sub>2</sub>) and 0.7 t of oxygen release (O<sub>2</sub>), and the uses of the products result in long-term binding of carbon
- provide positive psycho-physiological and restorative effects and benefits for health and well-being for humans
- can objectively show a transparent certificate of sustainable sourcing
- enable integrating urban development and vitality of rural regions in the sense of sustainable development and long life cycle

Sources: Henrik Heräjärvi, Erkki Verkasalo

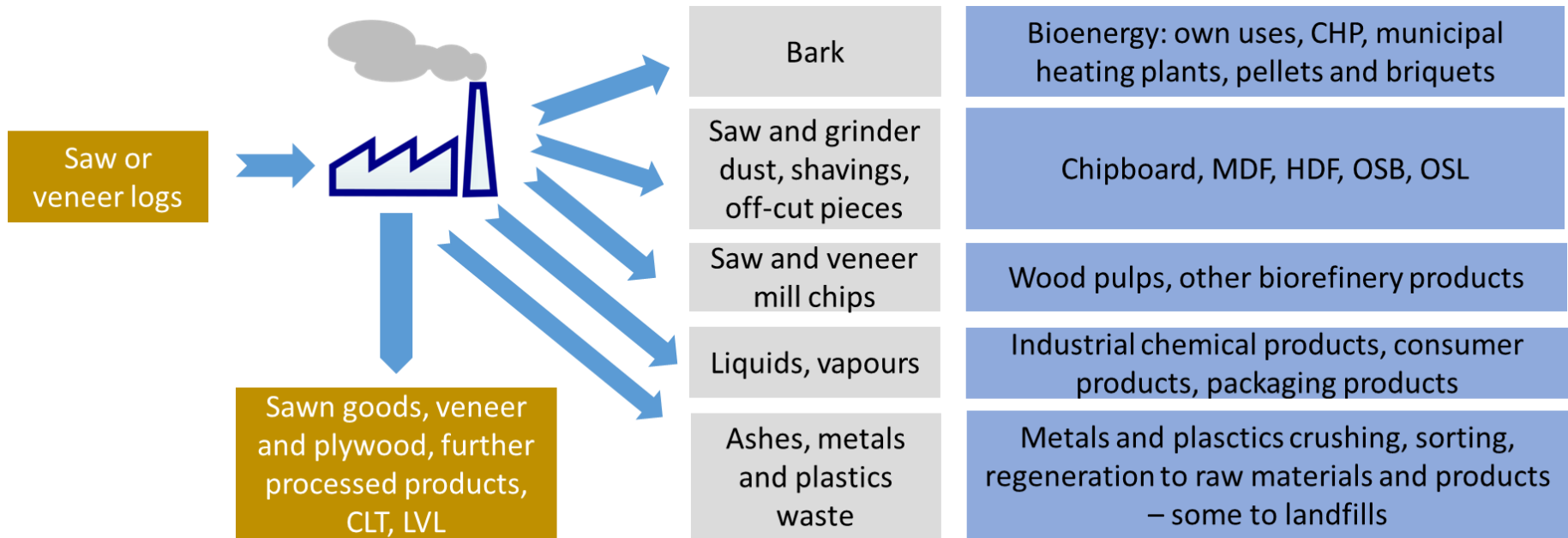
# Wood-based by-products and wastes



# Wood construction driven side streams and cascading: Overall value chain

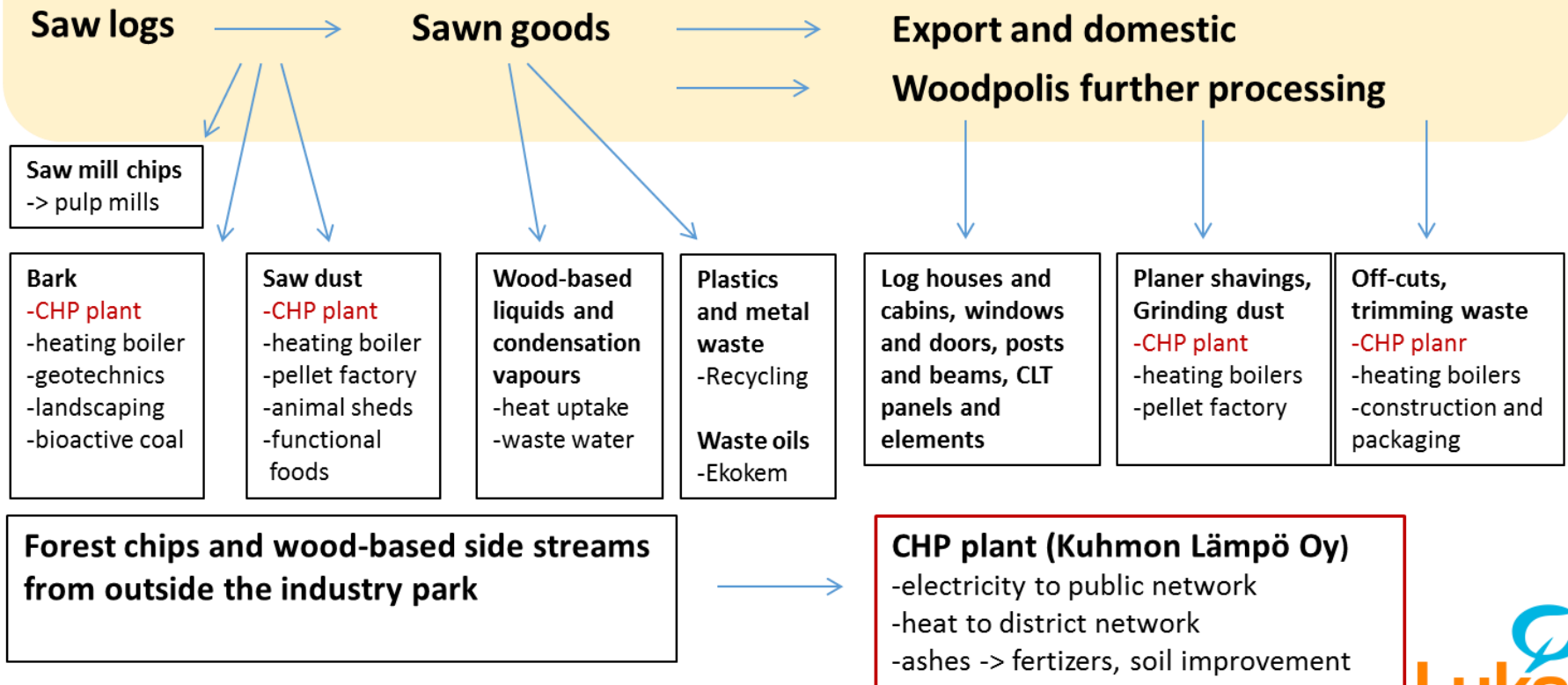


# Side stream value chains: Saw or plywood mill based alternatives



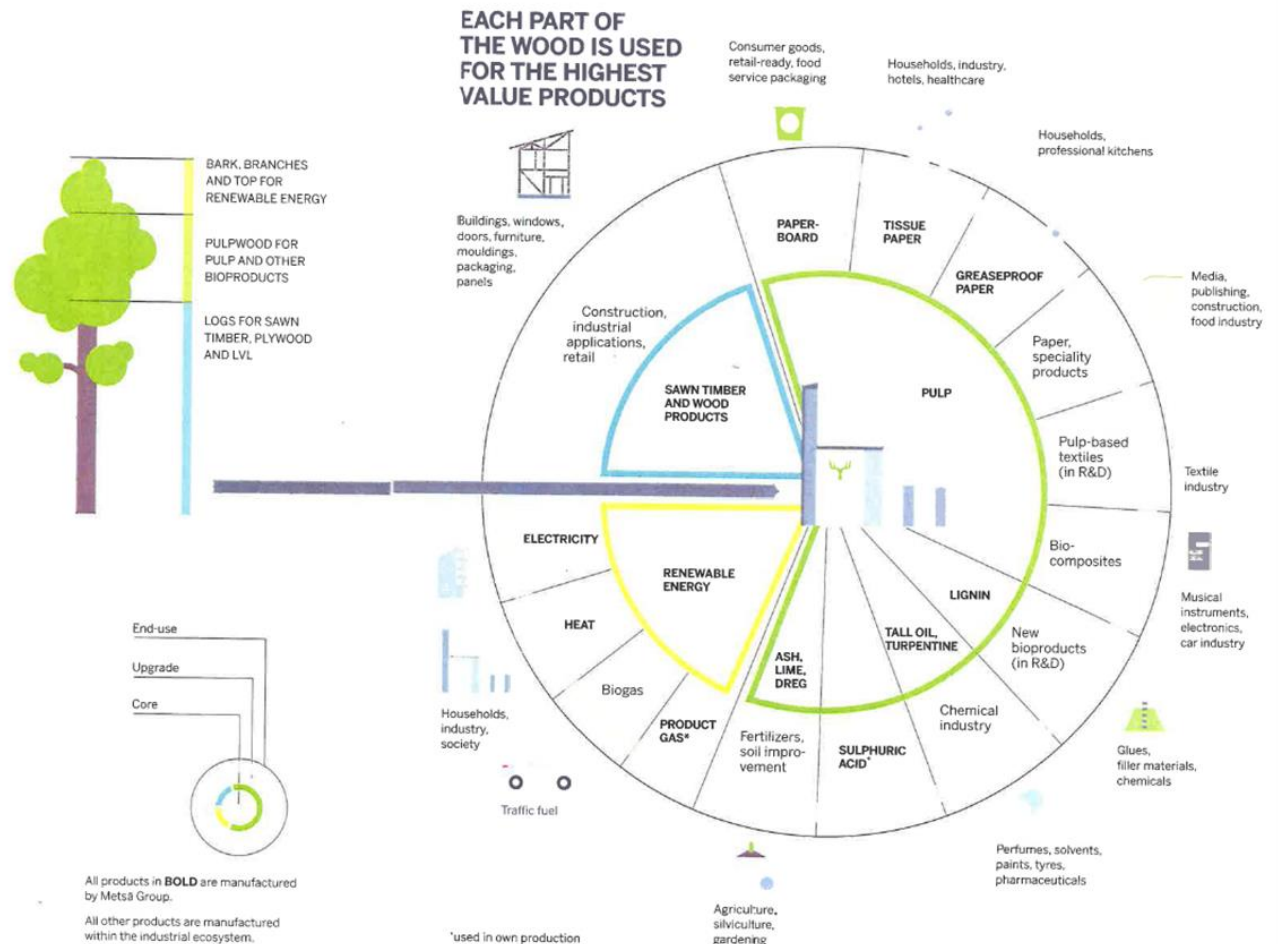
# Side stream value chains: Wood industry park

