

Argyle Wood Pellet Heat Utility

Demonstrating a Proven Approach for Reducing Energy Poverty and Increasing Community Resiliency



What is 'Bioheat'?



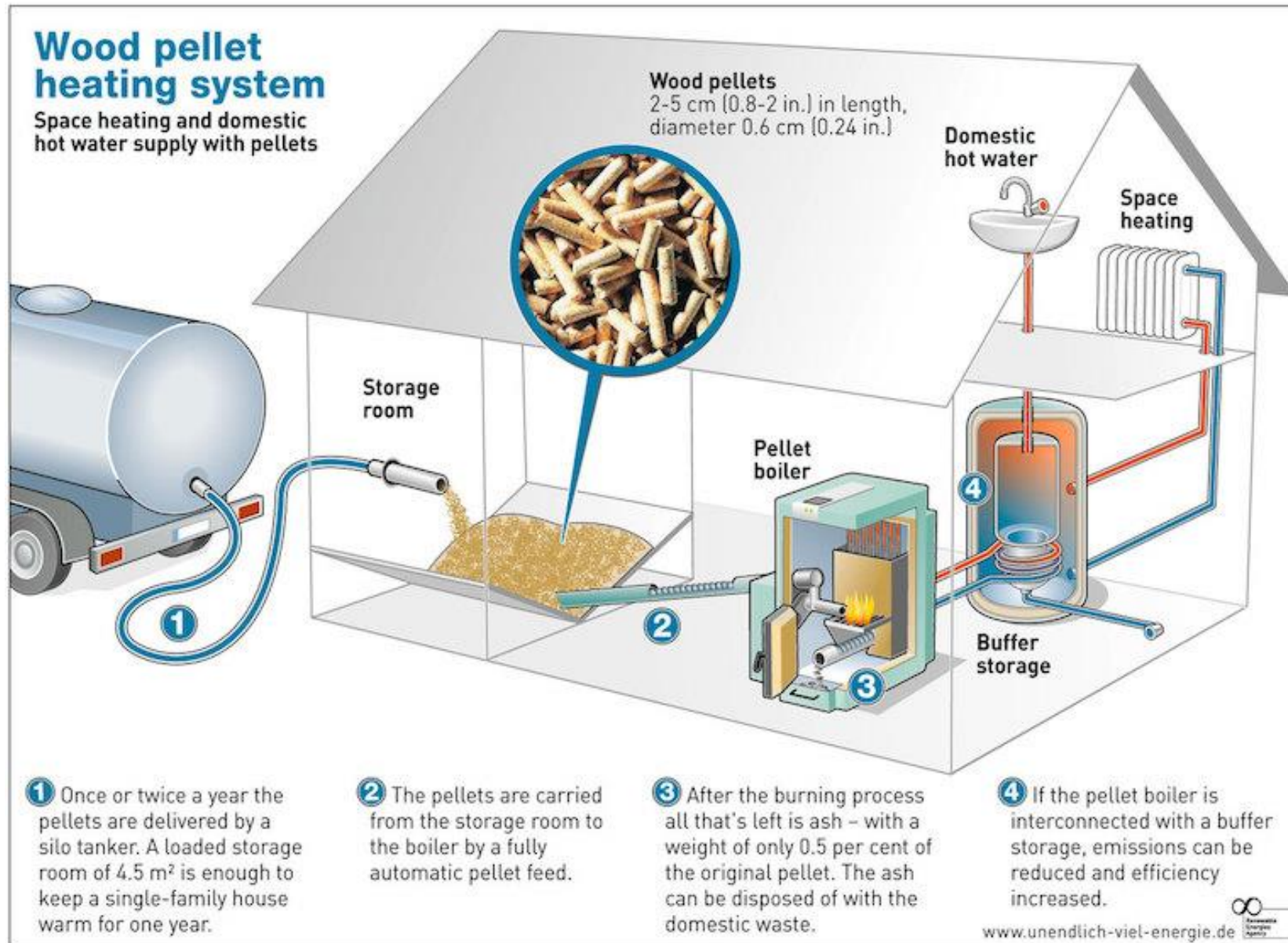
Why Wood Pellets for Argyle?

1. Energy expenditures on oil & electricity **LEAVE** the region & province
2. Existing options are **HIGH CARBON**, so exposed to large price increases (policy)
3. Wood pellets are Nova Scotia fuel that could be made **LOCALLY**
4. One million residential wood pellet boilers in the EU: **PROVEN** technology
5. Lowest **COST** renewable, clean, and low-carbon heat supply
6. Most **EFFICIENT** use of wood for GHG reductions
7. Energy price is **PREDICTABLE** via long-term supply agreements
8. A market for low quality wood essential for **SUSTAINABLE** forests

