CORRIM
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To: Senator Lisa Murkowski, Chair, Senate Committee on Energy and Natural Resources
Senator John Barrasso, Chair, Senate Committee on Environment and Public
Senator Chris Coons, Caucus Co-Chair, Senate Bipartisan Climate Solutions
Senator Mike Braun, Caucus Co-Chair, Senate Bipartisan Climate Solutions
Rep. Kathy Castor, Chair, House Select Committee on the Climate Crisis
Rep. Frank Pallone, Chair, House Energy and Commerce Committee
Rep. Raúl Grijalva, Chair, House Natural Resources Committee
Rep. Collin Peterson, Chair, House Agriculture Committee
Rep. David Scott, incoming Chairman, House Agriculture Committee
Rep. Cathy McMorris Rodgers, incoming Ranking Member, House Energy & Commerce Committee
Rep. Bruce Westerman, incoming Ranking Member, House Natural Resources Committee
Rep. G.T. Thompson, incoming Ranking Member, House Agriculture Committee

Re: Science Supporting Harvested Wood Products as a Carbon Negative Technology.

As scientists with expertise in forest carbon, wood products, engineering, timber construction systems, architecture, and forest economics, we are writing to urge you to support legislative proposals that recognize forest management and wood use as an integral component of a coordinated climate mitigation strategy. Nearly 25 years ago, scientists from 20 university forestry research institutions formed CORRIM as a scientific research consortium that conducted rigorous scientific analysis of the environmental performance of wood products, using internationally accepted methods, standards, and tools. Contrary to assertions by a climate advocacy organization, Forest Legacies, we believe our research results can be used to develop a climate mitigation strategy that addresses key legislative priorities on both sides of the political aisle.

Science Supports Federal Agency Positions on Wood Carbon. CORRIM member institutions and their partners have collectively generated hundreds of peer-reviewed publications and spoken both nationally and internationally on the benefits of using wood as a carbon-negative technology. Our federally funded research on the environmental performance of wood products (corrim.org/lcas-on-wood-products-library/) makes a compelling case for the carbon mitigation benefits of using wood in place of more energy-intensive materials and fossil fuels[1]. Together in partnership with the USFS Forest Products Lab[2], the USFS Pacific Northwest (PNW) Research Station[3], the US Department of Energy[4] and other federal labs[5] we have created a large body of work using data-driven life cycle analysis to quantify and characterize the environmental performance of wood products, including biofuels. Our research has found that wood and wood products, when appropriately deployed, can reduce U.S. greenhouse gas (GHG) emissions in the built environment, transportation, and manufacturing sectors, with significant co-benefits of sustaining rural economic development and maintaining forests as forests. There is wide

[1] Perez-Garcia et al. 2005, Lippke 2006, Lippke et al. 2004, 2010, 2011, 2011b, 2011c, 2012, Oneil et al. 2017,
[2] Bergman and Bowe 2012, Bergman et al. 2014, Alanya-Rosenbaum et al. 2018, Chen et al. 2020, Liang et al. 2020, Sahoo et al. 2019
[3] e.g. Brackley et al. 2017, Malmsheimer et al. 2011
[4] e.g. Lippke et al. 2008; USDOE 2011, Lippke et al. 2019, Mason et al. 2019, CORRIM-DOE Final Report. 2020
[5] E.g. Han et al. 2018

variability in the carbon mitigation benefits of wood depending on its use. Wood demonstrates the most significant climate mitigation potential where it can substitute for more energy intensive materials like steel and concrete in the built environment[6]. Greater benefits are shown in multi-story construction due to lower fossil fuel use in manufacturing and construction, with the added benefit of carbon storage in the building itself[7].

Managed Forests Offset Losses from Poor Practices. While concerns about carbon debt have surfaced based on the assumption that to meet wood demand we are cutting more forests than we are growing, USFS Forest Inventory and Analysis research finds that despite generating nearly 11% of global wood products from USA working forests, we have 25% more standing live tree biomass now than in 1990, and 30% more than in 1953[8]. The largest gains in live tree biomass are on private timberlands and in regions with strong wood products markets. High market demand creates strong incentives to maintain forests as forests and manage them for economic benefit. These gains are reduced by losses in other regions, including insect, disease, and wildfire losses on western federal forests, and conversion to non-forest uses in rapidly urbanizing parts of the US.

