

# Techno-economic modelling of bioeconomy value chains

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## Background

**Bioeconomy:** substitute fossil resources by renewable resources in all applications\*

**Challenges:** Changing conditions for supply & demand

### Supply

- Climatic conditions
- Qualities & quantities: shift in wood species, increase in damaged wood

### Demand

- Increasing demand along different value chains
- Changes within the value chains, interactions



# COMET project BioEcon

- Main objective:
  - Analysis of these effects on the wood-based economy and corresponding value chains from economic and technological perspectives
- Duration: April 2019 – March 2022
- Scientific and Industry Partners



Universität für Bodenkultur Wien  
University of Natural Resources  
and Applied Life Sciences, Vienna





## Work plan

1. **Evaluating biomass potentials** in Austria/Central Europe
2. **Analyzing value chains:** raw materials, products and by-products, opportunities and risks, interactions
3. **Econometric modelling:** scenarios for supply & demand, price elasticities of wood biomass products and fuels
4. **Elaborating a tool for techno-economic assessments** as decision support



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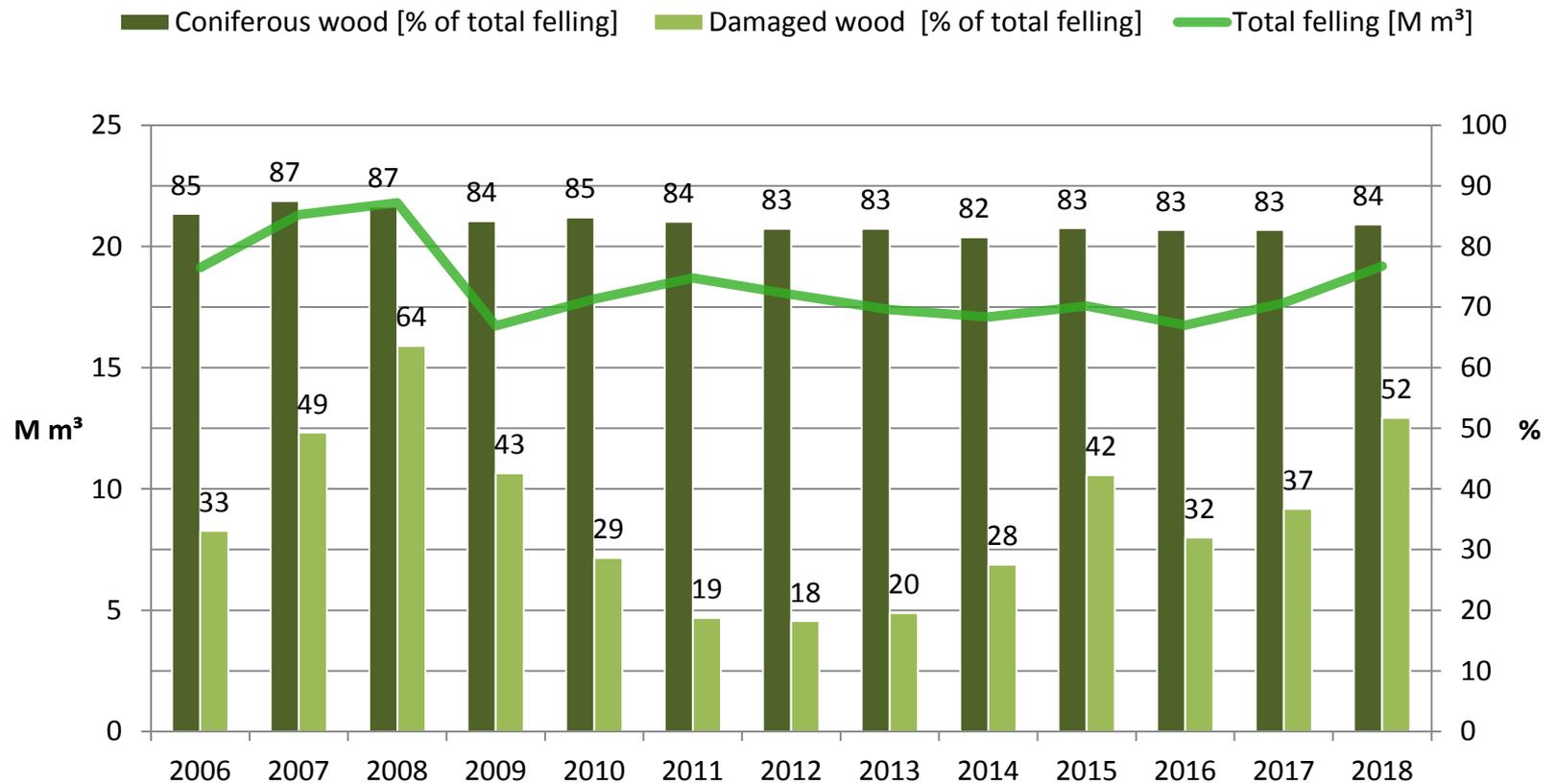
# 1. Biomass potentials: Data collection

