The Untapped Potential of Biomass Heating in Canada

Opportunities in District Heat and Industrial Heat Markets

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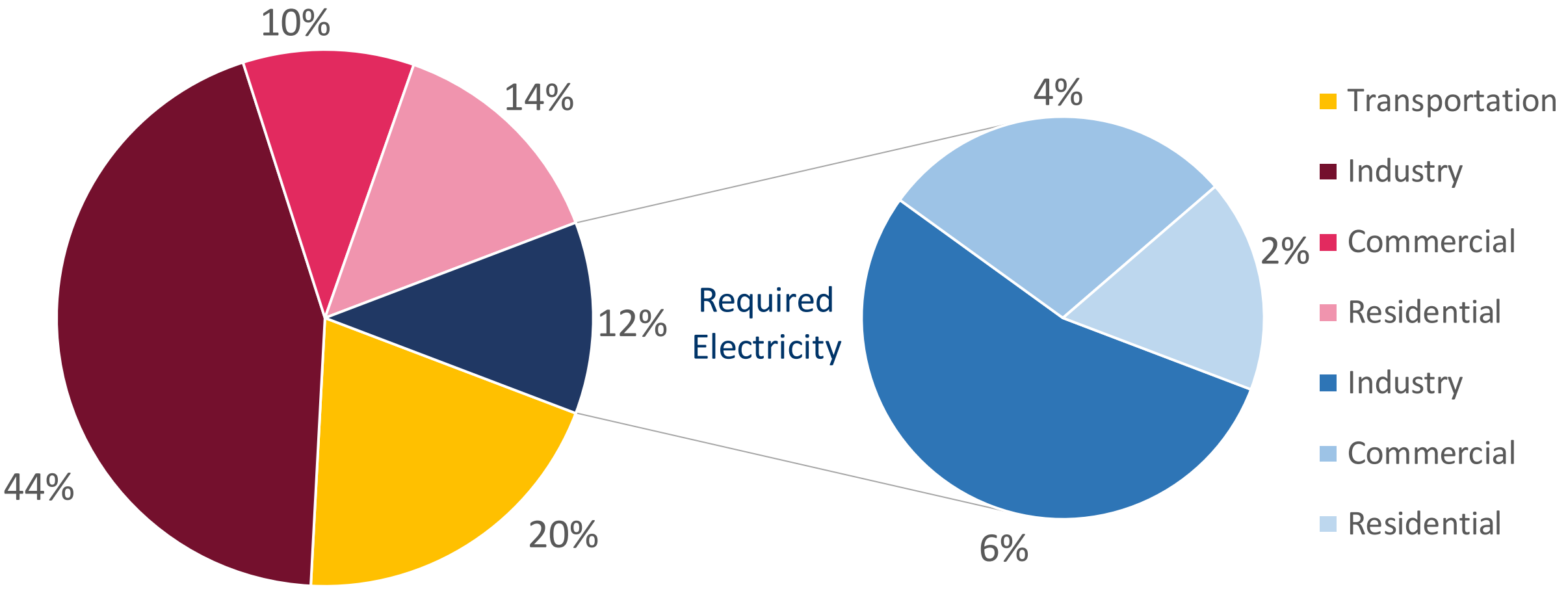
Energy Demand in Canada



- **<u>Thermal energy (red shades)</u>** is approximately 60-65% of Canada's energy demand
- Excluding existing electrical heating, electricity (blue shades) is 12% of Canada's energy demand
- Heating residential buildings requires more energy than ALL of Canada's electricity demand

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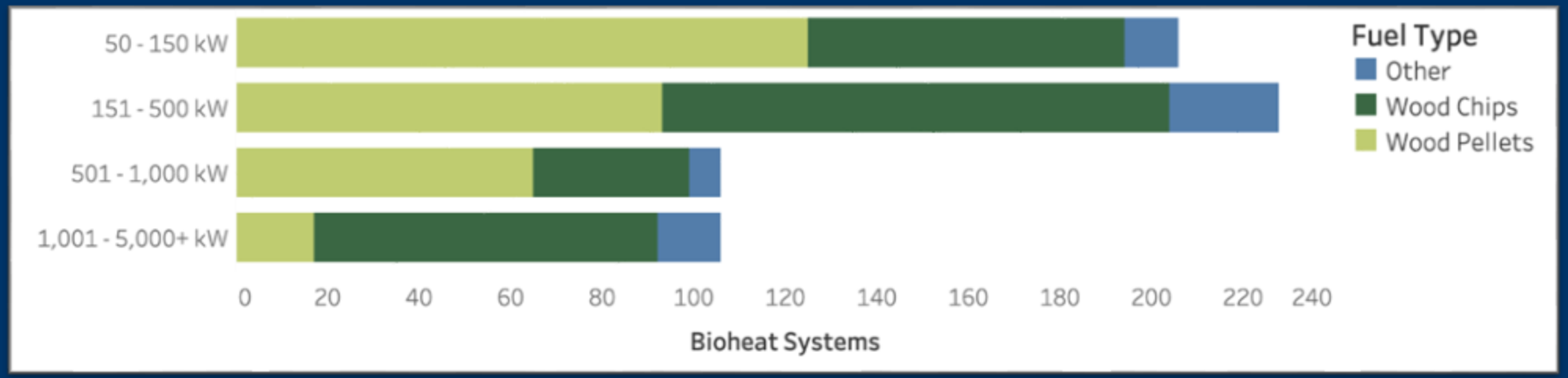
Bioheat