Forests and Wood Products Store Atmospheric Carbon. Wood is about 50% carbon by dry weight, so 1 ton of wood holds 1,000 pounds of carbon which is equal to 3,667 pounds of carbon dioxide removed from the atmosphere. The wood harvested from the forest is used in a wide variety of products from wooden boards to rayon fabric, paper, food, and more. The harvest residues left in the forest after harvest support biological activity in the next generation of planted trees, and contribute to above and below-ground soil carbon. Complex supply chains for solid wood, engineered products (e.g. MDF, particle board, fiberboard), paper, and bio-energy products use more than 99% of every harvested log entering US processing facilities. This nearly zero waste manufacturing sector does produce GHG emissions, but over 70% of those emissions come from renewable biomass energy rather than fossil fuels [9]. Taken together, US forests and wood products remove enough carbon dioxide from the air on a yearly basis to offset about 10-15% of US fossil fuel combustion emissions[10]. Of that total, an average of 13% is in harvested wood products[11]. USFS inventory data show that over the past 30 years, carbon stored in forests (live and dead biomass) has increased by 22%, and carbon in wood products (in use and in solid waste disposal sites) by 24%[11], resulting in over 5 billion metric tons of additional carbon stored in the forest sector as a whole since 1990. Our western public (largely federal) lands are suffering from significant insect, disease and wildfire impacts, so much so that wildfire losses reduce the climate mitigation benefit of the forest sector by nearly 3% (EPA 2020) in extreme fire years like 2015, 2017, 2018 (National Interagency Fire Center (NIFC)) (and probably 2020 when the statistics come in).

Unmanaged Forests can be Net Sources of Atmospheric CO2. Not only do the carbon, nitrogen and methane emissions from wildfires reduce forest sector climate mitigation benefits, they reduce forest inventories, sometimes for decades[12]. In the near term they also create massive health, safety, and economic impacts in affected communities throughout the west (e.g. California, Oregon, PNW) and create substantial wildlife habitat and water quality degradation. According to USFS data, the Rocky

[6] e.g. Lippke et al. 2011, Oliver et al. 2014
[7] e.g. Pierbon et al. 2019, Chen et al. 2020, Liang et al. 2020
[8] Oswalt et al. 2019
[9] Milota and Puettmann 2017.
[10] Stockmann et al. 2012, EPA 2011, EPA 2020, Domke et al. 2020
[11] Domke et al. 2020
[12] Stevens-Rumann et al. 2018

Mountain region has lost 80% of the forest growth increment over the past decade due to insects, disease and wildfire[13] and are on a trajectory to be net sources of GHG instead of net sinks due to these factors. Federal forest inventory statistics show that some states are already net GHG sources due to the impact of wildfires and insects[14].

Analysis Shows Forest – Harvested Wood Product System Provides Carbon Benefits. Data-rich scientific analysis using ISO (International Standards Organization) compliant life cycle assessment (LCA) methods and detailed forest inventory analysis found that the forest sector climate mitigation benefit, when considering only the private forest lands in Washington state, is equal to 12% of the economy wide GHG emissions of the state[15], similar to the national level offset value found by the EPA (2020). Both Oregon and Washington are major contributors to US softwood timber production, including 33% of all US softwood lumber and 34% of all US softwood plywood in addition to a host of other products[13]. While producing a large amount of forest products, both states show stable or increasing forest carbon stocks based on USFS Forest Inventory and Analysis data[8,11].