Residential & Commercial Pellet Boilers

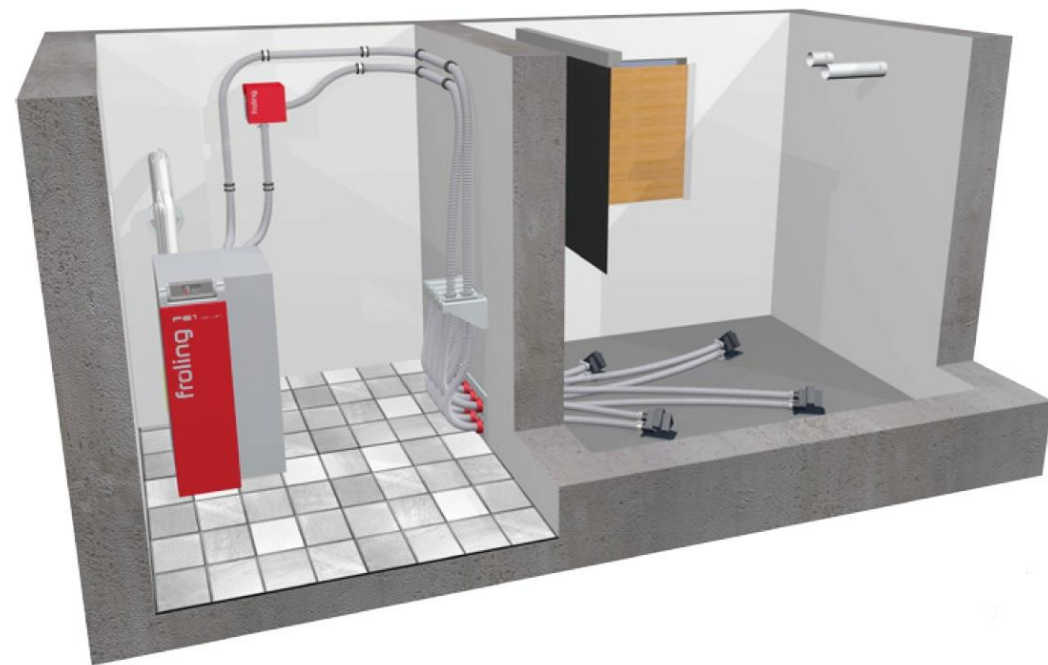


Wood Pellet Heating



Wood Pellets



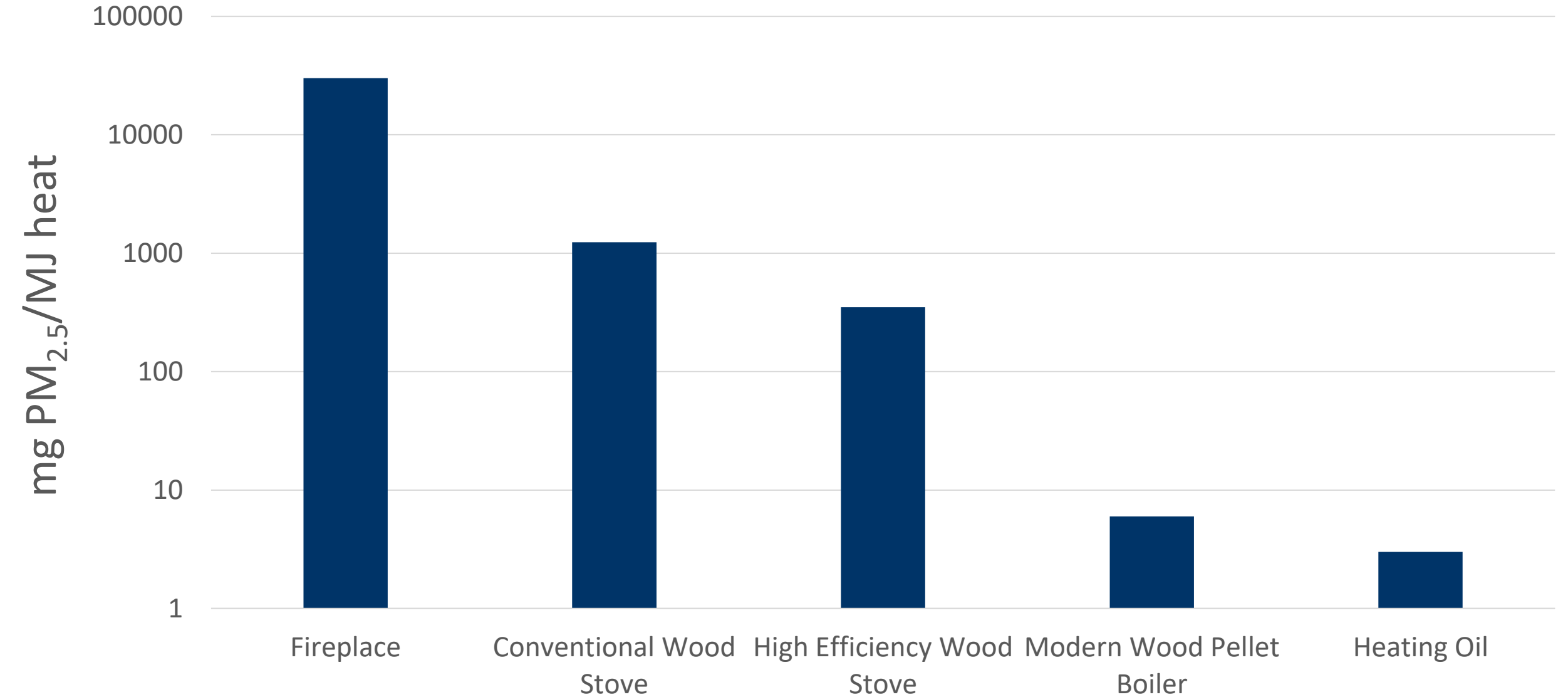


In-Building Energy Distribution

- Options
 1. Radiators
 2. In-floor
 3. Hydronic air handler & ducting
 4. Fan coil

