CENTER FOR SUSTAINABLE ECONOMY * BARK * OREGON WILD * PACIFIC RIVERS * COAST RANGE ASSOCIATION * NATURAL RESOURCE ECONOMICS * FRIENDS OF THE EARTH * DOGWOOD ALLIANCE * WILLIAM MOOMAW, PH.D. * * 350 PDX * SUSTAINABLE ENERGY AND ECONOMY NETWORK * * ROCKAWAY BEACH CITIZENS FOR WATERSHED PROTECTION * * 350 CENTRAL COAST * LINCOLN COUNTY COMMUNITY RIGHTS * * ENGINEERS FOR A SUSTAINABLE FUTURE * MOUNTAIN ROSE HERBS * * CONCERNED CITIZENS FOR CLEAN AIR * OREGON PHYSICIANS FOR SOCIAL RESPONSIBILITY*

July 10th, 2018

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RE: **Input on forest carbon study and policy interventions to reduce the adverse impacts of industrial forestry on climate change and climate resiliency**

Dear Ms. Sheeran and Mr. Daugherty:

Please accept this letter as stakeholder input to the Oregon Forest Ecosystem Carbon Report project led by the Oregon Department of Forestry in tandem with the Carbon Policy Office. While the project is likely to generate some useful information about the forest carbon situation in Oregon, as currently planned and structured, it is unlikely to provide decision makers and the Oregon public with accurate, comprehensive information regarding forests and climate change. As such, we hope it does not distract Governor Brown from the imperative of moving quickly and decisively to address the adverse impacts of industrial forest practices on climate change and climate resiliency in Oregon during the 2019 legislative session.

Find below a brief summary of the most salient aspects of the forest carbon situation in Oregon and responsive policy options that have already been put on the table and which can serve as a focus for legislative initiatives during the 2019 session. In particular, policy interventions that are already well researched and ready to implement include:

- Halting all state support for logging of carbon rich mature and old growth forests on federal, state, and private lands.
- Capping and ramping down greenhouse gas emissions from industrial forest practices through either a cap-and-invest or forest carbon tax-and-reward approach.

- Reporting emissions by the wood products industry in biennial greenhouse gas inventories.
- Modernizing the state's antiquated Forest Practices Act to make climate smart forestry the law and not the exception.
- Through enforceable forest management plans, establishing carbon storage targets for industrial forestlands where forest carbon stocks are seriously depleted.
- Eliminating subsidies and tax breaks for carbon intensive forest practices and for ownership of forestlands by timberland investment management organizations, real estate investment trusts, and other corporate owners with short time horizons.
- Expediting the conversion of tree plantations back into climate resilient natural forests.
- Abandoning forest carbon offsets as a climate strategy and replacing it with payments for carbon storage that reward small scale, sustainable foresters leading the way on climate smart practices.
- Safeguarding drinking water supplies at risk from climate change by working with state agencies and counties to eliminate clearcutting, pesticides, herbicides, fertilizers and construction of new logging roads in sensitive watersheds.
- Working with sustainability leaders to develop and implement a variety of measures to reduce demand for carbon intensive wood products consumed in and exported from Oregon.
- Implementing requirements for long rotations, alternatives to clearcutting, and restoration of unneeded logging roads to reduce the extent of carbon sequestration dead zones.

Few, if any of these considerations will be addressed by the ODF project as currently planned since ODF has already committed to replicating a California study rather than conducting a study more relevant to the unique situation in Oregon. Given that there are no restrictions on ODF to limit the scope of this study, we encourage the agency to address the following:

If allowed to mature, Pacific Northwest forests can capture and store more carbon than almost any terrestrial ecosystem on Earth.

Old growth forests in the Pacific Northwest are carbon storage powerhouses. Mean carbon densities in Oregon's remnant old growth forests have been measured to exceed 1,000 metric tons carbon dioxide equivalent per acre.[1] Tropical forests, on average, store between 360 to 460 metric tons per acre. Yet old growth forests exist as a mere fragment of their original extent. As noted by the Oregon Conservation Plan, less than 10% of late successional and old growth forests remain.

If humanity has any hope of reversing global warming, scientists agree that a drawdown of atmospheric carbon dioxide through climate smart forest and agricultural practices needs to occur. Growing big trees in excess of 120 years old is one of those practices in which Pacific Northwest states can excel. It is where Oregon's competitive advantage lies. In the world of climate policy, Oregon should exploit this competitive advantage. As such, state policies should stimulate growth of the big tall trees Oregon is famous for instead of the millions of acres of small diameter plantation trees that dominate the state and private forestland matrix. These plantations do not provide the multiple benefits for Oregonians that old growth sustains – exceptional water quality, habitat for well over 1,000 species, temperature refuges, and carbon storage.