Facts Support Benefits of Product Substitution. Studies showing that the wood sector offsets 10-15% of state, regional, or national GHG emissions[10,13,15] do not include the carbon mitigation benefit from product substitution. This product substitution benefit is the difference in GHG emissions between alternative product systems that serve the same function. Multiple analyses comparing wood to competing materials[1,6,7] (i.e. steel, concrete) show that climate benefits are 0.2-14 times greater when using wood over alternative materials[16]. These differences arise because of the significant differences in manufacturing processes, and the GHG emissions associated with them, as well as the co-benefit of carbon storage in the wood product itself. In California, data-driven assessments of the full climate benefits of using harvested wood products,[17] with comparisons between historical and new recovery and utilization factors, explains some, but not all, of the variance in outcomes among competing scientific reports.

Competing Narratives. In contrast to the data-driven synthesis across the forest-to-wood utilization continuum that emerges from internationally recognized life cycle assessment methods, science based on process models and historical wood utilization assumptions can paint a starkly different picture. For example, Law et al 2018[18] used process models that suggest the forest sector was a net source of GHG instead of a net sink in Oregon. To get that result they assumed that harvested forests are not replanted (though that is required by law), wood products were mostly used for low value, short-lived products, wood substitution was of minimal significance, and large wildfire losses were excluded from their dataset as uncharacteristic, including the 2002 Biscuit wildfire. The 10 worst fire years on record have been since 2004 (NIFC 2020) and in those 10 years an average of 27% more acres burned than in 2002 when the Biscuit fire ravaged southern Oregon. In large part these fires are driving the decline in forest inventories in fire prone areas of the west[13]. Included in the Law et al 2018 methodology were assumptions regarding wood substitution that are based on data published in Harmon (2019)[18] which makes some startling assumptions regarding current and future industrial processes. For example,

[13] Oswalt et al. 2019
[14] Domke et al. 2020
[15] Ganguly et al. 2020,
[16] Oneil et al. 2020
[17] Stewart and Nakamura 2012
[18] Law et al. 2018, Harmon 2019

Harmon (2019) assumed that the conversion of the energy grid to 100% non-fossil sources would occur in the imminent future which would create equal emission profiles for wood, steel and concrete production, rather than the 3-6 fold additional emissions from the production of steel and concrete using current and near term production technologies. Based on this assumption, he concluded that from a climate mitigation perspective, wood is not a preferable construction material alternative to fossil fuel intensive materials such as steel and concrete, and that US climate mitigation policies should focus on preventing the harvest of existing forest stocks.

Scientific justification for considering wood as a carbon negative technology. As scientists who have worked extensively to understand the environmental performance of wood products, we are concerned that a focus solely on increasing forest carbon stocks as advocated by Forest Legacies, an advocacy organization that uses the assumptions of Harmon (2019) and Law et al (2018), misses most of the opportunities for the forest sector to act as a significant component of the US GHG mitigation toolkit. It also ignores the essential role that the forest sector plays in providing jobs and sustaining rural communities. As scientists we know that scientific models are only as good as the data and assumptions that go into them. We believe that the path forward should rely on the extensive forest, and wood product, inventories that have been generated over decades of federal agency research[11,13]. This federal research, in concert with data analysis from the major US Forestry and Agriculture Schools[1], collectively makes a compelling case for the carbon mitigation benefits of using wood in place of more energy intensive materials and fossil fuels.

While there are no immediate fixes for climate change, there are immediate fixes that can shift society in a direction that reduces GHG emissions. They start with sound forest policies that encourage and support sustainable forest practices by private forest landowners that own 70% of US forests[13] and who provide most of the wood products we use – from toilet paper to wooden skyscrapers. It includes a realistic assessment of our building needs and how best to meet them sustainably using American grown products that support rural economies. Finally, this year's wildfire and smoke issues clearly identify a need for changes in federal forest policy to encourage fire risk reduction on fire prone forests.

Our work supports and illuminates the scientific connections between healthy sustainable forests and healthy sustainable markets for low carbon wood products. In that way it provides the scientific underpinning for efforts like the Trillion Tree Movement, the US Forest Climate Working Group, and the American Forest Foundation with their direct focus on implementing natural climate solutions that rely on the relationship between a stable forest – economic system.

Respectfully

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