

Agricultural Research Service and TallWood Design Institute

2022/2023 Combined Funding Announcement – Agricultural Research Service

A. FUNDING OPPORTUNITY DESCRIPTION

We are pleased to invite proposals for research projects under the “Developing leadership in the design, manufacture and construction of buildings using innovative wood products.” Program, funded by the USDA Agricultural Research Service. This call targets projects that can help achieve the research goals of the ARS proposal through the TallWood Design Institute, a collaborative effort among Oregon State University College of Forestry, University of Oregon College of Design, and Oregon State University College of Engineering. The TallWood Design Institute brings together expertise in architecture, wood science, and engineering to undertake research and development and education related to innovative wood products and building systems capable of being produced in Oregon and the Pacific Northwest. The Institute has active partnerships underway with design professionals, engineers, wood products manufacturers and agencies related to building code development to drive innovation and testing for engineered structural wood materials, enhance wood utilization in the built environment, and enable the region to be highly competitive in emerging domestic and global markets.

Preference Criteria

Selection of projects for funding will be based on the following criteria:

- Alignment with the thematic research priorities of the TallWood Design Institute and ARS (see below)
- Building on the findings and synthesis of previous research done under this call
- Multi-disciplinary partnerships among researchers, in particular those involving Oregon State University (OSU) College of Forestry (COF), University of Oregon (UO) College of Design (DSGN), or OSU College of Engineering (COE) faculty
- Active collaboration with the private sector and projects that are strongly linked to and driven by industry needs. Projects that address current challenges or opportunities in the architectural design, structural engineering, mass timber product manufacturing or construction fields will be favored.
- Potential for tangible benefits to the industry (design, engineering, manufacturing or construction sectors) over the next 2-5 years.
- Innovative projects that have the potential for *significant impact* on manufacturing, design, construction, or product development will be considered even if their commercial impact has a longer timeframe.
- Use of the Emmerson Lab facilities, wherever relevant
- Promotion of equity and inclusion of diverse perspectives and experiences

B. GOALS AND THEMATIC PRIORITIES

Program Goals

The overarching goal of this funding program is to help companies in Oregon and the Pacific Northwest develop competitive leadership in accessing emerging domestic and global markets for new engineered wood products. One of the keys to success of any industry is a focus on current challenges as well as a focus on future innovations. Success will increase the value of the region's forests, support sustainable management, and grow the number of manufacturing jobs in rural communities. The Pacific Northwest's timber industry can benefit by growing its capacity to manufacture mass-timber building components, including cross laminated timber. Similarly, the region's building design profession is ideally positioned to expand on its reputation for sustainable design and establish itself as North America's hub for expertise in innovative wood building design.

Our aim is to conduct and disseminate research to help the region's business community capitalize on the growing interest around the world in using more wood in taller structures. We aim to provide information that helps stimulate markets, remove barriers, foster innovation, understand risk, and inform capital and cost analyses. In addition, in order to fulfill academia's traditional role in leading industry, we also encourage innovative research that may pave the way for continued development and competitiveness of engineered wood product use in the built environment.

Objectives fall into two broad categories:

- Conduct research to stimulate new wood building design; expand and develop new products, next generation product concepts and building components, facilitate building construction approvals and processes, alleviate anticipated challenges in wood construction, and foster markets and next generation supply chains for taller wood buildings and engineered wood product use in the built environment.
- Effectively disseminate and communicate research findings to scientists, manufacturers, designers, and relevant public-sector personnel.

2022/2023 Research Priorities (eligible for up to 3 years of funding)

Our research priorities address the central theme of increasing applications for wood-based products that can be appropriately used for structural purposes in modular, multi-family and tall wood buildings and other appropriate applications. Research may focus anywhere along the supply chain where benefits can be derived – from the sourcing and development of materials to their end-of-life, and to design, engineering, manufacture and construction. Proposals in this category must explicitly articulate how the proposed project addresses one or more of the following themes.

1. Research that proposes new or validates existing roof and/or floor systems where steel and concrete components can be entirely or partially replaced with wood products

New products that replace composite metal decks, site-cast concrete (flat slab, beam slab, flat plate), precast concrete (hollow core or solid slabs) and other commonly used floor and roof structural assemblies. Comparisons focusing on economics, technical performance and environmental impact should be an integral part of these research efforts. Projects can focus narrowly on the performance of specific components or broadly on entire assemblies.