The implementation of permanent conservation areas to develop late successional and old growth forest characteristics, long rotations and alternatives to clearcutting should be part of a comprehensive package of reforms to modernize Oregon's antiquated Forest Practices Act (OFPA). In addition, the state should withhold financial support or prohibit authorization of any projects that log remnant old growth forests or big trees on public lands and on private lands where approvals by the state or counties are necessary. This includes the loss of big trees and old growth forests from logging, urban development, infrastructure expansion and other uses. The state is currently set to authorize clearcutting of mature forests in many of its annual operating plans for state forests – canceling these is an easy first step in the right direction.

Allowing significant blocks of state and private forestlands to mature so big trees are abundant rather than scarce will not only help reduce atmospheric concentrations of carbon dioxide but enable Oregon's wood products industry to transition away from being a supplier of low-value, weak wood from plantations and into serving as a supplier high value, structurally superior wood from large older trees.[2] Growing old growth forests again does not mean excluding timber harvest – to the contrary, long rotations will eventually boost both yield and quality once a sufficient amount of older forest is restored to the landscape.

But since old growth forests are a mere fraction of their original extent, the focus in the short term should be recreating late successional and old growth forest characteristics that are sorely missing on the state and private forestland base. Thinning plantations to accelerate development of these characteristics is an important strategy to do so that also has its economic advantages because wood derived from this climate and old-growth friendly forest practice helps meet demand for Forest Stewardship Council (FSC) certified building products and other eco-labels that carry a price premium compared with conventionally produced wood.

Industrial forest practices have depleted Oregon's forest carbon stocks to a small fraction of their natural capacity.

Because old growth forests have been stripped and replaced with young tree plantations across most of western Oregon, much less carbon is now stored on the land. For example, according to the most recent Forest Inventory and Analysis (FIA) data, average carbon densities on western Oregon forestlands range between 108 tons per acre on industrial forestlands to 157 tons per acre on national forests. These values are far below the natural capacity of old growth forests, which can store in excess of 320 tons carbon per acre.[3] While the more conservation-oriented management of federal public lands produces 50% greater carbon benefit than poorly managed industrial forests, there is room for even greater gains.

To help lead the way on climate policy, Oregon needs forestland owners to commit to carbon storage targets that can achieve or at least come close to nature's baseline capacity. Targets were one of the policy recommendations made by the Oregon Global Warming Commission's Forestry Task Force. Given how productive Oregon's forests can be, setting a reasonable target of doubling carbon densities can make a big difference to Oregon's climate agenda. In western Oregon alone, a modest doubling of carbon density would sequester and store over 5.8 gigatons of CO2 – equivalent to over 90 years of the state's current emissions from fossil fuel sources.[4]

Such targets can be made part of long term forest management plans (FMPs) required for large corporate forestland owners that not only address climate impacts, but help the state achieve greater certainty with respect to management of public trust resources such as water supply, wildlife, fish and soil fertility. To be effective, FMPs must be established in the same manner as conservation easements that are carried with the land to ensure that future owners do not undermine long term commitments made by previous ones. Since forest management plans are not currently required by the OFPA, it should be modernized to include this provision.

Industrial forest practices are the leading source of greenhouse gas emissions in the state and should be monitored, capped, and reduced over time.

Industrial scale logging is by far the number one source of greenhouse gas emissions in Oregon according to two recent analyses using the same data sets but different methods. Using a life cycle assessment (LCA) method, OSU researchers estimated that Oregon's wood products industry is responsible for emissions of 33.89 million metric tons carbon dioxide equivalent (Mmt CO2-e) each year.[5] A previous analysis by Center for Sustainable Economy estimated logging-related emissions to be 33.03 Mmt CO2-e/yr over the same time period using a different methodology that considered carbon removed from forests, net storage in long lived wood products, foregone sequestration from clearcuts and emissions from decay of logging residuals. Given this, failure to regulate emissions from industrial forest practices is a gaping hole in Oregon's climate agenda that must be addressed.

Currently, the state is set to approve legislation to establish a cap-and-invest program designed, ostensibly, to regulate all major sources of greenhouse gas emissions. Failure to include industrial logging emissions in this program will undercut both its effectiveness and its credibility. Amendments to include forestland owners who emit more than 25,000 metric tons CO2-e per year in this program – roughly the emissions associated with a typical clearcut in western Oregon – have been proposed and can be incorporated with relative ease. Alternatively, industrial forest practices can be regulated by way of a forest carbon tax and reward approach, which taxes high emissions practices and uses revenues to dramatically scale up climate smart alternatives. Both are market-based approaches that provide maximum flexibility to forestland owners to reduce emissions in the most cost-effective manner possible.

Industrial tree plantations pose serious public health and safety risks to Oregonians as climate change unfolds.

