

CORRIM
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DATE: June 25, 2008

TO: CORRIM Board, Members and Supporters

FROM: Bruce Lippke, President and Tom McLain, Secretary

SUBJECT: MINUTES OF THE 2008 ANNUAL BOARD MEETING, held in St. Louis, Missouri, JUNE 24, 2008

(DRAFT, please provide additions, corrections to blippke@u.washington.edu)

Call to order: The meeting began at 2:15 CDT June 24, 2008 with 14 voting members and 7 other non-voting members, Panel Chairs, advisors, cooperators, Technical Committee members and guests represented. Fourteen of 15 eligible voting Board members were represented, 5 by speakerphone.

Attendance: *Institutional members:* Bruce Lippke, Tom McLain, Paul Winistorfer, Jim Dangerfield and alternate Patrice Tardif, Michael O'Halloran, Steve Zylkowski, Rado Gazo, Sudipha Dasmohapatra alternate for Steve Kelley, Susan Anagnost and alternate Bill Smith, and by phone Pat Huelman, Leonard Johnson, Jim Wilson, Gary Heroux, Jim Finley alternate for Paul Smith; *Forest Service advisors:* Ken Skog, Ted Wegner; *Cooperators, technical committee members, and other interested participants:* Richard Bergman, and by phone Wayne Trusty, Lynn Michaelis, John Perez-Garcia.

Board Members Represented: Mississippi State, Washington State, Louisiana State and Tennessee remain temporarily vacant leaving 15 eligible voting members.

Minutes of the June 12, 2007 Annual Board Meeting were approved as distributed. The Board passed a resolution "that all conduct and actions of the Directors and Officers since the last annual meeting which were referred to or disclosed in communications to members be ratified, confirmed and approved."

Annual Report: the draft annual report distributed prior to the meeting was approved with the addition of several corrections/omissions. The financial statements attached to the annual report were reviewed and approved subject to the final adjustments reflecting end of month expenses for consistency with the report that will be provided to the IRS for the fiscal year ending June 30, 2007.

Fund Raising: Lippke reported that no new grant funds were booked during the year but a \$314,000 grant to demonstrate fire risk reduction alternatives on carbon and a \$500,000 grant to begin a biofuel collection and processing LCI have been awarded and are being processed. \$13,000 in new funds were raised (\$18,000 total) for the Phase 2 bioenergy supplement characterizing the reduction in burdens from the potential to increase the use of biofuel within wood product mills, with another \$10,000 expected from the Weyerhaeuser Foundation. These funds are sufficient to complete the module as a consequence of developing a more efficient way to simulate the impacts. Donations of \$14,000 from CPA and the Engineered Wood Foundation raised the total company, foundation and industry association contribution for the Phase II Research plan to \$255,000, \$33,000 over the original target after including the bioenergy

supplement. However we are still carrying \$27,500 receivables for three final pledges invoiced in 2007. Attempts to receive financial support from the Bi-National Softwood Lumber Council continue focused on providing life cycle educational activity considered core to providing better data for their product promotion activities and also central to the CORRIM Board's objectives of contributing more to the education of life cycle science and environmental performance information. They have delayed making funding decisions for a number of applications.

Phase 2 activity reports:

Most all of the Phase II Research Plan Modules are nearly complete and the discussion centered around the most appropriate plan for a formal LCI/LCA review as an addition to technical reviews and formal journal review processes. A publication plan (attached) was discussed. The Board approved the plan of editing final reports for submission as journal articles covering the Phase II Research plan to Wood and Fiber Science for a special issue as outlined in the attachment with the caveat that any savings from the budgeted publication and review expenses be devoted to synthesis summary articles in other journals to broaden the coverage of publications.

Phase II Research Plan Status :

Cradle-to-Gate LCI's for Phase 1 products (Jim Wilson, OSU): was completed by Maureen Puettmann and Jim Wilson and published in Wood and Fiber Science, December 2005.

LCA Components Analysis (Bruce Lippke, U of Washington): was completed by Bruce Lippke and Lucy Edmonds and published in the Forest Products Journal, October 2006. An interactive streaming video on the subject was also filmed featuring Lucy Edmonds and posted on the website: www.corrim.org.

Extending the carbon tracking in the resource modules to include the landfill (Bruce Lippke and Jim McCarter, U of Washington): The methodologies have been programmed into the 3rd release of the Landscape Management System (LMS) by Dr. James McCarter and will be used in future applications and support for additional publications including the newly funded fire risk reduction treatment alternatives grant with carbon tracking.