**Woodpolis Kuhmo, Finland:** Kuhmo Oy, Oy TimberFrame Ltd., AA-Puu Oy, Kuhmon Ikkuna Oy, Oy CrossLam Ltd., Elementti Sampo Oy, Rakennus-Sauma Komulainen Oy, TimberBros Oy, Myyntipalvelu Esa Haverinen, Kuhmon Lämpö Oy, Kainuun Lastu Oy, M-Pelletti Oy, Biocoil Oy, Montinutra Oy



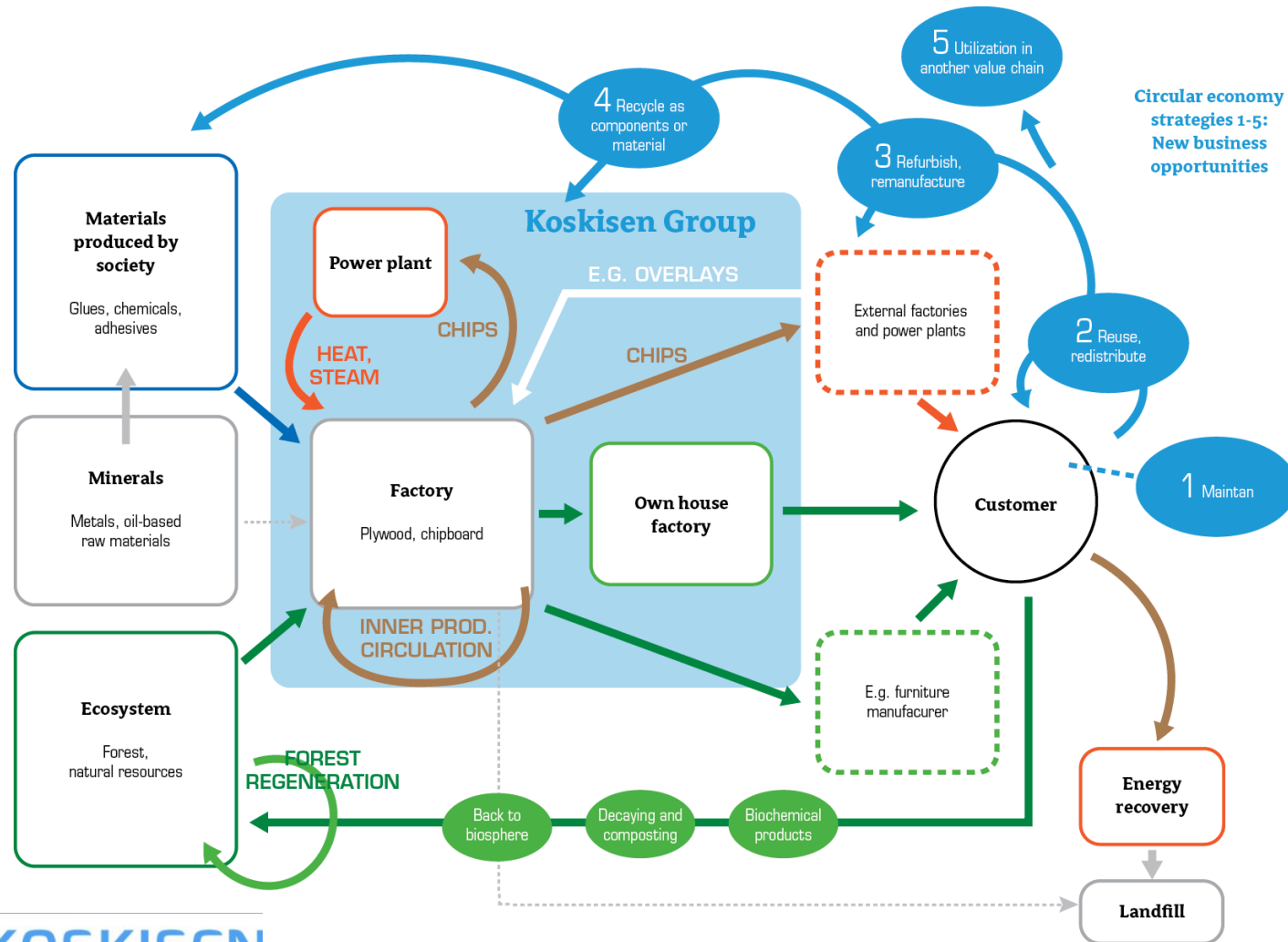


# Side stream value chains: Forest industry corporation



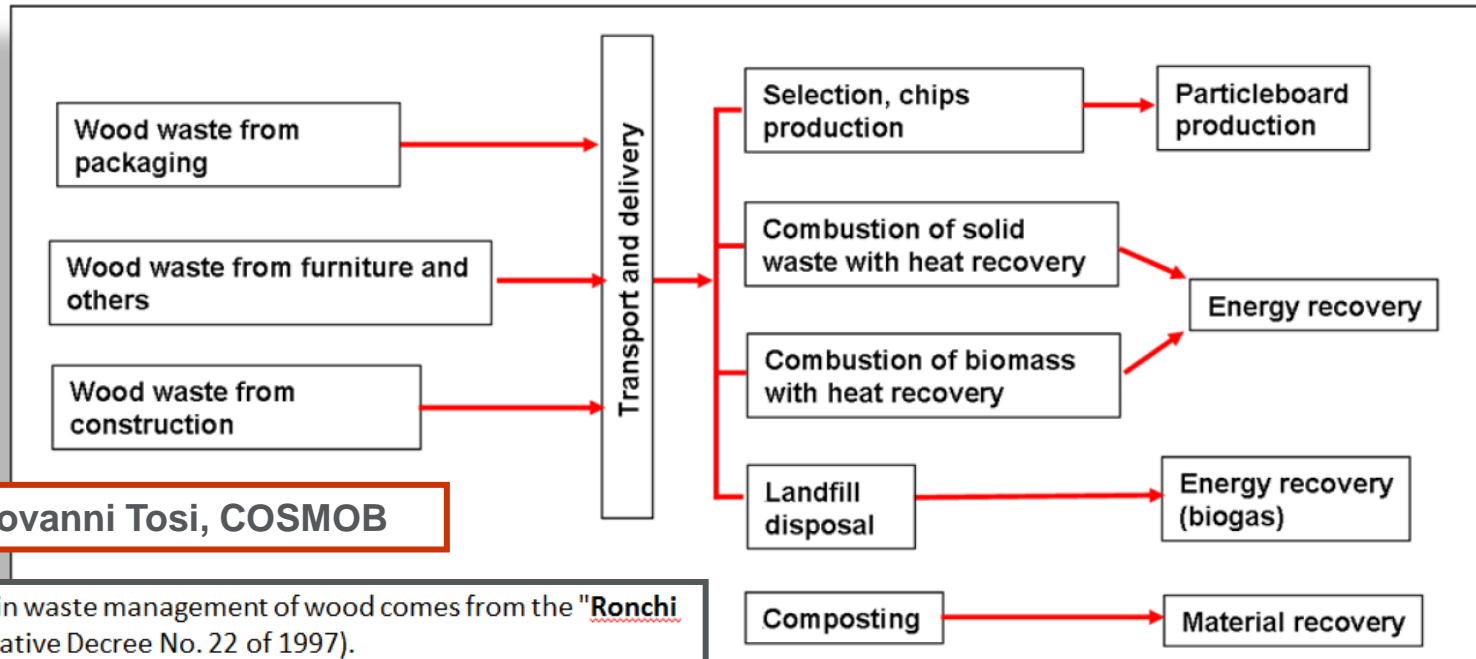


