



Woody fibre management webinar series
Webinar #2
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Sustainability Impact Assessments of Biomass Supply Chains for Combined Heat and Power Systems

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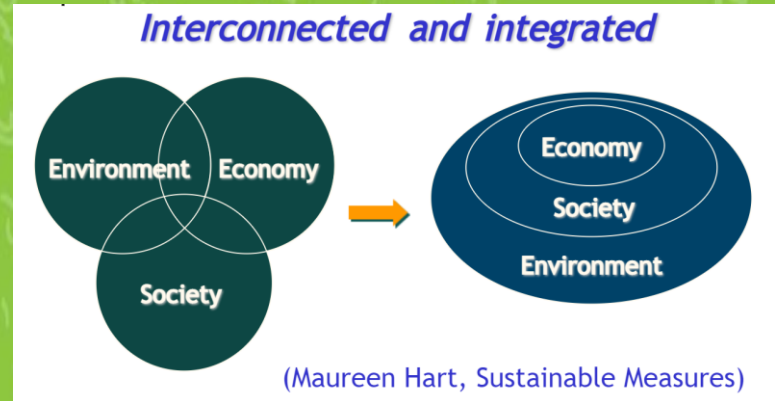
SUSTAINABLE DEVELOPMENT

- **Sustainable Development** → development that *meets the needs of present generations without compromising the ability of future generations to meet their own needs.*

(Our Common Future: Report of the World Commission on Environment and Development)

- Multiple pillars: Economic, Social, Environmental, Cultural, Spiritual...
- Multiple goals/criteria
- Multiple stakeholders
- Multiple Criteria Decision Making
- Sustainability indicators

- Complex sustainability assessment processes leading to holistic solutions that al/majority of stakeholders can agree on

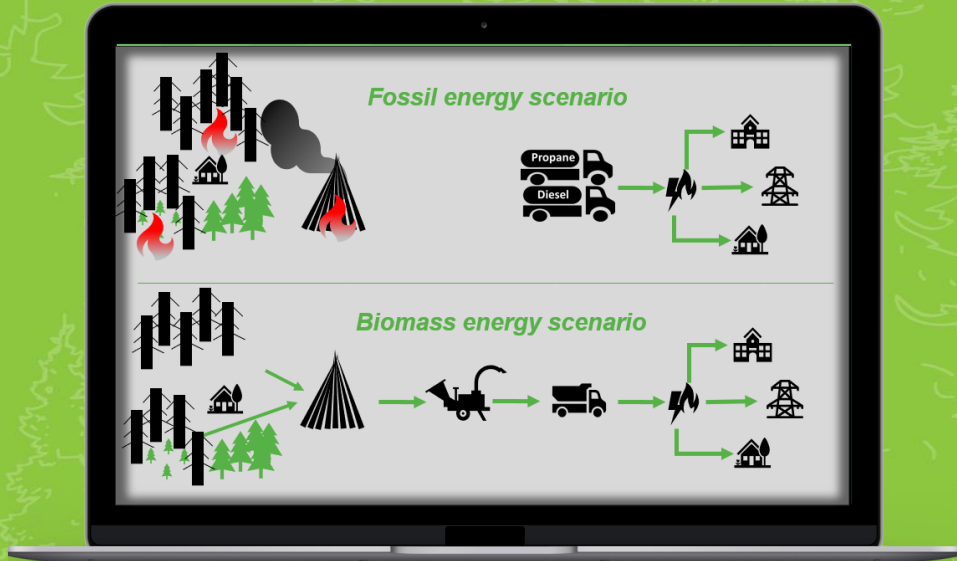


SUSTAINABILITY IMPACT ASSESSMENTS

Sustainability Impact Assessments (SIA) are *calculations of environmental, economic, and social indicator values at every stage/link of a supply chain: from the forest (e.g., the community fireproofing operation) to the final use/end of life of the products (e.g., biomass) generated from the forest (e.g., generation of heat and electricity in a community).*

Scale of analyses: local → (inter-) continental

SIA – validated in many FPInnovations studies in Canada and internationally



> SCENARIOS

- **BASE CASE:** Fossil fuel energy scenario
- **ALTERNATIVE:** Biomass residue energy scenario (fossil fuel substitution with biomass)