Industrial tree plantations are more susceptible than natural forests to drought, disease, wildfire, floods, landslides, low summertime streamflow, thermal pollution, fish kills, regeneration failures and other threats associated with climate change.[6] In one recent study, Oregon State University researchers found that timber plantations burn faster and more intensely that natural forests, largely because of their lack of structural diversity. Multi-decadal studies have shown that heavily logged watersheds dominated by timber plantations produce 50% less water than intact ones that support old growth forests.[7] ODF modeling has shown that an average OFPA compliant logging unit boosts water temperatures by 2.6°F.[8] The rate of landslides in clearcut units and along logging roads is over 200% greater than the natural background rate.

Climate change is exacerbating all these trends. Because of this, public health and safety are increasingly at risk. Warm waters boost toxic algal blooms that are deadly to humans and wildlife. Salem's ongoing water crisis is partially attributable to industrial forest practices that not only increase water temperatures and reduce flow but also introduce chemical and nutrient contamination through herbicides, pesticides, and fertilizers. Low water also means less fish and less access to clean water. Landslides and flash floods have killed Oregonians and destroyed homes.

Steep slope clearcutting has been demonstrated to increase the risk of mudslides, which can endanger homes and human life. The tragic loss of life in Oso, Washington in 2014 was a stark reminder that much of the Pacific Northwest is geologically unstable, and that activities which exacerbate these conditions put lives and property at risk. Wildfires put lives at risk and create unhealthy air quality conditions. Those who are least able to get out of harm's way or adapt are affected the most. As such, this is not only a public health issue but an environmental justice issue that demands an aggressive state response.

Current clearcut logging practices also endanger rural communities and public health directly, through activities such as the widespread aerial spraying of pesticides and the logging of steep slopes. The issues with Oregon's lax aerial spray rules have been well documented, with numerous cases of forest industry workers, rural residents, children, pets and livestock suffering exposure to toxic chemicals through spray events, including compounds such as 2-4-D and glyphosate. These chemicals are used after clearcutting to suppress the natural regrowth of broadleaf plants, accelerate the re-growth of Douglas fir plantations, and achieve the shortest possible logging rotation before the next clearcut.

Because of all these climate related risks, one of the most urgently needed climate policy interventions for the state is to prohibit any further expansion of industrial tree plantations (which is occurring as large, corporate owners increasingly buy up non-industrial private acreage) and then enact policies and incentives to expedite their conversion back into climate resilient forests through ecologically based thinning, long rotations, and other management practices. Doing so will yield multiple co-benefits in the form of enhanced dry season water supplies, cooler micro-climates, cooler water less susceptible to toxic algal blooms, improved habitat for wildlife that need real forests to survive, healthier fish runs and maintenance of long term forest productivity. It will also make Oregon's forested landscape more resilient to wildfire.

The state has multiple options for doing so. Modernizing the OFPA, land use plans, and other state and county laws to distinguish between natural, climate resilient forests and tree plantations will help identify the lands at greatest risk. Timetables and techniques for converting existing high-risk tree plantations to more natural forests should be included as mandatory provisions in FMPs for industrial forestland owners. Tax incentives can be reworked to remove subsidies and tax breaks for plantations but leave them intact for real forests. This will also generate significant new revenues to invest in plantation conversion. County land use plans can be amended to exclude plantation forestry in sensitive areas such as the wildland-urban interface, drinking water supplies, along streams and rivers, and on steep slopes. The state should aggressively pursue these long overdue reforms and encourage counties to do the same.

Clearcuts and logging roads create carbon sequestration dead zones and emission sources that are expanding in areal extent as rotation age decreases.

As clearcuts and logging roads sequester no carbon, reducing their extent should be front and center in Oregon's climate agenda. Recently clearcut lands, in fact, are net carbon emitters because the emissions associated with decay and burning of logging residuals overshadows sequestration by new growth for roughly 13 years after harvest.[9] Unfortunately, these carbon sequestration dead zones and emission sources are on the rise.

As rotation age decreases – as it has in Oregon for quite some time now – more land is in recent (<13 years) clearcut condition in any given year. For a 10,000 acre tract, a rotation age of 35 years means that [(10,000/35)*13] or 3,714 acres is in this carbon sequestration dead zone status at any one time, not counting logging roads. In contrast, a 120-year rotation results in [(10,000/120)*13] or 1,083 acres in this carbon sequestration dead zone status in a given year. Advanced satellite imagery that monitors tree cover provides the state an option for monitoring changes in the extent of these carbon sequestration dead zones over time. Since 2000, Oregon has lost nearly 1.7 million acres of tree cover and much of this is due to the expansion of recently clearcut lands.[10] Given the Oregon Global Warming Commission's statutory duty to track and evaluate the carbon sequestration potential of Oregon's forestlands, a duty now taken on by ODF, calculating the annual sequestration forgone by this loss should be a required element of the ODF study.

Long rotations and alternatives to clearcutting will reverse these trends and should be high priorities for legislative interventions so that these practices are the law and not the exception. The OFPA should be modernized to include limitations on cumulative watershed effects to ensure that a sufficient amount of natural forest cover remains in each watershed at all times.