- Described by domestic production and trade, including currently unused biomass, considering technological, economic and ecological restrictions
- Period: 2014-2018
- 12 defined wood assortments
- Data: Austrian Timber Felling Report, Wood Flow Diagrams, FHP, Statistics Austria



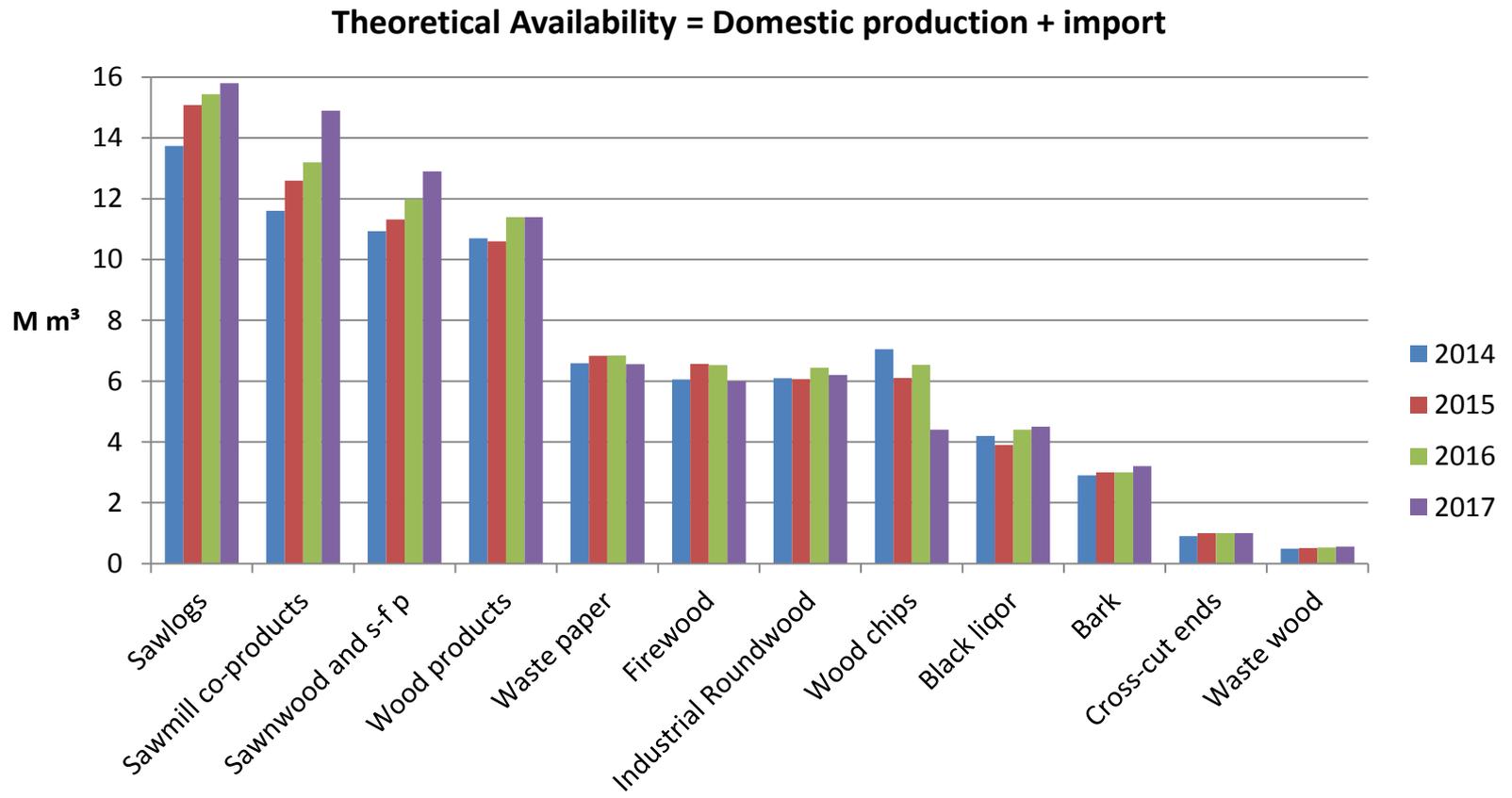


# 1. Results: Austrian timber felling



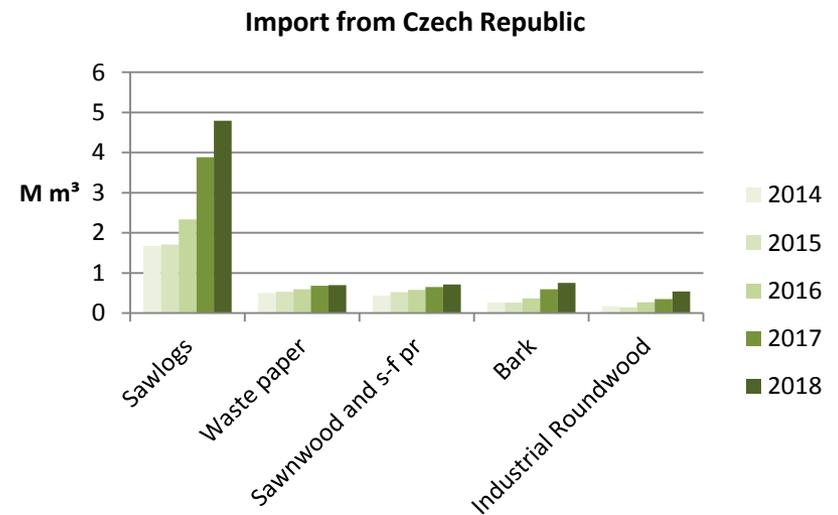
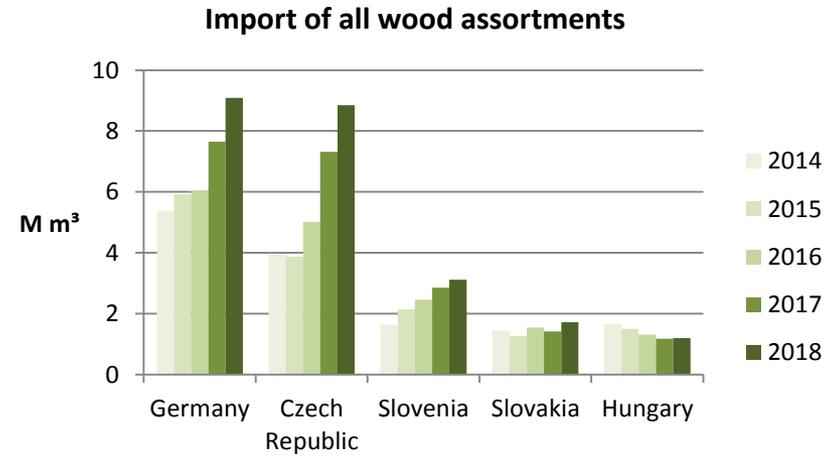
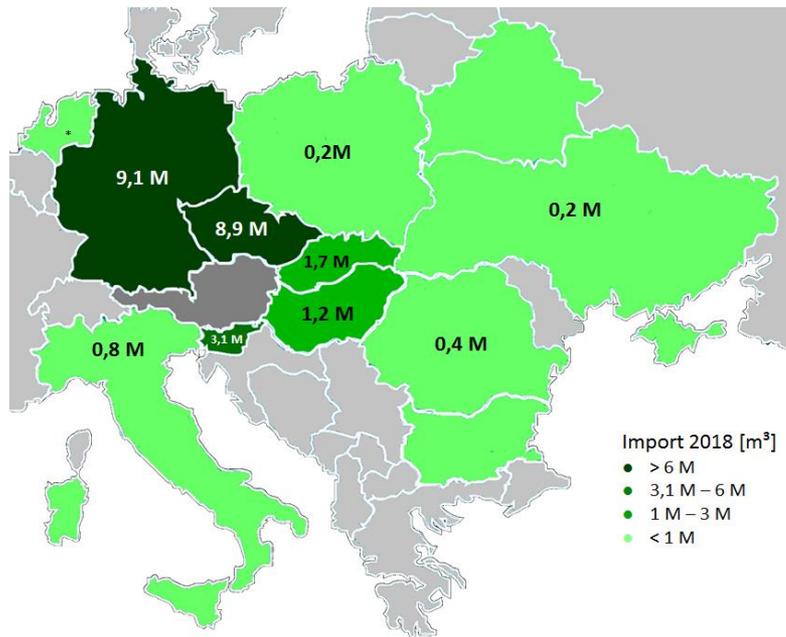