> SUSTAINABILITY INDICATORS

- **ECONOMIC:** Local income, local investment
- **SOCIAL:** total local employment, high skill employment
- **ENVIRONMENTAL:** annual emission savings
- **COMMUNITY HEALTH:** Reduced small particulate matter in community
- **COMMUNITY SAFETY:** Reduced forest fire risk due to fireproofing of community

> INPUT DATA

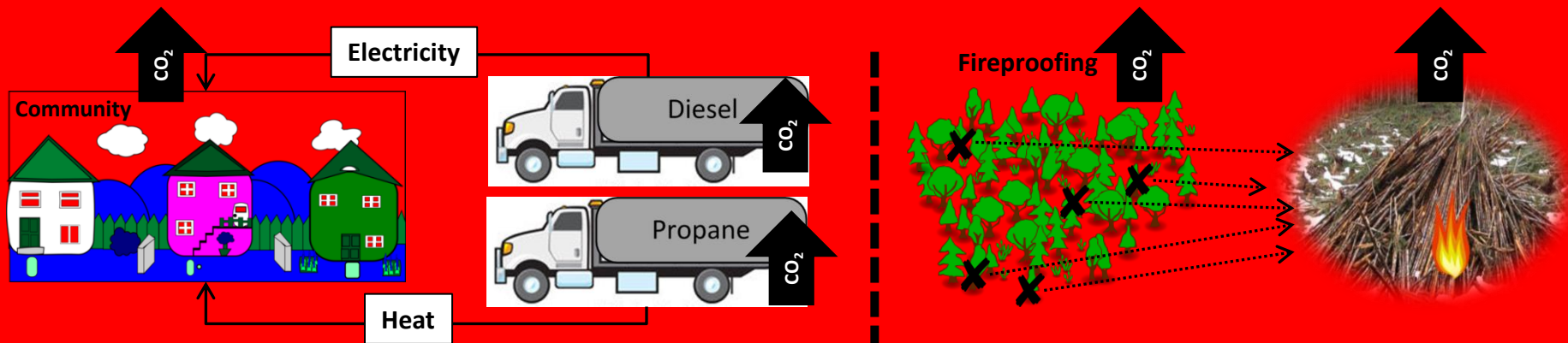
- **Fossil energy supply chain:** annual consumption of diesel, propane, heating oil, transportation distances, costs, employment, emission factors
- **Biomass supply chain:** Timber harvesting schedules, biomass availability and costs, biomass gathering, storing, processing and transportation costs, equipment CAPEX & OPEX, employment, emission factors