# Side stream value chains: Nordic wood panel industry



# Side stream value chains: Wood recycling in Italy

- Collection, treatment, recycling, disposal of wood waste



Source: Giovanni Tosi, COSMOB

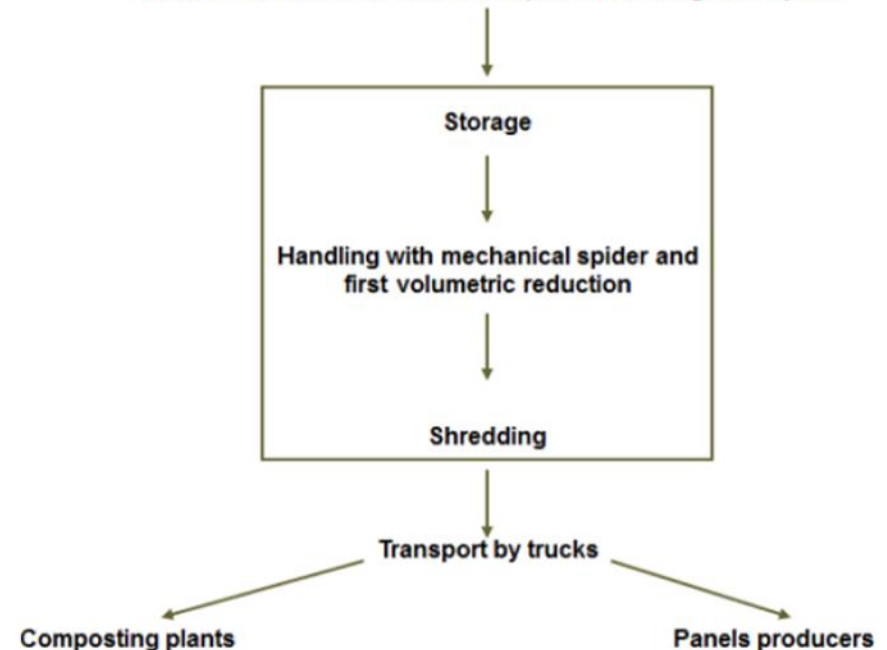
The hierarchy in waste management of wood comes from the "Ronchi decree" (Legislative Decree No. 22 of 1997).