# 1. Results: Austrian availability of wood assortments



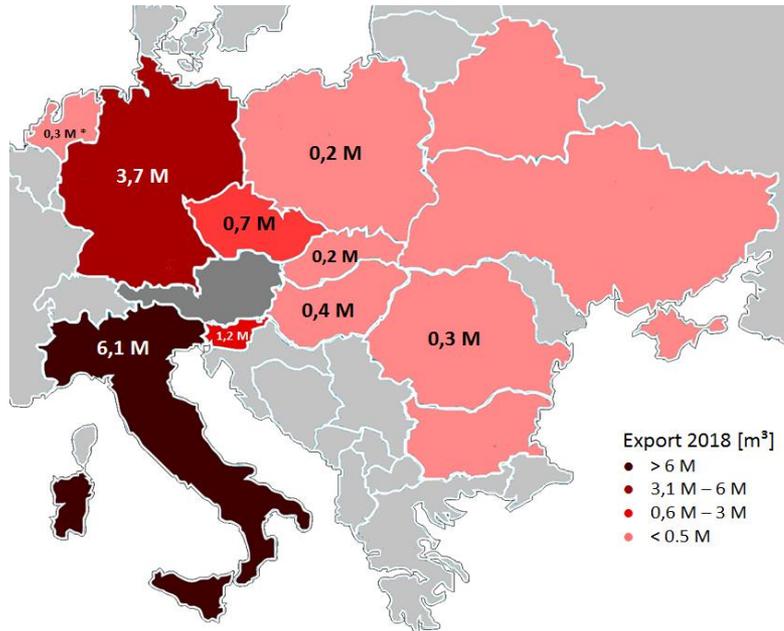


# 1. Results: Imports

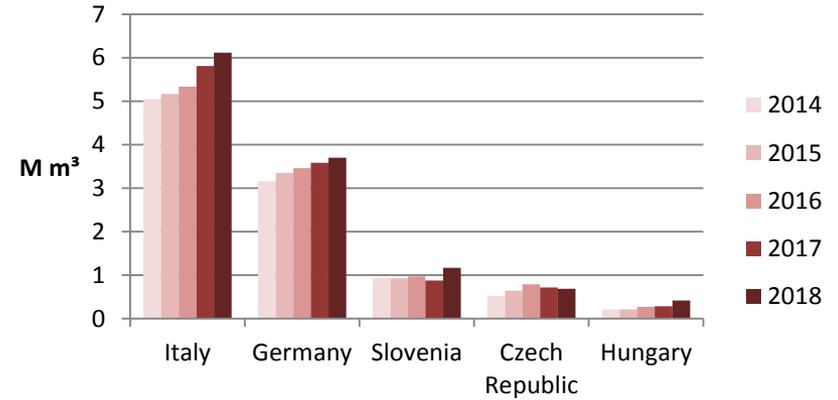




