Regional biomass demand and supply in Finland

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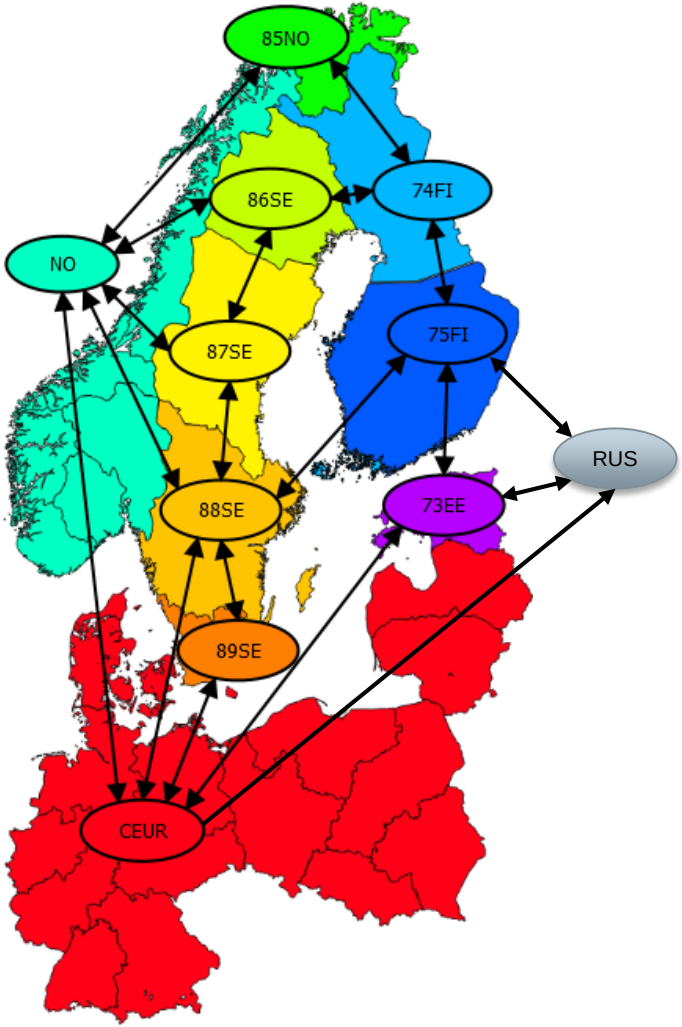
Using biomass efficiently

- Biomass can be used to reduce emissions in most of the sectors
- Availability and sustainability will be key questions
- In this study, we
  - model power and heat sector at 2030 to
  - estimate regional biomass balance and
  - the need for imported energy wood

