

Urban Wood Waste Options Study – Phase II

June 3, 2016



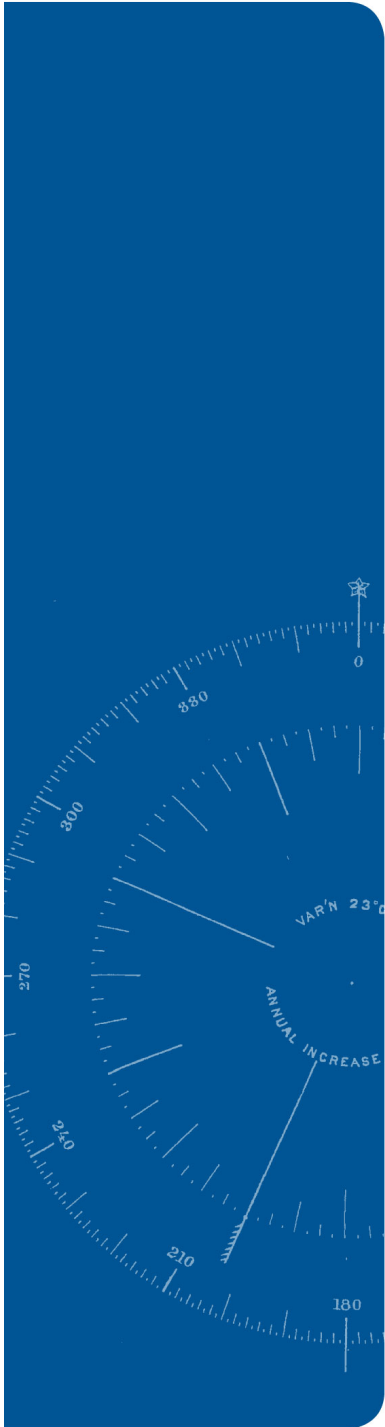
Josh Proudfoot,
Principal
Good Company



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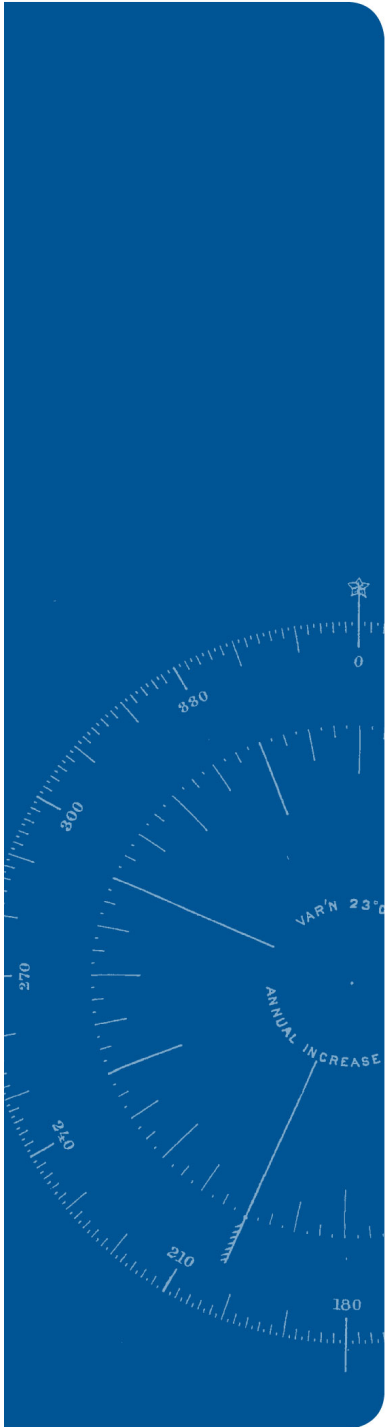
Overview

- Background
- Project Description
- Market Research
 - Methodology
 - Results
 - Findings
- Details Environmental Analysis
 - Methodology
 - Results
 - Review of Significant Analysis Assumptions
- Conclusions and Options



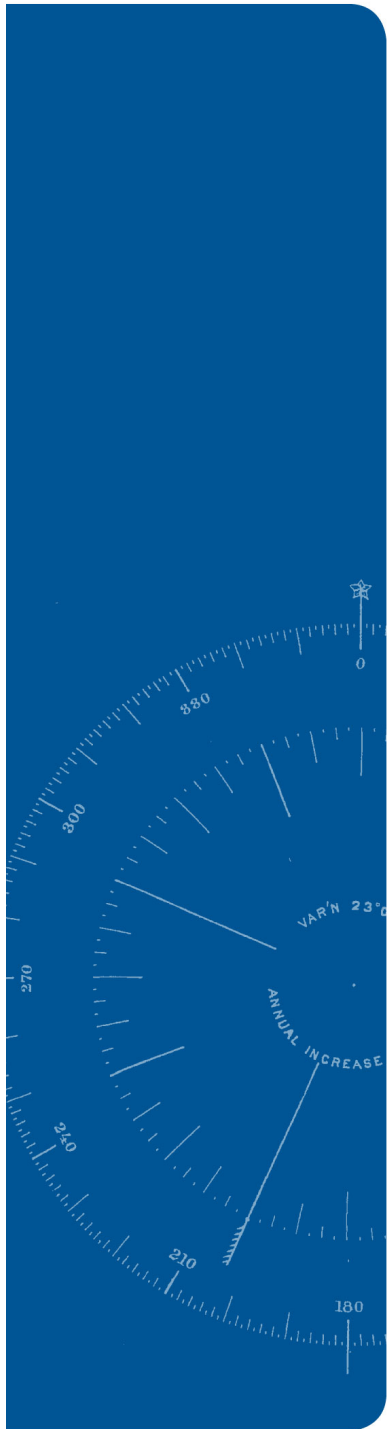
Project Purpose

- Identify and assess options for maintaining and improving end-market capacity, stability and environmental outcomes
- Can be implemented within next 10 years
- Emphasis on actions Metro can take



