

MEMORANDUM



To: Oregon Global Warming Commission

From: Cathy Macdonald, OGWC Chair
Alan Zelenka, Assistant Director for P&I
Zachariah Baker, Senior Climate Policy Analyst

Date: February 1, 2023

Re: Final Draft Roadmap Recommendations

The Roadmap is intended to be a pivotal report that includes recommended strategies and actions that should be pursued to further reduce Oregon's greenhouse gas emissions. A draft recommendations framework for the Roadmap report was published in November 2022 and discussed at subsequent Oregon Global Warming Commission (OGWC) meetings. Updated Draft Recommendations were discussed at the OGWC's January 13, 2023, meeting and open for public comment through January 25, 2023. The Final Draft Recommendations here reflect changes informed by those conversations and public comment to-date. To facilitate review, more substantive changes from the Updated Draft Recommendations were redlined – minor editorial changes (e.g., formatting, typos, clarifications not changing meaning, and small text moves) were not.

The OGWC is scheduled to discuss and decide on these recommendations at its meeting on February 3, 2023.

~~UPDATED-FINAL~~ DRAFT RECOMMENDATIONS

Informed by the [Transformational Integrated Greenhouse Gas Emissions Reduction \(TIGHGER\)](#) analysis, the OGWC recommends six overarching strategies [for maintaining and increasing Oregon's climate action ambition](#):

1. Support ~~robust and continued~~ [continued-continuous](#) implementation of existing climate programs and regulations.
2. Adopt updated state greenhouse gas reduction goals consistent with the best available science.
3. Advance a set of additional climate actions that can help the state meet an accelerated greenhouse gas reduction goal of 45 percent below 1990 levels by 2030.
4. Fund future studies to continue to guide climate action over time.
5. Strengthen governance and accountability for Oregon climate action.
6. Position the state to take full advantage of federal investments in climate action.

Each of these strategies are discussed in turn below and include sub-recommendations.

1. Support robust and continued/continuous implementation of existing climate programs and regulations.

The TIGHGER analysis demonstrates the importance of the state’s existing climate programs and regulations in reducing greenhouse gas (GHG) emissions.

The TIGHGER analysis specifically considered/analyzed 1315 of Oregon’s climate programs and regulations adopted or under development at the time ~~(this grouping of programs and regulations was referred to using the acronym PRAUD). However, by the end of 2022 t~~The two programs and regulations “under development” ~~(Advanced Clean Cars II and the Clean Fuels Program Expansion)~~ were eventually adopted by the Environmental Quality Commission (EQC) and the acronym was shortened to full group of programs was referred to as the PRA – Programs and Regulations Adopted.¹ The PRA includes the following programs and regulations:

- Advanced Clean Cars
- Advanced Clean Cars II
- Advanced Clean Trucks
- Clean Fuels Program
- Clean Fuels Program Expansion
- Community Renewable Energy Program
- Climate Protection Program
- Energy efficiency standards for appliances
- HB 2021
- Heat Pump Rebate Program
- Healthy Homes Repair Fund
- Landfill Program
- Manufactured home replacement
- Recycling Modernization Act
- Solar + Storage Rebate Program

The TIGHGER analysis projects that with continued implementation of ~~these climate programs and regulations~~the PRA as planned, the state will be on track to meet the EO 20-04 GHG emission reduction goal for 2035. In addition, the analysis shows that these programs and regulations also have the potential to get the state most, but not all the way, to the EO 20-04 2050 goal. Therefore, Oregon’s existing climate programs and regulations provide a strong foundation for achieving the state’s GHG emission reduction goals.

¹ The two programs and regulations under development were Advanced Clean Cars II and the Clean Fuels Program Expansion. Both of those were adopted by the Environmental Quality Commission by the end of 2022. The TIGHGER modeling included an annual average carbon intensity reduction of 20 percent below 2015 levels by 2030 and 25 percent below 2015 levels by 2035 for the Clean Fuels Program Expansion. The program ultimately adopted targets of 20 percent below 2015 levels by 2030 and 37 percent below 2015 levels by 2035. The overall TIGHGER modeling outcome would not change significantly with the higher target included as fuels are covered under multiple programs. The higher target would instead shift the amount of reductions these programs would results in, with the Clean Fuels Program accounting for a higher share of emission reductions.

However, continued efforts are needed to solidify that foundation and ensure success over the long run. This includes adequate staffing and resources, complementary programs and regulations, and concerted efforts to ensure equitable implementation. [Many of the programs, including the two that account for the majority of projected emission reductions – DEQ’s Climate Protection Program and HB 2021 – are just getting off the ground with a number of implementation and compliance details still to be worked out. Given the novelty and breadth of those two programs, and their importance to meeting Oregon’s GHG emission reduction goals, it is especially important that the state support their implementation.](#) Further, assuming the Legislature updates the state’s GHG emission reduction goals consistent with best available science as the OGWC recommends (see Recommendation 2), there will be even less margin for error with the existing programs and regulations. The lessons learned from implementing these programs and regulations can also help inform the design and implementation of the additional actions necessary to meet updated goals [\(see Recommendation 3\)](#).

In addition to the specific programs and regulations evaluated as part of the TIGHGER analysis, there are several other existing state programs and regulations that play an [important](#) role in reducing emissions either directly or indirectly but could not be analyzed in the TIGHGER analysis ~~due to~~for a variety of reasons ~~(e.g. For example, DLCD’s Climate-Friendly and Equitable Communities program, provides direct emission reduction benefits through local land use changes and also enables conditions for advancing alternative transportation options which reduce emissions as well, which was put into place after the PRAUD analysis was completed still under development at the time of the modeling and would have required more detailed modeling to accurately project the program outcomes at a local level).~~ [These Several research, data, and education programs also support state climate action. A more complete list of Oregon’s climate mitigation](#) programs are listed in ODOE’s 2022 Biennial Energy Report section cataloging state climate programs and require similar support and attention.²