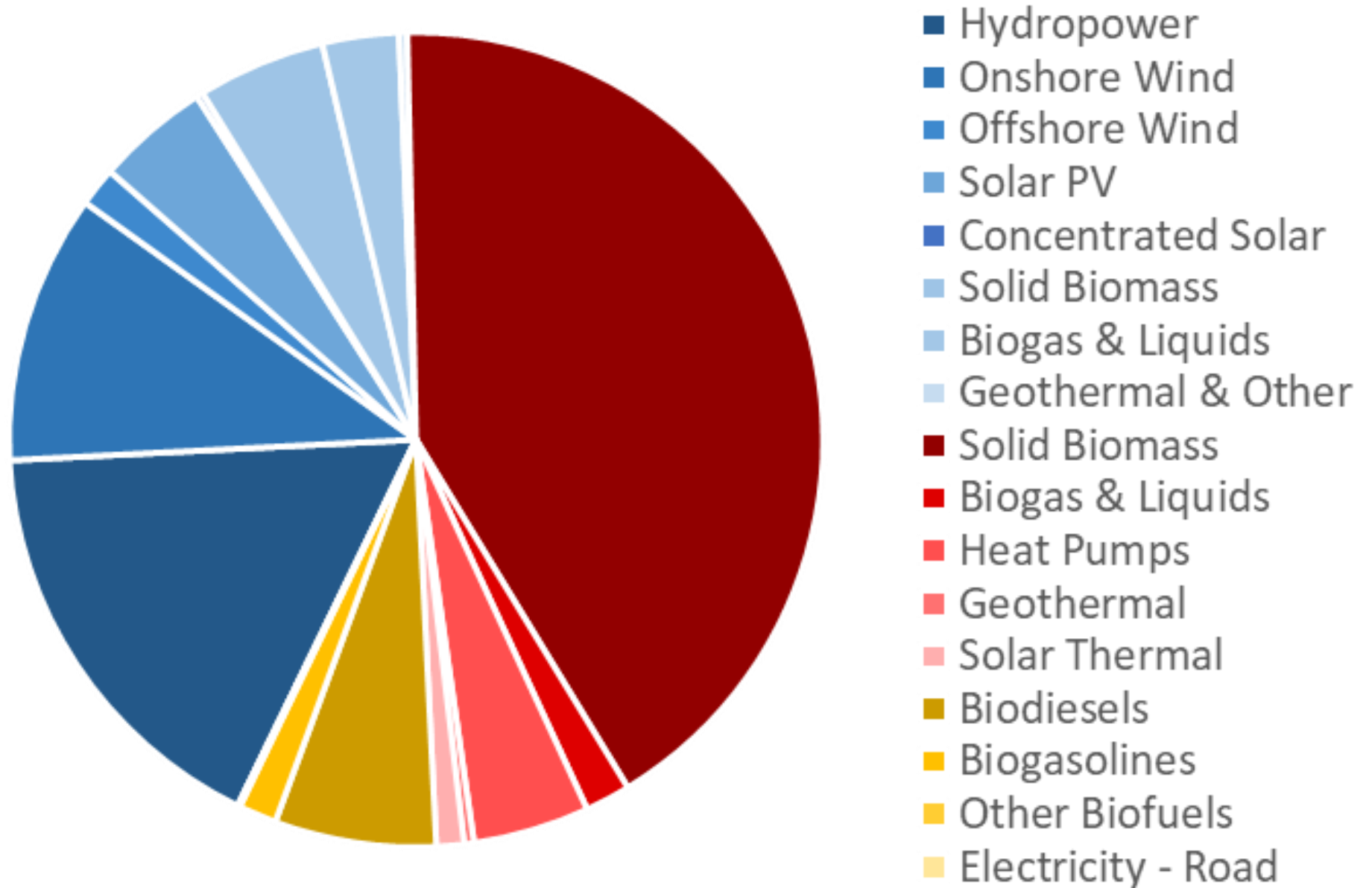


Fine Particulate Matter (PM_{2.5}) Emissions

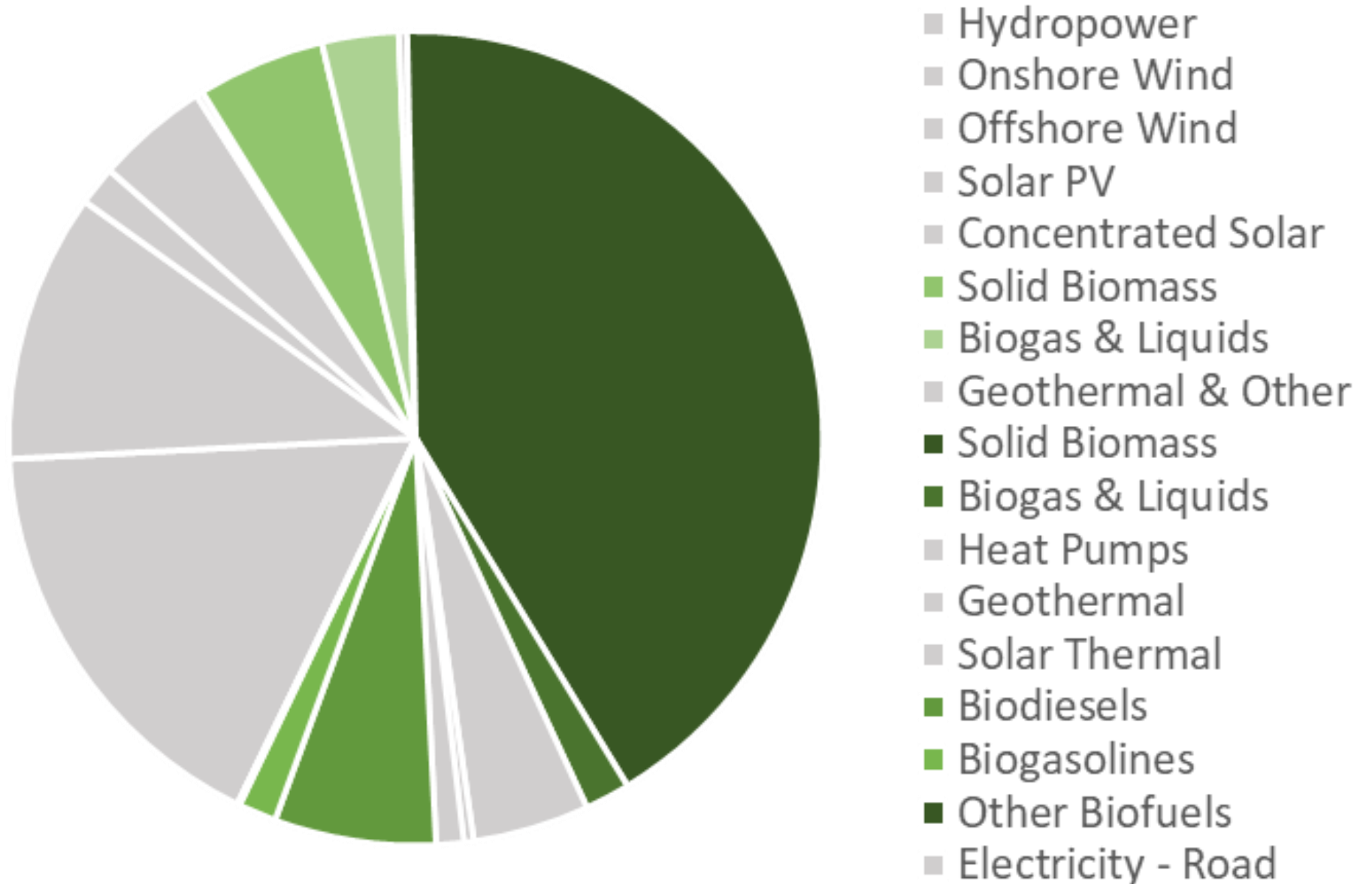