Inland Northwest Forest Resources Module (Leonard Johnson, U of Idaho): A final draft of the report was completed (200+pages) with external review comments received which are being incorporated. The dominant Inland West disturbance regime is fire and dynamic simulations of the impact of treatments and their impact on fire and post fire impacts were developed and published as a working paper in conjunction with fire modeling completed by the Rural Technology Initiative at the University of Washington. A journal article was been published in 2008 based on the FPS 2006 annual meeting Biofuel and Wood Utilization Technical Group proceedings.

Inland West Lumber Module (Fran Wagner, U of Idaho): Data has been collected and analyzed, and an LCI model constructed by Maureen Puettmann. A final draft report is anticipated soon.

NE/NC Forest Resources (Jim Finley, Penn State U.): The analysis was stratified over 4 forest types (Spruce/Fir, Oak/Hickory, Northern Hardwoods, and Aspen/Birch) on 4 owner groups (National Forest, Other Public, Industry, NIPF) covering 169 million acres. The report has yet to be integrated with other modules pending resolution of issues that became evident in the review process. Marc McDill is scheduled to complete the corrections in June 2008.

NE/NC Harvest Analysis (Joe McNeil, University of West Virginia): The analysis of harvesting systems was completed and delivered to Leonard Johnson and incorporated into the LCI template developed for other Forest Resource Modules and will ultimately be integrated into the Cradle-to-Gate LCI product analysis with the completion of the Forest Resources module.

NE/NC Hardwood and Softwood Lumber Module (Scott Bowe, U of Wisconsin): Richard Bergman completed the hardwood lumber module and a journal article has been accepted for

publication. The softwood lumber model LCI has been developed and a draft final report is anticipated.

NE/NC Hardwood flooring (Scott Bowe, U of Wisconsin): Steve Hubbard has completed the final draft report and incorporated review comments. It has been submitted for journal publication.

NE/NC OSB Module (Steve Shaler, U of Maine): Survey data has been collected but the analysis is incomplete and assistance has been requested to complete the project.

Particleboard and MDF Module (Jim Wilson, Sustainable Wood Technologies and Oregon State U.): Final draft reports of the cradle-to-product life cycle inventories have been completed and review comments incorporated. Manuscripts are being prepared for journal submission.

Resins Module (Jim Wilson, Sustainable Wood Technologies and Oregon State U.): The cradle-to-resins manufacture report has been drafted and is going out for review. The data was used in the particleboard and MDF LCI studies, and will also be used to replace the European/Canadian resin data used in earlier CORRIM LCI studies for plywood, LVL, I-Joists, and glulam, and will be made available to the USLCI database.

West Coast Housing and Non-Residential Structures Module with Seismic Requirements (Jamie Meil, ATHENA Institute, John Perez Garcia, U. of Washington): Morrison Hershfield Ltd. adjusted the designs of the Minneapolis virtual house used by CORRIM to eliminate the basement in favor of a crawl space more appropriate for West Coast locations and to include city specific seismic requirements for Seattle and Los Angeles. ATHENA Institute provided a preliminary LCA of the basic structures (excluding insulation, interior coverings etc.). This allowed a direct comparison of these new designs with a Minneapolis house that did not include the seismic criteria but in a Minneapolis location isolating the seismic impact from other impacts. The energy consumption is substantially higher as a result of the additional materials needed to meet seismic requirements. Preliminary results were presented at the 2007 FPS annual meeting. The final report was purposely delayed pending availability of the reprogrammed ATHENA EIE model but should be completed late-summer of 2008.

Cradle-to-Gate LCI Module for Phase 2 products (Maureen Puettmann, WoodLife Consulting) Activity on this module has been initiated as availability of the resource, harvesting and manufacturing data is nearly complete.

Cradle-to-Construction LCA Module on Components and Assemblies for West Coast Structures and LCA Analysis of Subassemblies identifying Opportunities for Improved Performance: The contracts for these two modules, while initially Board approved as a placeholder for \$20,000 and \$28,000 were indefinitely postponed at last years Board meeting due to insufficient funds.

Potential for Increased Biofuels Use: The Board approved the addition of a module to analyze the impact of increased use of biofuels in wood processing mills for internal energy if supplemental funding could be obtained. The funding goal will be met from new industry contributions and the availability of an expected grant from the Weyerhaeuser Foundation. The alternative LCIs will be analyzed with the availability of the West Coast building structures.