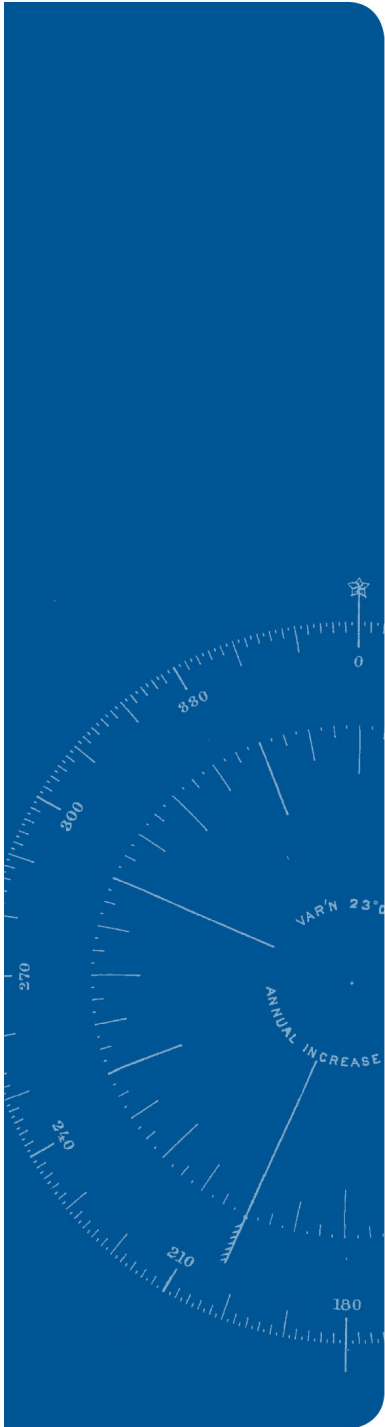
Wood Waste Tonnage

	Disposed	Recovered	Generated
Painted/Treated/NR	129,000	0	129,000
Not Painted/Treated	58,000	106,000	164,000
TOTAL	187,000	106,000	293,000



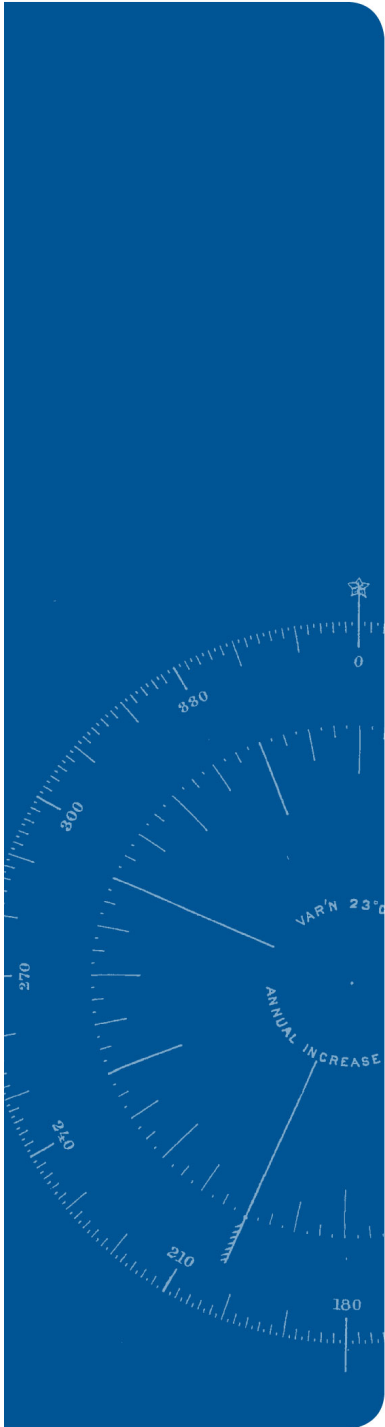
Phase 1 Scope

- Studied 13 options
- Literature review
- Interviewed 30 industry leaders, wood scientists and researchers
- Surveyed 16 potential markets
- Analyzed public policy landscape
- Outlined alternatives for further consideration



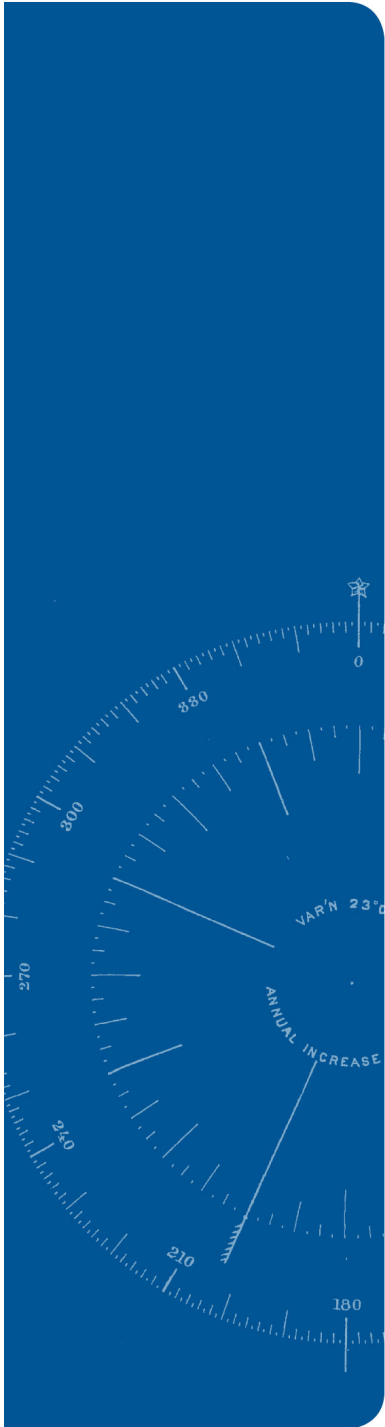
Options Studied In Phase 1

- Animal bedding
- Biochar
- Cellulosic fuels
- Composite panelboard
- Densified fuels
- District heat
- Dry AD
- Erosion control
- Export hog fuel
- Industrial hog fuel
- Pulp
- Reclaimed building materials
- Refurbished pallets
- Remanufactured lumber products