In addition, state approval for new logging roads should be contingent on commitments to close and reforest at least twice the equivalent length of unneeded or hazardous logging roads in order to increase the number of acres sequestering carbon. The density of logging roads in the Pacific Northwest is excessive – over 4 miles per square mile in half of the forest practices act regions assessed by the US Fish and Wildlife Service in Washington and averaging 3.6 miles per square miles across all the regions.[11] Oregon road densities on industrial forestlands are similar. Road densities at this level create a plethora of adverse effects and risks – sedimentation, landslides, fragmentation and loss of big game habitat, invasive species, spread of forest diseases, loss of water quality and increased fire risk, to name a few.[12] All these risks will increase as climate change impacts unfold, so closure and reforestation of unneeded roads are strategies for both enhancing sequestration and improving climate resiliency.

By law, climate smart alternatives should be defined, tracked, and evaluated.

Climate smart forestry techniques are those that simultaneously reduce logging related emissions, build carbon stocks, maintain or enhance sequestration capacity and improve climate resiliency. Forest carbon reserves, afforestation, reforestation, long rotations, alternatives to clearcutting and ecological thinning of dense tree plantations to expedite development of old growth characteristics are examples.

Since 2007, the Oregon Global Warming Commission has had a statutory duty to track and evaluate "alternative methods of forest management that can increase carbon sequestration and reduce the loss of carbon sequestration to wildfire" but has yet to comply.[13] The ODF study would be an ideal place to help the OGWC fulfill this duty by defining and analyzing the full range of climate smart forestry techniques available and discuss their potential impacts.

For example, the report could quantify the emissions reduction and carbon storage benefits of various extended rotation scenarios as well as their ability to help reduce the extent of carbon sequestration dead zones and help re-establish more fire resilient older forests on the landscape. This would represent a welcome and far more useful contribution to Oregon's forest carbon policy deliberations than merely replicating the California study.

Forest carbon offsets generate perverse incentives and reward the wrong actors and, as such, should not be the primary policy focus.

As noted by ODF, thus far, forest carbon offsets are the main mechanism being proposed for promoting climate smart forestry by the Clean Energy Jobs (CEJ) legislation. While any improvements at all in forest practices are welcome, using offsets as the primary vehicle is not likely to have a significant impact and may actually make matters worse. Offsets, in general, suffer from a number of shortcomings that have undermined their efficacy so far. They are based on unknowable scenarios of what would have happened in the future. They are based on assumptions about carbon accumulation rates that may suddenly change as the climate warms and dries. According to the GAO, their efficacy is nearly impossible to validate and can actually result in emissions increases overall.[14] In the EU, a 2016 report found that 85% of the offsets purchased were fraudulent.[15] In California, offsets have even been created by projects that clearcut ancient forests under the guise of enhancing sequestration.

Offsets also create perverse incentives through well-known effects associated with moral hazard (paying people not to do harmful practices actually encourages more harmful practices for their 'threat' value) and adverse selection (polluters who are already planning to reduce emissions have an incentive to mask or delay these plans in order to get paid for doing it). Depending on the arrangement, offsets can also lead to accelerated harvesting of immature stands if the offset payments are exclusively linked to newly regenerated rather than existing stands.[16]

Offsets also reward the wrong actors. Good actors, the small scale sustainable foresters that are already practicing climate smart forestry, are ineligible for offsets because their practices lack additionality while bad actors are incentivized to actually increase logging to improve their 'threat' value and ability to demonstrate additionality. We believe in a reward system that turns this equation on its head.

If incentives are to be used, a more economically rational mechanism would be payments for carbon storage – rewarding forestland owners with the highest carbon densities and the most beneficial practices for climate resiliency. The CEJ bill's proposed Climate Investments Fund (CIF) should focus on this. Payments can be based on the ratio of current storage to capacity, thus increasing over time and providing incentives to rapidly accumulate and store carbon. They can also be based on the proportion of acreage supporting structurally diverse forests more capable of withstanding fires, floods, and other climate threats. To ensure additionality, good actors can be

incentivized to assume greater management responsibility for lands they do not directly control by granting them special 'climate smart' consultant status and ensuring that CIF payments to landowners are only made if these consulting foresters are used.

Excessive corporate ownership of Oregon's forestlands by out of state and foreign investors is incompatible with long term carbon storage and climate resiliency.

Over the past ten to fifteen years, Oregon's forestland ownership has undergone a dramatic transition. Traditional vertically integrated companies have been replaced by investor-owned Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts who now control most of the private industrial forestland base in Oregon according to a detailed analysis of property ownership data by the Coast Range Association. Tax advantages are largely to blame for the rise of these Wall Street entities. As succinctly noted by a 2009 Oregonian piece, "investor-owners have used one big advantage as they've quietly replaced traditional forest products companies: They don't pay corporate taxes."