Renewable Energy in the EU

Total: 8.5 EJ



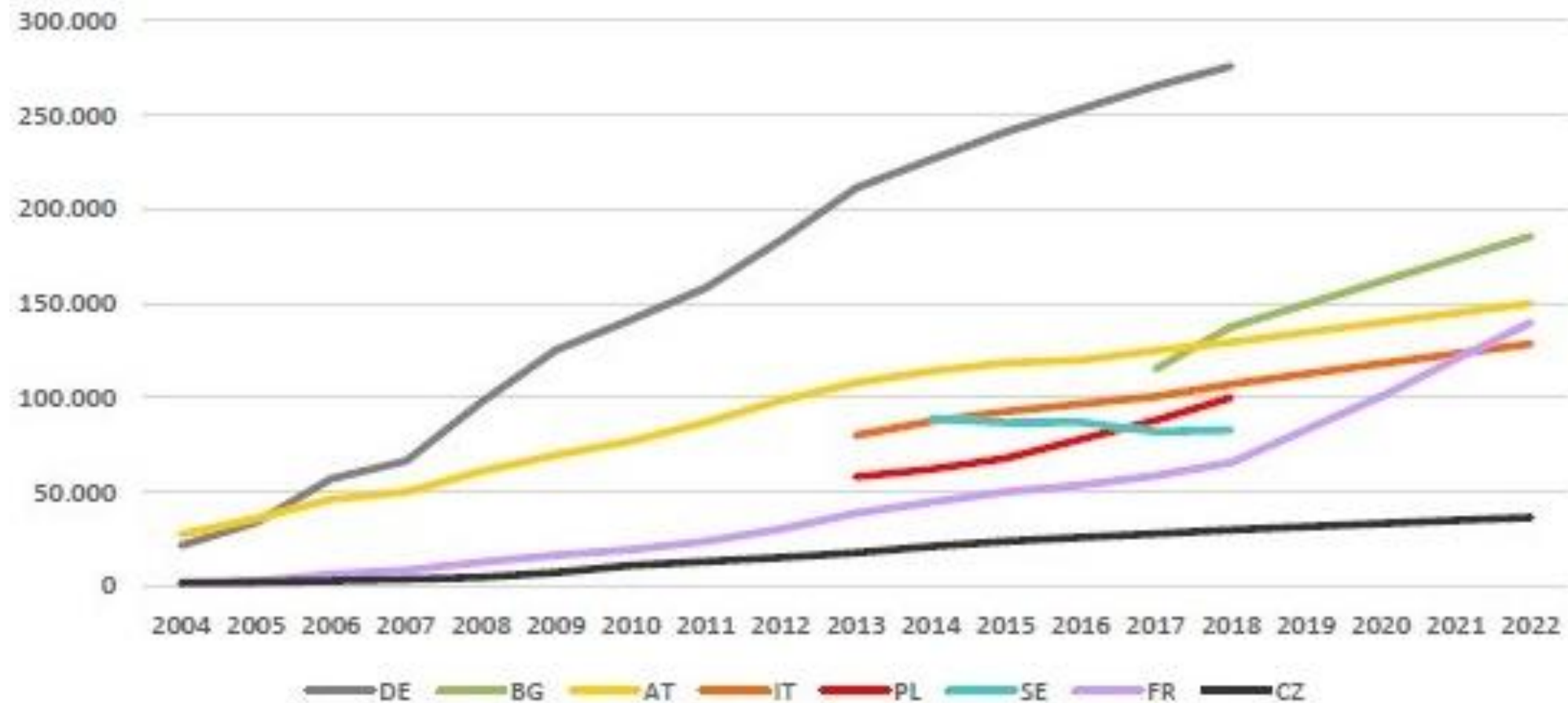
Bioenergy in the EU