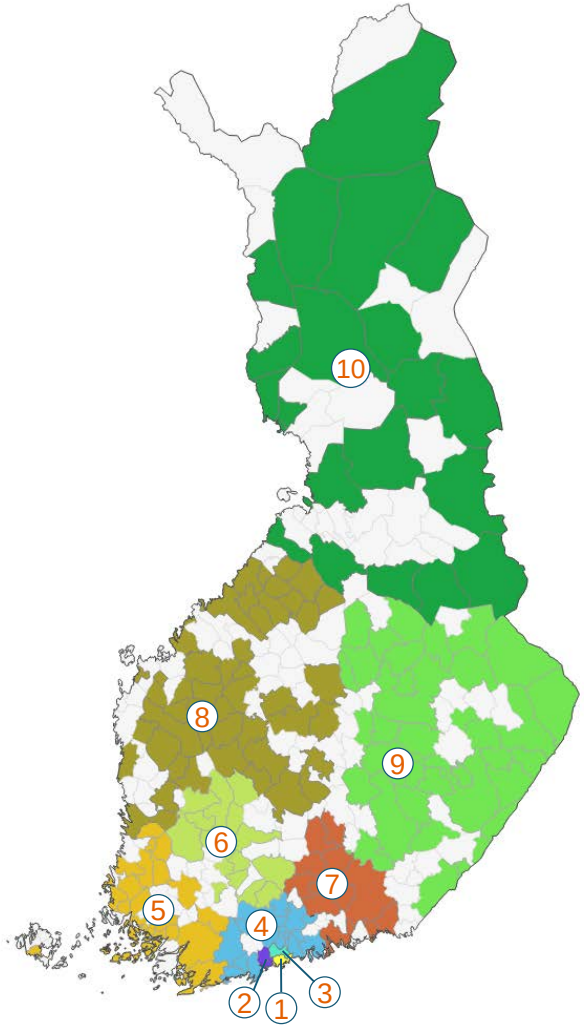


General assumption

- Extended Nordic region
- Modelling power and heat
- Hourly modelling to capture the impacts of increasing share of wind and solar power
- 2030 capacities, transmission grid, reserve requirements, and time series for demand and renewable energy from several European modelling projects

Modelling Finnish power and heat sector in detail

- Co-generation of power, heat, and cooling
- Storages for heating and cooling
- Co-firing peat and biomass
- Unit-by-unit modelling for the capital region (flexibilities, operational constraints, costs, etc)
- District heat trade in the capital region
- Aggregated units for other regions



10 heat regions in Finland

District heating data available from colored municipalities.

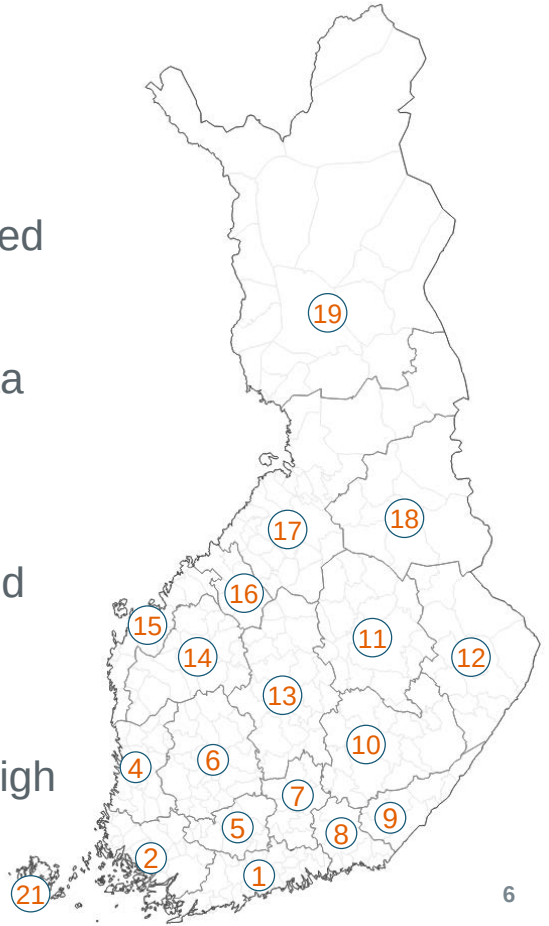
Grouped into ten heat regions:

1. Helsinki
2. Espoo
3. Vantaa
4. Other Uusimaa
5. Turku region + Mariehamn
6. Tampere region
7. Lahti region + South-East Finland
8. West and Central Finland
9. Eastern Finland
10. Northern Finland

