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**BEFORE THE UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED AGENCIES
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CONCERNING “INNOVATIVE WOOD PRODUCTS”**

Chair Pingree, Ranking Member Joyce and members of the Subcommittee, thank you for the opportunity to appear before you today as the Committee considers the role wood innovation has on our nation’s forests, economy, and society. My testimony will cover how the USDA Forest Service supports innovative wood products, and their impact on our nation.

INNOVATIVE WOOD PRODUCTS AND THE FOREST SERVICE

The USDA Forest Service provides leadership on innovative wood products to support the agency’s mission of sustaining the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations. Research and development of innovative wood products is a critical component to science-based forest management as a natural solution to climate change in the United States. Markets for innovative wood products, particularly those that use low-value biomass as inputs, incentivize forest stewardship and help keep forests as forests. We need these forests to provide the nation with a positive carbon sink, as well as other ecosystem benefits that sustain people and communities—clean water, wildlife habitat, outdoor recreation opportunities, and economic opportunities for local communities.

Forests and forest products can help us build a pathway to a more environmentally sustainable economy. To help our nation and the world move in that direction, the Forest Service supports development of a diverse range of wood products - from mass timber for tall wood buildings to nano materials that can make concrete stronger. The agency’s research and development in this growing field is accomplished at the Forest Products Laboratory, regional research stations, and through our Wood Innovations Program.

RESEARCH AND DEVELOPMENT

The Forest Service has the largest forestry research and innovation organization in the world. The agency supports all stages of research: from discovery, to product and process development, and proof of concept leading to commercialization. The USDA Forest Products Laboratory (FPL) is a hub for basic and applied research, coordinating the work of numerous academic, governmental, industrial, and non-profit groups to initiate and accelerate development of innovative forest products to provide economic and environmental benefits to the nation. The agency’s unique system of research capabilities, partnerships, and a strong technology development and transfer program makes this approach possible.

Forest products research at the FPL currently focuses on four areas:

Nanotechnology

Much of the basic research showing properties and potential of cellulosic nano materials from wood was conducted by FPL scientists, in collaboration with university partners around the country. FPL is in partnership with the United States Endowment for Forestry and Communities to accelerate transfer of these cutting-edge particulate materials from the laboratory to commercial application by industry in fields ranging from packaging films to food additives. As an example of this collaboration, people in Yreka, California, are now driving over a bridge constructed in 2020 with cement that is 20 percent stronger due to the incorporation of cellulosic nano materials from wood.

Bioenergy/Biorefinery

FPL researchers and their university partners have been at the forefront of developing fundamental science to efficiently convert wood into renewable transportation and heating fuels using chemical and biological treatments. Working with nine universities and four industrial partners through the Northwest Advanced Renewable Alliance, FPL played a key role in making 1,000 gallons of fuel for the first ever cross-country commercial flight in 2016 using biofuel from wood. This work could help the airline industry meet its goals for mitigating greenhouse gas emissions. Research on torrefaction paves the way to convert wood to biochar, a solid fuel, from forest residues and byproducts of forest restoration activities. Biochar is a renewable energy substitute for coal and natural gas. When used as a soil amendment, biochar can improve soil health and productivity by increasing soil carbon and nutrient availability.

Advanced Composites

Advanced composites are produced by bonding wood materials together which gives them their unique performance characteristics. Ranging from fiber-based products to laminated beams, these products are used in a variety of structural and nonstructural applications. FPL's state-of-the-art pilot composites plant draws researchers from academia and industry to work together with FPL scientists and technicians to accelerate development and commercialization of advanced composites. For example, the basic science behind bonding with soy adhesives was carried out at FPL. Now industrial partners who worked at FPL are making it a commercial reality: soy adhesives are quickly becoming the chosen alternative to formaldehyde adhesives. In addition, FPL scientists and industry cooperators are developing a high-performance natural composite from sustainable wood resources for the United States Navy to use in missile nose fairing and other aircraft components. The new composites are designed to replace legacy plywood parts made from increasingly scarce resources. Finding lightweight and strong domestic substitutes is imperative to meeting the military's technology needs.

Advanced Structural Materials

FPL scientists are developing laminated mass timber materials from softwoods, hardwoods, and wood-based composites. These materials are being used to produce structural beams, columns, and panels at commercial-scale sizes used in the building industry. The burgeoning construction markets for these products are projected to grow as demand for green buildings increases. We are working with partners to develop advanced cross-laminated timber (CLT) panels to fulfill United States Department of State performance standards for protective building design. This work will

make it possible for federal facilities to reap the sustainability and aesthetic benefits of wood construction, while maintaining protective design standards. In addition, FPL, university, and industry cooperators are developing mass timber structures to resist multiple hazards, including earthquakes, hurricanes, and tornadoes. As a result, the first prequalified CLT shear wall will be listed in the next edition of the governing structural design standards of the United States. Ongoing work in walls and horizontal floor and roof slabs will qualify more mass timber structural components to be included in building code standards.

FPL economists and analysts provide economic analysis and projections indicating impacts of changing wood products use. Economists provide information describing how and why wood products markets and technologies change over time. They also highlight natural resource management implications and selected broader environmental, economic, and social impacts. This information is used to assess market opportunities and inform investment decisions. Through application of Life Cycle Analysis, FPL and partners also provide environmental impact and benefit assessments resulting from the use of different wood-based materials. There is growing demand for this information as organizations and businesses seek opportunities to reduce their environmental footprint and improve their sustainability ratings received from financial institutions.