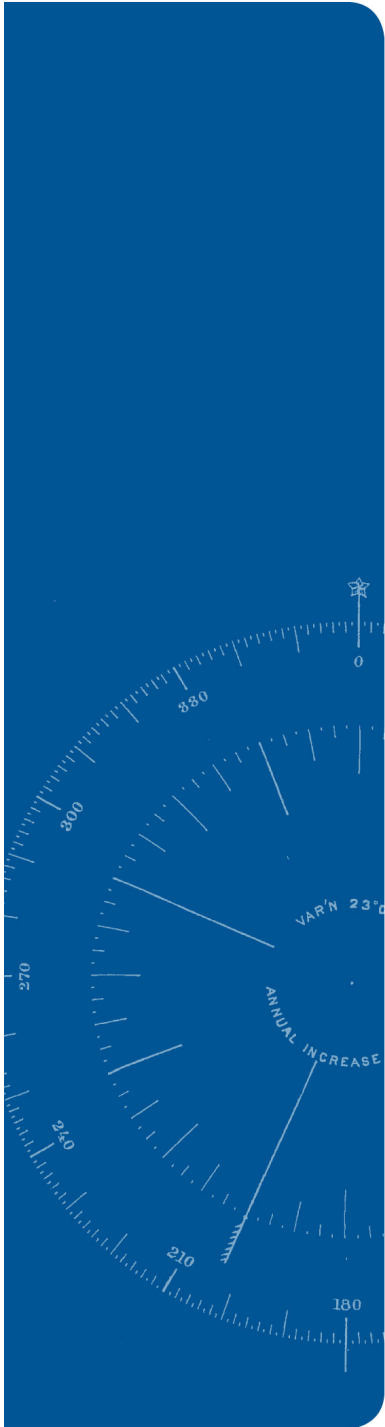
Phase 2 Scope

- Builds on findings of Phase I Study
- Compared three most practical fates for UWW
 - Status quo - hogged fuel
 - Production of densified fuels (pellets, logs, etc.)
 - Production of engineered wood panels



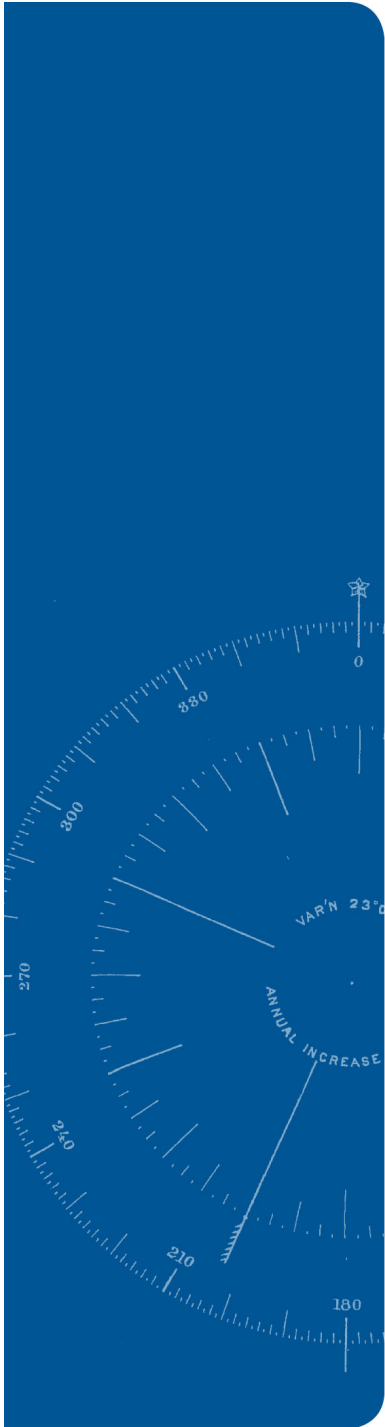
Phase 2 Research Questions

1. What are requirements, level of interest and scale of target end-markets?
2. What changes, if any, are needed in how UWW is collected and processed to meet these requirements?
3. Are there actions Metro can take to support and/or catalyze these changes?
4. What are the lifecycle environmental implications of each fate analyzed?
5. What is significance, if any, of recent state legislation relating to woodstove smoke (HB 3068 and SB 752)