Bioheat – Individual Buildings

- Individual commercial, institutional or residential buildings
  - Pellets well suited, many examples
  - Pellets tend to be used at smaller scales, where bulk delivery is available and/or local wood chip availability is low



Bioheat – District Heating

- Scales up heat demand, connects several buildings to central plant
  - District Heat (DH) infrastructure underdeveloped in Canada, ~1% of demand
  - Biomass is the most economic renewable fuel for DH in most cases, especially if power is co-produced
  - Complements electrification of other sectors
  - Larger scale systems usually use wood chips but in some cases pellets are best

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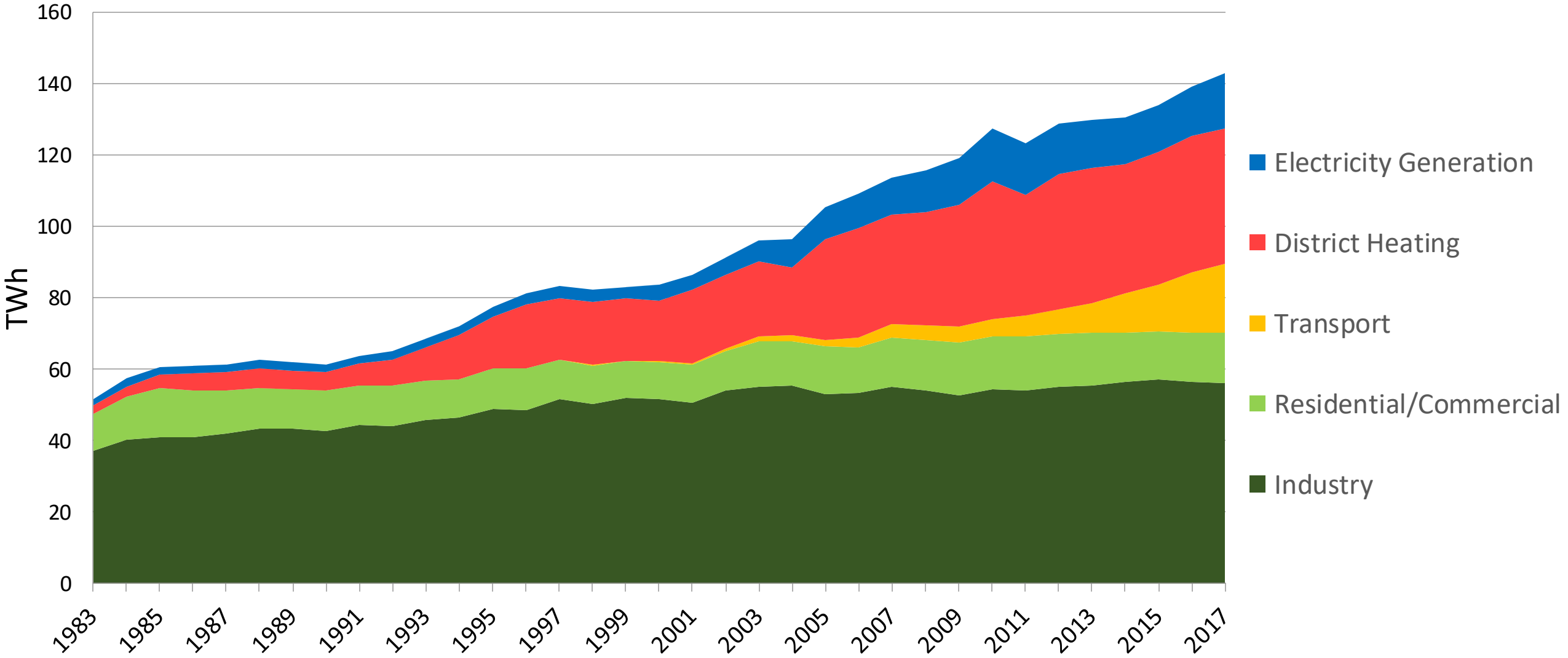
Bioenergy Demand in Sweden