WOOD INNOVATIONS PROGRAM

Market Development

The Forest Service Wood Innovations Program expands and creates markets for wood products and wood energy that support long-term, sustainable management of National Forest System lands and other state and private forest lands. This program addresses the nationwide challenges of reducing the risk of catastrophic wildfires and associated carbon emissions and reducing the incidence of forest diseases and infestations, by retaining or expanding markets for material removed during forest management activities. This work reaches across national forest boundaries to states, Tribes, communities, and non-industrial private forest landowners. The Wood Innovations Program is carried out through two national competitive grant programs, other key investments, and many partnerships. The program established the Wood Education and Resource Center to support the forest products industry in the Eastern Hardwood Region and nationally through its Wood Energy Technical Assistance Program. The Center also works closely with agency researchers on hardwood utilization and product improvements to increase the value and market opportunities for hardwood resources.

In addition to research on CLT, the Forest Service is revolutionizing the nation's building sector by supporting the market introduction of mass timber products. In 2014, when the Forest Service initiated engagement in the CLT sector, there were zero manufacturing facilities in the United States. Today, there are ten mass timber manufacturing facilities, and additional plants are anticipated to come online. Most notable is a new plant being built in Arkansas to provide mass timber from Arkansas-grown trees to Walmart for their new corporate office complex that will accommodate over 10,000 employees.

To support introduction of CLT to the United States, the Forest Service worked closely with a

myriad of partners. The Forest Service worked with the International Code Council on fire tests and other research to support changes in the 2021 International Building Code that now allow mass timber buildings of up to 18-stories. This code change has supported growing demand and new construction for CLT buildings in our nation's urban areas, including Atlanta, Portland, Seattle, Boston, and Denver. The Forest Service also worked closely with the Department of Defense and other partners on the first-in-the-world blast testing of CLT, which resulted in Department of Defense initiating its own CLT construction program.

In addition, the Forest Service supports the nonprofit WoodWorks, a partner that provides free project assistance, education, research, and resources related to the design of multi-family, commercial and institutional wood buildings. Since 2014, WoodWorks has converted or influenced approximately 7,600 projects to incorporate wood solutions, including over 1,000 mass timber projects across the United States. Converting these buildings to wood has the carbon benefit of sequestering or avoiding 20 million metric tons of carbon dioxide emissions over the same period. This is the equivalent impact of pulling 4.3 million cars off the road for an entire year.

As a result of market development work by the Forest Service and our essential partners, companies like Microsoft, Google, Walmart, Nike, and Adidas are now building offices out of CLT. Corporate leadership in sustainable construction has positive implications for both forest management and the forest-to-market supply chain. New CLT plants are in rural areas near timber supplies. These new plants have supported economic development and new jobs in rural communities.

Wood Innovations Grant Program

Launched in 2015, the Wood Innovations Grant Program creates new opportunities for wood products and wood energy markets that create jobs, revitalize local economies, and support sustainable forest land management. Last year, the program supported 35 business, nonprofit, university and tribal partners in 19 states and Puerto Rico who matched the grants with a 2:5 grantee match. Of the 35 projects selected, 27 focus on expanding markets for wood products and 8 seek to increase markets for renewable wood energy. The projects expand uses for small diameter wood, develop new markets for biochar and wood-powered energy, explore using CLT in health care facilities, examine how to finance urgent restoration work, and more. The projects take place in 19 states including Alaska, Arizona, California, Colorado, Hawaii, Illinois, Massachusetts, Maine, Minnesota, Mississippi, Montana, Nebraska, New York, Oregon, South Dakota, Utah, Virginia, Vermont, Washington, and Puerto Rico.

These grants act as a catalyst, allowing partners to hit the ground running and more prepared for market success. For example, the agency supported Carbon12 in Portland, Oregon, which is the tallest mass timber building in the country; and Ascent in Milwaukee, Wisconsin, which will be the tallest mass timber building in the world when completed in 2022. Likewise, the agency is supporting a new wood insulation product through GO Lab's conversion of a closed paper mill in Maine. Menominee Tribal Enterprise in Wisconsin received a grant and additional support from the Wood Energy Technical Assistance Program to support a new wood-fired combined heat and power system. The new system significantly improved air quality in the community and

provides an annual savings of nearly \$500,000 in fuel and maintenance costs over the old system.

Community Wood Energy and Wood Innovation Grant Program

Made possible through the 2018 Farm Bill and launched in 2020, the Community Wood Energy and Wood Innovation Grant Program provides funding for grants to install thermally led community wood energy systems or to build innovative wood product manufacturing facilities in rural communities nationwide. Last year, the program made grants to seven projects that use locally sourced wood to reduce energy costs and fossil fuel use while supporting local forest management in Alaska, Maine, Minnesota, Oregon, and Washington. One of the awardees, Limington Lumber in East Baldwin, Maine, is developing a combined heat and power system using their wood manufacturing residues to generate electricity. This project reduces their electricity costs, improves profitability, and utilizes residues that have no other markets.

CONCLUSION

The Forest Service creates solutions for our natural resource challenges through research, grants, and partnerships to bring innovative wood products to the market. Through strong partnerships and a dedicated community working together, we are collectively building a more sustainable future through wood products. These innovations directly benefit the health of our nation's forests and their continued ability to mitigate climate change through carbon storage - all while providing new opportunities for employment in rural America. We appreciate the Committee's interest in our work related to innovative wood products and look forward to working together to ensure these programs are delivered in the most efficient and effective manner possible.