

MEMORANDUM



To: Oregon Global Warming Commission
From: Cathy Macdonald, OGWC Chair
Alan Zelenka, Assistant Director for P&I
Zachariah Baker, Senior Climate Policy Analyst
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Date: December 16, 2022
Re: Draft Recommendation 2 Follow-Up

While Oregon has taken action to reduce emissions, the state's greenhouse gas (GHG) reduction goals no longer align with the science-based emissions mitigation pathways that have the greatest likelihood to avoid the worst impacts of global warming. Several states and the federal government have adopted more ambitious GHG reduction goals that better reflect the current science.

At its November 17th meeting, the Oregon Global Warming Commission (Commission) discussed preliminary options for recommending an update to the state's sector-based GHG reduction goals. The Commission asked staff to recommend a more specific proposal and/or options based on the best available science, current federal goals, and other states' goals.

Staff suggest the Commission recommend the Legislature strengthen and align Oregon's GHG reduction goals as follows:

- I. Establish that it is the policy of the state to direct legislative and agency action at a level and pace that is consistent with pathways to limit global warming to 1.5°C.
- II. Update Oregon's sector-based greenhouse gas emission reduction goals to reflect the best available science consistent with limiting warming to 1.5°C and align with other state and national goals.
- III. Direct the Oregon Global Warming Commission to study and recommend a net zero/net negative goal based on the potential to increase carbon sequestration through land sector actions. The net zero/net negative goal should be separate from and in addition to the sector-based emission reduction goals above.
- IV. Better enable periodic updates to Oregon's climate goals based on best available science.

The following sections discuss these recommendations in greater detail.

I. Establish that it is the policy of the state to direct legislative and agency action at a level and pace that is consistent with pathways to limit global warming to 1.5°C.

The scale and speed of emissions reductions necessary to mitigate climate change depends on the degree of warming policymakers wish to prevent. Over the past century, average global surface temperatures have risen by approximately 2°F, or 1.1°C.¹ This level of climate change is already having

¹ NASA, Long-Term Warming Trend Continued in 2017: NASA, NOAA. Jan. 18, 2018. <https://climate.nasa.gov/news/2671/long-term-warming-trend-continued-in-2017-nasa-noaa/#:~:text=The%20planet's%20average%20surface%20temperature,made%20emissions%20into%20the%20atmosphere.>

measurable impacts on weather patterns and ecosystems across the planet, and the severity and scale of these impacts will worsen as temperatures continue to rise.

To reduce the risks and impacts of climate change, the parties to the Paris Agreement agreed to take collective action to prevent global temperatures from increasing by more than 2°C above pre-industrial levels, and to strive to prevent global temperatures from increasing above 1.5°C.² According to the Intergovernmental Panel on Climate Change (IPCC), limiting warming to 1.5°C would greatly reduce the scale, intensity, and frequency of extreme climate events in comparison to 2°C of warming.³

Some states have incorporated an intent to limit global warming to 1.5°C into their climate policy frameworks. For example, in its 2020 climate bill, the Washington legislature noted the projected impacts of 1.5 degrees of warming; found that avoiding warming of 1.5 degrees or more would require GHGs to decline precipitously, and as soon as possible; and directed action “at a level consistent with pathways to limit global warming to one and one-half degrees.”

Establishing a policy to avoid warming by more than 1.5°C would strengthen Oregon’s climate policy framework in three ways. First, it would indicate an intent to protect Oregon’s communities, economy, and natural environment from the catastrophic climate impacts that the current science projects will likely manifest if temperatures increase beyond 1.5°C. Second, it would indicate an intent to reduce the state’s emissions at the speed and scale necessary to support a 1.5°C future. And third, it would provide a foundation for updating the state’s GHG reduction goals if necessary to align with new scientific findings and mitigation goals.

Draft Recommendation: Establish that it is the policy of the state to limit warming to 1.5 °C
The Oregon legislature should adopt a guiding policy declaring that global warming of more than 1.5 °C presents an unacceptable level of risk for Oregon’s communities, economy, and natural environment; and establishing an intent to direct legislative and agency action at a level consistent with pathways to limit global warming to 1.5 °C.

II. Update Oregon’s sector-based greenhouse gas reduction goals to reflect the best available science consistent with limiting warming to 1.5°C and align with other state and national goals.

A 2018 IPCC special report on the impacts from 1.5°C of warming estimates that limiting global temperature increases to 1.5°C would likely require a 45 percent reduction in GHG emissions from 2010 levels by 2030, and net zero emissions by 2050.⁴ These findings reinforce the need for ambitious, near-term reduction targets. Setting targets that track more closely to the mitigation pathways identified in the 1.5°C special report have the highest likelihood of avoiding the worst impacts of exceeding the 1.5°C threshold. Further, given that this is a global target, developed countries who have contributed more to the emissions problem and have more resources to address the problem (like the United States) should arguably be setting the strongest reduction targets.