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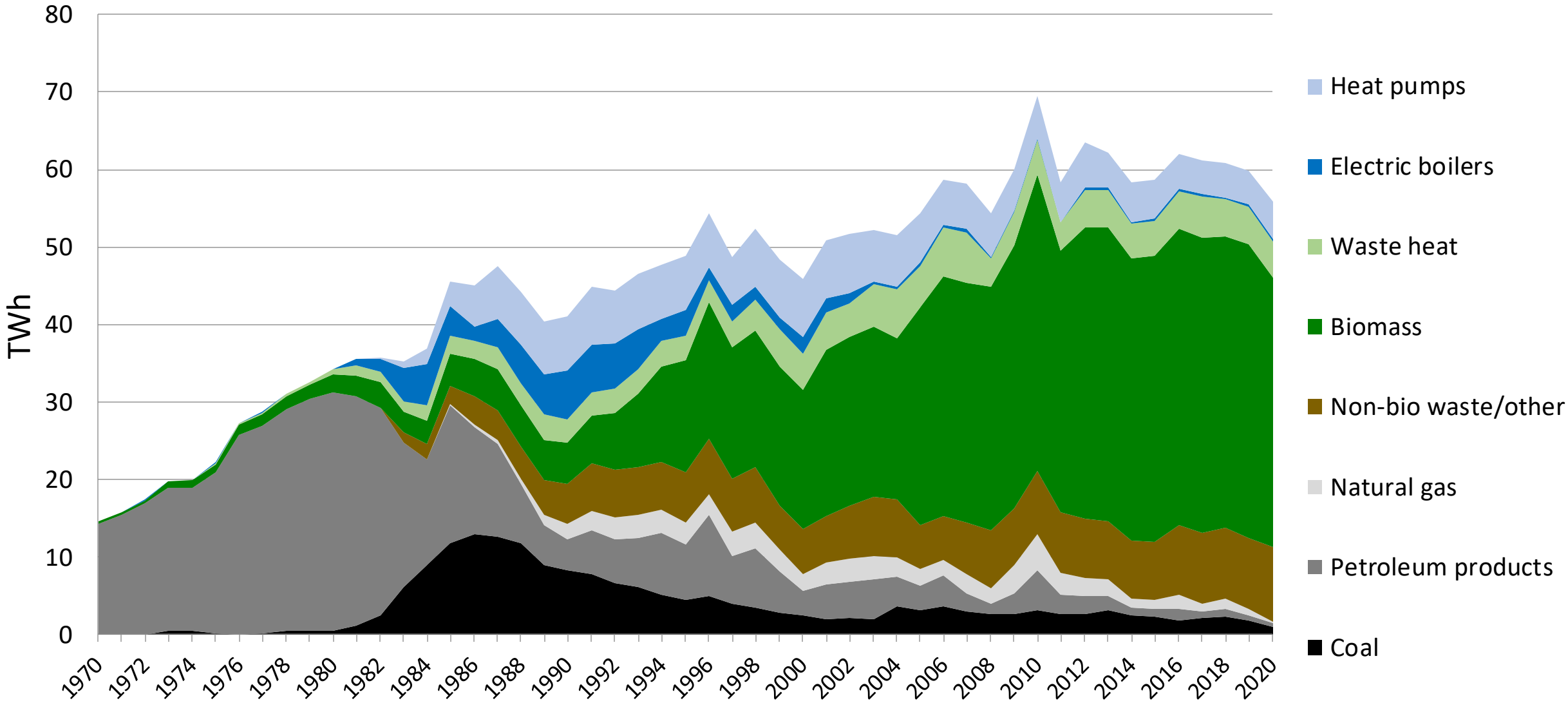
Sweden District Energy by Fuel



District Heat – Pellet Opportunity

- At larger scales, wood chips make most sense in most cases - when/where might pellets be used?
  - Small scale systems
  - Urban areas
  - Places with low biomass availability – ship via rail
  - Conversion of existing steam district heating systems