The rise of TIMOs and REITs not only deprives the state of badly needed revenues but poses a major barrier to long term climate solutions for Oregon's forests. Managing the land for carbon storage and climate resiliency – for instance, by committing to long rotations and restoring timber plantations into real forests – is fundamentally at odds with the short term returns these corporations promise their investors. Studies have shown that when these entities acquire land, they are more likely to intensify management through establishment of high yield timber plantations sustained by clearcutting, short rotations, genetically modified trees, chemicals and fertilizers.[17]

Because of this, state climate policies should be aligned with the goal of phasing out these owners and replacing them with companies committed to stewardship of the land over generations. There are several strategies the state can adopt to achieve this goal. First, and most obviously, is to rescind the various tax breaks and subsidies that favor these large, industrial forestland owners over smaller ones. Oregon can also join with other states in restricting the ownership of agricultural or forestlands by foreign or out of state entities. In the U.S., much of the growth in foreign investment can be traced to large timberland investors. As an investor, the state and state-managed pension funds can join with other shareholders to leverage climate action from TIMOs and REITs willing to do so and divest from those who are unresponsive to this need.

The group of stakeholders should be diversified to include voices other than those whose economic interests are aligned with logging or carbon offsets.

According to Friends of the Earth, "[i]n the area of climate policy and beyond, government positions are being increasingly hijacked by narrow corporate interests linked to polluting industries and industries which are seeking to profit from the climate crisis."[18] This is an apt reflection of Oregon's evolving policies on forest carbon. Rather than directly regulating the timber industry's climate impacts, the state has already embraced an approach based on forest carbon offsets – a mechanism that leaves timber industry emissions untouched and creates a new class of actors whose economic self-interest is aligned with maintaining the status quo on forest practices because offsets are easiest to generate when legal baselines are weak or non-existent. The ODF

stakeholder group is heavily weighted with economic interests aligned with this approach. This same bias persists throughout the evolution of the state's forest carbon policies.

Absent or severely unrepresented in the stakeholder group and other forest carbon policy deliberations are the those advocating for direct regulation of the timber industry's adverse climate impacts, scientists, communities of color, environmental justice advocates, those on the front lines of wildfires, degraded water supplies, loss of fish and wildlife and other adverse impacts of industrial forestry, immigrant forest workers, public health practitioners and even the small scale, sustainable foresters who are the most knowledgeable about climate smart forest practices.

The state's failure to diversify its forest carbon stakeholder groups is not just an esoteric consideration – it runs afoul of specific requirements of Oregon's policies with respect to diversity, equity, and inclusion (DEI) and environmental justice. For example, the state's affirmative action policy is central to the overall DEI framework, and requires that "[a]ll appointive authorities for state boards, commissions, and advisory bodies shall implement this policy of affirmative action in their appointments" (ORS 182.100[1]). Under state law, affirmative action means:

> ...a method of eliminating the effects of past and present discrimination, intended or unintended, on the basis of race, religion, national origin, age, sex, marital status or physical or mental disabilities, that are evident or indicated by analysis of present appointment patterns, practices and policies.

There is no evidence that any of the advisory or stakeholder groups assembled to date to work on forest carbon policy including the ODF stakeholder group have complied with these provisions and the composition of these groups has suffered an imbalance as a result. The inclusion of OFIC *and* its most influential individual member (Weyerhaeuser) is particularly egregious, since OFIC itself represents an elite group of nearly two dozen corporate landowners who have consistently outpaced all other economic interest groups in Oregon in terms of direct contributions to political campaigns and influence on Oregon's forest policies. OFIC has been the lead contributor to campaigns at least as far back as 2008. The double representation of OFIC and its members insures that voices for corporate CEOs will overshadow all others.

Oregon's evolving forest carbon policies have also failed to adhere to the state's environmental justice guidelines for natural resource agencies, including ODF. The state's environmental justice guidelines warn of undue influence by regulated entities and economic interests they represent:

> Communities facing disparate environmental health risks with insufficient resources are least able to advocate for their interests, while the stakeholders with resources – regulated entities and mainstream environmental conservation groups – are averse to or do not represent environmental justice concerns, respectively.[19]

Environmental justice advocates have been very vocal in their opposition to offsets and to the labor practices of industrial timber corporations in Oregon. Forest carbon offsets are a double hit on environmental justice – they excuse emissions from industrial facilities that disproportionately fall on communities of color and they promote logging practices that create litany of public health and safety threats for rural poor. Given this, failure to reach out to and include environmental justice advocates in the ODF stakeholder group or in other forest carbon policy processes now underway

is a serious misstep. The CPO should remedy this imbalance before the next stakeholder meeting is convened. In addition, we stand ready to work with you both on ways to diversify this stakeholder group and all future state-sponsored boards, commissions, and advisory bodies relevant to forest policy so that they fully comply with Oregon's DEI and environmental justice statutes and guidelines.