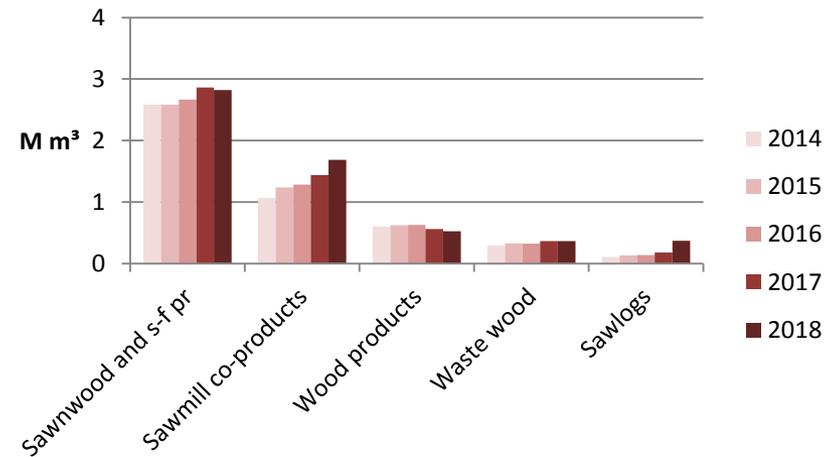
# 1. Results: Exports



Export of all wood assortments

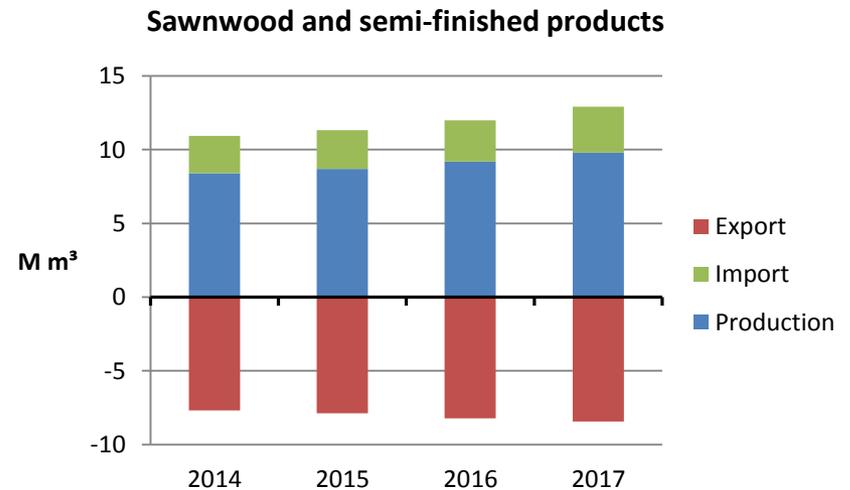
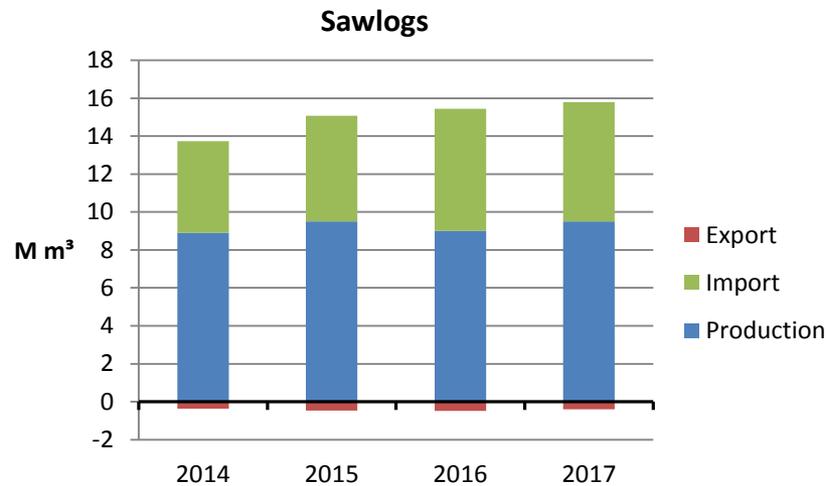