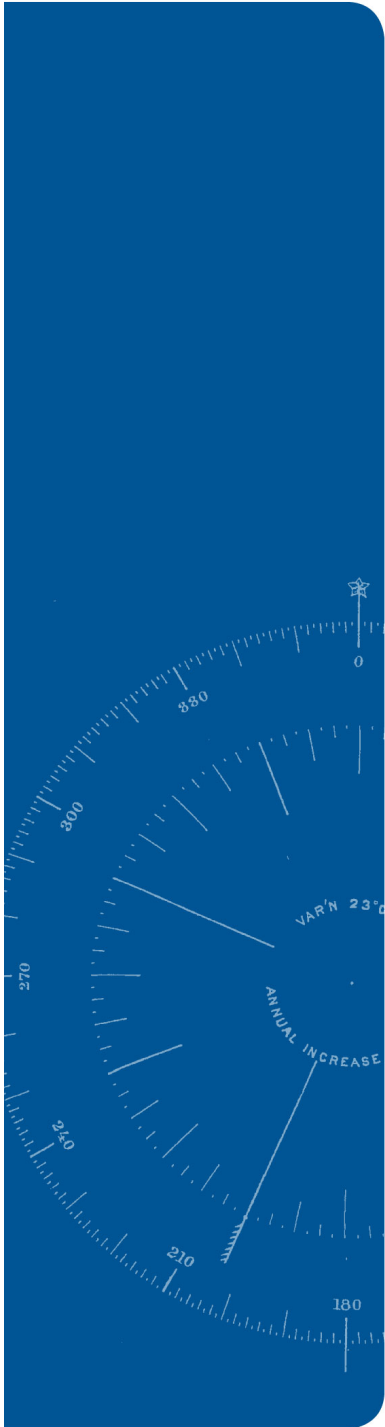
Market Research Methodology

- Identify interested, proximal manufacturers
- Interviewed manufacturers to define requirements (e.g., feedstock specs, pricing, demand, level of interest)
- Interviewed recyclers regarding current infrastructure and practices
- Generated sample equipment layouts and budgets
- Analyzed research findings to determine changes needed to meet end-market requirements



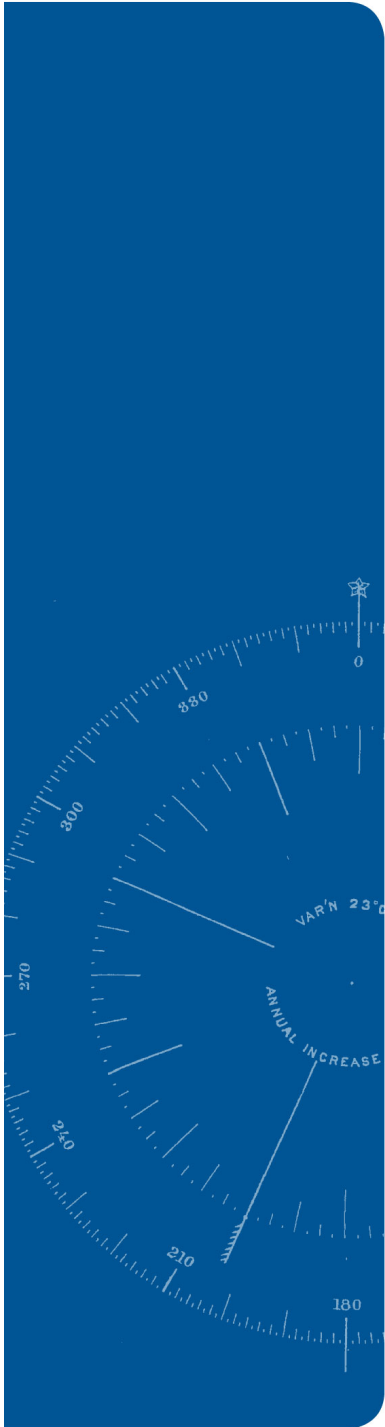
Findings

- Traditional hogged fuel remains a viable option for 3 – 5 years
 - “Stable but Fragile”
- Pellets for industrial fuel offers potential
 - UWW prohibited for use in residential stoves but allowed for industrial use
 - Western Oregon Wood Products is a potential customer @ around \$12-15/ton.
- Hogged fuel to charcoal briquettes offers potential
 - Kingsford torrefaction (Springfield)
 - Verify scale and health impacts



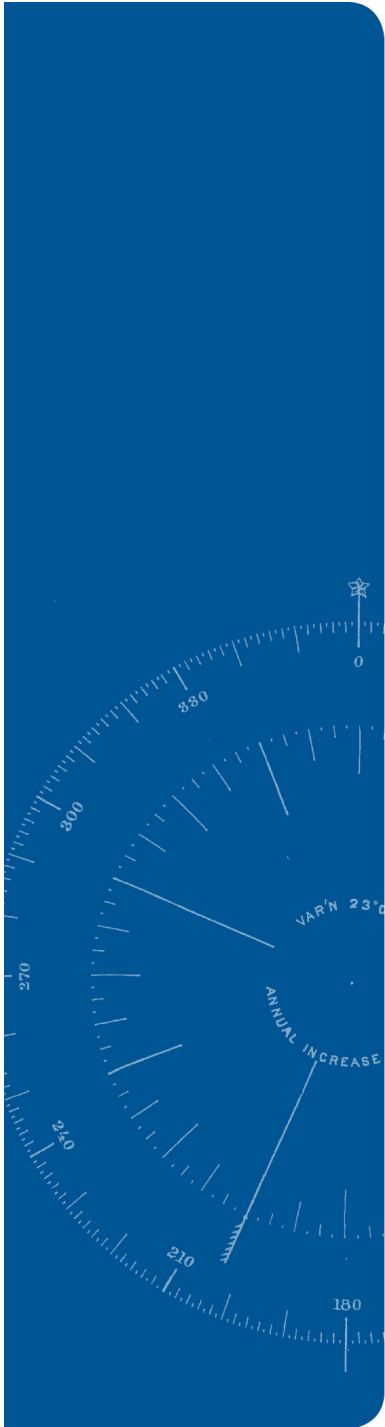
Findings

- Particle board furnish is not a viable option
 - No interest from industry
 - High cost to use UWW and meet stringent standards
 - Recent attempts to use UWW have failed due to contamination (esp. non-ferrous), particle size and uniformity, and species variation



Findings

- Preparation of fiberboard and densified fuel feedstocks is identical and requires investment in additional infrastructure which may not pencil for many existing processors
- These feedstocks require extremely clean, unpainted, untreated UWW material with no contamination whatsoever.
- Removing the “clean” material from the existing hogged fuel stream would result in engineered wood products being landfilled