SUB-RECOMMENDATIONS

- A. Implement and operate existing climate programs and regulations as planned and provide adequate staffing and resources.** The existing programs and regulations are expected to operate and achieve emission reductions sometimes over decades. To be successful over the long run, it is imperative that they be implemented and operate as planned with adequate staffing and resources. Further, some of the largest emission reduction programs and regulations are just getting off the ground (e.g., DEQ’s Climate Protection Program and HB 2021) with significant implementation and compliance work still ahead. [Experience with implementing these programs and regulations moving forward may also inform and warrant expansion of the programs as happened with the Clean Fuels Program.](#)
- B. Support complementary programs, regulations, and investments that help facilitate, accelerate, or maximize implementation of existing climate programs and regulations.** The existing programs and regulations may require or benefit from complementary actions that can help facilitate, accelerate, or maximize their implementation. For example, policies supporting the development and availability of transmission could help alleviate a potential barrier to achieving the clean electricity targets in HB 2021. Similarly, new or additional financial incentives (e.g., for the purchase of electric vehicles) could be used to reduce costs associated with implementation of existing programs and regulations and help accelerate uptake of actions to ensure emission reductions are delivered at the pace and scale necessary. [Interagency](#)

² The 2022 Biennial Energy Report section is entitled “Oregon State Climate Programs and Actions.”

[coordination and partnerships such as those between ODOT, DEQ, DLCD, and ODOE to implement Oregon’s Statewide Transportation Strategy are also critical to maximizing efforts.](#)

C. Ensure equitable implementation of existing climate programs and regulations. The existing programs and regulations have additional benefits beyond reducing greenhouse gas emissions – e.g., health benefits from reducing air pollution or economic savings from energy efficiency. Environmental justice communities³ bear a disproportionate burden of climate impacts and have the potential to benefit the most from the co-benefits of climate action. Many of the adopted programs and regulations have provisions to help ensure environmental justice communities are engaged and prioritized in implementation. Strides are being made in this regard, but our understanding of how best to achieve these outcomes is still evolving. This is an area where additional exploration, learning, and analysis is needed to inform how policies and programs should be designed and implemented to ensure equitable implementation. This work will need additional resources and focused attention into the future.

2. Adopt updated state greenhouse gas reduction goals consistent with best available science.

Over the past century, average global surface temperatures have risen by approximately 2°F, or 1.1°C. This level of climate change is already having significant 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. 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. [To do so, requires immediate action to substantially reduce emissions. Further, given the global nature of the 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.](#)

[Prior to the signing of the Paris Agreement in 2015, several jurisdictions including Oregon set GHG emission reduction goals. Many jurisdictions have since updated those goals using the Paris Agreement and latest science as guides.](#)

In 2007 the Oregon Legislature established the following GHG emission reduction goals:

- By 2010, Oregon will arrest the growth of greenhouse gas emissions and begin to reduce emissions;
- By 2020, Oregon will achieve greenhouse gas levels that are 10 percent below 1990 levels; and
- By 2050, Oregon will achieve greenhouse gas levels that are at least 75 percent below 1990 levels.

³ Environmental justice communities are defined in Oregon House Bill 4077 (2022) to include communities of color, communities experiencing lower incomes, communities experiencing health inequities, tribal communities, rural communities, remote communities, coastal communities, communities with limited infrastructure and other communities traditionally underrepresented in public processes and adversely harmed by environmental and health hazards, including seniors, youth, and persons with disabilities.

[In 2015, the OGWC recommended an interim goal of 44 percent below 1990 levels by 2035.](#)⁴

In 2020, through Executive Order 20-04, Governor Brown added a [new 2035](#) interim goal [similar to the one the OGWC recommended](#) and updated the 2050 goal:

- By 2035, Oregon will achieve at least a 45 percent reduction below 1990 levels.
- By 2050, Oregon will achieve at least an 80 percent reduction below 1990 levels.

Currently, there is a misalignment between the GHG emission reduction goals in Oregon's statute and those in EO 20-04. The statute only includes a 2050 goal moving forward, whereas EO 20-04 includes a 2035 goal as well as a 2050 goal. The 2050 goal in the statute (at least 75 percent below 1990 levels) is also less ambitious than the 2050 goal in EO 20-04 (at least 80 percent below 1990 levels). Given the differences, the TIGHGER analysis considered progress toward achieving the EO 20-04 goals.

The TIGHGER analysis found that with continued implementation of existing programs and policies, the state is on track to meet its 2035 goal and could likely get most of the way to its 2050 goal. But, the best available climate science continues to indicate the need to go further and faster than these goals. In fact, driven by current science, the federal government and a growing number of states have adopted more ambitious goals than those currently in EO 20-04.

As a result, the OGWC studied updated goals to recommend to the Legislature. The TIGHGER analysis specifically assessed accelerating achievement of the EO 20-04 2035 goal to 2030 to more closely track the best available science. The TIGHGER analysis found substantial economic and health [net](#) benefits from accelerating the 2035 goal to 2030 ([more than \\$120 Billion by 2050](#)). Further, the TIGHGER analysis found that the accelerated goal would be achievable with a suite of additional climate actions. Given limited resources and the focus of the Roadmap to 2035, the TIGHGER analysis did not model accelerated goals beyond that, but the OGWC did substantial additional analysis to inform its recommendations.

To inform the OGWC's recommendations, the OGWC considered the best available science from the Intergovernmental Panel on Climate Change (IPCC); Oregon's current GHG emission reduction goals and other climate program goals; the TIGHGER scenario analysis results; national GHG emission reduction goals; and the GHG emission reduction goals of other states. In doing so, the OGWC observed that in addition to multiple states having stronger goals than Oregon – some also included multiple interim goals to help ensure emission reductions stay on track. Additionally, many states have also set net zero targets so that any remaining emissions will be counterbalanced by removing the same amount of emissions from the atmosphere through carbon sequestration. The OGWC also observed that some states directly connect their climate policy to the 1.5°C temperature limit identified by the IPCC and some states also include mechanisms for periodic updates to the goals.

Based on this assessment, the OGWC recommends a package of four recommendations detailed below and include: making it state policy to pursue action to limit warming to 1.5°C (Recommendation 2A); setting specific 2030, 2040, and 2050 goals to align with the 1.5°C limit and other similarly ambitious state and national goals (Recommendation 2B); setting a separate net zero goal (Recommendation 2C); and better enabling updates to the goals based on best available science (Recommendation 2D).