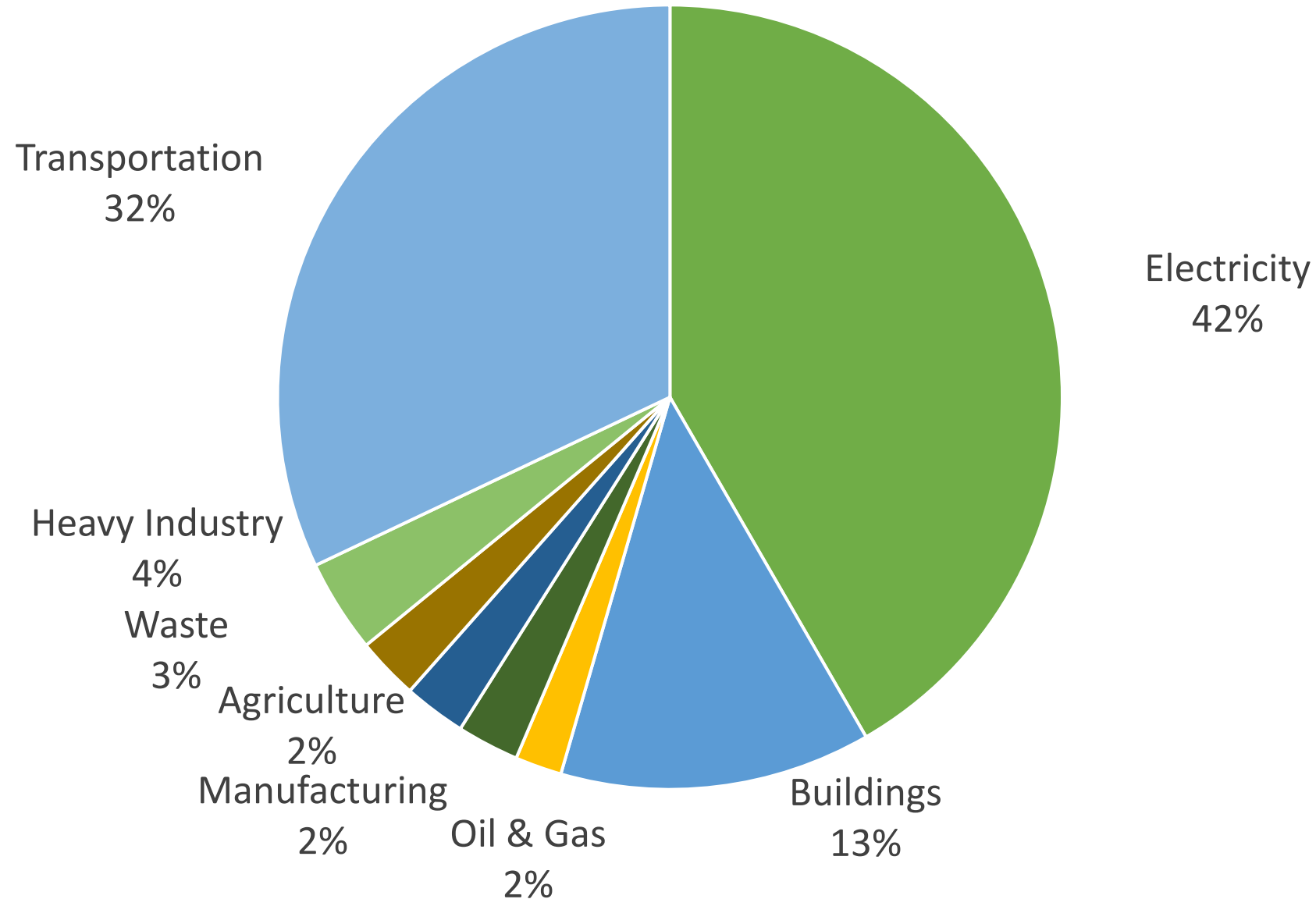
Bioenergy in 2017:
211 Mt CO₂e reductions

EU Wood Pellet Boilers (Top 8 Countries)

