The following comments address the Department of Ecology's ("Ecology") proposed regulations in Chapter 173-446 WAC. The comments pertain to auction pricing, offset additionality, offset protocol requirements, and GHG sources.

Auction Pricing

The marginal costs of greenhouse gas (GHG) pollution increase with each additional ton of CO_2e emitted.[1] Further, the ability to measure the costs attributable to this pollution continues to improve.[2] Ecology's methodology[3] for setting auction floor and ceiling and allowance price containment reserve prices fails to consider these changes because the fixed prices used, increased by factors unrelated to actual marginal costs or measurement improvements (i.e. a fixed 5% per year plus the CPI for all urban consumers), decouple the auction floor and ceiling prices from pollution costs. Thus, Ecology's pricing methodology subsidizes, at an increasing rate, polluters' emission of GHGs.

The Legislature has not authorized Ecology to subsidize GHG polluters. Ecology's pricing methodology exceeds the Department's authority in two aspects. First, RCW 70A.65.150 requires Ecology to "adopt by rule an auction floor price and a schedule for the floor price to increase by a predetermined amount every year." The Legislature has not authorized Ecology to set all auction prices prior to the first auction in the first year. The Legislature intended Ecology to set the auction price in advance of each auction.[4] Second, "[t]he [price] ceiling must be set at a level sufficient to facilitate investments to achieve further emission reductions beyond those enabled by the price ceiling, with the intent that investments accelerate the state's achievement of greenhouse gas limits."[5] A price ceiling that subsidizes polluters does not facilitate emissions reduction investments. Further, "[t]he price ceiling must increase annually in proportion to the reserve auction floor price established in RCW 70A.65.150(1)."[6] This proportionality requirement mandates the floor price increase sufficiently to maintain the ceiling price's ability to facilitate investments as the marginal costs of GHG emissions increase.

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1 See, e.g., Hersher, R.; "Researchers can now explain how climate change is affecting your weather"; NPR; July 7, 2022. Citing the increasing frequency, duration, and intensity of heatwaves. https://www.npr.org/2022/07/07/1107814440/researchers-can-now-explain-how-climate-change-is-affecting-your-weather

2 See, e.g., Callahan, C.W., Mankin, J.S. National attribution of historical climate damages. Climatic Change 172, 40 (2022). https://doi.org/10.1007/s10584-022-03387-y

3 See WAC 173-446-335 et seq. and WAC 173-446-370(4)(b) et seq.

4 See the singular form of auction used in RCW 70A.65.150(6)(a).

5 See RCW 70A.65.160(1).

6 See RCW 70A.65.160(1).

Offset Additionality

The requirements for offset projects using Ecology's compliance offset protocols do not adequately define additionality. Ecology requires "activities that result in GHG emission reductions and GHG removal enhancements . . . would not otherwise occur in a conservative business-as-usual scenario."[7] The phrase "conservative business-as-usual scenario" is not defined. A similar phrase, "a conservative estimate of business-as-usual", also appears in the definition of "Project Baseline." This phrasing differs from the "business-as-usual scenario" term used in the "Crediting Baseline" definition[8] and the requirements for compliance offset protocols.[9] I recommend that Ecology either describe the criteria for conservative scenarios to distinguish these scenarios from regular business-as-usual scenarios or remove the term "conservative" from the relevant sections. Note the "conservative" adjective is not used in carbon registry protocols.[10] I also recommend Ecology define "business-as-usual scenarios" or reference accepted protocol definitions because some "business-as-usual scenarios" may include GHG emission reductions. For example, businesses usually make capital investments that may have incidental reductions in GHGs, but the investments aren't made for the purpose of reducing GHG emissions.