⁴ [Calculated at the time by drawing a straight-line projection between 1990 emissions and the 2050 statutory goal of 75 percent below 1990 levels.](#)

Table 1 helps illustrate what the OGWC considered and how it landed on the goals in Recommendations 2B and 2C. Since goals vary by different baseline years (e.g., 1990, 2010, or 2019) and target numbers depending on the source, Table 1 shows how Oregon’s total emissions would decline if the respective targets were applied to Oregon’s emissions. Table 1 does not include every state, but highlights California and Washington for comparison given that they have some of the most ambitious state GHG emissions reduction goals, share many similar climate policies with Oregon, and collaborate with Oregon on climate action as West Coast neighbors.

TABLE 1: Comparison of GHG Reduction Goals Applied to Oregon Baseline Emissions.

GREENHOUSE GAS REDUCTION GOALS		OREGON EMISSIONS (MMTCO ₂ e)					
SOURCE	TARGET	BASELINE ⁵	2030	2035	2040	2045	2050
OGWC Recommendations 2B and 2C	45% below 1990 by 2030; 70% by 2040; 95% by 2050	57	31		17		3
	Net zero by 2050						NZ
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 2030 Scenario Projections	42-43% below 1990 levels by 2030; 56-60% by 2035; 66-69% by 2040; 71-73% by 2050; 76% by 2050 ⁶	57	33	25-23	20-18	17-16	14
Oregon DEQ CPP Targets ⁷	50% below 2017-2019 levels by 2035; 90% by 2050	64	-	32	-	-	6
IPCC 1.5°C Special Report ⁸	All GHGs: 40-50% below 2010 by 2030	63	38-32				
	CO ₂ : 45% below 2010 by 2030; net zero by 2050	63	35	-	-	-	NZ
IPCC 6 th Assessment (1.5°C pathways) ⁹	All GHGs: 43% below 2019 by 2030; 69% by 2040; 84% by 2050	65	37	-	20	-	10
	CO ₂ : 48% below 2019 levels by 2030; 80% by 2040; (net zero by 2050-2055) ¹⁰	65	34		13		NZ
Federal Goals / U.S. NDC ¹¹	50% below 2005 by 2030; net zero by 2050	68	34	-	-	-	NZ
Washington ¹²	45% below 1990 by 2030; 70% by 2040; 95% by 2050	57	31	-	17	-	3
	Net zero by 2050						NZ

⁵ The baseline emissions data reflects updated, draft emissions data provided to the OGWC by the Oregon Department of Environmental Quality in advance of publication and is expected to be published shortly.

⁶ The targets here are calculated from the emissions projections of the two TIGHGER scenarios – electrification and hybrid. These scenarios are keyed to accelerating the EO 20-04 goal of at least 45 percent below 1990 levels by 2035 to instead achieve it in 2030. The TIGHGER scenario analysis did not consider additional goals.

⁷ Oregon DEQ’s Climate Protection Program (CPP) is an economy-wide program that covers approximately half of the state’s GHG emissions. The depiction in Table 1 applies the CPP targets to all state emissions to facilitate comparison; it is not an actual depiction of the program coverage or reductions that will be achieved by the CPP.

⁸ IPCC Special Report: Global Warming of 1.5°C (2018). <https://www.ipcc.ch/sr15/>. These numbers correspond to the 1.5°C pathways with no or limited overshoot (i.e., exceeding the limit, but ultimately getting back to the limit). The IPCC looks at numerous scenarios in a pathway category and reports the median emissions reductions across the scenarios as well as a range of those reductions. It reports reductions for all GHGs and individual GHGs including CO₂ emissions reductions. The numbers for all GHGs and those for CO₂ emissions are commonly cited in the public interchangeably as CO₂ emissions account for the majority of GHG emissions.

⁹ IPCC, AR6 Climate Change 2022: Mitigation of Climate Change (2022).

https://report.ipcc.ch/ar6/wg3/IPCC_AR6_WGIII_Full_Report.pdf. See also explanation in Footnote 5.

¹⁰ *Id.* Not all of the 1.5°C pathways achieve net zero CO₂ emissions, but all that do would do so between 2050-2055. See Box TS.6.

¹¹ President 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%2021%202021%20Final.pdf>.

¹² RCW 70A.45.020. HB 2311, 66th Wash. Leg., 2020 Reg. Session.

California ¹³	48% below 1990 by 2030; ¹⁴ 85% by 2045 Net zero by 2045 or as soon as possible; net negative thereafter	57	30	-	-	9 NZ	NN
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SUB-RECOMMENDATIONS

- A. Establish that it is the policy of the state to pursue action at a level and pace that is consistent with pathways to limit global warming to 1.5°C.** The scale and speed of emission reductions [and sequestration](#) necessary to mitigate climate change is informed by the degree of warming to prevent. 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°C of warming; found that avoiding warming of 1.5°C 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 worst climate impacts that the current science projects will likely manifest if temperatures increase beyond 1.5°C. Second, it would indicate an intent to take action consistent with reducing the state’s emissions at the speed and scale necessary to avoid warming of more than 1.5°C. And third, it would provide a foundation for updating the state’s GHG emission reduction goals if necessary to align with new scientific findings and mitigation goals.

- B. Update Oregon’s statutory sector-based greenhouse gas emission reduction goals to reflect the best available science consistent with limiting warming to 1.5°C and align with similarly ambitious state and national goals as follows: at least 45 percent below 1990 levels by 2030; at least 70 percent below 1990 levels by 2040; and at least ~~90 or 95~~ percent below 1990 levels by 2050.** The OGWC-recommended goals would better reflect best available science and be more consistent with similarly ambitious climate goals in other states (see Table 1 above for a comparison). The OGWC is recommending a separate [net-zero sequestration](#) goals (see Recommendation 2C), so the focus here is on the numerical targets.