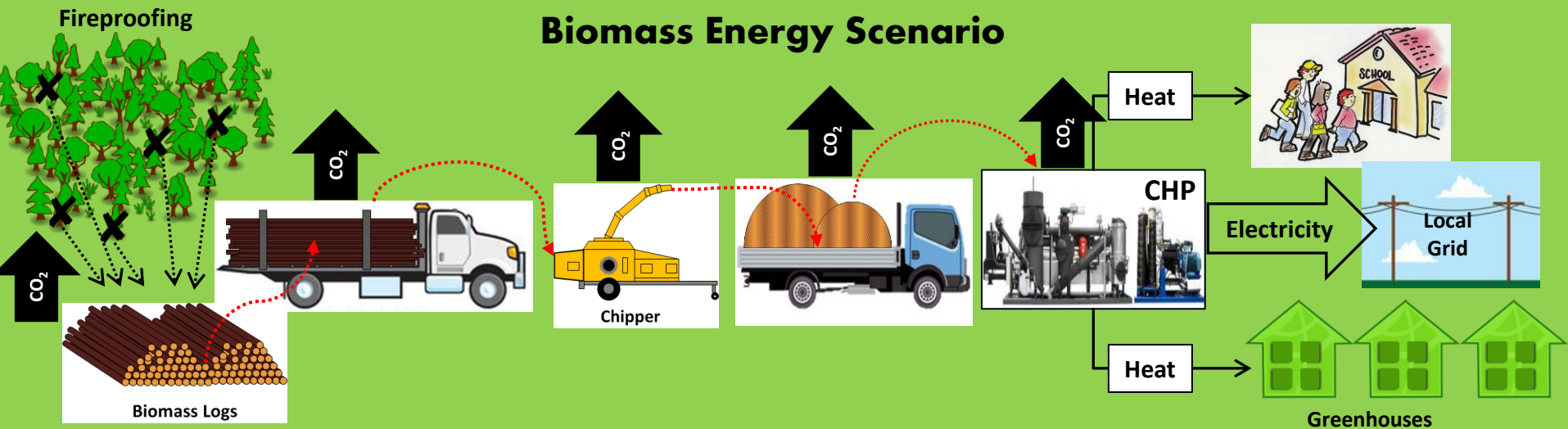
CASE STUDY

- Community fireproofing activities → residues piled & burnt
- Instead, residues can generate both electricity and heat
- 3 x 45 kW_e CHP units → 870 ODt/year or 2,300 m³ solid wood/ year
- How **SUSTAINABLE** is this biomass energy operation?
- Indicators: **GHG Emissions, Local Salaries and Employment, Capital and Operational Costs, and Local Investment**