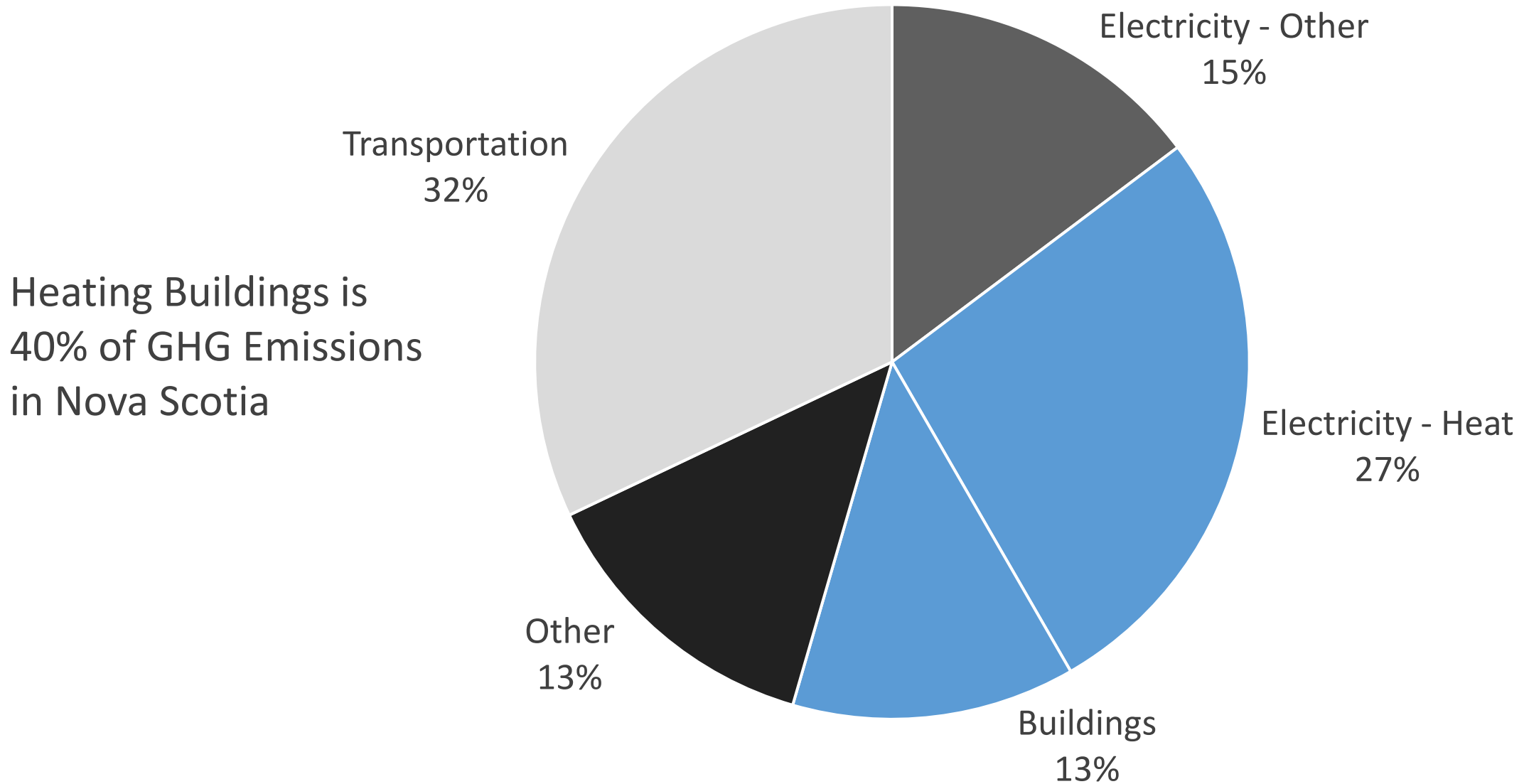
- Installed base of >900,000 residential pellet boilers $\leq 50\text{kW}$
- >60,000 commercial pellet boilers of >50kW
- Canada has <250 commercial wood pellet boilers



GHG Emissions in Nova Scotia, 2017 (15.6 Mt CO₂e)