[According to the IPCC, limiting warming to 1.5°C requires immediate action to substantially reduce emissions in the near-term.](#) The acceleration of Oregon’s EO 20-04 2035 GHG emissions reduction goal (at least 45% below 1990 levels) to 2030 is consistent with the best available science and the ambition of Oregon’s West Coast neighbors. Further, as demonstrated in the TIGHGER Scenario Analysis, there are substantial health and economic benefits to achieving the accelerated goal.

¹³ AB 1279 (2022); Cal. Global Warming Solutions Act of 2006, SB 32, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32; See also 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>.

¹⁴ California’s statutory goal is 40 percent below 1990 levels by 2030, but California’s recently adopted Scoping Plan sets a goal of 48% below 1990 levels by 2030. https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp_1.pdf. Page 71.

Once the EO 20-04 2035 goal is accelerated to 2030, there would then be a gap in goals to 2050 under Oregon’s current goal structure. The OGWC recommends an additional interim 2040 goal of at least 70 percent below 1990 levels to help ensure Oregon stays on track to meet its goals moving forward. Just by continuing implementation of Oregon’s existing climate programs and putting in place the additional programs needed to achieve the 2030 goal as studied in the TIGHGER Scenario Analysis, Oregon would be on track for a 66-69 percent reduction in emissions below 1990 levels by 2040. This is largely consistent with the IPCC median projections for GHG emission reductions by 2040, as well as Washington and California’s respective goals and trajectories.¹⁵

Finally, the OGWC recommends the 2050 goal be updated to at least ~~[90-or-95]~~ percent below 1990 levels by 2050. Oregon’s current statutory 2050 goal (at least 75 percent below 1990 levels) and EO 20-04 goal (at least 80 percent below 1990 levels) are outdated compared to the best available science and the goals of its West Coast neighbors.¹⁶ In addition, roughly half of Oregon’s emissions are essentially already moving toward a 90 percent reduction in emissions by 2050 as a result of DEQ’s Climate Protection Program. Further, Oregon’s electricity sector is slated to reduce emissions by 100 percent well before this date (by 2040) as a result of HB 2021. Therefore, a 2050 goal of ~~[90-or-95]~~ percent below 1990 levels would be consistent with the leadership our neighbors to the north and south are showing, better reflect the existing ambition of some of Oregon’s key climate programs, and result in the strongest emissions reductions – which is ultimately the scientific imperative.

In summary, the OGWC recommends the Legislature adopt the following GHG reduction goals to guide Oregon’s climate action:

- at least 45 percent below 1990 levels by 2030;
- at least 70 percent below 1990 levels by 2040; and
- at least ~~[90-or-95]~~ percent below 1990 levels by 2050.

Adopting these goals will help ensure Oregon continues to be a leader on climate action.

- C. ~~Legislatively declare it is the intent of the state~~Set the following statutory sequestration goals and direct the OGWC to develop a plan for the state to achieve these goals using the potential to increase carbon sequestration through land sector actions: to a**Achieve net zero emissions as soon as practicable and no later than 2050; and to achieve and maintain net negative emissions thereafter.; and direct the OGWC to develop a plan for the state to achieve these goals**~~net zero emissions using the potential to increase carbon sequestration through land sector actions. These~~net zero goals **should be separate from and in addition to the state’s sector-based emission reduction goals**~~above.~~

In the context of climate change, “net emissions” refers to the difference between the total amount of GHGs emitted over a period of time (typically one year) and the total amount of

¹⁵ Washington’s 2040 goal aims for a 70 percent reduction in emissions. For California, the reduction would be approximately 73 percent in 2040 assuming a straight-line reduction from California’s 2030 Scoping Plan goal to California’s 2045 statutory goal.

¹⁶ California does not have a numerical 2050 goal, but California’s goal of 85 percent below 1990 levels by 2045 surpasses achievement of Oregon’s EO 20-04 2050 goal by at least five years. Similarly, Washington’s goal of at least 95 percent below 1990 levels by 2050 far exceeds Oregon’s EO 20-04 2050 goal.

GHGs removed from the atmosphere over that time period. “Net zero” and “net negative” emissions represent the point at which the total quantity of GHGs removed from the atmosphere equals or exceeds the total amount of GHGs emitted into the atmosphere, respectively.

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 net zero emissions by 2050.¹⁷ The IPCC’s most recent assessment calls for net zero emissions on a similar time frame. Further, the IPCC explains that many of the net zero scenarios continue on to net negative emissions.¹⁸

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 sequestration 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. Further highlighting how these dual goals can and should co-exist, both California and Washington have specific numerical sector-based goals that are significantly driving down emissions in the same year that they are aiming to achieve net zero emissions. For example, Washington state requires both a 95 percent reduction in 1990 emissions by 2050, and economy-wide net zero emissions in 2050. California’s net zero ambition is even earlier—2045 or as soon as possible.

In practice, determining net GHG emissions is 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 OGWC has already started to grapple with some of these issues. In its 2021 Natural and Working Lands Proposal, the OGWC recommended the state establish carbon sequestration goals – in addition to but separate from the current sector-based goals. The OGWC recommended preliminary carbon sequestration goals and estimated that Oregon could potentially achieve net zero emissions by 2040. Given the complexity of the topic, the OGWC has convened a Natural and Working Lands Advisory Committee to continue the OGWC’s work to refine its recommended Natural and Working Lands sequestration goals and to begin a conversation about net zero accounting.

To reinforce this work, the OGWC recommends that the Legislature set a net zero and net negative goal separate from the sector-based emission goals discussed in Recommendation 2B

¹⁷ This target references net zero CO₂ emissions. Net zero GHG emissions would be achieved later under relevant IPCC scenarios. The earlier net zero CO₂ target is commonly used and cited generically as CO₂ emissions account for the majority of GHG emissions.

¹⁸ IPCC, AR6 Climate Change 2022: Mitigation of Climate Change (2022). https://report.ipcc.ch/ar6/wg3/IPCC_AR6_WGIII_Full_Report.pdf. Page 23. See also Cross-Chapter Box 3.

and direct the OGWC to [study/recommend an accounting methodology consistent with IPCC and EPA guidance](#) and provide recommendations on how to best achieve the goals.

- D. Better enable periodic updates to Oregon’s GHG emission reduction [and sequestration](#) goals by directing the OGWC to conduct a periodic evaluation of the goals based on the best available science and recommend updated goals to the Legislature as needed based on that evaluation.** 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.