As a matter of climate policy, promoting increased consumption of wood products is irrational – like any other carbon intensive product, demand reduction is key.

Whenever corporations assert the environmental benefits of using their products a large degree of skepticism is usually in order. Such is the case with the climate impacts of Oregon wood products. The timber industry promotes the concept of increasing the pool of harvested wood products (HWP) as a climate mitigation strategy under the theory that storing wood in products is better than storing it in forests or that HWPs displace more carbon intensive substitutes. The latter claim mimics what the natural gas industry said before the truth about fracking was revealed. Neither claim has merit.

First, the majority of carbon stored in wood products is emitted into the atmosphere over a 100-year period through natural decay processes while carbon stored in trees likely lasts for centuries – even after accounting for wildfires, insects, and disease. And those trees continue to sequester carbon even after hundreds of years whereas wood products are dead and only emit carbon.

Secondly, what little carbon exists in wood products after a century is actually stored in landfills, not products in use. Wood and paper products are, by far, the largest share of landfill waste both in Oregon (30.59%) and nationally. Standard forest carbon data tables for the Pacific Northwest indicate that after a century, only 7.6% of the carbon in wood used for pulp, paper, and other short-lived products (about 40% of Oregon's timber harvest goes to these uses) remains out of the atmosphere, and all of that residual is in landfills. For longer lived wood products, about 41% of the original carbon remains after a century but the majority of that residual (about two thirds of it) is stored in landfills and not products in use.[20] So those who advocate for storing carbon in wood products as a climate solution are actually talking about storing carbon in landfills rather than forests. We believe Oregonians overwhelmingly prefer the latter.

Third, independent studies from both OSU and CSE indicate that wood products – especially if derived from conventional short rotation clearcutting – are very carbon intensive. The OSU and CSE emissions figures suggest that producing a metric ton of wood products comes at a cost of over seven metric tons of carbon dioxide emissions (>7 tCO_2/t).[21] Producing a ton of cement, by contrast, generates about one ton of CO_2 (1 tCO_2/t). A ton of steel generates about 2 tCO_2/t. A ton of coal from mountaintop removal mining emits 2.6 tCO_2/t. Even if Oregon's wood products emissions are less than half of the emissions estimated by CSE and OSU what these data suggest is that clearcutting is Oregon's version of mountaintop removal mining. The climate impacts are just as severe both in terms of emissions and damage to the land.

Given wood products' high carbon intensity, the climate would be much better served by reducing demand through improvements in recycling and reclamation rates, repurposing existing buildings rather than building new ones, paperless offices, less waste at construction sites and mills and changes in building codes to restrict the construction of gargantuan single-family homes that

exacerbate urban sprawl. By doing so, wood consumption is reduced without any corresponding increase in consumption of substitutes that may be more carbon intensive. Most of the HWP studies to date – many of them funded by the timber industry – fail to consider demand reduction as a carbon neutral substitute for wood products.

Moreover, to the degree that demand reduction does stimulate the consumption of substitutes, there are many less carbon intensive substitutes for wood. Solar and wind for biomass energy is one. For pulp and paper products, there are many less carbon intensive substitutes such as kenaf, hemp, flax and bamboo-based fibers.[22] LCA analyses suggest that each of these substitutes has a carbon intensity less than 1tCO2/t. And unless structural wood is sourced with climate smart techniques, concrete and steel buildings may in fact be less carbon intensive when considering factors such as reduced energy consumption and the fact that they last much longer than wood buildings and thus do not need to be renovated and replaced as often.

The Oregon Forest Industries Council has made it clear that they "look forward to working with state lawmakers on finding ways to encourage the use of more Oregon wood, not less." But state policy should do the opposite. The state should promote measures to reduce, and not increase, wood products consumption simultaneously with other carbon intensive products.

Resources devoted to reducing wildland fire threats on federal lands are misplaced – they should be redirected to focus on industrial tree plantations.

The timber industry has been very good about diverting attention away from its own harmful practices by keeping the focus on federal lands and the threats posed by wildfire and forest health. But as it turns out, the biggest fire threat is on its own timber plantations. As we noted earlier, these lands also present the greatest threats associated with warm waters that spur growth of toxic algae, landslides, floods, insects, disease, low stream flow and other risks that will worsen as climate change unfolds.

Given this, state financing to accelerate the Trump Administration's logging on federal lands under the guise of wildfire risk reduction and forest health should be redirected to deal with the multiple hazards created by timber plantations and logging roads on state and privately-owned lands. This includes state resources now being used to provide administrative, financial and technical resources to collaboratives that promote federal lands projects as well as future Climate Investment Fund revenues earmarked for projects that "promote resiliency to disease and forest fires."[23] Redirection of scarce state resources is urgent not only because the more significant problems lie on state and private lands but also because, in many cases, logging projects on federal lands have been shown to do more harm than good.