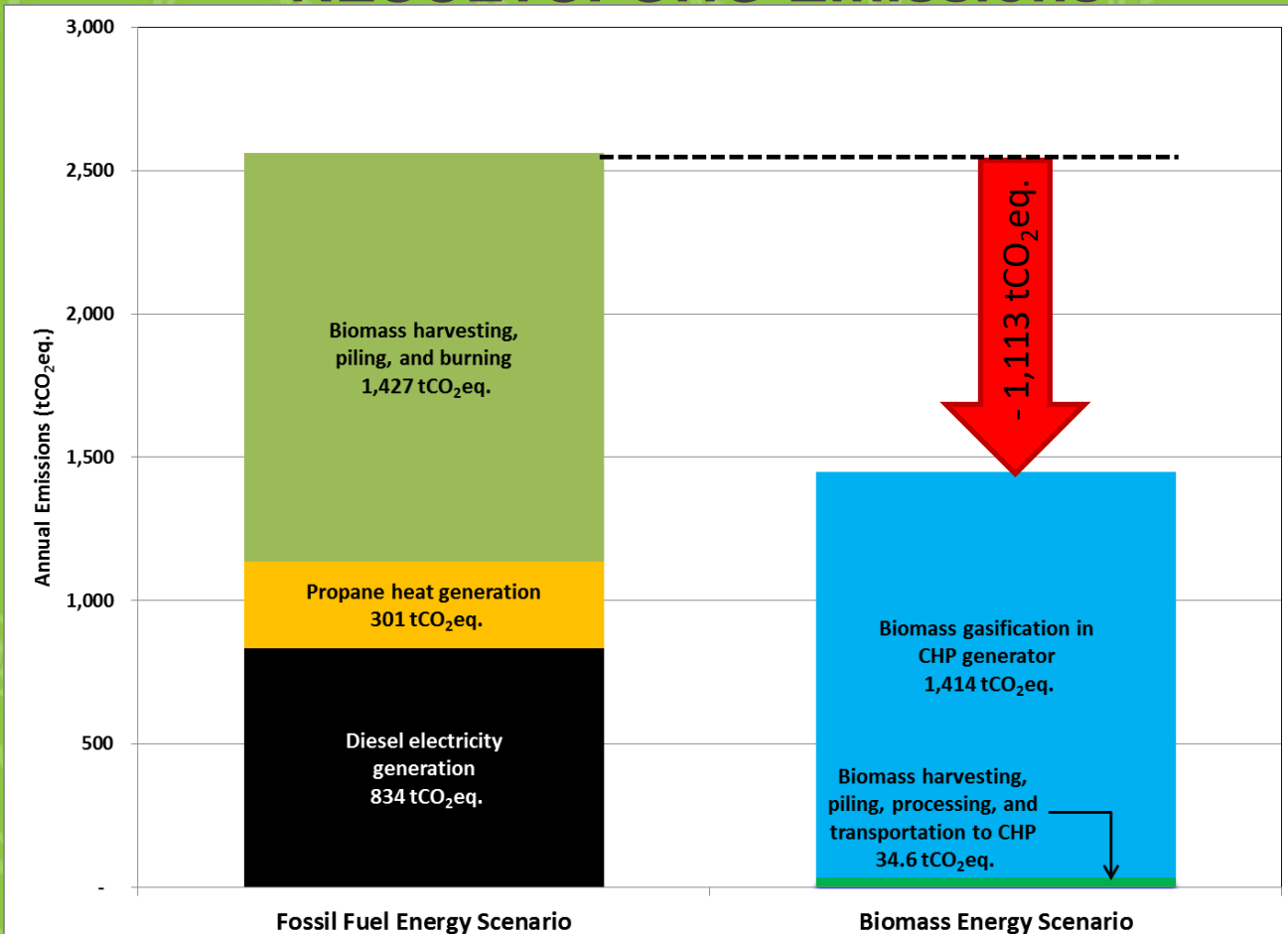
Fossil Fuel Energy Scenario



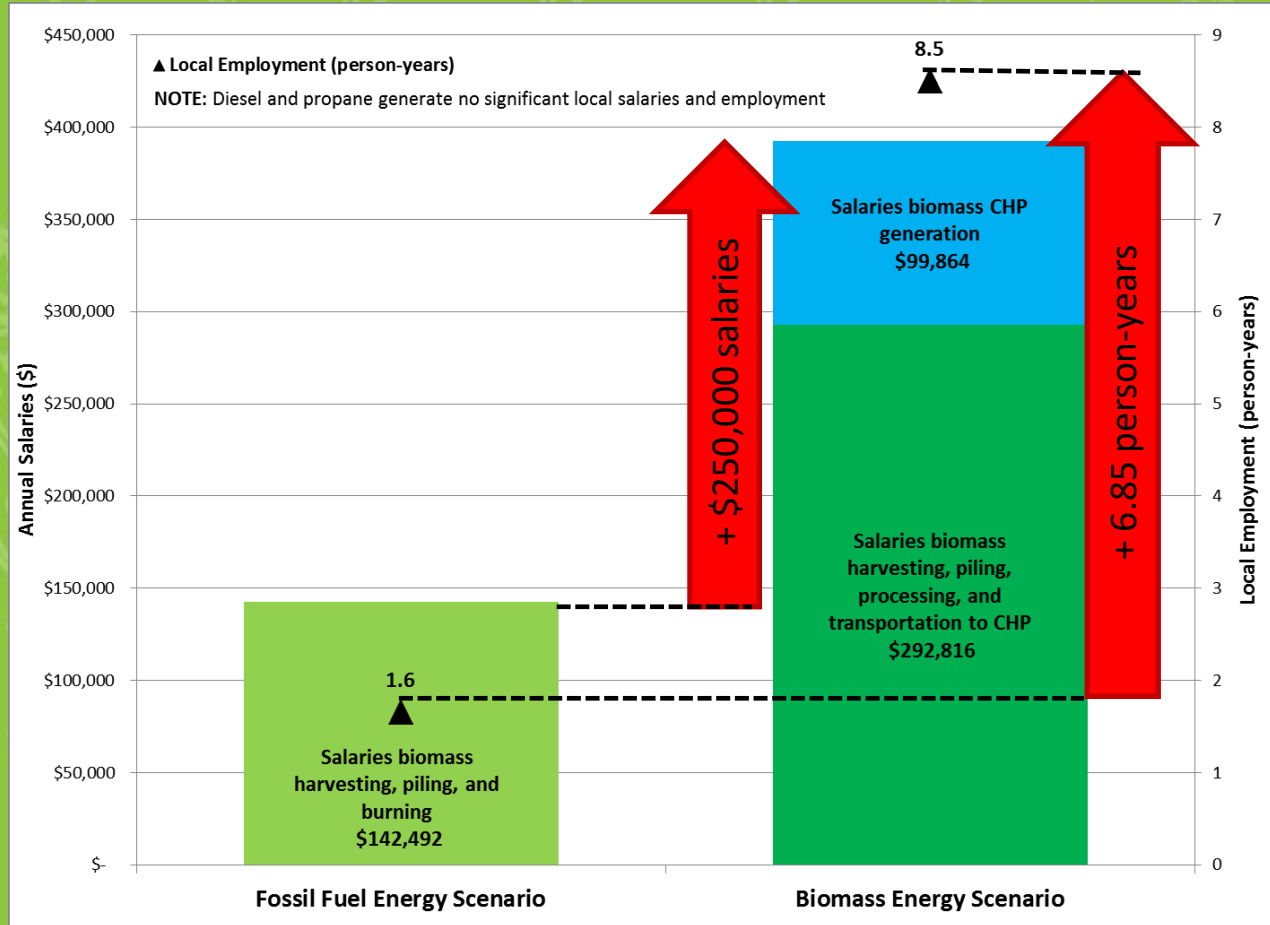
Biomass Energy Scenario



RESULTS: GHG Emissions