The OGWC, in consultation with other state agencies, has had the role of tracking and evaluating progress toward achieving the state’s GHG emission reduction goals and recommending statutory or administrative changes to achieve the goals. This has also included the OGWC recommending updated goals to the Legislature in its biennial reports to the Legislature.

However, this has not resulted in legislative action to update the state’s goals. For example, in its 2015 Report to the Legislature, the OGWC recommended establishing a 2035 goal to keep Oregon on track to the 2050 goal. Seven years later, that goal has not yet been adopted by the Legislature. Given the need for rapid climate action to avoid the worst impacts, a delay in adopting goals consistent with the best available science is problematic.

Recommendation 2A above to establish that it is the policy of the state to pursue action at a level and pace that is consistent with pathways to limit global warming to 1.5°C would provide a rationale and north star for future goal updates based on the best available science. In addition, the OGWC recommends the Legislature create a more explicit expectation, trigger, and pathway for this type of analysis and discussion to occur.

Washington’s climate policy framework includes this kind of mechanism. 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 to be updated. 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 updates to the GHG emissions limits based on that science.

Oregon should have a similar mechanism. Specifically, the Legislature should direct the OGWC to conduct a periodic evaluation of Oregon’s GHG emission reduction [and sequestration](#) goals based on the best available science and recommend updated goals to the Legislature as needed based on that evaluation. At a minimum, an evaluation of this type should be required to be conducted and submitted no later than 18 months after the publication of a global or national climate science assessment. Having this direction in statute would provide a clearer pathway

and expectation for discussion and action on maintaining state GHG emission reduction [and sequestration](#) goals consistent with the best available science.

3. Advance a set of additional climate actions that can help the state meet an accelerated greenhouse gas reduction goal of 45 percent below 1990 levels by 2030.

[In addition to implementing the existing programs and regulations as planned \(see Recommendation 1\), achieving the EO 20-04 2035 goal in 2030 as analyzed in the TIGHGER process and recommended by the OGWC will require a suite of additional state climate actions.](#)

The TIGHGER analysis evaluated dozens of actions to meet the [accelerated goal](#). [The actions were selected from a much larger list of potential actions \(125 actions\) identified by state agencies and the public. The resulting TIGHGER action list focused on actions that reduce sector-based emissions – which is what the state’s current GHG emission reduction goals cover. Actions focused on addressing consumption-based emissions and natural and working lands emissions and sequestration were not included, but as noted in Recommendations 4D and 4E, are important areas for further attention.](#)

[Understanding that there are different pathways to achieve the accelerated goal, the OGWC explored construction of two scenarios of grouped actions: an Electrification Scenario and an Alternative Fuels Scenario. Modeling determined that a scenario relying on alternative fuels alone could not meet the accelerated goal \(i.e., there was insufficient RNG and renewable hydrogen to meet the goal\). As a result, the OGWC developed a Hybrid Scenario that augmented alternative fuels actions with electrification actions. and created two scenarios \(a combination of actions\) entitled “Electrification” and “Hybrid”. The Electrification sScenario focused exclusively on energy efficiency and incentivizing efficient electric equipment. actions that shifted energy use to electricity, while the Hybrid scenario expanded the use of alternative fuels such as renewable natural gas and clean hydrogen, but also included many electrification actions.](#)

[Given the need for numerous electrification actions in both scenarios, tThe majority of actions were common to both scenarios with only a handful of about a dozen actions unique to each of the two scenarios. A total of 35 actions were included across the scenarios – 23 common actions, and 12 unique actions \(5 in the Hybrid Scenario and 7 in the Electrification Scenario\). A list of the TIGHGER actions sorted by their GHG reduction amounts \(highest first\) are included in Table 2 below.¹⁹ The TIGHGER actions that are unique to either the Electrification or Hybrid Scenario are in italics and shaded gray; all the non-shaded actions are common to both scenarios. Table 2 also categorizes the actions based on their primary focus area \(e.g., building energy efficiency, transportation, etc.\).](#)

TABLE 2: TIGHGER Actions Sorted By GHG Reduction Amount

TIGHGER Action	Category
<i>RNG Use at Full Potential by 2050 (47.5 tBTU by 2050, with 10.6 tBTU from Oregon, and 36.5 tBTU from Imports)²⁰</i>	Renewable Natural Gas

¹⁹ The actions in Table 2 are sorted by GHG emission reduction amount using the Electrification Scenario emission reductions as the basis for the common actions. Some common actions have different emission reduction amounts depending on the scenario because of the way they were modeled in each respective scenario.

²⁰ Action unique to the Hybrid Scenario.