Export to Italy





# 1. Results: Balance of Austrian production and trade





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## 2. Analysis of value chains

- **Value chain** = the full range of interlinked value-adding activities which are required to provide a product to end consumers
- Empirical data collection
  - Description by industry partners, representing different value chains
  - Risks and opportunities for woody biomass and products
  - Assessing interactions of different value chains



## 2. Value chains: Example Forest Company



### **S**trengths

- Great amounts of wood
- Distribution across Austria
- All-year production

### **O**pportunities

- Sale at factory gate or road
- Digitalization (controlling, transparency)
- Logistic management

### **W**eaknesses

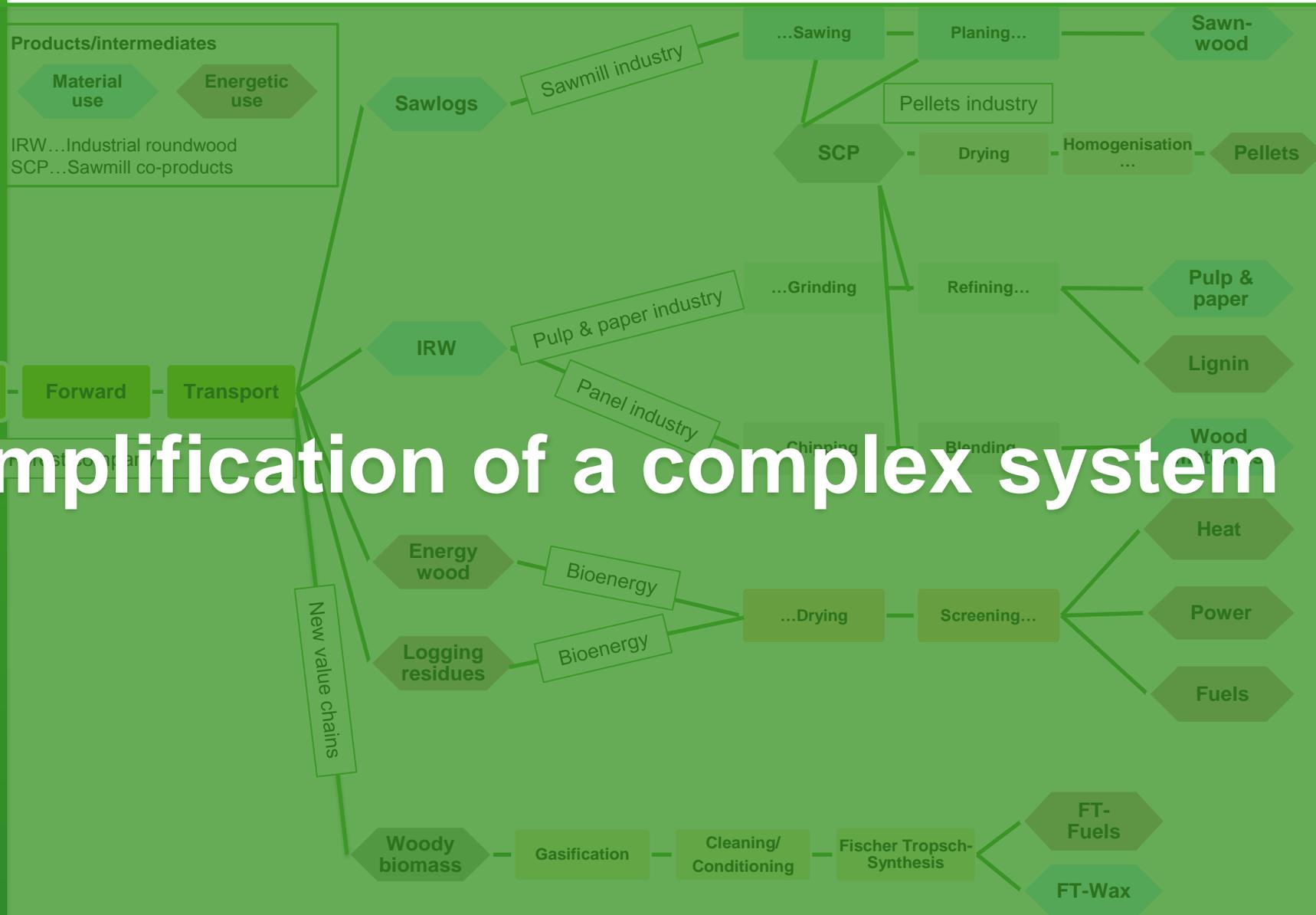
- Varying freight capacities
- Truck transport (vehicles, drivers), rail transport (wagons)
- Varying demand and supply