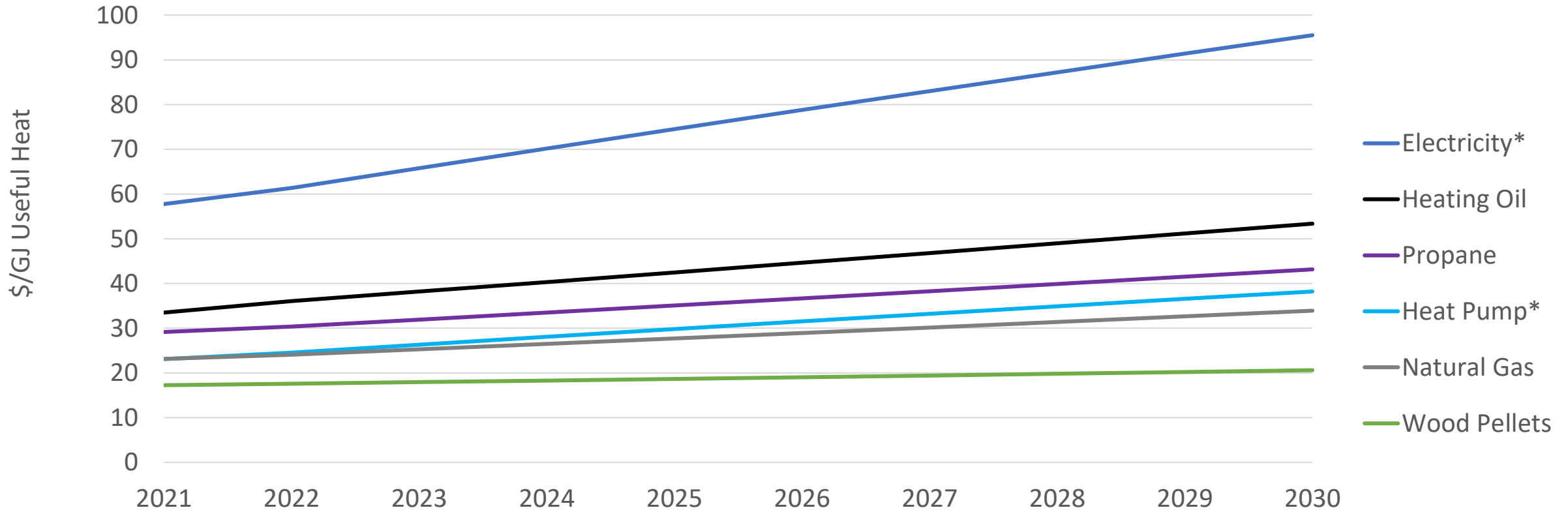


GHG Emissions in Nova Scotia, 2017 (15.6 Mt CO₂e)



Nova Scotia Carbon & Fuel Pricing

- \$170/t CO₂e adds \$8.70/GJ to natural gas; \$0.45/L to heating oil

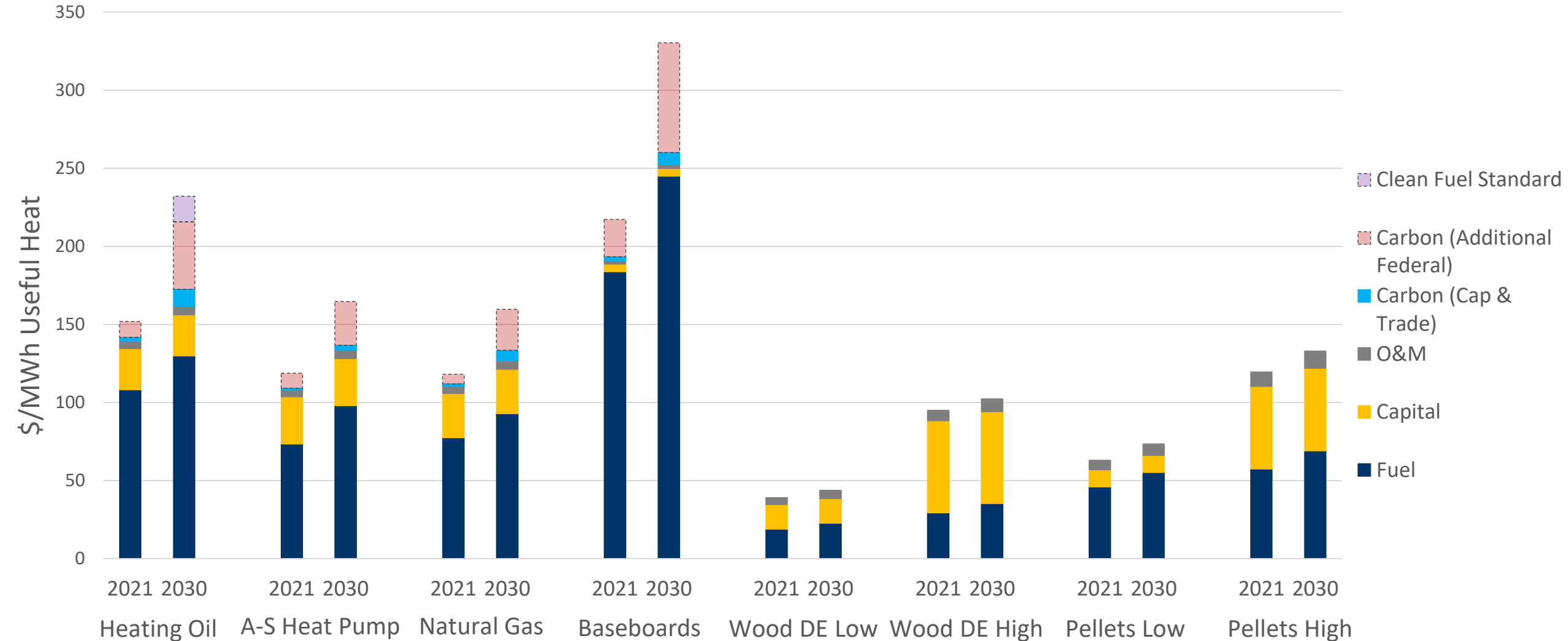


* Assumes 100% of emissions subject to carbon pricing; rates increases as projected by NSP Integrated Resource Plan

* Grid CI of 650 g CO₂e/kWh in 2021 decreasing to 500 g CO₂e/kWh by 2030

- Heating oil cost includes Clean Fuel Standard compliance
- Cost assumes 2% annual inflation