Protocol Change: The protocol on carbon stored in products was altered to link it directly to the product processing LCI. While covered separately in Phase I both as a part of time dynamic carbon tracking and the integration across stage of processing carbon pools in a steady state LCA format, the fact that it was not linked to the product LCI resulted in users of the USLCI database leaving the carbon stored in products out of their analysis. The change substantially alters the product footprint for CO₂ and it was noted that new fact sheets and publications should be developed to demonstrate the results.

Discussion on Phase 1 and 2 communication outcomes: The Board expressed continued support for increased educational activities as a primary thrust for a Phase 3 program if funding can be found. Tom McLain agreed to lead a brainstorming group on how to better respond to the Boards education objectives given limited funding for any startup activities.

New Grant Board approved budgets:

For the fire risk reduction and carbon tracking grant the Board approved proceeding with the budget plan provided in the grant application which will involve a primary subcontract with U. of Washington, and advisory consultation contracts for supplemental data support needs from member institutions and the involvement of the Lakeview County Resources Initiative. The CORRIM portion of the grant will be for \$214,699, with an additional \$87,974 of support provided by the Forest Products Lab, the USFS Fire Lab in Seattle and the Lakeview Federal Stewardship Unit (Fremont-Winema NF).

For the biofuel LCI grant covering collection and processing stages, the Board approved \$48,000 of the \$500,000 grant be devoted to an early workshop to bring together researchers working in this area with the objective of refining the work plan in order to gain as much as possible by integrating ongoing activities under CORRIM LCI protocols with the expectation that many of the participants will receive supplemental subcontracts to complete the more specific tasks that will be developed at the workshop. The Board encouraged consideration for integrating educational activities associated with the project in the work plan. After the workshop a complete budget for the work plan will be prepared and submitted to the Board for approval possibly as early as October 2008.

Report from the merged Nominating and Fund Raising Committee:

A nominating and fundraising committee met by conference call and email exchange several times to develop a strategic vision for where CORRIM should want to be several years in the future and what steps should be taken recognizing the need for additional talent as a key to success. Their report (attached) outlines a transformation thrust from the Phase I and II research that has been successful to include a new educational mission focused on academic as well as business, agency, NGO and public users.

Elections/Standing Committees: Jim Wilson suggested his role as Stage of Processing chair will be coming to an end with the completion of Phase II and he would like to resign as Vice President with the expectation that a new chair for processing stages will be needed for the biofuel LCI grant. The Board passed a motion unanimously to accept Jim's resignation while making no other changes in the elected office positions for the near term with Bruce Lippke serving as President, Leonard Johnson as Vice President and Tom McLain as Secretary/Treasurer. The Board elected Steve Kelley to replace Wilson on the Executive Committee along with the continued service of Bruce Lippke, Leonard Johnson, and Pat Huelman. After the biofuel project work plan is completed, efforts by the nominating committee to assess opportunities for organizational change will be reinitiated. Formation of an education committee had been put on hold pending funding decisions by the Binational Softwood Lumber Council, however given their delay in funding decisions Tom McLain agreed to lead a brain-storming sessions on best courses of action.

Future meetings: No future meeting dates were planned with the anticipation of a conference call in the fall to approve a complete budget plan for the biofuel project. The FPS 2009 annual meeting June 21 to 23 in Boise Idaho is the anticipated date for the 2009 Annual CORRIM Board Meeting.

Adjournment: The meeting was adjourned at 4:30.

Bruce Lippke, President

ATTEST:

Leonard Johnson, Vice President

Tom McLain, Secretary-Treasurer

CORRIM's Nominating and Finance committees Report to the Board (June 24, 2008)

Participants: Tom McLain, Michael O'Halloran, Jim Wilson, Leonard Johnson, Paul Winistorfer, Steve Kelley, Jim Dangerfield, Kenneth Skog, Bruce Lippke

Attachment: Current Funding Status of CORRIM grants

A joint Nominating and Finance committee meet several times during 2008 with the objective of determining how the organization should change to better address the future. Attendees discussed a range of proposals for possible changes in the mission/vision of the organization with respect to how it should/could be organized and appeal to new leaders and participants as it responds to changing environmental performance needs and future funding options.