### **T**hreats

- Climate change
- Calamities affect planability



## 2. Linkages between different value chains



# Simplification of a complex system

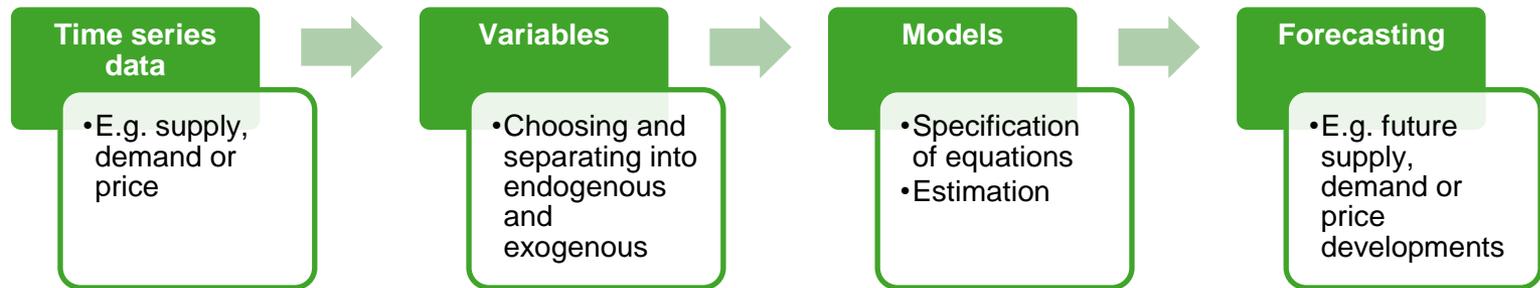


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### 3. Econometric modelling



- Outcome: models for supply & demand, forecasts based on defined scenarios, price elasticities & volatilities for selected products and fuels
  - How will demand increase in terms of bioeconomy?
  - How do changes in demand affect prices?
  - How do climatic changes influence the supply?



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## 4. Tool for techno-economic assessments

- Basis for strategic decisions on whether and how to increase the share of biomass utilization
- Databases for resources, technologies and products, including
  - Resource base: Availability, prices, properties
  - Technologies: Investment costs, products
- Assessments regarding future investments
  - Reference assessments
  - Guidelines and recommendations



## Summary

- Wood important raw material in Austria
    - availability, increase in calamities and damaged wood
    - wood-processing industries, in particular sawmill industry (import of sawlogs, export of semi-finished products)
  - Different value chains are based on wood resources
    - linked in a complex way
    - influenced by changes in supply & demand and new technologies
  - Complex influences on a bioeconomy, complicating decision making
- **Econometric modelling as basis for analysis of future bioeconomy**
- **Development of a decision-making tool for the industry**



# Thank you for your attention!

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