Oregon and Washington should not simply replicate what has been done in California but address the unique forest carbon circumstances in this region.

It is our understanding that ODF intends to replicate a California study prepared to meet requirements of AB 1504 and that Washington State plans to do the same. The study focusses on recent stocks and flows of carbon dioxide between various pools, something already reported on in detail by the Oregon Global Warming Commission and tracked by the USDA's Forest Inventory

and Analysis program. There is very little added value to using scarce public funds to replicate what has already been thoroughly addressed.

Moreover, reporting stocks and flows of carbon in accordance with the California study will overlook the most salient aspects of the forest carbon situation in Oregon (and likely in Washington as well) as set forth in this comment letter. In particular, the study will yield no useful information about emissions from logging operations, carbon sequestration dead zones, natural carbon storage capacity of old growth forests, the litany of climate risks associated with plantations, the potential for demand reduction, and the benefits of climate smart alternatives to industrial practices. As a result of leaving these issues off the table, the California study contains erroneous conclusions with respect to policy. For example, a key conclusion includes the following:

> If mature forests are approaching carbon sink saturation due to slowing tree growth rates, or there is a need to reduce stand densities for other forest health objectives, climate mitigation strategies can aim to maximize the sum from forest ecosystem carbon stocks, harvested wood product carbon stocks, and wood material and energy substitution to maintain and enhance forest ecosystem carbon stocks while also increasing carbon benefits from harvested wood products.[24]

As discussed above, such a conclusion is based on unfounded beliefs that logging old growth forests and converting them into tree plantations and wood products is a sound climate strategy, that logging under the guise of forest health and fire risk reduction comes with zero climate costs and that all substitutes for wood are more carbon intensive. Studies prepared in Oregon and Washington should not repeat these unfounded claims.

Nor should the Oregon and Washington studies repeat biases in forest carbon accounting that permeate forest carbon accounting rules birthed at the 2001 climate negotiations in Marrakesh and now standard practice. NGO monitors at the time described these rules "made by loggers for loggers" with good reason – they omit timber industry emissions or other climate impacts caused by industrial forestry operations.

One specific bias involves the choice of baseline year, the year against which changes in carbon stocks are evaluated. In the California study, the baseline year is 2000. A focus on recent stocks and flows leads to the conclusion that "California's forests are a net carbon sink," a conclusion the timber industry has used over and over again to defend its operations as climate neutral (even though actual logging related emissions are not tabulated). But use of the 2000 baseline ignores the vast release of carbon into the atmosphere associated with cutting down the redwood forests, ancient sequoias and other old growth forests before that time. Using recent carbon fluxes to characterize the timber industry as sustainable or climate neutral is analogous to characterizing a business as economically solvent because recent deposits and charges are roughly balanced even though its bank accounts are severely overdrawn. Again, we hope the Oregon and Washington studies do not replicate this bias.

Instead, information about the Pacific Northwest's carbon deficit should be updated with reference to natural baselines provided by old growth forests. This would be another useful piece of information to be refined in the ODF study. In 1990, forest scientists estimated that the conversion of over 5 million hectares of old growth forests into tree plantations in western Oregon and

Washington has added up to 1.8 billion metric tons of carbon to the atmosphere – a carbon deficit that represents 104 years of Oregon's current in-boundary GHG emissions.[25]

Thank you for the opportunity to comment on the ODF Forest Ecosystems Carbon Study. We hope to engage with both of you soon to discuss the composition of the stakeholder group going forward and well as a redirection of the study's focus towards these essential forest carbon policy considerations. We will contact you soon to set up a meeting to review these concerns in detail.

Sincerely,

John Talberth, PhD
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ENDNOTES

[1] Seidl, R., Spies, T.A., Rammer, W., Steel, E.A., Pabst, R.J., Olsen, K., 2012. Multi-scale drivers of spatial variation in old-growth forest carbon density disentangled with Lidar and an Individual-Based Landscape Model. *Ecosystems* 15: 1321-1335.

[2] According research on plantation wood by the FAO, "[m]uch small dimension roundwood is produced in forest plantations, as thinnings, top-logs, or due to economics of short rotations. Much of this timber is used for low value purposes such as posts and poles, low quality sawn timber or pulp. Recovery rates for solid wood processing of small logs tend to be low, and often the wood or fibre is of low quality." Brown, C., Ball, J., 2000. World view of plantation grown wood. Rome: Forestry Department, Food and Agriculture Organization of the United Nations.

[3] Talberth, J., 2017. Oregon Forest Carbon Policy: Scientific and technical brief to guide legislative intervention. Appendix M. Lake Oswego, OR: Center for Sustainable Economy.