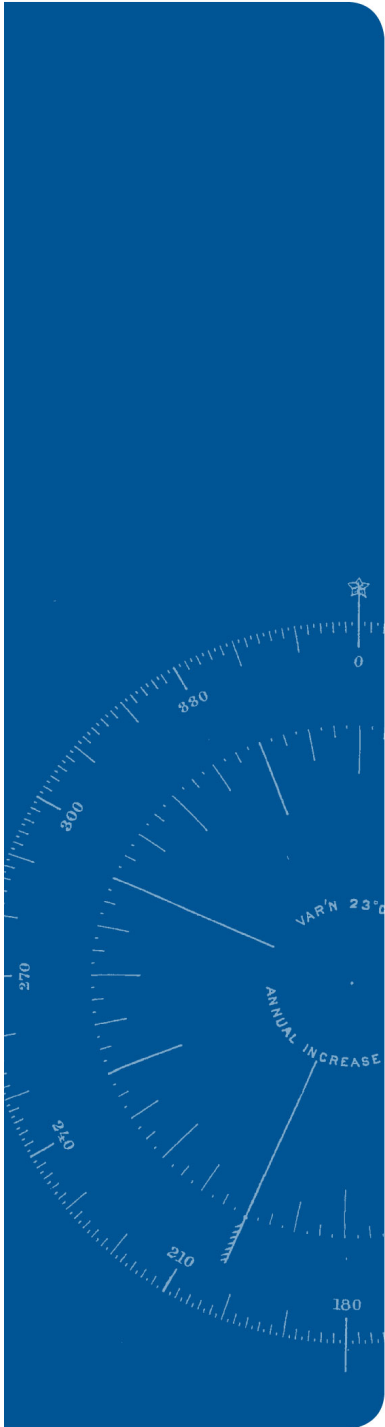
Environmental Analysis Methodology

- Compared Three Potential Fates for UWW
 - Hogged fuel to combined heat and power
 - Production of wood pellets for residential use
 - Production of MDF which is ultimately landfilled
- Metrics for Comparison
 - Greenhouse gas emissions
 - Particulate matter – emissions not exposure
 - Energy



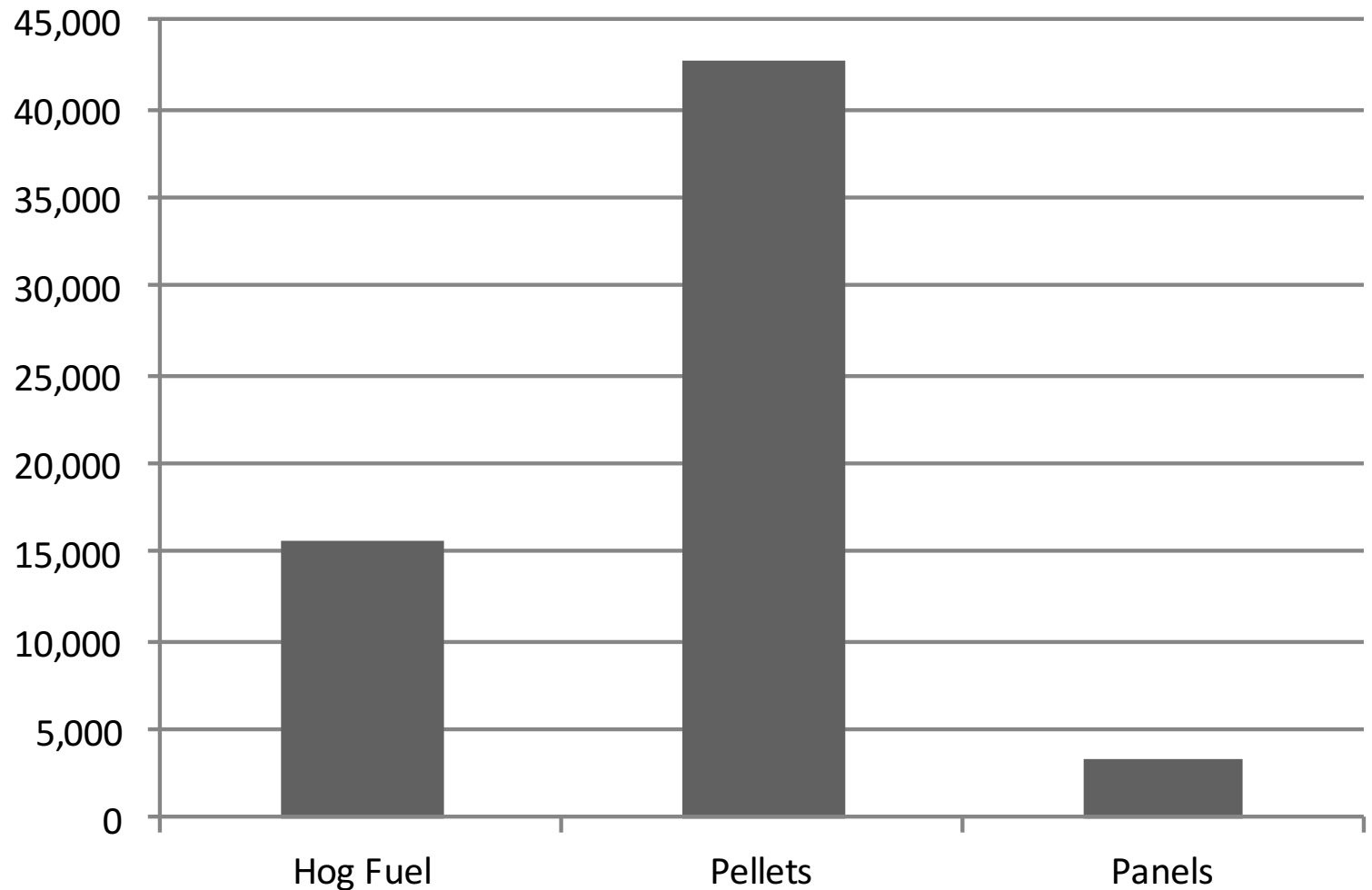
Methodology (continued)

