Life Cycle Inventories & Assessment of Products & Buildings & Biofuels

measures of all the inputs and outputs for every stage of processing

LCI/LCA is the accepted method
- ISO standards have been established
- Principles accepted by IPCC
- EPA is now emphasizing the importance of LCI
- CORRIM wood products LCI/LCA already accepted in NREL’s all-material US LCI database
- LCA metrics based on hundreds of LCI emissions provide credible risk measures: energy, GHG(carbon), toxicity (air &water), waste

CORRIM Biofuel LCI/LCA objectives

Integrate with CORRIM product LCIs
- CORRIM has published structural wood product LCIs for all stages of processing from NW and SE supply regions through LCAs for warm and cold climate virtual houses. (Phase I).
- Extensions in supply region LCIs to NE/NC with hardwoods, and the fire prone Inland West are in draft form. Extensions in LCAs to seismic sensitive west coast buildings both res and no-res are nearly completed. LCIs for non-structural particleboard, MDF and resins are in draft form. (Phase II).
- We have LCA substitution analysis for structural buildings (steel and concrete frame) but not fiberboard products (interior applications, furniture, packaging) or paper.
- Biofuel LCIs will fill gaps in the use of forest resources when aligned with CORRIM’s existing LCI/LCA data, and support LCAs for fuel substitution alternatives.

Consistent Methodology
- Start with regional supply models, but national process flow models – to inform infrastructure growth decision making
- leading to regional scale facility models.

LCI requires rigorous protocols for consistency, comparability & scalability
- CORRIM established research guidelines for consistency across products, processes, regions, etc.
- Biofuel collection will differ regionally
- Treatments will differ by forest type & owner objectives
- Short rotation resources will differ by species etc.
- Many bioprocessing methods have potential
  - Direct heat for drying (smallest scale)
  - Combined heat and power
  - Pulp mill platform for extended capabilities
  - Liquid fuel/chemicals via gasification or fermentation
  - Mixed resources

Game Plan for the workshop:
- Listen to research representatives doing current work
- Determine best methods to develop LCI/LCAs
- Consider best strategy for emphasis given limited resources
  - What to include, what to leave out or defer
  - Quality over quantity for credibility over coverage
  - Direct link to CORRIM’s Phase I&II
  - Catalog who is doing what/where and how to leverage results
- Extend the capacity to develop LCIs and Provide LCA comparisons (experience and education)
- Develop a work/task plan and budget for CORRIM Board approval and implementation
Project Stratification
(no one said this would be easy)

- **Collection** by region, forest type, location, management strategy, transport logistics
- **Short Rotation Plantations** by region, species, scale
- **Biofuel Processors** by scale, energy form and end use
- **Integrated Biofuel Comparisons** for energy, carbon, by material source, region, processing type, treatment/collection type
- **Integration of both products and biofuels to the forest resource** for sustainable management of forests, carbon tracking, energy displacement, and fossil intensive substitution

---

Total Energy for Life Cycle Stages (MJ/m³) SE/

Example outputs from Phase I

---

Product Manufacturing Carbon Emissions

Net Product Life Carbon Emissions

---

GWP Emissions for Framing Alternatives

Global Warming Potential with Product Storage
What Future Carbon Prices Will Do:

- Pay to collect forest residuals
- Pay to collect waste
- Pay to use more wood in construction or other fossil substitutes (furniture etc.)
- Pay to use more bio processing

Growing Carbon Pools: from State & Private Inland West (per acre avg.)
Gaps that need filling

- Impact of substitutes for fiber products
- Using forest residuals
- Avoiding fires by management
- Collecting wood wastes
- Growing biomass faster (short rotation crops)
- Avoiding or capturing landfill emissions

This project will contribute to all - but the substitution and land fill impacts may need more emphasis