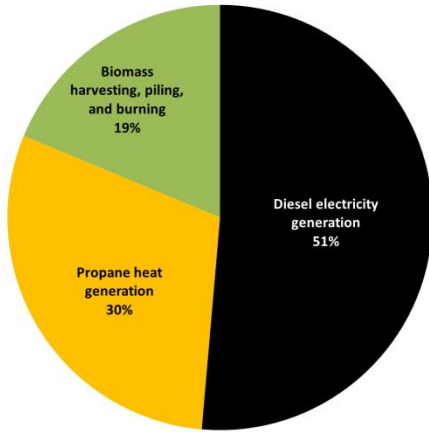


RESULTS: Salaries and Employment

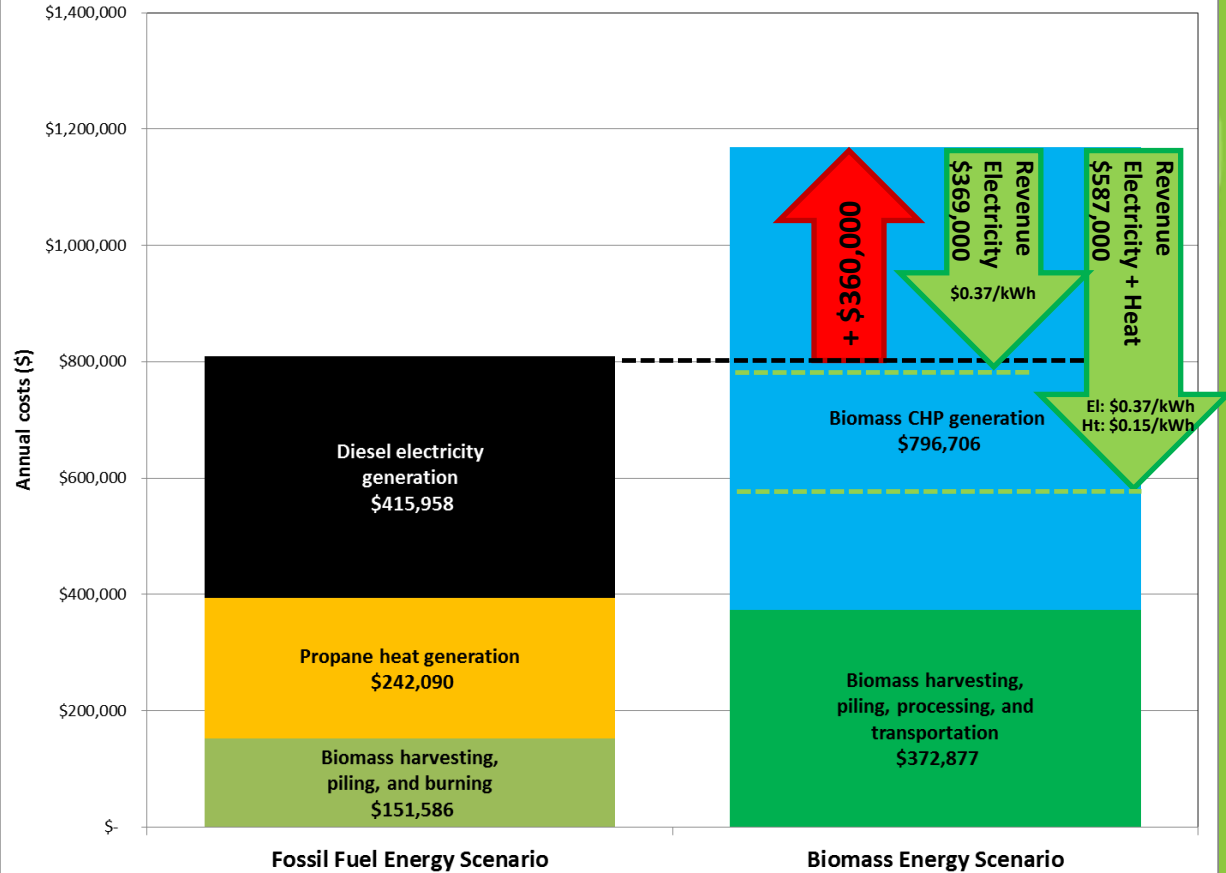
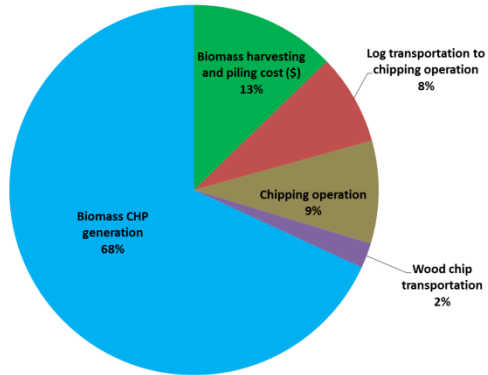