- Based heavily on EPA's WARM methodology
- Considered lifecycle of materials and energy
- Significant conceptual assumptions are required – particularly for GHG impacts
- Considered a number of scenarios, based on assumptions

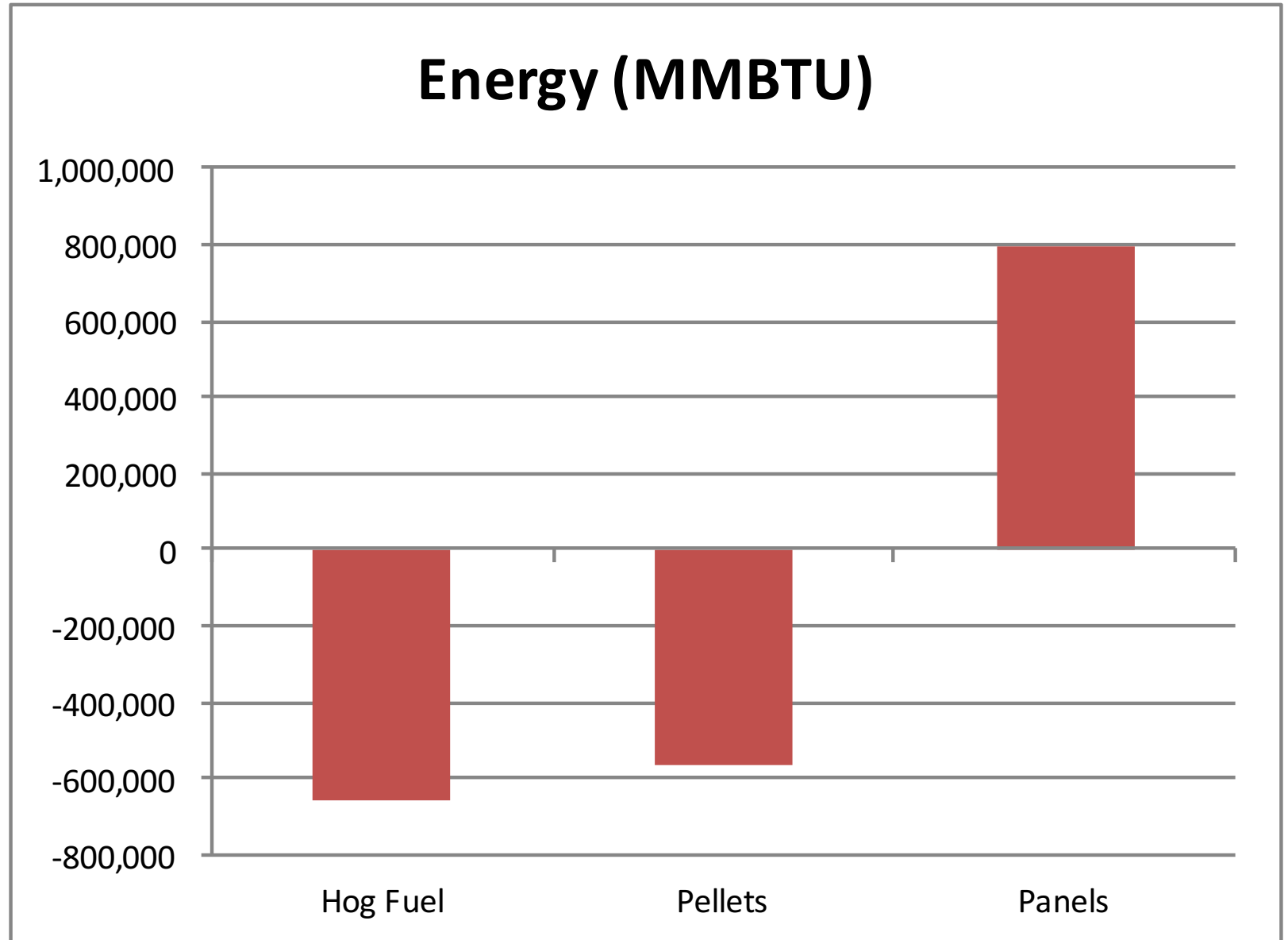


Panels produce fewest emissions

Particulate Matter (kg PM₁₀)