TIGHGER Action	Category
<i>Industrial Renewable Hydrogen Adopted by 70% by 2050</i> ²⁰	Renewable Hydrogen
Weatherize 95% of Existing Commercial Building Envelopes by 2040	Building Energy Efficiency
<i>Rooftop Solar 16.3 TWh by 2035</i> ²¹	Renewable Electricity
Weatherize 95% of Existing Residential Home Envelopes by 2040	Building Energy Efficiency
100% Heat Pumps & Water Heaters in New Residential Homes by 2025	Building Energy Efficiency
Commercial Code Energy Reduction 60% by 2030	Building Energy Efficiency
Improve Energy Efficiency of Existing Non-CPP Covered Industrial Facilities by 50% by 2050	Industrial Energy Efficiency
<i>Electrification of Industry 70% by 2050</i> ^{21 & 22}	Industrial Electrification
Residential Code Energy Reduction 60% by 2030	Building Energy Efficiency
<i>Injection of 15% Renewable Hydrogen into Distribution System by 2035</i> ²⁰	Renewable Hydrogen
Increase Amtrak Ridership	Transportation
Implement the Medium and Heavy Duty Zero Emission Plan by 2035 (beyond Advanced Clean Trucks)	Transportation
Carshare Increases in Urban Areas by 2035	Transportation
100% of Existing Residential Homes retrofitted with Heat Pumps by 2043	Building Energy Efficiency
100% of Existing Residential Homes retrofitted with Heat Pump Water Heaters by 2043	Building Energy Efficiency
50% of New Off-road Vehicles Sales (farm, forestry, construction, and recreation) are EVs by 2035 ²²	Transportation
Implement an Electric Micro-Mobility Strategy, E-Bikes & E-Scooters Gain 10% Mode Share In Portland Metro And Eugene Counties by 2035	Transportation
Fuel Cells in 5% of Residential Homes by 2030 ²⁰	Renewable Hydrogen
100% of New Transit Buses are EVs by 2035 ²²	Transportation
100% of Existing Commercial Buildings retrofitted with Heat Pumps by 2043	Building Energy Efficiency
<i>Increase Integrated Solar Generation on New Buildings 4 TWh by 2035</i> ²¹	Renewable Electricity
Food Waste Program Diverting 50% of Organics and Capturing Methane by 2030	Waste
Water and Wastewater Systems improve Energy Efficiency 20% by 2035	Industrial Energy Efficiency
Congestion Pricing Achieves a 10% Transport Mode Shift Away From Private Cars To Transit In Multnomah, Lane, And Washington Counties By 2035	Transportation
<i>Energy Storage of 14 kWh in 25% of Residential Homes by 2035</i> ²¹	Renewable Electricity
<i>Diesel Backup Power 100% Conversion to Battery Storage</i> ²¹	Renewable Electricity
Reduced Residential Floor Area of New Homes	Land-Use
Higher Residential Density in Urban Areas	Land-Use
<i>5% of Fuel Share from Pyrolysis of Biomass By 2035</i> ^{20 & 22}	Biomass

²¹ Action unique to the Electrification Scenario.

²² Action included in the scenario analysis, but not further scored and ranked. The action's GHG emission reduction amount was calculated and included in the scenario analysis, but there was not sufficient cost or other data to score and rank the actions on the other evaluation criteria the OGWC used to score and rank the other actions.

TIGHGER Action	Category
Transfer 10% of Medium Duty Vehicle Miles Traveled To Light Duty/Electric Micro-Mobility In Urban Counties By 2035	Transportation
100% of Existing Commercial Buildings retrofitted with Heat Pump Water Heaters by 2043	Building Energy Efficiency
100% Heat Pumps and 50% Water Heaters in New Commercial by 2025	Building Energy Efficiency
100% New appliance sales for Commercial Buildings are Electric by 2035 ²¹	Building Energy Efficiency
100% New appliance sales for Residential Homes are Electric by 2035 ²¹	Building Energy Efficiency

[While some actions could be attributed to multiple categories, Table 3 below provides an accounting of the number of actions by dominant category. For example, the Reduced Residential Floor Area of New Homes action is categorized as a Land-Use action, but it also deals with Building Energy Efficiency. As can be seen in Table 3, the actions span a variety of categories – with the majority addressing Building Energy Efficiency.](#)

TABLE 3: Summary of TIGHGER Actions by Category

Action Category	#
Buildings Energy Efficiency	12
Transportation	8
Renewable Electricity	4
Renewable Hydrogen	3
Industrial Energy Efficiency	2
Land-Use	2
Biomass	1
Industrial Electrification	1
Renewable Natural Gas	1
Waste	1

[In addition to the Electrification and Hybrid scenarios providing pathways to achieve the accelerated 2030 goal, both result in substantial economic and health benefits. The net economic benefit from the TIGHGER actions is approximately \\$47 Billion through 2050. An additional \\$74-76 Billion in health benefits is projected through 2050. The cumulative economic and health benefits for Oregon are, in total, over \\$120 Billion through 2050. The analysis also shows that the Electrification Scenario will create an additional 358,000 net job-years²³ through 2050, and the Hybrid Scenario will create an additional 284,000 net job-years. The peak year for job creation is in 2026 with over 32,000 additional jobs in the Electrification Scenario and over 25,000 in the Hybrid Scenario.](#)

To further assess the scenarios and associated actions, the OGWC developed a set of evaluation criteria. The six evaluation criteria include: GHG reduction amount, cost-effectiveness, equity co-benefit, health co-benefit, jobs and economic prosperity co-benefit, and risk and uncertainty. The actions were scored and ranked based on the evaluation criteria and the OGWC used the information to help craft its recommendations below regarding the actions.

²³ [A job-year is equivalent to one full-time job for one year.](#)

While the scoring exercise provided a lot of useful data, there were also limits to the exercise due to available funding, the extent of public engagement that could be conducted, and insufficient quantitative data in certain cases. ~~There were some actions that had insufficient data to be scored. In addition, due to the limited, one-time grant funding received for the TIGHGER project, there were also limitations to what could be evaluated and the extent of public engagement that could be conducted on these actions.~~ This was particularly the case regarding the depth of the co-benefits analysis, including the equity implications of the actions. Further analysis and public engagement around the actions would help refine prioritization and implementation of the actions moving forward. This can be done as part of the development of the Action Implementation Plans recommended below.

SUB-RECOMMENDATIONS

- A. ~~Advance all the TIGHGER analyzed actions using the OGWC's recommended implementation prioritization as a guide~~ Direct and fund state agencies, as needed, to develop Action Implementation Plans, in coordination with the OGWC, for all the TIGHGER actions as soon as possible and no later than September 2024. Given the need for urgent climate action, ~~and since all of the fact that ALL of the~~ identified actions ~~for in~~ each scenario are needed to achieve the 2030 accelerated goal, and the majority of the actions are common to each scenario, the OGWC recommends moving forward ~~all~~ ALL of the actions from both scenarios. Future planning around the energy system (see Recommendation 4 ~~CB~~) as well as continued public engagement (see Recommendation 3C) could help inform ~~and optimize~~ the prioritization of actions moving forward.