# Side stream value chains: Wood and packaging residues management in Italy

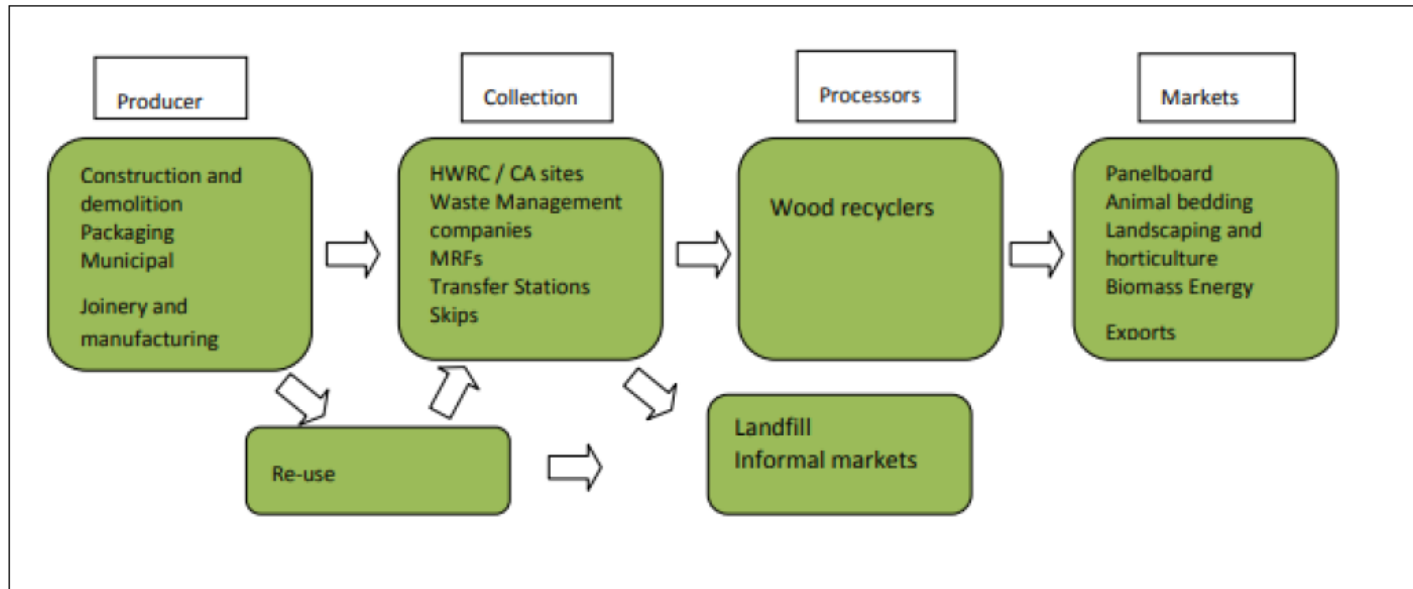


Wood waste collection and subsequent conferring to the plant



Source: Giovanni Tosi, COSMOB

# Side stream value chains: Recycling practices of wood redidues in UK



The main markets in the wood waste industry in the UK are:

- Panelboard industry and biomass/energy production
- animal/poultry bedding; mulches (soil conditioners and composting), equine surfaces and pathways and coverings
- There is also a growing export market (for recovery) in wood waste

# Roles and aims of value chain actors

## Wood product industries

- Role in supplying by-products for raw materials and bioenergy to other industries - companies are relatively small, located apart and with small resources for generating new initiatives for cascading
- Resource efficiency of the main products is in the core, more value and markets are sought for by-products (now max. 15% of income) - customer and market surveys for side streams are needed
- Closed loops and zero waste are already rather close, except chemically treated wood, non-wood ashes and inorganic waste materials – they need solutions
- Novel uses are wanted for side streams of further processing (e.g, CLT, glued, painted and surface treated wood, scrap pieces of different dimensions)
- Economic assessment of alternative products and proofs-of-concept is crucial
- Options of bioenergy should be kept available – the importance varies countrywise
- Consistent, predictable public regulation and support policies are must for the business
- Logistics, volumes, dimensioning, upscaling and total economy are important, landfill acts are to be reacted actively
- Synergy in collection, processing and utilization of side streams of further processing and construction and demolition waste has been proposed (and targeted)

# Roles and aims of value chain actors

## Construction and demolition companies

- Recycling companies take care of waste logistics, handling and re-processing, construction companies are responsible of on-site sorting
- Organisation and operations are rather functional and straightforward in greenfield construction sites, but not in demolition sites – still not any sources of income
- Waste management and recyclability should be added to pre-planning of construction sites
- Clarify classification of recycling materials (vs. bionergy and landfills)
- Sharpen sorting of wood-based and other construction wastes -> add regulatory requirements
- Re-use opportunities and specified companies for walls and mid-floors, and other larger parts of buildings are wanted
- Pre-fabricated wooden elements are needed more to minimize construction site wastes – in addition to other benefits of pre-fabrication
- Education of professionals is needed for wood construction, also regarding recycling and cascading



# Roles and aims of value chain actors

## Recycling companies and users of side streams

- Wood construction is only one source in the variety of recycled materials
- Core activity is in waste collection and management, sourcing from households and companies to waste centers, crushing and separation of metals by subcontractors
- LCA as well as operative and product certificates are crucial issues
- Maximize utilization (for materials & energy), minimise loading of landfills and handling of hazardous and toxic wastes
- Logistics management and composition of recycled materials are big issues
- Detection and separation of hazardous and toxic materials is a big issue
- Creation and promotion of new business related to side streams - how much sorting
- Demolition waste management needs improvements – development projects are going
- Separation of more valuable molecular materials, fluids and gases from wood based side streams and waste materials are wanted -> raw materials for BotB and BtoC products and industries
- Start-up projects on composting, decomposting and chemical re-processing and modification are wanted
- **Change needed in the way of thinking - FROM CARBON FOOTPRINT TO CARBON HANDPRINT**

# Conclusions and development needs

- Implementation and promotion of carbon neutrality and compensation of emissions through carbon sequestration in building with wood
- Promotion of holistic sustainability and further development of green building chains: economic, ecological, social, cultural
- Integration of health and well-being with life-cycle sustainability toward resilient living and working environments (buildings & infra)
- Improving further resource and energy efficiency in material processing (virgin wood & cascading materials)
- Providing advanced waste management and circular economy solutions for built urban environment and infrastructure
- Providing new business concepts and platforms related to side streams and waste utilization, more start-up projects

# Conclusions and development needs

- Toward fully closed loops of materials, waters and gases – maximizing recycling (materials and bioenergy), minimizing landfilling (EU Landfill Directive 2018/850 -> national codes) and hazardous/toxic wastes (EU Waste Framework Directives 2018/851, 2008/98/EC)
- Toward more advanced demolition waste management and material recycling of wood products
- Overall system performance assessment and good practices identification for cross-boarder transfer and Triple Helix collaboration provide potential benefits