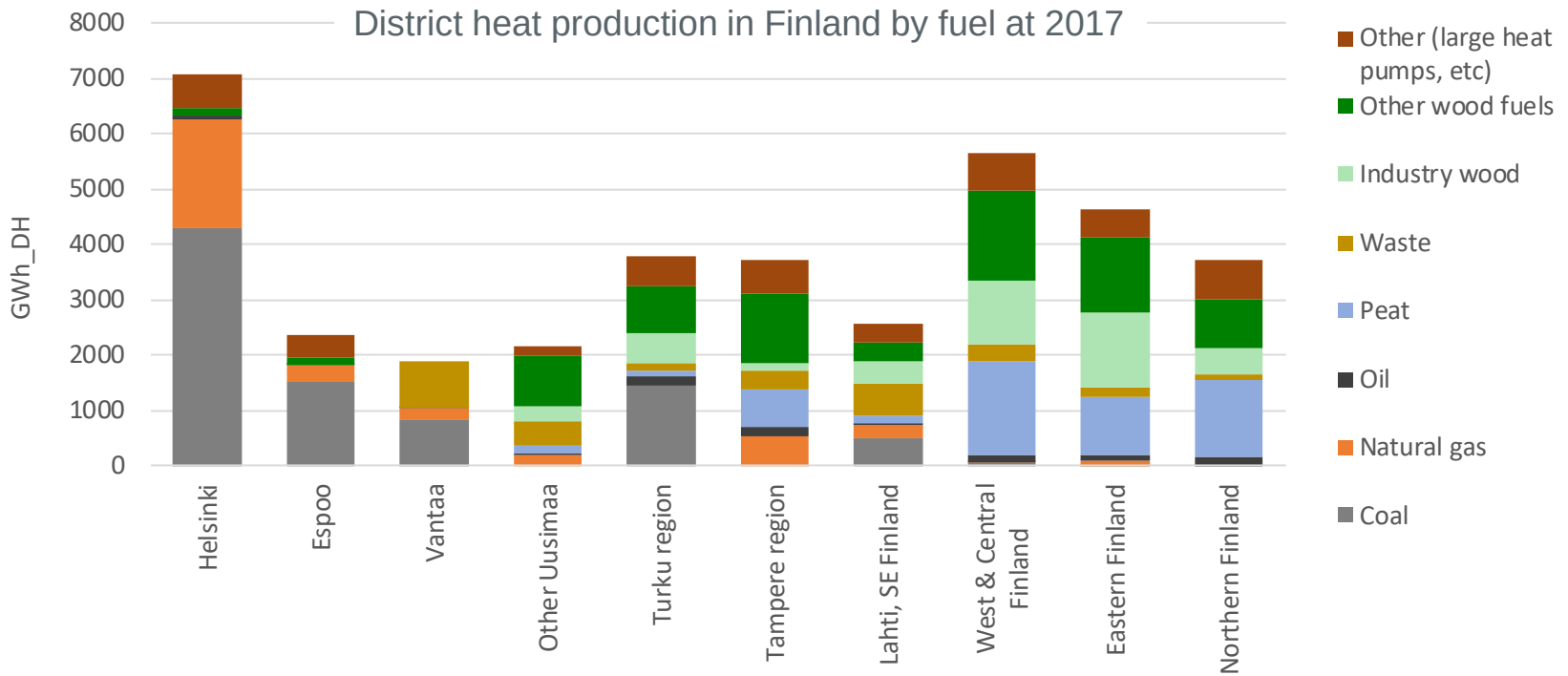
Covers 98% of district heat production in Finland (when compared to Finnish Statistics Centre)

Modelling FI biomass supply – 4 commodities

- **Industry waste wood** – data available of use, not supply. Assumed that 2030 use is as in 2017. Cheapest cost, 10 €/MWh
- **Forest logging residues and small diameter stem wood** – Data available of both use and supply.
  - Supply in 18 regions
  - Transport distances and costs limit the use
  - Produced evenly throughout the year, biomass terminals needed for fuel peak demand in winter
  - Costs 19/21 €/MWh + transport + possible storage cost
- **Imported pellets** – Allowed to coastal model regions, assumed high price 35 €/MWh