2. Research that that can answer important technical questions while leveraging or complementing large-scale research efforts undertaken by other entities

There are a number of research topics that would significantly contribute to increasing the use of wood in multi-story buildings; for example, any research related to diaphragm behavior, performance of wood braced systems (co-centric, eccentric and buckling resistant), and on the use

of adhesives for connections in these systems. Projects that tackle these themes while creating synergistic relationships with other research institutions, or supplement and support existing large-scale high visibility research initiatives are highly effective and desirable.

3. Research that validates existing or proposes new connections as standard solutions for vertical load carrying systems, and addresses some or all of seismic, fire, fatigue and moisture-related performance concerns

Plate-to-beam, beam-to-girder, girder-to-column connections and their performance at seismic-related displacements in high seismic areas are of significant concern to design professionals. Research that will allow development of best practices for design and construction methods of these connections could significantly alleviate concerns, optimize performance and speed up code approvals.

4. Research that contributes to the development of alternative approaches to ELF (Equivalent Lateral Force) seismic design

Research on design methodologies that either reduce or eliminate the need for developing seismic factors (R , C_d , Ω) for timber lateral load resisting systems offer a unique opportunity for wood experts to pioneer efforts related to codifying performance-based methodologies.

5. Research that validates or proposes new hybrid systems that combine wood Vertical Load Carrying Systems with steel or concrete Lateral Load Resisting Systems

In order to speed up adoption of wood as a choice material for buildings, structural systems that could be classified as equivalent to existing systems approved by code would be highly desirable. Examples of such systems could include wood buildings with concrete core, wood buildings with steel brace or moment frame, etc. Hybrid components such as wood beam with embedded steel or concrete segments could also be included.

6. Research related to fire, vibration, or durability (especially moisture-related) performance

A significant body of testing has been performed in Europe over the last 20 years related to the performance of CLT panels in various situations. Also, significant testing has been performed in New Zealand and Canada related to post-tensioned wood structures. Comprehensive review and validation of some of these studies would allow quicker development of prescriptive or performance criteria for code adoption.

7. Research that helps to develop modular systems including components or assemblies (panel + windows + finishes + EMP) for use in affordable housing, fast deployment housing, etc.

Modular construction offers significant potential benefits to the wood products manufacturing community. It allows a shift of labor from site to factory. It increases the addition of value to commodity products and significantly contributes to improving the labor market in rural communities. Of specific interest are modules for hotels, multi-family construction, affordable housing, fast deployment (emergency and military use) and schools.

8. Research that addresses wood-related environmental concerns and explores carbon benefits and lifecycle analyses of wood buildings

Life cycle analysis focused on comprehensive and coordinated examination of all factors affecting carbon sequestration issues in mass timber buildings, including, but not limited to wood-related research that addresses environmental concerns and questions related to, whole building life cycle assessment (WBLCA) and WBLCA with end-of-life considerations, consumer perception of mass timber buildings, adhesives and other environmental impact topics, achievement of net-zero, etc.

9. Research on digital design, fabrication and construction of wood buildings

Research that investigates the role of advanced digital technologies through design-build projects or iterative prototyping is of interest, including computer-aided design, computer-aided-manufacturing, CNC fabrication and robotic fabrication and assembly of building elements.

10. Business and economic questions

In addition to the technical challenges related to mass timber buildings, there are some economic questions that continue to represent barriers to wider adoption. Developers require comprehensive, empirical information comparing the costs of mass timber buildings to better-known reinforced concrete and steel systems, while uncertainty over market size and dynamics, evolving production technologies and manufacturing models delays the entry of many wood products manufacturers into the market. Research addressing these questions is welcomed.

11. Research and outreach materials development that contribute to educating architects, engineers, builders and developers on modern timber construction

TDI is intended to play a strong supporting role in industry product development and capacity building as well as encouraging greater use of wood in the built environment. Research and related outreach publications that assist in developing market “pull” and manufacturing base “push” strategies are considered highly desirable. We invite proposals for development of design guides and research summaries in stakeholder friendly formats.