² Paris Agreement. 2015. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

³ IPCC Special Report: Global Warming of 1.5°C, Chapter 3. 2018. <https://www.ipcc.ch/sr15/>.

⁴ IPCC Special Report: Global Warming of 1.5°C, Chapter 2. 2018. <https://www.ipcc.ch/sr15/>.

At the national level, the federal government has adopted goals for the US to reduce emissions by 50 percent below 2005 levels by 2030, and achieve net zero emissions by 2050.⁵ Several other states have also adopted more ambitious climate targets that align with the 1.5°C mitigation pathways identified by the IPCC. For example, Washington requires GHG emissions to decline 45 percent below 1990 levels by 2030, 70 percent below 1990 levels by 2040, 95 percent below 1990 levels by 2050, and net zero by 2050.⁶

Because the targets mentioned above reference different baseline years (e.g., 1990 or 2005) and target numbers, a table is provided below to assist with a comparison of targets from different sources. Table 1 shows how Oregon’s total emissions would decline if the respective targets were applied to Oregon’s emissions. This table is not inclusive of every state’s targets or all potential target formulations, but includes the ones that staff thought would be illustrative.

Oregon’s existing state targets are also included in the table to facilitate comparison. In addition, Table 1 includes the expected remaining emissions under the TIGHGER Scenario Analyses for the electrification scenario and the hybrid scenario in 2030, 2035, 2040, 2045, and 2050 as additional points of comparison.

TABLE 1: Comparison of GHG Reduction Goals Applied to Oregon Baseline Emissions. Baseline Data DEQ 2022; TIGHGER Scenario Projections SSG 2022.

GREENHOUSE GAS REDUCTION GOALS		OREGON EMISSIONS (MMTCO _{2e})					
SOURCE	TARGET	BASELINE ⁷	2030	2035	2040	2045	2050
ORS 468A.205	75% below 1990 by 2050	57	-	-	-	-	14
Oregon EO 20-04	45% below 1990 by 2035; 80% by 2050	57	-	31	-	-	11
TIGHGER Scenario Projections	42-43% below 1990 levels by 2030; 56-60% below by 2035; 66-69% below by 2040; 71-73% below by 2050; 76% below by 2050 ⁸	57	33	23-25	18-20	16-17	14
Oregon DEQ CPP Targets⁹	50% below 2017-2019 levels by 2035; 90% below by 2050	64		32			6

⁵ Greg Carlock and Dan Lashof, 6 Words to Describe the US Pledge to Reduce Emissions 50-52% by 2030. April 23, 2021. <https://www.wri.org/insights/6-words-biden-us-target-ghg-emissions-reduction>.

⁶ RCW 70A.45.020.

⁷ The baseline emissions data reflects updated, draft emissions data provided to the Oregon Global Warming Commission by the Oregon Department of Environmental Quality in advance of publication. The Oregon Department of Environmental Quality expects to publish the updated emissions data by the end of 2022.

⁸ The targets here are calculated from the emissions projections of the two TIGHGER scenarios – electrification and hybrid. These scenarios are keyed to accelerating achievement of the EO 20-04 goal of at least 45 percent below 1990 levels by 2035 to instead achieve it in 2030.

⁹ The Oregon Department of Environmental Quality’s Climate Protection Program (CPP) is an economy-wide program that covers approximately half of the state’s greenhouse gas emissions. This depiction in the graph uses

IPCC 1.5°C Special Report¹⁰	45% below 2010 by 2030; net zero by 2050	63	35	-	-	-	NZ
IPCC 6th Assessment (1.5°C Pathway)¹¹	43% below 2019 by 2030; 84% by 2050	65	37	-	-	-	10
Federal Goals / U.S. NDC¹²	50% below 2005 by 2030; net zero by 2050	68	34	-	-	-	NZ
Washington¹³	45% below 1990 by 2030; 70% by 2040; 95% by 2050	57	31	-	17	-	3
	Net zero by 2050						NZ
California¹⁴	40% below 1990 by 2030; 80% below 1990 by 2050.	57	34	-	-		11
	Net zero by 2045						NZ
Colorado¹⁵	50% below 2005 by 2030; 90% below 2005 by 2050	68	34	-	-	-	7
New York¹⁶	40% below 1990 by 2030; 85% below 1990 by 2050	57	34	-	-	-	9
	Net zero by 2050						NZ

As can be seen in the table above, Washington state’s targets would result in the strongest reduction in emissions over time. The TIGHGER Scenarios are slightly less ambitious than Washington’s targets but track very closely to Washington’s goals through the 2040 projection. The TIGHGER 2050 scenario results were considerably lower than those that would be produced with the Washington targets and fall short of the current scientific thinking on the needed emissions reductions by 2050.