Central to the discussion was that while there will be a continuing need for LCI/LCA like research, including carbon tracking, the group remains concerned that the education of many audiences based on the research has not materialized satisfactorily and should be a more deliberate part of future efforts. And, that CORRIM remain a broker of research and education, avoiding direct promotion and advocacy positions that might affect credibility. However, given the substantial data base and tools that have been developed both for wood (by CORRIM) and other materials (by others), the opportunity for education based on sound science for use in framing (not advocating) policy issues and building practices for constructive outcomes has never been better.

To assist CORRIM in responding to these changing conditions a new vision of where we want to be over the next several years is needed that can serve to inspire new leaders and participants, both to advance the educational cause and continue progress on developing useful data and support tools. With agreement on a new vision, it will be easier to focus on developing new leaders. There is general agreement that carbon, renewable energy, and their relationship to sustainability will likely dominate future issues for some years to come and that this must be framed as an all stages of processing i.e. cradle-to-grave issue.

The Board's three-pronged focus as documented at the annual meeting: (1) education (broadly interpreted), (2) extending the scope of LCI coverage where needed, and (3) green building and carbon policy, remain the most important themes. But, in order to stay effective as science brokers, we need to broaden our participation beyond wood and forest researchers and that this will be critical to an expanded educational effort.

The committee believes CORRIM should strive to become a more broadly based educational consortium, providing curricula, distant learning courseware, short courses and articles in multi media to achieve a higher level of understanding of the key environmental and particularly carbon issues of the day. This should be independent of advocating particular material uses even as we attempt to inform users of their impacts. It should not be integrated with wood promotion narrowly but should serve the benefits of any use including wood promotion that improves environmental performance, a recognizably difficult balancing act. It should appeal to new students as well as help identify both product and design opportunities that can improve performance. New leaders must be found to broaden the perspective without diluting the

scientific integrity. Basic research must continue both to fill in gaps and increase credibility and will need to be managed with a broader educational scope in mind.

While CORRIM has so far managed to organize around an extensive but focused research plan it will need to learn how to organize for an educational communication agenda as an additional new thrust. This will likely require better funded administrators such as a nearly fully funded director, and different institutional clusters and participants than was required to conduct the highly segmented Phase I&II research programs.

Important new features should include:

- Learning how to differentiate CORRIM's role in education from product technical support education and developing and promoting the use of educational material.
- Providing information on the complex carbon accounting across stages of processing that can assist policy makers in avoiding the traps associated with looking only at single carbon pools.
- Providing/using a scale of demonstrations from virtual buildings as case studies with impacts scaled to larger regions such as communities for public and policy credibility.
- Innovative building design and product improvement potential.
- We acknowledge that we are in respects much like Extension charged with providing technology transfer for research while recognizing that the extension model and the research model have had difficulty in packaging research for multiple audiences and applications requiring better collaborative models.

Side issues that will benefit by more information and additional planning:

- What funding sources are potentially available to CORIM in the immediate future and how might it constrain our focus/transformation? (See funding status attached)
- Who are the participants that would be effective in participating in both fund raising and managing new activities?
- The Binational Lumber Council's mission to improve wood promotion supported by environmental science can be an important source of support for a CORRIM educational program as an adjunct to their wood promotion. How can CORRIM best participate in an externally funded wood promotion consortium?
- What are the possible case studies CORRIM might leverage to increase credibility?
- The newly funded USFS support for a CORRIM directed LCI/LCA activity on biofuel resource collection (forest residuals, short rotation species, and other sources) and processing alternatives will involve paper processing, new liquid biofuel processing technologies and even mixed solid waste processing alternatives and involve many new collaborators. How might this effort be best directed to contribute to longer-term objectives?
- The USFS climate change competitive grant recently awarded to CORRIM will be able to demonstrate the impact of introducing fire risk reduction treatments to reduce the rate of fires and reduce carbon emissions including increased product storage and displaced product emissions for a broader range of at risk forest types. How might this be able to contribute to longer-term objectives?
- What are the gaps in current research that will be important to credibility and educational efforts and can they be filled by current projects or if not how might they be funded?

Next Steps: Review the strategy statement with the Board soliciting refinements on where we want to be in the next few years and develop assignments for future activity.