12. Development of new advanced timber products

Development and testing of new engineered wood products such as mass plywood panels (MPP). We encourage proposals for research, development and testing of new wood products for application in buildings and furniture that have commercial impact over a 2-5 year time frame or may have industry impact over a longer time period.

C. AVAILABLE FUNDING 2022/2023

Financial Scope – Approximately \$1,000,000 in funding is available (\$400,000 for projects starting 01/01/22 and \$600,000 for projects starting 07/01/2022). A proposal describing your project and overall budget request and project duration are required at the time of submission. Detailed budgets are not required at the time of submission, although we strongly encourage you to use provided budget templates and guidance to accurately estimate your total project costs. If your project is chosen for funding, you will have 2 weeks after notification to provide a full budget. Awards are pending receipt of funding.

D. ELIGIBILITY INFORMATION

Eligibility - Faculty at Oregon State University College of Forestry and College of Engineering, and the University of Oregon College of Design, are eligible to apply. The lead principal investigator (PI) must have at least a half-time professorial ranked appointment. Unfunded Co-PIs or collaborators may include non-OSU/UO faculty and/or industry professionals.

PI Limit - Faculty are limited to submitting as lead PI on one major and one small (up to \$30K) project in the current funding cycle.

E. CONFIDENTIALITY

Proposals are not publicly disseminated.

F. SUBMISSION INFORMATION

Submission Information – Proposals are due by **Noon PT Friday, November 19, 2021**. Submit the proposal using the required template in MS Word format electronically to Cathy Knock cathy.knock@oregonstate.edu with a cc: to katy.kavanagh@oregonstate.edu.

G. PROPOSAL PREPARATION INSTRUCTIONS

A proposal narrative must be submitted using the required template available at <https://www.forestry.oregonstate.edu/research/funding> The formatting requirements are 8.5 x 11 inch, one-inch margins using Times New Roman font size 11.

Please follow the format and guidelines in the provided template. Proposals that do not follow guidelines may be returned without review.

Components of the template include:

- A. Cover page – 1-page maximum, follow template
- B. Project description - 5 pages maximum (you can do less if you desire) following the elements numbered and organized as described below and in the template in the following areas:
 1. ***Introduction, justification and relationship, if any, to prior research done under this call.***
In layperson’s terms describe the justification and merit for the proposed work. Identify the priority research themes that the research will address.
 2. ***Research location, methods and personnel***
Describe your research plan in enough detail for reviewers to understand that the project is likely to be completed successfully. Clearly outline the role that graduate students will play.
 3. ***Anticipated outcomes and impacts***
In layperson’s terms describe the planned outcomes and deliverables. Clearly identify the tangible industry impacts over the short and medium term. Describe your planned activities for communicating results/impacts.
 4. ***Timeline***
Provide a timeline that summarizes research tasks and major milestones. Include outreach activities.
 5. ***Partner linkages and support***
Describe proposed partnerships between OSU and UO faculty, between COF and COE faculty, and/or with businesses or agencies outside OSU and UO.
 6. ***Diversity, Equity, and Inclusion***
Describe how this project will address equity and inclusion of diverse perspectives and experiences?
- C. Bibliography and references cited (1-page maximum)
- D. Emmerson Lab Facility Use technical plan (1-page maximum) **NEW FOR 2022/2023**
Proposers using Emmerson Lab must submit a one-page technical plan to TDI describing the expected technical support required (graduate student training/supervision, fabrication or testing support required from TDI staff, equipment/space requirements) and a proposed

calendar for technical activities. This plan should be developed in consultation with the TDI Technical Manager and will help ensure the needed resources will be available when needed.

Proposal Evaluation Process/Timeline

Project review and selection process:

- Lead PI will give a short presentation on **Friday, December 10, 2021** via Zoom to the external review panel followed by Q & A session.
- An external review committee made up of industry representatives from the structural engineering, wood products manufacturing, construction, business, and architecture fields, academia, and governmental researchers will review and rank the proposals.
 - It is highly recommended you discuss your proposal with our industry review panel members as appropriate. The list of reviewers will be posted at <http://tallwoodinstitute.org/ars-2021-industry-review-committee> as they are confirmed.
- The Dean of the College of Forestry will make the final selection of projects for funding and notify PI.
- Award letters will be issued to PIs once institutional approvals including any research compliance requirements are met.