[4] These calculations are based on doubling existing per acre carbon densities in Western Oregon across all ownerships, multiplying those values by the corresponding acreage in each ownership category, converting carbon to carbon-dioxide equivalent, and then dividing by the Oregon's current in-boundary GHG emission figure of 63 Mmt CO2-e/yr.

[5] Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Boutte, P.C., Harmon, M.E., 2018. Land use strategies to mitigate climate change in dense temperate forests. PNAS April 2018, www.pnas.org/cgi/doi/10.1073/pnas.1720064115.

[6] Talberth, J., 2017, Note 3, pages 11-14.

[7] Perry, T. D., Jones, J.A., 2016. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. Ecohydrology. 1-13.

[8] Oregon Department of Forestry. 2016. Oregon Department of Forestry (ODF), 2015. Detailed analysis: predicted temperature change results. Agenda Item 7, Attachment 3 to the meeting packet prepared for the Board of Forestry, June 3rd, 2015. Salem, OR: ODF.

[9] Turner, D.P., Guzy, M., Lefsky, M.A., Ritts, W.D., Van Tuyl, S., Law, B.E., 2004. Monitoring forest carbon sequestration with remote sensing and carbon cycle monitoring. *Environmental Management* 33(4): 457-466.

[10] Talberth, J., 2017, Note 3, pages 5-6.

[11] U.S. Fish and Wildlife Service, Western Washington Office, 2004. Road Density by Analysis Regions and by WRIA for FPHCP Covered Lands. Available online at: https://www.dnr.wa.gov/publications/fp_hcp_deis_appendix_d.pdf.

[12] Gucinski, H., Furniss, M.J., Ziemer, R.R., Brookes, M.H., Eds., 2000. Forest Roads: A Synthesis of Scientific Information. Washington, DC: USDA Forest Service.

[13] ORS 468A.250(1)i

[14] US Congress, Committee on Oversight and Government Reform, 2011. GAO Report Rips Readiness of Carbon Offset Market for Cap-And-Trade. Available online at: https://oversight.house.gov/release/gao-report- rips-readiness-of-carbon-offset-market-for-cap-and-trade.

[15] Institute for Applied Ecology, 2016. How additional is the Clean Development Mechanism? Summary available online at: https://www.transportenvironment.org/news/85-offsets-failed-reduce-emissions-says-eu- study.

[16] Murray, B., 2000. Carbon values, reforestation, and 'perverse' incentives under the Kyoto protocol: An empirical analysis. *Mitigation and Adaptation Strategies for Global Change* 5(3): 271-295.

[17] Yale School of Forestry and Environmental Studies, Global Forest Atlas. Commercial Logging. Available online at: https://globalforestatlas.yale.edu/forest-use-logging/logging/commercial-logging.

[18] Friends of the Earth International, "Corporate capture explained," available online at: https://www.foei.org/what-we-do/corporate-capture-explained.

[19] Oregon Environmental Justice Task Force, 2016. Environmental Justice: Best Practices for Oregon's Natural Resource Agencies. Available online at: https://www.oregon.gov/gov/policy/environment/environmental_justice/Documents/Oregon%20EJTF%20Handbook.v4.pdf.

[20] Smith, J.E., Heath, L.S., Skog, K.E., Birdsey, R.A., 2006. Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States. Gen Tech. Rpt. NE-343. Morgantown, WV: USDA Forest Service, Northeastern Research Station.

[21] According to ODF's forest harvest statistics the 2000-2015 statewide average was 3,821 Mmbf, or 3,821,000 thousand board feet (mbf). Average annual emissions from logging operations were calculated to be about 33.5 Mmt CO2-e/yr by the CSE and OSU studies, or 8.76 metric tons per mbf. A typical mix of Oregon's timber harvest weighs about 1.18 metric tons per thousand board feet (mbf). So producing one metric ton of wood products generates about 7.43 metric tons CO2-e.

[22] Barth, M., Carus, M., 2015. Carbon Footprint and Sustainability of Different Natural Fibres for Biocomposites and Insulation Material. Hurth, Germany: Nova Institute.

[23] Clean Energy Jobs, Work Group on Agriculture, Forests, Fisheries, Rural Communities, and Tribes, 2017. How the Redraft Addresses Issues in the Work Groups. Available online at: https://www.oregonlegislature.gov/helm/workgroup_materials/2%20ISSUES%20(final)%2012%2020%2017.pdf

[24] Christensen, G.A., Gray, A.N., Kuegler, O., Tase, N.A., Rosenberg. M., 2017. AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2006 - 2015. Final Report. California Department of Forestry and Fire Protection agreement no. 7CA02025. Sacramento, CA: California Department of Forestry and Fire Protection and California Board of Forestry and Fire Protection, page 123.

[25] Harmon, M., Ferrell, W.K., Franklin, J.F., 1990. Effects on Carbon Storage of Conversion of Old Growth Forests to Young Forests. *Science* 247: 699-702.