NS Residential Heating Cost Comparison



Making the Economics Work

- Lowest cost fuel, high upfront capital cost
- Federal-Provincial Investing in Canada Infrastructure Program:
 - \$700 M grants allocated to 'Green Stream' in NS
 - Green Transit funds can also be allocated to 'Green Stream' – additional \$550 M
 - Application windows: Annual – most recent August 2020
- If to municipalities: 73.3% of project costs (40% federal, 33.3% provincial)
- 100% municipal ownership via private partner utility management agreement
 - (Part) finance, develop, install, fuel, maintain, bill, manage customers
- Similarities to other energy utilities but without the pipes/wires – RURAL approach

Proposed Demonstration Project

- 20 residential/commercial wood pellet boilers (~250 tonnes/yr)
- Pellet silo & delivery truck
- Application to \$50 M Nova Scotia Forestry Innovation Transition Trust for 100% of capital cost
 - Estimated at \$800k, with boilers \$600 k installed and \$200 k for small silo and bulk delivery
 - TorchLight to prepare all draft documents, consultation with CAO & Director of Public Works
- Pellet supply and heat utility management by Shaw Resources (part of Shaw Group)
 - Plant in Shubenacadie (50,000 t/yr)
 - Large truck delivery to municipal pellet silo in Argyle
- Local heating oil supply company contracted by Shaw for local bulk pellet delivery & boiler maintenance
- Pellet hub and boiler/stove demonstration projects completed in Ontario
- Successful operation of demonstration project provides precedent for large pellet boiler initiative
 - Application to ICIP for 200-400 boilers

Pellet Hub



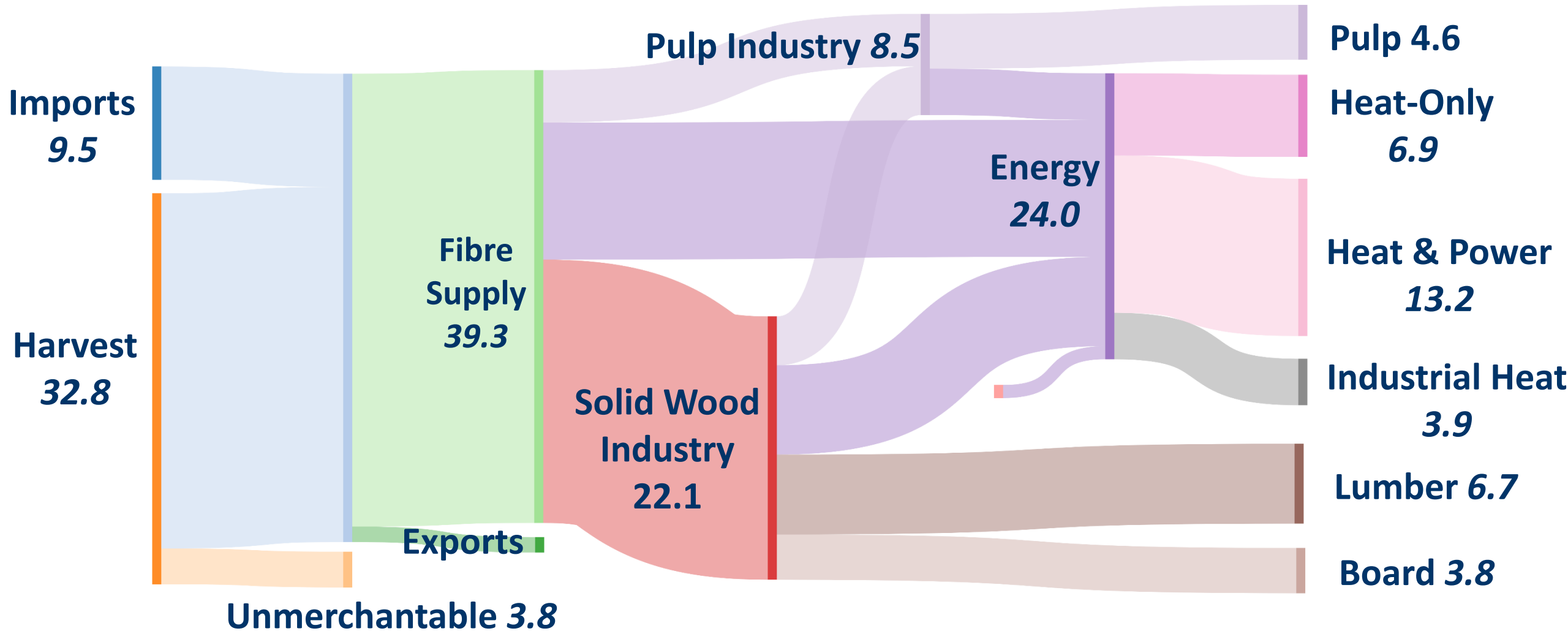
100 t pellet silo and filling facility in Massachusetts

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Austrian Forest Sector – C\$9 B/yr



All figures in Mm³
Total NS Harvest ~3 M m³

Highly profitable mass timber industry supported by heat market
 Forested area: <4 M ha; highly mountainous; stocks increased 45% since 1960

Bioheat in Canada

- 460 Commercial/Institutional Bioheat Projects in Canada (75-5,000 kW scale)
- Industry growing at 15% per year
- >99% wood chips or wood pellets
- Wood (cordwood, pellets) provides 11% of residential energy supply
- Wood provides 10% of industrial energy supply
- Carbon intensity energy used by pulp and paper sector decreased 60% (1990-2015) by fuel switching



Prince County Hospital, Summerside, PEI