~~Specifically, the OGWC recommends moving all of the Electrification Scenario actions in their tier groups forward, along with the four unique Hybrid Scenario actions (noted in italics with an "H" before their action number) in their recommended tier group as follows. The recommended prioritization tiers for the Roadmap to 2035 follow below.~~

To facilitate advancement of these actions, an Action Implementation Plan (AIP) should be developed for each action. ~~Action Implementation Plans AIPs would should~~ include the specifics on who (which agency), what, where, when, and how the action ~~will could~~ be implemented. Some of the actions build on existing programs and regulations, while others may require new authority or direction. The ~~plans AIPs~~ will need to suggest funding sources and provide enough specific details for agency approval or Legislative authorization. In addition, the action's program design should maximize the co-benefits identified by the OGWC. Actions that either do not have an existing delivery pathway, or their delivery mechanism or technology is uncertain or underdeveloped will need particular attention. Finally, the OGWC identified higher risk and uncertainty surrounding some of the actions which should be further considered in developing AIPs for those actions.

Development of these ~~Action Implementation Plans AIPs~~ is a large undertaking that will need focused attention and requiring additional ODOE staff resources to support OGWC coordination efforts with other agencies (see Recommendation 5A). Other state agencies may also need additional resources to develop the individual AIPs.

Tier 1 Actions:

- ~~Weatherization in Existing Commercial Buildings by 2040 (#8)~~
- ~~Rooftop Solar (#25)~~

- Weatherization in Existing Residential Building by 2040 (#7)
- Commercial Code 60% Reduction Compared to 2006 levels by 2030 (#4)
- Industrial Energy Efficiency (Non-CPP entities) of 50% by 2050 (#15)
- Electric Heat Pumps and Water Heaters in 100% of New Residences by 2025 (#5)
- Residential Code 60% Reduction Compared to 2006 levels by 2030 (#3)

Tier 2 Actions:

- Increase Amtrak Ridership (#19)
- Medium-Duty/Heavy-Duty Zero Emission Plan (#16)
- Carshare Increases by 2035 (#20)
- Existing Residential Buildings 100% with Heat Pumps by 2043 (#9)
- Existing Residential Buildings 100% with Heat Pump Water Heaters by 2043 (#10)
- New Commercial Buildings 100% with Electric Heat Pumps & 50% Water Heaters in by 2025 (#6)
- Increase in Micro-Mobility 10% by 2035 (#18)
- Existing Commercial Buildings 100% with Heat Pumps by 2043 (#11)
- Food Waste Program (#23)
- Residential Building 25% with Energy Storage (#26)
- RNG Deployed at its Full Potential by 2050 (#H23)
- Industrial Renewable Hydrogen Use 70% by 2050 (#H22)

Tier 3 Actions:

- Solar on New Buildings (#24)
- Water/Wastewater Systems Increase Energy Efficiency 20% by 2035 (#22)
- Congestion Pricing (#21)
- Reduced Residential Building Floor Area (#1)
- Higher Residential Density in Urban Areas (#2)
- Mode Shift of 10% from Medium Duty and Heavy Duty to Light Duty Freight Vehicles (#17)
- Existing Commercial Buildings 100% with Heat Pump Water Heaters by 2043 (#12)
- Backup System Replaced with Battery Storage (#27)
- Electric Appliances (Non-Heating Equipment) in All Commercial Buildings by 2035 (#14)
- Electric Appliances (Non-Heating Equipment) in All Residential Buildings by 2035 (#13)
- Renewable Hydrogen Injection at 15% by 2035 (#H24)
- Home Fuel Cells in 5% of Residential Buildings by 2030 (#H25)

B. Prioritize further study of a subset of the recommended TIGHGER-analyzed actions to facilitate timely implementation. Many of the recommended actions need more study and development before they can be fully implemented. These actions either do not have an existing delivery pathway, or their delivery mechanism or technology is uncertain or underdeveloped. These actions should be made a high priority for Oregon to address. Adequate staff resources are needed to ensure these are fully developed in the near-term (see Recommendation 5A). Similarly, there were a few additional actions that were identified in the TIGHGER scenario analysis but had insufficient data to score and include in the prioritization above. These actions should also be further studied and are labeled as “Other Actions” below. As a result, the actions that need more study and development before they can be fully implemented are:

Subset of Tier 2 Actions To Study Further:

- Increase Amtrak Ridership (#19)
- Medium-Duty/Heavy-Duty Zero Emission Plan (#16)
- Carshare Increase by 2035 (#20)
- Increase in Micro-Mobility 10% by 2035 (#18)
- Food Waste Program (#23)
- RNG Deployed at its Full Potential by 2050 (#H23)
- Industrial Renewable Hydrogen Use 70% by 2050 (#H22)

Subset of Tier 3 Actions To Study Further:

- Congestion Pricing (#21)
- Reduced Residential Building Floor Area (#1)
- Higher Residential Density in Urban Areas (#2)
- Mode Shift of 10% from Medium-Duty and Heavy-Duty to Light-Duty Freight Vehicles (#17)
- Backup System Replaced with Battery Storage (#27)
- Renewable Hydrogen Injection of 15% by 2035 (#H24)
- Home Fuel Cells 5% by 2030 (#H25)

Other Actions To Study Further:

- 70% Industrial Electrification by 2050
- 100% of Transit Buses are EVs by 2035
- 50% of Offroad Vehicles are EVs by 2035
- 5% of Fuels By Share From Pyrolysis of Biomass by 2035

B. In the immediate term, prioritize development and implementation of Action Implementation Plans for a priority subset of TIGHGER actions that provide the biggest GHG emission reductions and have existing delivery mechanisms. Given the urgency of climate action, the OGWC, as part of its evaluation and prioritization of the TIGHGER actions, put the most weight on emissions reductions. In addition, given the short time period to position the state to achieve the accelerated 2030 goal, the OGWC looked at whether the actions had existing delivery mechanisms. Five of the largest GHG emission-reducing TIGHGER actions common to both scenarios already have long-standing avenues for implementation through existing programs and regulations. In addition, these actions scored well overall on the other evaluation criteria the OCWC considered. As a result, the Commission identified this subset of actions as top priority in the immediate term.