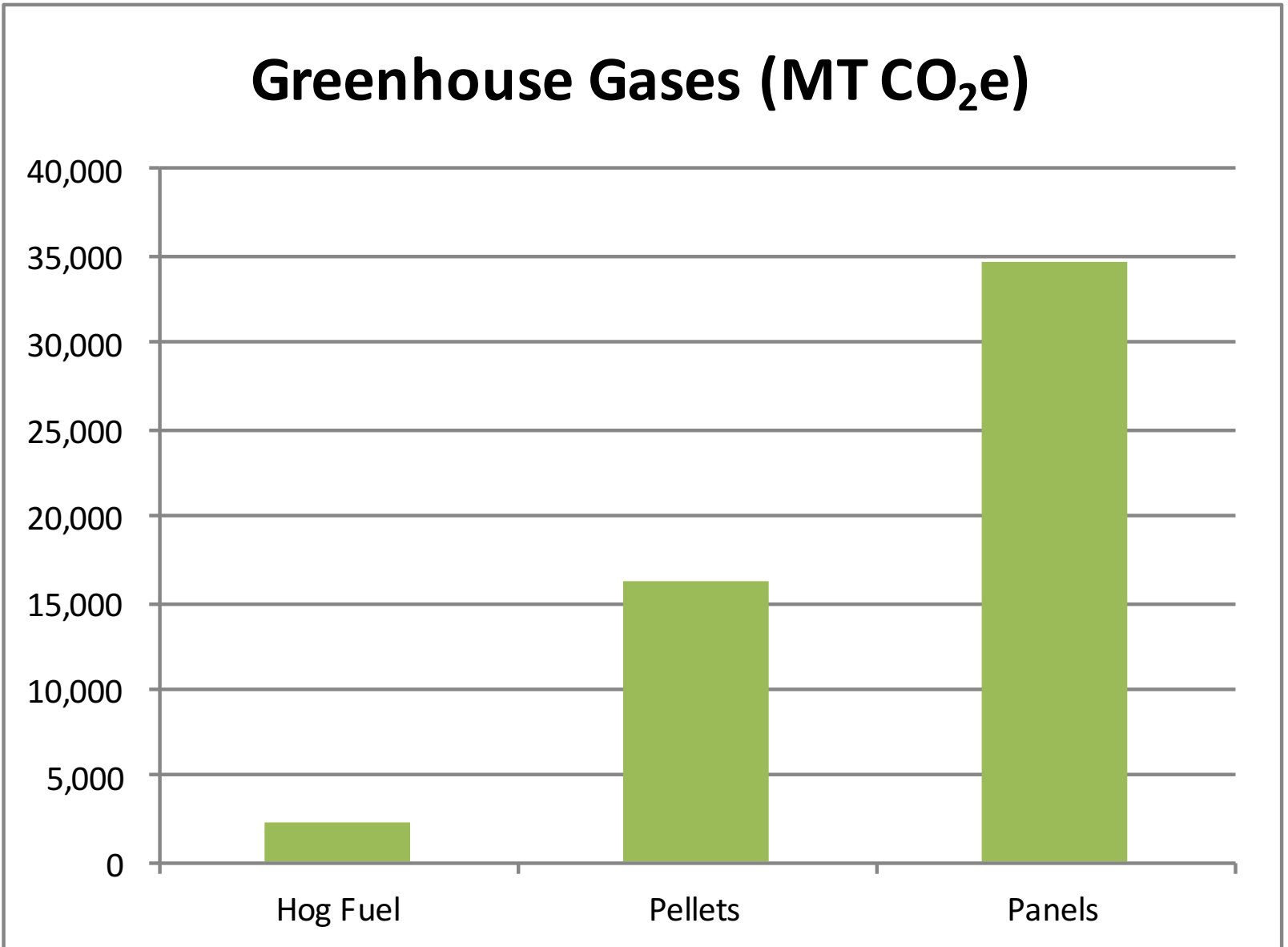


Hog Fuel / Pellets perform best

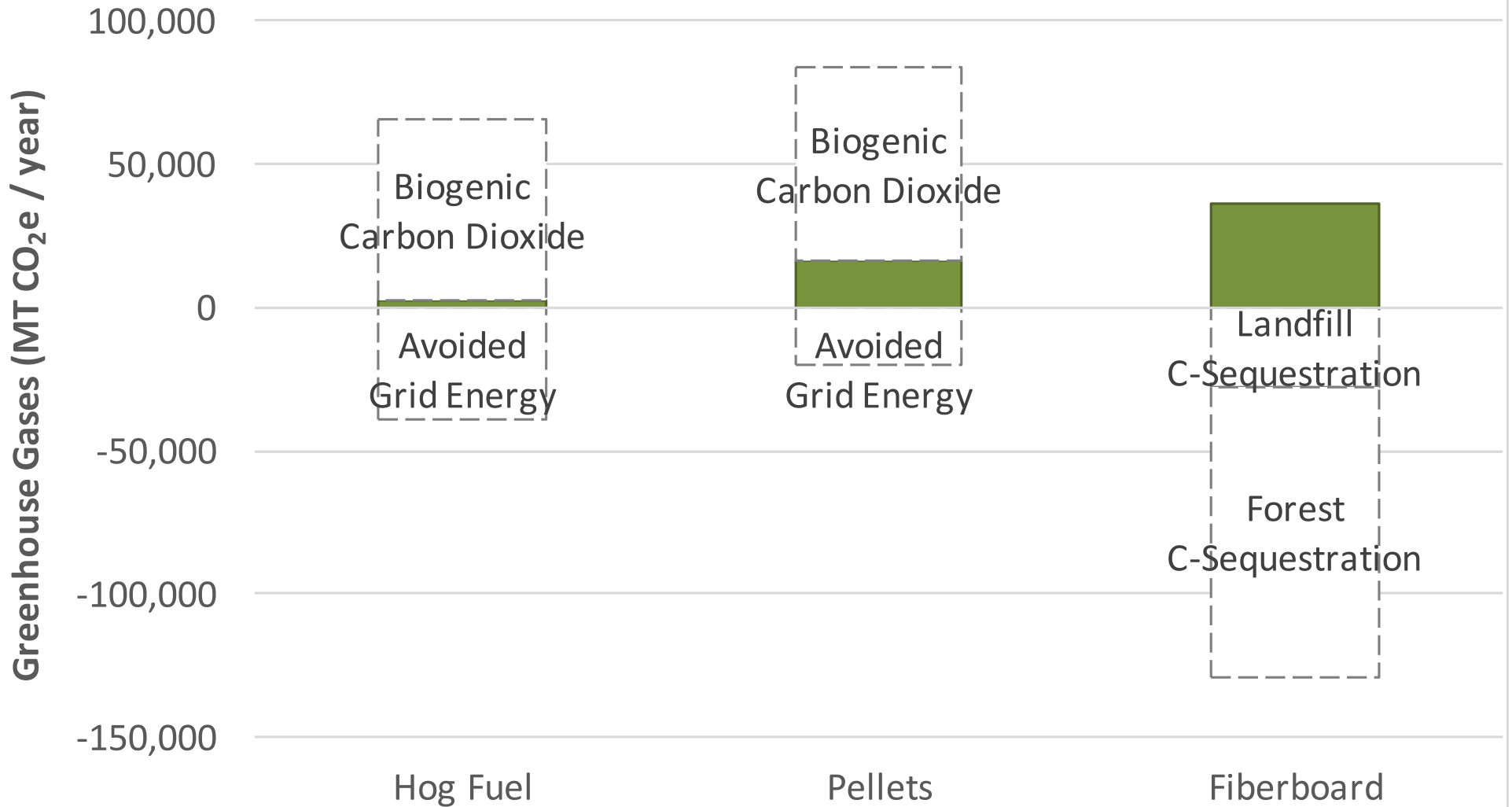


Hog Fuel performs best*

Greenhouse Gases (MT CO₂e)

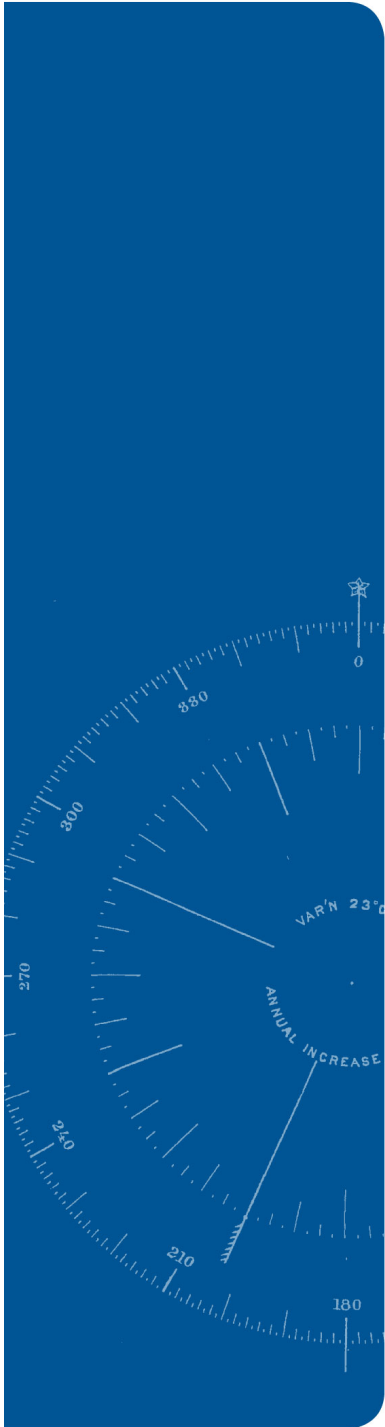


GHGs – Effect of Significant Assumptions



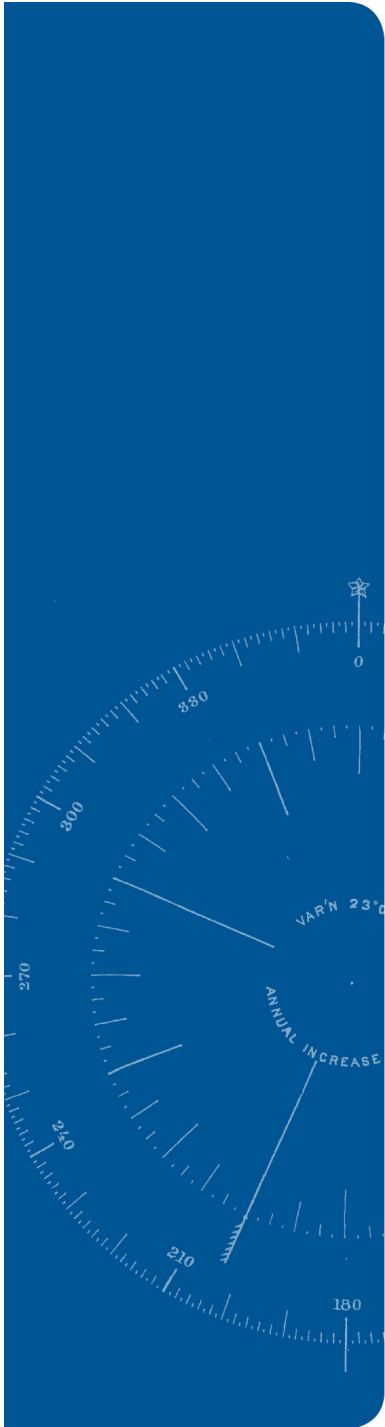
Conclusions and Options

- Hogged fuel is the most viable alternative over the next 3 to 5 years
- Particle board furnish is not a viable option
- Potential future options for further exploration
 - Pellets for domestic or international industrial markets
 - Kingsford charcoal products
 - Small combined heat and power energy system



Possible Metro Actions

- Continue work on enhanced salvage and reuse
- Distribute Final Report to intermediate processors and end markets; do follow-up phone calls to assess likelihood of private infrastructure investment
- Consider having policy discussion regarding planned versus laissez faire evolution of the UWW system
- Determine break-even scale for pellet feedstock facility selling pellets at \$12/ton
- Factor wood-related scenarios into Covanta analysis
- Revisit more promising Phase 1 options that were not included in Phase 2 investigation (e.g., biochar)
- Explore if anything can be done to help retain existing hog fuel market



Thank you

Q&A

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