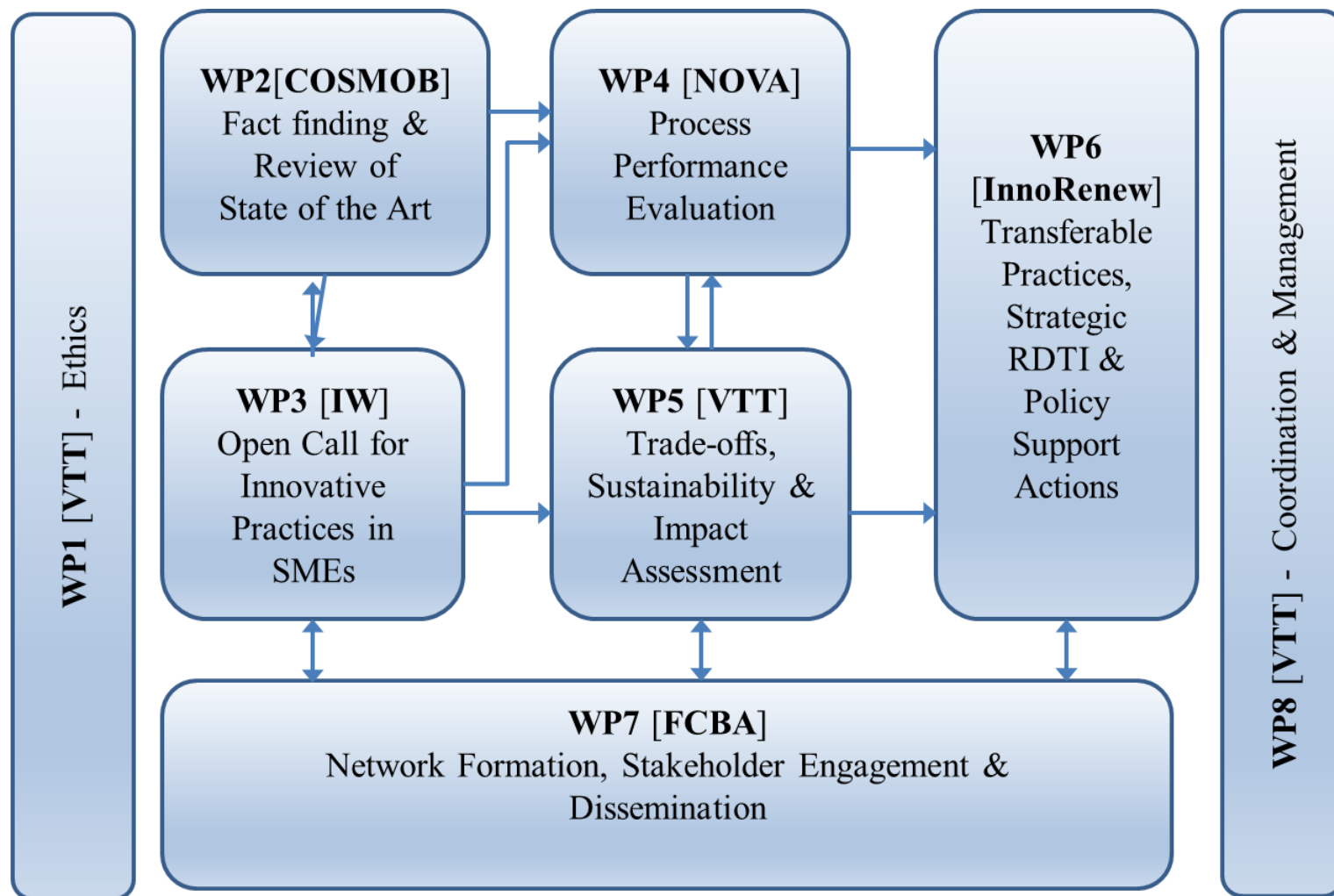
**Regions and countries have different opportunities and specialities, pros and cons – appreciate them!**