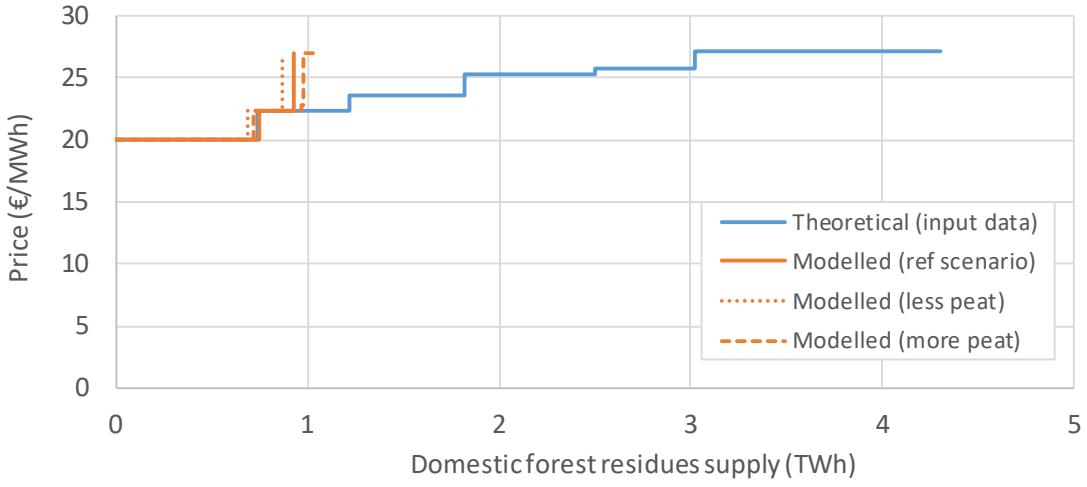


Decarbonizing district heating

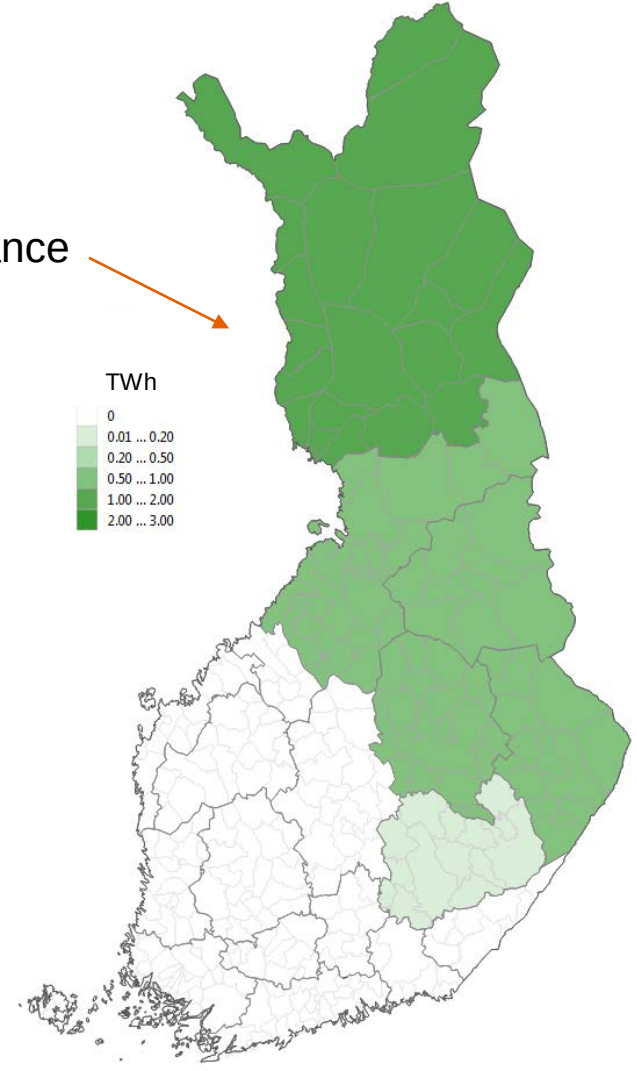


How much forest residues will be available at 2030?

Capital region, supply



Finland, balance



Summary

- Current investment plans can (and will) consume more biomass than what is domestically available.
- In addition, even more biomass could be needed for transport biofuels and when replacing natural gas in power & heat.
- Sustainable biomass is valuable resource and its use should to be optimized to maximize benefits from a limited resource.
- Unrestricted growth can lead to issues with forest sinks, biodiversity, etc.

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