As briefly discussed in the November draft recommendations memo, there are multiple ways to consider constructing updated goals. The TIGHGER scenario analysis has focused on potentially accelerating the EO 20-04 2035 goal of at least 45 percent below 1990 levels to 2030. Another option

the targets of the CPP and applies it to all of the state’s emissions to facilitate comparison across the other goals. This is not an actual depiction of the reductions that will be achieved by the CPP itself.

¹⁰ IPCC Special Report: Global Warming of 1.5°C, Chapter 3. 2018. <https://www.ipcc.ch/sr15/>.

¹¹ IPCC, AR6 Climate Change 2022: Mitigation of Climate Change, SPM-21 (2022). https://report.ipcc.ch/ar6/wg3/IPCC_AR6_WGIII_Full_Report.pdf.

¹² Pres. Joe Biden, Executive Order on Tackling the Climate Crisis at Home and Abroad, Jan. 27, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>; The United States of America Nationally Determined Contribution, <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%202021%20Final.pdf>.

¹³ RCW 70A.45.020. HB 2311, 66th Wash. Leg., 2020 Reg. Session.

¹⁴ Cal. Global Warming Solutions Act of 2006, SB 32, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32; Executive Order B-55-18 to Achieve Carbon Neutrality (2018), <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>.

¹⁵ Colorado Climate Action Plan to Reduce Pollution, HB19-1261 (2019), <https://leg.colorado.gov/bills/hb19-1261>.

¹⁶ New York Climate Leadership and Community Protection Act of 2019. S.B. 6599, A.B. 8429. <https://legislation.nysenate.gov/pdf/bills/2019/s6599>.

could be instead to recommend strengthening the 2035 goal. Recommending either of these also raises the question of whether to create additional interim goals on the path to 2050 and/or strengthen the 2050 goal.

To help focus the options, there are two general schema staff suggests the Commission consider:

- a) Recommending goals for 2030, 2040, and 2050; or
- b) Recommending goals for 2035 and 2050 (similar to the state's current goal structure)

Washington's goals provide a ready-made option for the first schema. And, as mentioned above, the TIGHGER analysis largely tracks these goals through 2040. Washington's 2030 goal is 45 percent below 1990 levels compared to the TIGHGER 2030 goal of 42-43 percent. Washington's 2040 goal is 70 percent below 1990 levels while the TIGHGER 2040 projection is 66-69 percent. Like the 2030 and 2040 goals, Washington's numerical 2050 goal is also consistent with the best available science to avoid warming of 1.5°C. (NOTE: Washington also has a 2050 net zero goal which staff is not including here – see Section III regarding net zero as a separate goal needing further study).

Using the second schema, the TIGHGER scenario projections could be used to identify a stronger 2035 goal – at least 60 percent below 1990 levels. For the corresponding 2050 goal in this schema, staff recommends a minimum of at least 90 percent below 1990 levels by 2050. This would be a substantial increase over the statutory and EO 20-04 2050 goals and more consistent with the current best available science. In addition, roughly half of the state's emissions are essentially already moving towards this goal as a result of DEQ's Climate Protection Program.¹⁷ Further, the electricity sector is slated to reduce emissions by 100 percent well before this date (by 2040) as a result of HB 2021. The Commission could also consider recommending the higher Washington 2050 numerical goal noted above.

Draft Recommendation Options:

1) Strengthen Oregon's Sector-Based GHG Reduction Goals by establishing the following 2030, 2040, and 2050 goals in statute:

- *at least 45% below 1990 levels by 2030;*
- *at least 70% below 1990 levels by 2040; and*
- *at least 95% below 1990 levels by 2050.*

OR

2) Strengthen Oregon's Sector-Based GHG Reduction Goals by establishing the following 2035 and 2050 goals in statute:

- *at least 60% below 1990 levels by 2035; and*
- *at least 90% below 1990 levels by 2050.*

¹⁷ DEQ's Climate Protection Program uses an average of 2017-2019 emissions as a baseline for emissions reductions. The recommendation here keys to a 1990 baseline to be consistent with how the existing state GHG reduction goals are measured. The ultimate result using the respective baselines differs by about 0.6 MMTCO_{2e} in 2050.

III. Direct the Oregon Global Warming Commission to study and recommend a net zero/net negative goal based on the potential to increase carbon sequestration through land sector actions. The net zero/net negative goal should be separate from and in addition to the sector-based emission reduction goals above.