# WoodCircus – Consortium

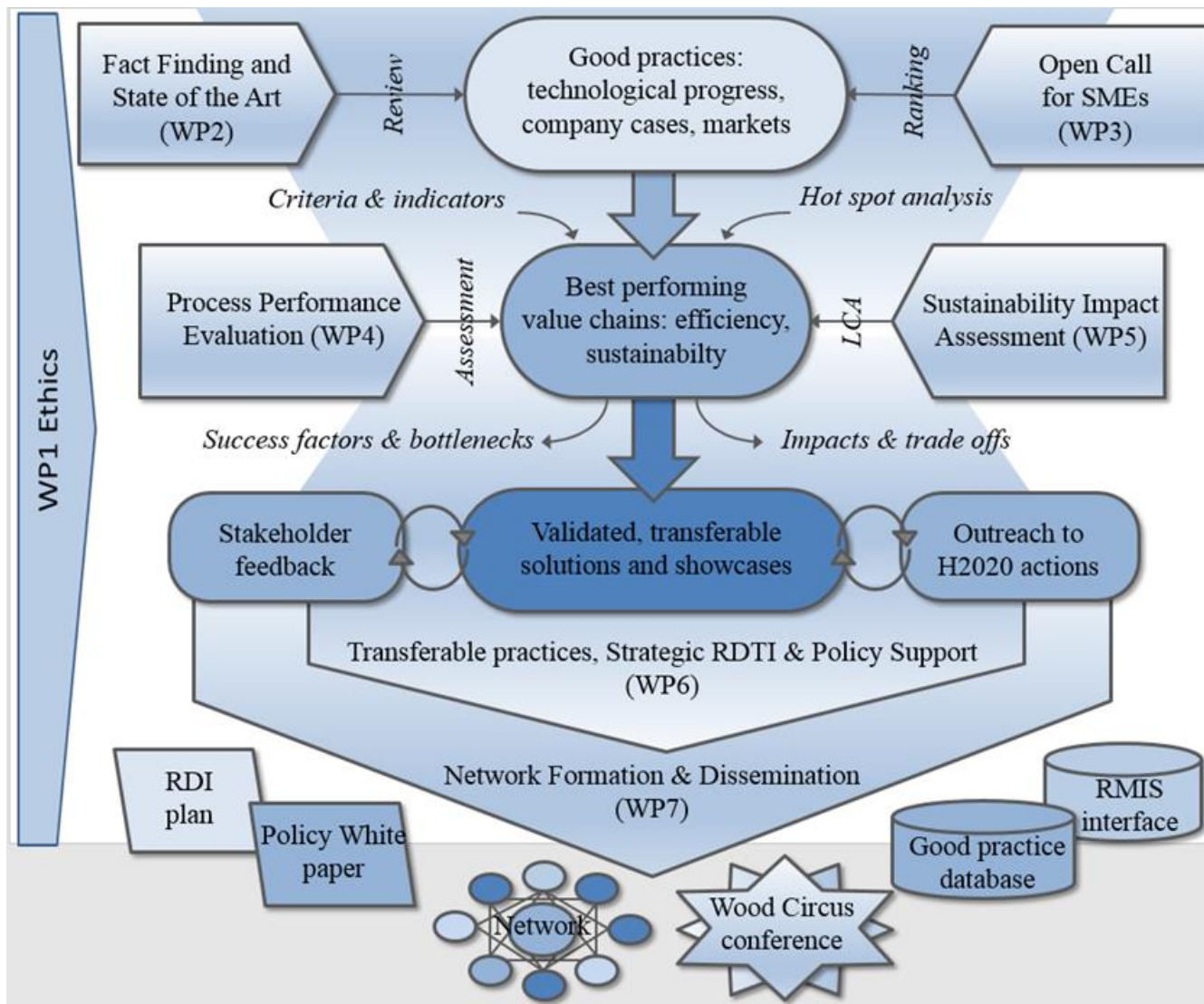


Part. No *	Participant organisation name	Short Name	Country
1	VTT Research Centre of Finland Ltd (coordinator)	VTT	FI
2	FCBA Institut Technologique	FCBA	FR
3	InnoRenew CoE	IoR	SI
4	nova-Institut gmbh	NOVA	DE
5	Fundación Tecnalia Research & Innovation - TECNALIA	TECN	ES
6	Consorzio del Mobile SCPA	COSMOB	IT
7	Natural Resources Institute Finland - LUKE	LUKE	FI
8	InnovaWood asbl	IW	BE
9	Sahateollisuus ry (The Finnish Sawmills Association)	SAHA	FI
10	Xilopan S.p.A.	XIL	IT
11	Alfa Natura d.o.o.	ALFA	SI
12	Asociación De La Madera De Euskadi - BASKEGUR	BASK	ES
13	Veolia Proprete France Recycling - VPFR	VEO	FR
14	Consorzio Nazionale per la raccolta, il recupero e il riciclaggio dei imballaggi di legno - RILEGNO	RIL	IT
15	EGOIN S.A.	EGO	ES
16	European Forest-Based Sector Technology Platform	FTP	BE
17	European Wood-Based Panels Federation - EPF	EPF	BE

# WoodCircus – Work Packages



# WoodCircus – Flowchart





**The WoodCircus consortium sets the foundation for a larger, lasting network engaging excellence and commitment for future-oriented joint promotion of the wood sector in the Circular Bioeconomy.**

Building on the 4-step methodology, the project produces the following major outcomes:

1. Good practice database, a thorough documentation of the state of the art, including an active interface to the European Commission's Raw Materials Information System (RMIS) and the Bioeconomy Knowledge Centre (BKC)
2. Open competition and award to SMEs, highlighting individual good practice showcases
3. Evaluation approach for performance and sustainability assessment, tested on typical value chains
4. Best performing supply chains typology, validated for broad transfer
5. RTDI plan for wood industries towards the Circular Economy
6. White Paper including policy recommendations, endorsed by a broad panel of stakeholders
7. WoodCircus Network, established on solid commitments from technical institutes, industries and policy makers for follow-up beyond the project lifetime
8. High Level Conference, a major international event promoting the wood sector in the Circular Economy

# Thank you



Underpinning the  
vital role of the forest-  
based sector in the  
Circular Bio-Economy

[woodcircus.eu](http://woodcircus.eu)

[@WoodCircusEU](https://www.linkedin.com/company/woodcircus/)

[linkedin.com/groups/13642093](https://www.linkedin.com/groups/13642093)

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