Offset Protocol Requirements

Ecology's requirements for adopting an offset protocol as a compliance offset protocol mandates that "GHG emission reductions and GHG removal enhancements are permanent".[11] The gigaton scale of emissions reductions and removals required to mitigate climate impacts necessitates both emissions reductions and carbon capture sequestration and use. The requirement that reductions and removals be "permanent" inhibits the development of carbon negative innovations. For example, compostable, single-use bioplastic produced from biomass that displaces fossil fuel-derived, single-use plastic is not permanent as that term is conventionally defined; however, compostable bioplastics can provide continually repeating carbon negative effects by displacing fossil fuel demand, increasing sequestered carbon in the production cycle, and becoming a partial end-of-life carbon sink in soils and landfills. I recommend that Ecology evaluate protocols for their ability to ensure "GHG emission reductions and GHG removal enhancements produce continually repeating carbon-negative effects or permanent reductions or removals." This language will allow protocols to evolve while maintaining compliance.

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7 See WAC 173-446-510(1)(d)(i).

8 See WAC 173-446-020.

9 See WAC 173-446-505(1)(c).

10 See, e.g., the "Additionality" sections of the Verified Carbon Standard v4.3 and the Verified Carbon Standard Methodology Requirements v4.2.

11 See WAC 173-446-505(1)(f) and (g).

In a similar manner, limiting non-sequestrastion projects to 2 renewal periods[12] inhibits innovations that utilize GHGs in a carbon negative manner on an on-going basis.

GHG Sources

The proposed rule requires Ecology to verify GHG sources in offset project boundaries.[13] Shifting climate dynamics and expanding scientific knowledge of both causation and impacts necessitate an adaptive approach to climate laws and regulation to manage risks appropriately. These changes in knowledge and environmental conditions combined with current operating practices have created significant unreported sources of GHGs in forest and agricultural lands.

A search of Washington's GHG Reporting Multi-Year Dataset showed no reports from forest or agricultural lands. Aggregate federal and state reports appear to be the only source of information on forest and agricultural land. This data focuses on carbon sequestration—wildfires being the sole emissions source reported for forests. See Washington Department of Natural Resources, Summary of Natural and Working Lands Carbon Inventories and Incentive Programs, December 1, 2020. Agricultural soils produced 2.6% of Washington's three-year average emissions of ~98.5 million metric tons of CO_2e (or ~2.6 million metric tons of CO_2e). See Washington State Department of Ecology, Washington State Greenhouse Gas Emissions Inventory: 1990-2018, p. 24 Figure 9.

Management practices coupled with climate change cause significant emissions from forests and farms. Forests present a paradox in that they both store carbon and emit GHGs. Research has documented an ongoing shift in forests from carbon sinks to sources. Trees emit both methane and carbon dioxide. These emissions have historically been offset by carbon sequestration in tree growth; however, rising average temperatures and increasing climate volatility, producing both extreme weather events and regularly occurring temperature spikes, have caused trees to become periodic GHG emitters now. These emissions occur both seasonally and inter-annually within the five-year reporting window of WAC 173-441-030 (6). See an early analysis of extreme heat event frequency in Philip, S. Y. et al, Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021, World Weather Attribution July 7, 2021.[14]

Reporting forest GHG emissions is both a legal requirement and a necessary step in resolving the climate crisis. Forests currently sequester more carbon annually than they emit; however, Washington's GHG reporting requirements do not allow for netting sequestration against emission. See WAC 173-441-030(1)(b). Carbon offset standards do not consider GHG emissions from living forests when calculating sequestration volumes for offsets. Thus, reporting these

12 See WAC 173-446-520(12)(a).

13 See WAC 173-446-580(3)(b)(ii)(A)(I).

14 https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/

emissions becomes necessary for understanding forest sequestration efficacy because these emissions represent an increasing sequestration impairment. Further, a forest's current net annual emissions may be positive for one or more years. Weather-induced respiration emissions alone or coupled with timberland operations-induced emissions, such as fertilization, prescribed burning, thinning, harvest residue (i.e. slash and stumps) decay, and soil-disturbing timber harvest, may produce net positive GHG emissions in a year. Finally, forests will become net annual emitters. Tracking the degradation of this ecosystem service prevents over reliance on reforestation and afforestation as climate solutions and overestimating the value of forest carbon offsets.