At the discretion of the TDI Director and ARS PI, projects of \$30,000 or less may undergo a streamlined review process by an internal committee consisting of the Associate Dean for Research at COF, the COF Wood Science & Engineering Department Head, the TDI Director of Design, and the OSU COE Civil Engineering Department Head.

H. DETAILED BUDGET INSTRUCTIONS

If your proposal is selected for funding, a detailed budget and budget justification are required along with unit and institutional sponsored programs research offices (OSU and UO) reviews and approvals within 2 weeks of notification. The CoF Research Office (CoFRO) will assist with budgeting, cost share and facilitate institutional approvals. A budget template is available at <https://www.forestry.oregonstate.edu/research/funding>.

The following budgeting guidance should be followed:

- Fully funded PIs (12-month appointments) should not budget salary.
- Faculty who are appointed at 9 months or at less than 1.0 FTE may include up to one month of salary.
- Funds will be dispersed to University of Oregon via a subaward process.
- Costs for outside services or procurement are allowed.
- Indirect costs are NOT allowed and should not be included in budgets.
- Graduate students
 - a. Include GA salary and fringe in the requested budget – follow your institutional and college guidelines
 - b. CoF graduate students must be fully appointed at 0.49FTE

- c. Graduate student major professor name & affiliation must be described.
 - d. **Do not include tuition costs** in the budget (can be included as match)
- Cost Share – 20% cost share (matching) is required and is calculated on total project costs. Cost share can be met using a combination of salary, tuition and unrecovered indirect costs based on the negotiated indirect cost rate agreement (NICRA) research rate. Federal dollars cannot be used as match. Sub-awarded funds must include the 20% required cost share. Third party or in-kind match is allowed and must be accompanied by a letter of commitment from the authorized organizational representative stating the amount and type of match. All matching funds must be expensed during the project period.

The ARS funds are federal and all budgeted costs must be allocable and allowable as per federal uniform guidelines.

I. EVALUATION AND AWARD REQUIREMENTS

The lead PI must be available December 10, 2021 via Zoom to provide a brief presentation.

Yearly in-person progress reports will be required if your project is selected for funding. These will be made at a round table event involving all three academic units affiliated with the Institute at which industry will be invited to participate.

In addition to the in-person progress reports, awardees will also be required to:

- Engage in industry outreach activities including, but not limited to, publications, presentations, conferences. **NEW FOR 2022/2023:** Prior to release of grant funds, awardees are encouraged to develop an outreach plan in consultation with the TDI Outreach Coordinator. By describing the activities and timeline for outreach activities in which the PI and her/his research group will participate, better coordination of outreach activities will occur.
- **NEW FOR 2022/2023:** Prior to release of grant funds, awardees using Emmerson Lab must review and resubmit the one-page technical plan included at proposal stage to TDI describing the expected technical support required (graduate student training/supervision, fabrication or testing support required from TDI staff, equipment/space requirements) and a proposed calendar for technical activities. This plan should be developed in consultation with the TDI Technical Manager and will help ensure the needed resources will be available when needed.
- Participate in the annual TDI Research Symposium and provide content for outreach materials for industry stakeholders (e.g. project outlines for existing communication channels such as the TDI website)
- Submit substantive written annual progress reports that include major findings and outreach activities in short non-technical language.
- Keep ADR and TDI updated on physical research activities in real-time as well as provide written and visual resources as requested to assist with the TDI mission of research dissemination.

Additional reporting requirements will be made at the time of award notification. ARS and TDI must be acknowledged on all publications. Proper citation information will be supplied at award stage. Institutional financial and other federal post-award reporting will be managed through sponsored programs offices.

J. CONTACT INFORMATION

Katy Kavanagh
Associate Dean of Research
College of Forestry
Oregon State University
katy.kavanagh@oregonstate.edu
541-737-5097

Cathy Knock
Director of Budget and Compliance
College of Forestry
cathy.knock@oregonstate.edu
541-737-7306

Iain Macdonald
Director
TallWood Design Institute
iain.macdonald@oregonstate.edu
541-231-9626

Judith Sheine
Director of Design
TallWood Design Institute
University of Oregon
jesheine@uoregon.edu