RESULTS: Total and per activity costs

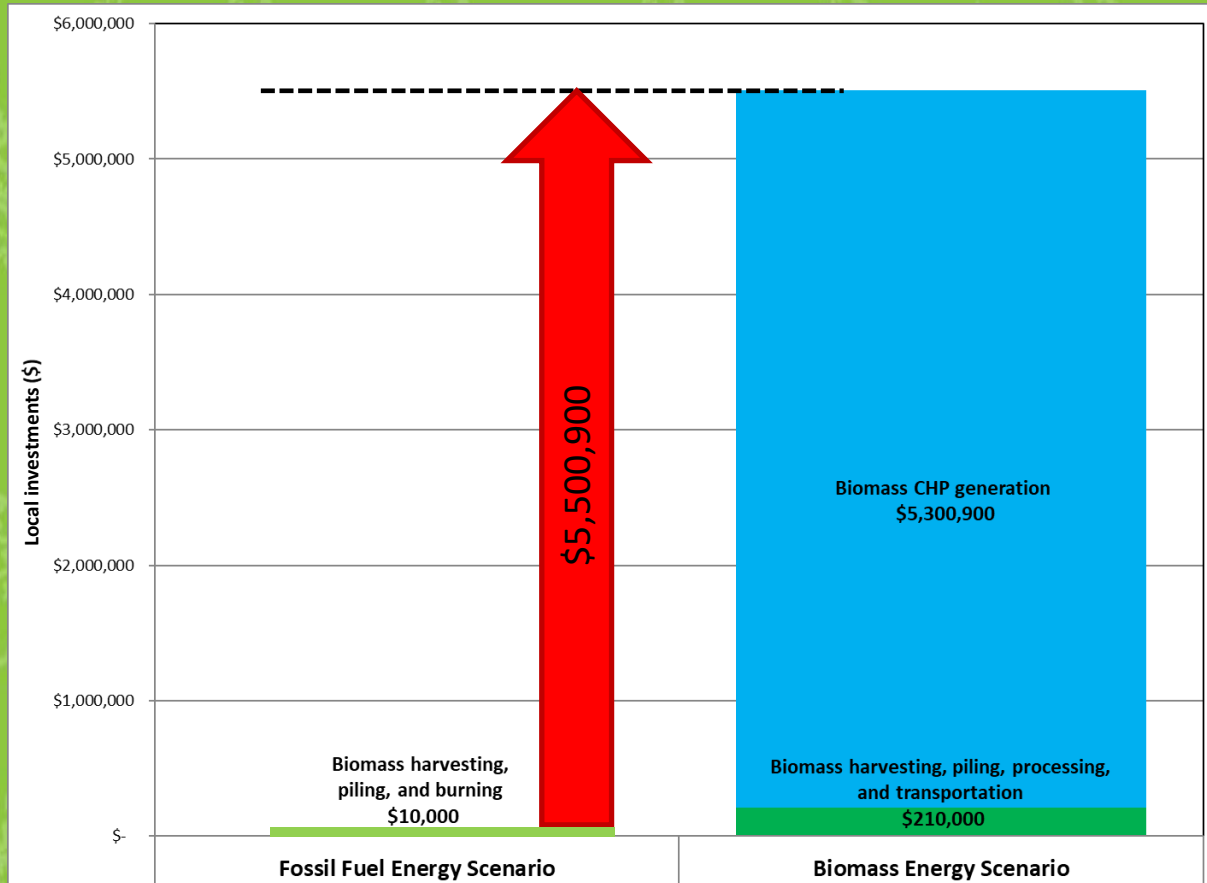
Fossil Fuel Energy Scenario Costs



Biomass Energy Scenario Costs



RESULTS: Local Investments



CONCLUSIONS

Biomass CHP system costs more than current fossil fuel systems

However, sustainability benefits offset these costs

Significant emissions savings and local employment/wages



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