A substantial and growing body of research documents the forest carbon sink-to-source shift. For illustrative works, see:

a) Huntingford, C., Atkin, O.K., Martinez-de la Torre, A. et al. Implications of improved representations of plant respiration in a changing climate. Nat Commun 8, 1602 (2017) (https://doi.org/10.1038/s41467-017-01774-z) [revising forest carbon models with respiration analysis];

b) Daniel L. Warner et al, Carbon Dioxide and Methane Fluxes From Tree Stems, Coarse Woody Debris, and Soils in an Upland Temperate Forest, Ecosystems (2017) (http://dx.doi.org/10.1007/s10021-016-0106-8) [tree trunk emissions of GHGs];

c) Mary A. Heskel, Odhran S. O'Sullivan, Peter B. Reich et al., Convergence in the temperature response of leaf respiration across biomes and plant functional types, Proceedings of the National Academy of Sciences Apr 2016, 113 (14) 3832-3837, (http://www.pnas.org/cgi/doi/10.1073/pnas.1520282113) [assessing respiration changes with temperature];

d) K.A. Duffy el al., "How close are we to the temperature tipping point of the terrestrial biosphere?," Science Advances (2020), (https://www.science.org/doi/10.1126/sciadv.aay1052) [analyzing forest sink-to-source temperature tipping point];

e) Briegel F., Lee S. C., Black T. A., Jassal R. S., Christen A., Factors controlling long-term carbon dioxide exchange between a Douglas-fir stand and the atmosphere identified using an artificial neural network approach, Ecological Modelling, Volume 435, 2020, 109266, ISSN 0304-3800, (https://doi.org/10.1016/j.ecolmodel.2020.109266) [measuring sink-to-source carbon flux changes in a Douglas-fir forest on Vancouver Island];

f) Seibold, S., Rammer, W., Hothorn, T. et al. The contribution of insects to global forest deadwood decomposition. Nature 597, 77–81 (2021) (https://doi.org/10.1038/s41586-021-03740-8) [estimating GHG impact of wood decay from insects and microbes];

g) Smith, I. A. et al, Evidence for Edge Enhancements of Soil Respiration in Temperate Forests, Geophysical Research Letters, Volume 46 Issue 8, 28 April 2019 pp. 4278-4287 90 (https://doi.org/10.1029/2019GL082459) [measuring increased carbon emissions at forest edges];

h) Andrew B Reinmann et al, Urbanization and fragmentation mediate temperate forest carbon cycle response to climate, 2020 Environ. Res. Lett. 15 114036 (https://iopscience.iop.org/article/10.1088/1748-9326/abbf16/meta) [identifying increased carbon uptake in forest edges but also increased climate sensitivity];

i) Cater, M., Darenova E., and Simoncic, P., Harvesting intensity and tree species affect soil respiration in uneven-aged Dinaric forest stands, Forest Ecology and Management, Volume 480, 15 January 2021, 118638 (https://doi.org/10.1016/j.foreco.2020.118638) [measuring carbon efflux under different timber harvest intensities];

j) Stenzel, J., Walsh, E., Berardi, D., Hudiburg, T. W., Forest Thinning and Drought Impacts on the Carbon Balance of the Northern Rockies, American Geophysical Union, Fall Meeting 2019, abstract #B53H-2496 (https://ui.adsabs.harvard.edu/abs/2019AGUFM.B53H2496S/abstract) [quantifying the reduction in carbon storage from forest thinning];

k) Paul F. Hessburg et al, Wildfire and climate change adaptation of western North American forests: a case for intentional management, Ecological Applications (2021) (https://esajournals.onlinelibrary.wiley.com/doi/10.1002/eap.2432) [evaluating the need for GHG emitting fire management practices such as prescribed burns]; and

l) Marino BDV, Mincheva M, Doucett A. 2019. California air resources board forest carbon protocol invalidates offsets. PeerJ 7:e7606 (https://doi.org/10.7717/peerj.7606) [testing validity of carbon offset standards against field measurements].

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