Overview of CORRIM Program and Direction

Forest Products Society Annual Meeting
Knoxville, TN., June 13, 2007

Bruce Lippke, Professor & Director RTI, U of Washington
and President, CORRIM

Consortium for Research on Renewable Industrial Materials
A non-profit corporation formed by 15 research institutions to conduct cradle to grave environmental studies of wood products
CORRIM Provides Environmental Data for Wood Uses

- Life cycle inventory (LCI) data for wood building materials
- Athena™ EIE: LCA software to assess performance
- Life cycle assessment of residential buildings
- US LCI Database: Environmental database of all US materials and processes
CORRIM’s Research Protocol

• 1996: Formed a non-profit govt. research Co. with a Board representing 15 research institutions
  – Working capital from member institutions and 5 companies

• 1996-98: Developed a 22 Module Research Plan
  – Agenda 2020 DOE grant

• Research guidelines follow LCI and LCA international protocol of ISO 14040’s Standards

• Reviewed by International LCI/LCA experts
CORRIM Plan

✓ **Phase I - 1st 6 modules 00-04 ($1mil USFS, 10 Cos, 10 Ins.):**
  ✓ NW&SE forest resources
  ✓ Lumber, plywood, LVL, glulam, trusses, SE OSB
  ✓ N&S virtual house

✓ **Phase II - extended geography 04-07 ($1mil)**
  ✓ 05: building components LCA; & cradle to gate LCI
  ✓ 07: NE/NC & Inland W resources & structural products
  ✓ 07: MDF, particleboard & resins
  ✓ 07: Western housing, non-res, assemblies w/seismic

✓ **Phase III:** discussions ongoing (education)
Phase 1: Input & Output Surveys conducted on 20 product processing and housing life stages.
Phase 2—Additional Forests and Construction Sites

- Seattle House & non-res. Wet Climate seismic stds.
- Minneapolis House Cold Climate
- Atlanta House Warm Climate
- S. Cal. House & non-res Warm Climate seismic stds.
Structural Wood Products, Home Construction, Use, Maintenance & Disposal (A life cycle)

Phase 1 Report

July 2004

Reports, presentations, publications, and news releases available on: www.corrim.org
CORRIM’s Phase 1 Research

“Cradle”

Forest Regeneration to Harvesting
PNW and SE

Processing of Structural Materials
PNW and SE
- Lumber
- Plywood
- Glulam
- LVL
- I-joists
- OSB (SE only)

Product
“Gate-to-Gate”

Construction of Virtual Residential Buildings to Code
- Minneapolis wood and steel designs
- Atlanta wood and concrete designs

Building Use and Maintenance

Disposal or Recycle

“Grave”
Stages of Processes
Forest Resources and Wood Products

Cradle-to-Gate LCI
Stages of Processes
Unit Process Approach for Manufacturing

**Inputs:** electricity, fuels, resin, wax, & water

- Log Handling & Flaking
- Drying & Screening
- Blending, Forming & Pressing
- Finishing

**Outputs:** co-products & emissions

**OSB Manufacturing Process**
Output of CORRIM Study

- Life-cycle inventories (LCIs) of forest, harvesting, and structural wood products.
- Life-cycle assessments (LCAs) of the construction, use, and maintenance of residential buildings.
- Carbon tracking and storage for forest, wood products, and substitution products.
- Biomass (wood) fuel use.
- Sensitivity analyses of LCI and LCA models.
- Some benefit/cost analyses.
Summary Performance Indices
Minneapolis House

Steel vs. Wood Design (%)

- Embodied Energy: 17%
- Global Warming: 26%
- Air Emissions: 14%
- Water Emissions: 312%
- Solid Waste: -1%
Summary Performance Indices
Atlanta House

Concrete vs Wood Design

- Embodied Energy: 16%
- Global Warming: 31%
- Air Emissions: 23%
- Water Emissions: 0%
- Solid Waste: 51%
Carbon Dynamics vs Steady State LCI

- LCI provides a cross sectional profile of all processes -- a steady state analysis

- Tracking carbon pools over time offers a dynamic alternative for a more financial cost/benefit perspective
Forest, Product and Substitution Pools
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CORRIM’s Phase 2 Expanded Effort

- CORRIM Phase 2 research in progress, it expands upon the initial study:
  - Extends forest resources to NE/NC & Inland W.
  - Assesses building of houses in other regions
  - Assesses low-rise and multi-family homes and commercial buildings
  - Extends wood products to non-structural products such as hardwood flooring and MDF
  - Conducts full product LCI’s and LCA’s
  - Conducts component-by-component construction analyses of walls, floors, roofs and assemblies—a menu of alternative construction options
Atlanta Walls: GWP per component

- Gypsum
- Fiberglass
- Vinyl Siding
- Concrete
- Lumber
- Plywood

kg of CO₂ per 2000 sq. ft.

Wall Type

ATL - KD Lumber

ATL - Concrete

427%
Minneapolis Walls: GWP per component

Wall Type

- MN - Subs
- MN - Steel
- MN - KD Lumber

kg of CO₂ per 2000 sq. ft.

- 0
- 1,000
- 2,000
- 3,000
- 4,000
- 5,000
- 6,000
- 7,000

- Gypsum
- Plywood
- Fiberglass
- Vinyl Siding
- EPS
- Steel

314% 44%
Floors: GWP per component

- Wood I-joists: 2%
- Wood Dimension Joists: 454%
- Concrete Slab: 731%
- Steel Joists: 

kg of CO₂ per 768 sq. ft.
ENVIRONMENTAL IMPROVEMENT OPPORTUNITIES

- Redesign house to use less fossil intensive products
- Product & system designs for lower burdens
- Scientific data for setting environmental standards
- Pollution standards set using LCI
- Low valued wood fiber for biofuel
- More intensive forest management
- More solid wood production
WTP for reduced emissions in a home purchase:
Comparing wood vs. steel frame

General Mail Survey
Total WTP

Additional mortgage payment $/m

CO2:
Wood advantage

Air pollution:
Wood advantage

Waste:
Steel advantage

Reduction Amount (percentage (for air and solid))/ ton
CORRIM Phase III?

1. Additional Product LCA extensions like increased biofuels, treated wood etc.

2. Education and Tech transfer like pubs, short courses, interactive video for engineers and architects and accredited curriculum.
   - International collaboration
   - Educator collaboration

3. Product Standards & labeling like developing an environmental criteria, evaluating the LCA of existing standards and regulations.
   - Carbon Cap & Trade methods
   - Green criteria
   - Marketing such criteria (certification)

The objective has been to maintain the scientific high ground with only educational support for tech transfer to users rather than get involved in advocacy. **All we need is money.**
Support Acknowledgements

- CORRIM- Consortium for Research on Renewable Industrial Materials
  - 15 research institutions and 23 authors
  - DOE & 5 companies funded the Research Plan
  - USFS/FPL, 10 companies & 8 institutions funded Phase I
- USFS, 10 companies & 6 institutions currently funding Phase 2
- Many product manufactures surveyed
The details:

Complete Phase 1 report (1000 pages), 12 page sum, 4 page fact sheets, and 1 page release available at CORRIM website: WWW.CORRIM.ORG

Athena: www.athenaSMI.ca

LMS: http://LMS.cfr.washington.edu

USLCI database: www.nrel.gov/lci

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