In its 1.5°C special report, the IPCC determined that limiting global warming to 1.5°C will require substantial carbon dioxide removals, in addition to substantial reductions in anthropogenic GHG emissions. As a result, it calls for both a numerical emissions reduction by 2030 and a net zero emissions by 2050. The federal government also includes a net zero emissions goal. Washington (mentioned above),

Therefore, to effectively mitigate climate change, jurisdictions must dramatically reduce GHG emissions, while also supporting natural processes that draw down atmospheric carbon concentrations that have been building for more than 150 years. To achieve these dual objectives, climate policies must include both quantitative emissions reduction goals and net zero goals. The federal government includes these dual objectives with a goal of 50 percent below 2005 levels by 2030 and net zero emissions by 2050. Some states have also already adopted this approach. For example, Washington state requires both a 95 percent reduction in 1990 emissions by 2050, and economy-wide net zero emissions in 2050.¹⁸ California and New York similarly have net zero goals in addition to their numerical emissions limits.

In the context of climate change, “net emissions” generally refers to the difference between the total amount of GHGs emitted over a period of time (typically one year) and the total amount of GHGs removed from the atmosphere over that time period. “Net zero” emissions represent the point at which the total quantity of GHGs removed from the atmosphere equal or exceed the total amount of GHGs emitted into the atmosphere.

In practice, determining net GHG emissions is much more complex than conducting simple arithmetic, and there are multiple approaches for calculating net emissions. The differences between these approaches primarily relate to the types of emissions and the types of removals included in the calculation.

The Commission has already started to grapple with some of these issues. In its 2022 Natural and Working Lands Proposal, the Commission recommended the state establish goals for the land sector – in addition to sector-based goals. Given the complexity of the topic, the Commission has convened a Natural and Working Lands Advisory Committee (N&WL AC) to continue the Commission’s work to refine its Natural and Working Lands goals.

Draft Recommendation: Direct the Oregon Global Warming Commission to study and recommend a goal to achieve net zero emissions. The Legislature should direct the OGWC to recommend a net zero goal by December 1, 2024. The net zero/net negative goal should be separate from and in addition to the state’s sector-based emission reduction goals. The recommendation should be provided by December 1, 2024, using the most up to date TIGHGER modeling and input from the N&WL AC.

¹⁸ RCW 70A.45.020.

IV. Better enable periodic updates to Oregon’s climate goals based on best available science.

The “best available science” is not a static body of work. Climate science is constantly evolving and advancing as researchers collect new data, refine measuring and modeling techniques, and update climate models to account for shifting real-world conditions that diverge from historical norms. The mitigation pathways that the “best available” science indicates have a high likelihood of avoiding the worst impacts of global warming do not account for currently unknown variables that could have positive or negative warming impacts at some point in the future.

Given the ever-changing nature of the “best available science,” Commissioners at the November 17, meeting expressed interest in Oregon’s climate policy framework including a mechanism to enable periodic updates to the state’s emissions reduction goals to align with emerging scientific findings. At least one other state – Washington – has specifically included this concept in its climate laws.

Washington’s climate policy framework includes a mechanism to promote periodic updates in response to new scientific findings. To ensure that Washington’s climate goals reflect the best available climate science, the Washington Department of Ecology is directed to consult with the University of Washington’s climate impacts group and periodically submit reports to the legislature summarizing the current science and recommending whether the state’s GHG emissions limits need updating.¹⁹ The Department is required to submit this report and recommendations within 18 months following the publication of a global or national climate assessment. This mechanism for periodic review and consultation ensures that both the state legislature and the Department of Ecology remain informed of any emerging science and consider its implications for the state and the region. Further, the directive for the Department of Ecology to recommend updates to the state’s GHG emissions limits provides a mechanism for maintaining alignment between the state’s goals and the best available science.

The Oregon Global Warming Commission, in consultation with other state agencies, has historically had the role of tracking and evaluating progress towards achieving the state’s greenhouse gas emission reduction goals and recommending statutory or administrative changes to achieve the goals. This has also included the Commission recommending updated goals to the Legislature – through its biennial reports to the Legislature. As a result, there is already a mechanism in place, but it has not resulted in the Legislature acting.

In its 2015 Biennial Report to the Legislature, the Commission recommended a new 2035 goal to keep Oregon on track. Seven years later, that goal has not yet been adopted by the Legislature. EO 20-04 signed by the Governor in 2020 includes a 2035 goal similar to the one the Commission had recommended. Given the need for rapid climate action to avoid the worst impacts, a lag in adopting science-based reduction goals is problematic.

Staff are still researching the best mechanisms for better enabling more frequent updates of our sector-based emissions reductions and sequestration and storage goals for Oregon and will develop a more specific draft recommendation for our January OGWC meeting.

¹⁹ RCW 70A.45.040.