La Cité Verte in Québec City, QC, Viessmann

Industrial Heat

- **44%** of Canada's energy demand is thermal industrial energy, largely met with natural gas
- Biomass already widely used for thermal energy in the forest sector (chips, bark, residues)
- Opportunity for conversion to biomass in other sectors increasing with climate targets and carbon pricing

Dow/Energias Renováveis do Brasil

Industrial Heat – Pellet Opportunity

- Largest opportunities for pellets in industrial applications include:

1. **Lime Kilns** (majority of existing fossil fuel use in pulp mills)
2. **Facilities with large ramping requirements**

Use pulverized wood (powder) burner

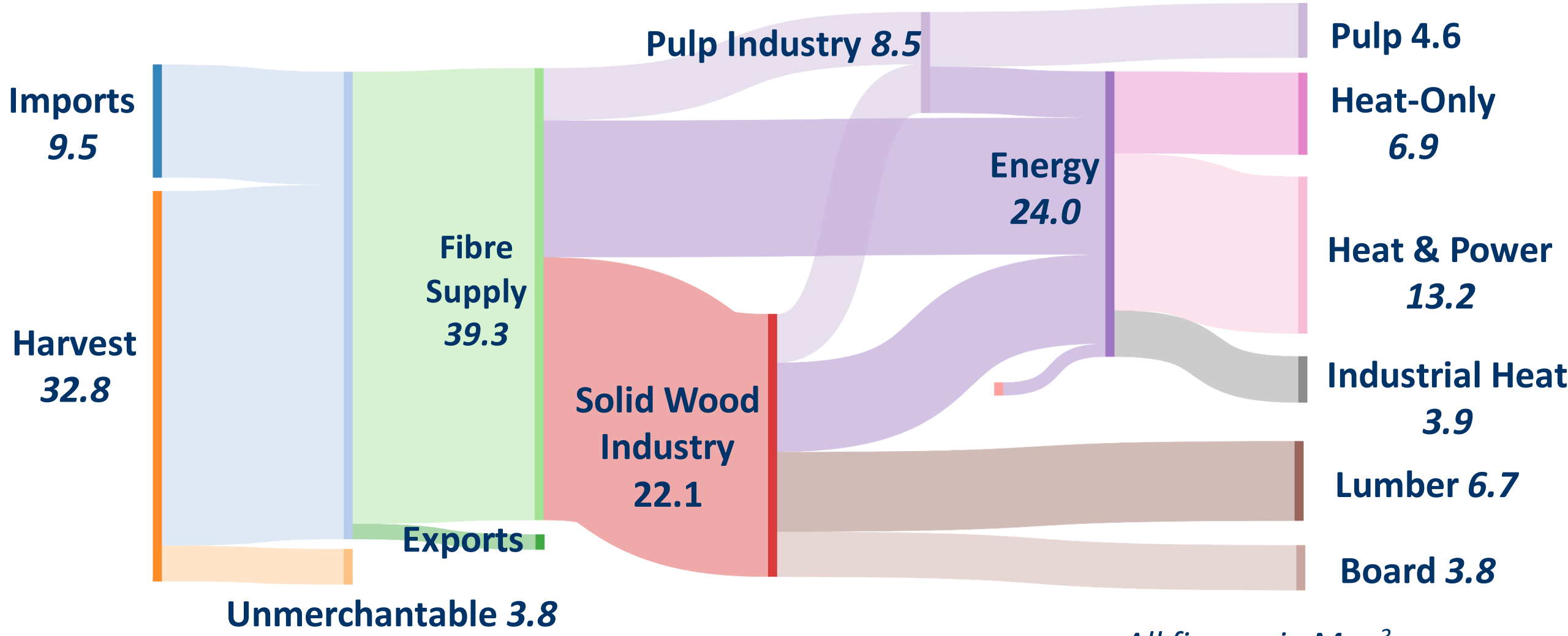
3. **Facilities in urban or low biomass areas**

Conversion of Lime Kilns

- 1.8 Mt CO2/yr emissions from lime kilns in Canada, mostly from natural gas
- Pulverized wood burners likely to be a primary decarbonization solution (syngas de-rates kiln)
- This could create a demand of roughly 2 Mt/y for pellets or sawdust/shavings
- Both a risk and opportunity for the pellet industry

Valmet's wood powder firing solution for lime kilns

Austrian Forest Sector – C$12 B/yr



Highly profitable mass timber industry supported by heat market

Forested area: <4 M ha; highly mountainous; stocks increased 45% since 1960

All figures in M m^3

Total NS Harvest <3 M m^3

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Thank You!

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