1. Leadership for a broad educational effort with perhaps only limited funding support from the Binational Council as a first step. Who (and how) do we enlist new leadership to manage and educational campaign which will need to raise money? Who within our current talent pool should become advisors to this effort?
2. Join with USFS FPL and others to conduct an educational needs and activities workshop in order to better prepare a strategy to identify education themes, leaders and a plan to pursue additional funding.
3. New leadership will be developed as a part of the Biofuel LCI project. Who within our current talent pool should advise this effort with the first step being to better understand related current ongoing activity and expertise across the country?
4. The fire risk reduction and carbon accounting grant will be lead by UW with USFS FPL, USFS Seattle Fire Lab and National Forest Lakeview Stewardship Unit partners. Are their other players that might be involved perhaps in a review capacity that could broaden the impact?
5. Given carbon accounting will be so important in the future are their other carbon related efforts we should be actively pursuing in the near future?
6. How do we better link to the architecture, engineer and builder for greener building technologies?
7. The Board may consider adding to the existing leadership especially such as a Vice President for Education as an immediate possibility. Otherwise the recommendation is to extend (re-elect) the current leadership positions and to extend the life of a joint finance/nominating committee to recruit new leadership in conjunction with the current and prospective new funding opportunities with a commitment to recommend a leadership succession plan for not later than June 2009.

Attachment: **New Funding Efforts:**

1. **Fire risk reduction impacts on carbon:** In response to the USFS climate change RFP with Ken Skog's sponsorship, CORRIM will receive about \$200,000 out of a \$300,000 grant to extend the Phase II Inland west analysis to demonstrate the best treatments for various forest types to reduce fire risk while carrying the analysis through to carbon stored not just in the forest but also products and substitution carbon pools including increased biofuels use from forest residuals. Other partners include the USFS Fire Lab in Seattle and the Lakeview Federal Stewardship unit in Southern Oregon as the location for a demonstration project. The proposed work plan was fairly detailed but will involve a startup meeting to review the methodology and scope the treatments and forest types that will be addressed.
(Proposal attached)
2. **Biofuel LCI:** The USFS efforts to better understand the potential for biofuel uses has resulted in them directing \$500,000 for a biofuel collection and processing LCI grant to CORRIM. The work will be focused on collection of forest residuals and other biomass including short rotation plantations, and a range of biofuel processing facilities including (1) heat processors for solid wood drying, the smallest scale facilities from CORRIM Phase 1 research, (2) heat processing for large pulp mills as a benchmark for future modifications, (3) combined heat and power (CHP) electricity and steam generation, (4) liquid fuel & chemical conversion facilities based on (a) gasification-syngas or (b) sugar fermentation technologies. Mixed agricultural feedstocks will be considered in the larger scale designs. The initial work plan calls for higher expenditures than funds available with additional funding to be raised later including any opportunities for competitive grants. A workshop will be scheduled by end of summer to bring participants together, refine the work plan and provide training on methodological standards.
(Pre-proposal attached)
3. **Binational Softwood Lumber Council LCA support for marketing promotion:** Consistent with the Board's emphasis on increased education on the benefits and use of LCA information, a series of papers, short courses and technology gap fillers were identified as important basic information for a marketing effort to be sponsored by the Council. Following an initial presentation in November, several conference calls have been devoted to scoping out essential information needs. The process of developing a suitable proposal continues. Funding for this effort would help launch the Phase III educational activities proposed by the Board.
4. **Other:** The pulp and paper industry is developing an LCI/LCA analysis for a paper mill that will be linked to CORRIM's forest resource LCIs. The Treated Wood Association has selected a contractor but has not to our knowledge found adequate funding to develop a broadly based LCI of treated wood including promotional applications. While CORRIM advised on the RFP and bid for the proposal the contract was awarded to an engineering firm with no clear indication that the data will be collected consistently with LCI/LCA guidelines. CORRIM also advised on an RFP developed for the Wood Pallets Association but did not find it feasible to respond to the deadlines requested in the RFP but did advise member institutions of the opportunity. Less formal requests for LCI information without a developed funding mechanism are frequent including decking, siding, manufactured panels etc.

CORRIM Phase II Research Plan: report outline for website and journal articles:

PHASE II RESEARCH REPORT ON THE RESEARCH PLAN TO DEVELOP ENVIRONMENTAL-PERFORMANCE MEASURES FOR RENEWABLE BUILDING MATERIALS WITH ALTERNATIVES FOR IMPROVED PERFORMANCE: NE/NC and Inland West Forest Resources and Structural Products; West Coast Light Construction with Seismic Standards; US Resins, Particleboard and MDF; LCA Product and Processing Improvement Opportunities and Cradle to Gate Product LCI's

Previously released Phase 2 publications:

1. Life-Cycle Analysis of Wood Products: Cradle-to-Gate LCI of Residential Wood Building Materials by Maureen Puettmann and James Wilson in Wood and Fiber Science Special Issue: CORRIM Reports on Environmental Performance of Wood Building Materials. Vol 37 Dec 05:18-29.
2. Environmental performance improvements in residential construction: The impact of products, biofuels, and processes by Bruce Lippke and Lucy Edmonds. Forest Products Journal, Oct. 06 Vol. 56, No.10:58-63.
3. Impacts of Thinning Intensity and Implementation Schedules on Fire, Carbon Storage, and Economics by Bruce Lippke, Jeffrey Connick, Larry Mason, Bryce Stokes. in Woody Biomass Utilization: Challenges and Opportunities, Forest Products Journal Publication 7223:47-59 2008.
4. Bergman et al. Hardwood lumber LCI (in process)
5. Hubbard et al. Hardwood flooring LCI (in process)

Phase 2 Final Report

Executive Summary and Main Report (pending completed module reports)

Module A: Inland West Forest Resources (internal review completed, external reviews partially complete)
By Leonard Johnson, Bruce Lippke, Elaine Oneil

Module B: NE/NC Forest Resources (response to internal reviews in progress)
By Marc McDill, James Finley, Paul Roth

Module C: Inland West Softwood Lumber (in progress)
By Francis Wagner and Maureen Puettmann

Module D: NE/NC Hardwood Lumber
By Richard Bergman and Scott Bowe (report completed and journal article accepted)

Module E: NE/NC Softwood Lumber (in progress)
By Richard Bergman and Scott Bowe

Module F: NE/NC Hardwood Flooring (report completed and journal article in progress with U of Wisconsin Funding under CORRIM protocols)
By Steve Hubbard and Scott Bowe

Module G: NE/NC Oriented Strandboard (help has been requested requested and will be provided)
ByStephan Shaler

Module H: Cradle-to-Gate LCI of Residential Wood Building Materials (Lumber and OSB) from NE/NC and (Lumber) Inland West Supply Regions. (in progress)
By Maureen Puettmann

Module I: US Particleboard with Cradle to Gate LCI (report completed)
By James Wilson

Module J: US Medium Density Fiberboard with Cradle to Gate LCI (report completed)
By James Wilson

Module K: US Wood Industry Resins (report in progress)
By James Wilson

Module L: Life Cycle Assessments of West Coast Residential and Non-residential Buildings with Seattle and Los Angeles Seismic Codes (in progress)
By Jamie Meil, et al

Module M: Inland West Carbon Tracking by region and owner specific treatment alternatives
By Elaine Oneil, Leonard Johnson and Bruce Lippke (Complete report as a stand alone appendix to Module A)

Module N: PNW Impact of Increased Internal Use of Biofuel on Energy and Carbon
By Jim Wilson, and Bruce Lippke (Will be completed in parallel with Module L)

Special Journal Issue (preliminary planning):

Special Issue: CORRIM Reports on Extending the Environmental Performance of Wood Uses for More Comprehensive Regional, Product, and Building Structure Coverage

Editorial: Extending the US Coverage for the Environmental Performance of Using Wood with Implications for Carbon Accounting
By John Perez Garcia, Bruce Lippke, Jim Wilson (to be drafted)

Life-cycle analysis of structural wood products from Cradle-to-Gate
By Maureen Puettmann

Life-cycle impacts of Inland West and NE/NC forest resources
By Leonard Johnson, Elaine Oneil, Marc McDill, Bruce Lippke, James Finley and Paul Roth

Life-cycle impacts of Inland West softwood lumber
By Francis Wagner and Maureen Puettmann

Life-cycle impacts of NE/NC softwood lumber (NE/NC hardwoods and flooring covered by other journals?)
By Richard Bergman and Scott Bowe

Life-cycle impacts of NE/NC Oriented Strandboard
By Stephen Shaler and Jim Wilson)

Life-cycle impacts cradle-to-gate of US Particleboard and MDF
By James Wilson

Life-cycle impacts cradle-to-gate of resins used in wood composites

By James Wilson

The impact of Seismic Codes on residential structures

By Jamie Meil and Bruce Lippke

Comparing Life-cycle impacts across residential-single, residential multi-wall, and, non-residential for buildings of different materials in different regions

By Jamie Meil, et al

Inland West Carbon Tracking by region and owner specific treatment alternatives

By Elaine Oneil, Leonard Johnson and Bruce Lippke

PNW Impact of Increased Internal Use of Biofuel on Energy and Carbon

By Jim Wilson, and Bruce Lippke