These actions include:

- Weatherize 95% of Existing Commercial Building Envelopes by 2040
- Weatherize 95% of Existing Residential Home Envelopes by 2040
- Improve Energy Efficiency of Existing Non-CPP Covered Industrial Facilities by 50% by 2050
- Commercial Code Energy Reduction 60% by 2030
- Residential Code Energy Reduction 60% by 2030

[While some of these actions have dates that extend beyond the date of the accelerated 2030 goal, action is necessary in the near-term to be able to achieve the long-term goal. For example, to achieve the Weatherize 95% of Existing Residential Home Envelopes by 2040 action, it was assumed that over half the residential buildings would need to be weatherized by 2030 and a rapid uptake in the near term would be needed to do so.](#)

- C. **[Adequately Resource and conduct more extensive public engagement – ideally in partnership with community-based organizations – to shape the design and implementation details of the TIGHGER actions, maximize benefits for environmental justice communities, and inform best practices for future Roadmaps.](#)** While the TIGHGER analysis focused on [the](#) “what” – which actions could get the state to the accelerated emission reduction goal, – it did not focus [purposefully](#) on “how” the programs should be designed and implemented. ~~This limitation was particularly evident when Commissioners discussed the method to assess the co-benefits of the actions. Commissioners noted that the “how” was particularly important to fully assess and maximize the co-benefits (e.g., health and equity) of the actions.~~ For example, Commissioners ~~raised~~ [asked](#) questions about whether and how underserved communities would be prioritized in program design and implementation. Commissioners also noted the importance of engaging environmental justice communities in that conversation. As a result, a concerted effort is needed to provide for, and incorporate public engagement into advancing the actions for implementation, including development of the Action Implementation Plans (see Recommendation 3A).

The co-benefits analysis conducted as part of evaluating the actions could help serve as a data point for this conversation. In addition, the county level data produced by the TIGHGER analysis could provide an avenue to further facilitate public engagement and inform program design and implementation. Further, efforts are underway to offer more guidance on best practices and tools to help with analysis to prioritize environmental justice. For example, HB 4077 (2022) requires a subset of Oregon state agencies to create an environmental justice mapping tool. Agencies will be able to consider results of the environmental justice mapping tool when developing administrative rules or agency policies or programs. ~~A social vulnerability index for wildfire risk was recently developed by Oregon State University and provides a sense of what a tool like this can offer.~~

This public engagement can and should help inform best practices for future Roadmaps. Using this information, and ideally with more resources available in the future, the OGWC could better engage environmental justice communities in development of future Roadmaps from the start.

4. Support future study and analysis to continue to guide climate action over time.

The TIGHGER analysis provides important data to inform state climate action. The OGWC has not had a detailed forecast of emissions based on current policies and programs previously, yet this information is crucial to assessing the state’s progress toward its GHG emission reduction goals. Further, the TIGHGER analysis provides county level data on climate actions that the state has not had before. But, the TIGHGER analysis is also based on a snapshot in time and this type of analysis needs to be regularly updated to incorporate the most up-to-date state climate action, goals, and data.

Further, the scenario analysis underscored that there are different approaches to achieving the state's GHG emission reduction goals. Those different approaches specifically involve choices regarding Oregon's energy system moving forward. For example, one of the TIGHGER scenarios relied on electrification, while the other scenario relied on a combination of electrification and alternative fuel actions (i.e., renewable natural gas and hydrogen). Given the need to implement these actions in time to be able to meet the OGWC's recommended 2030 goal (see Recommendation 2B), the OGWC recommended moving forward actions from both scenarios (see Recommendation 3). But, further planning around Oregon's energy system could help inform choices and optimize actions moving forward.

Finally, the TIGHGER analysis did not evaluate all the ways Oregon can contribute to addressing climate change. [A number of potential actions were identified through previous OGWC reports to the Legislature, discussions with state agencies, and public comment, but several were not modeled due to data and resource constraints. In addition, the TIGHGER analysis focused on actions to achieve the state's GHG sector-based emission reduction goals. Sector-based emissions include those emissions that occur inside the state's borders by economic sector as well as emissions associated with electricity used in Oregon regardless of where that electricity was generated. Oregon also contributes emissions outside its borders through consumption of goods and services \(e.g., cars, food, appliances, and clothing\). These consumption-based emissions are tracked by DEQ, but more work is needed to evaluate opportunities to address this portion of Oregon's carbon footprint. Further, Oregon's natural and working lands provide a key opportunity to bolster efforts to address climate change by sequestering carbon. The contribution of natural and working lands actions were not considered in the TIGHGER analysis, and more work is also needed to develop and advance this important opportunity. Analysis of additional opportunities to reduce Oregon's carbon footprint through actions that reduce consumption-based emissions and increase sequestration is needed and should be used to inform future Roadmaps.](#)

SUB-RECOMMENDATIONS

- A. Provide funding to the OGWC for a biennial, detailed forecast of emissions to ensure there is up-to-date data and analysis to assess progress toward meeting the state's GHG emission reduction and sequestration goals.** The recently completed TIGHGER analysis is based on a snapshot in time. How utilities and other regulated entities meet the requirements in House Bill 2021 and the DEQ's Climate Protection Program will become clearer in the next few years; as will actions the state can take to support the efficient and effective implementation of these and other programs. New data inputs will also be available as the years progress which will inform new policies and programs that may need to be put into place. Ongoing regular data collection and analysis will aid the State in making sure it stays on track to meet its GHG emission reduction goals. The OGWC can use the updated data and analysis to inform its ongoing biennial reports to the Legislature and associated recommendations. Every four years, the detailed forecast will serve as the foundation for updating the Roadmap [\(see Recommendation 4B\)](#). Specific funding is needed to contract for the analysis given the modeling expertise required.
- [B. Provide resources for additional public engagement and contracting as needed to support updating the Roadmap every four years.](#)** [The Roadmap serves an important function in identifying and coordinating a pathway to achieve the state's climate goals. Given the pace and scale of climate action necessary, a comprehensive update of the Roadmap every four years is prudent. This frequency will also provide an opportunity to reassess and incorporate actions that may not have had data to analyze in the previous Roadmap or were not previously](#)

[identified. In addition to a forecast of emissions that serves as the basis for the development of the Roadmap, there is significant public engagement and analysis necessary to identify and analyze actions to meet the goals. Development of future Roadmaps would benefit from additional resources for public engagement, particularly with environmental justice communities, as well as additional resources for a more comprehensive analysis of the co-benefits of the actions identified.](#)

B.C. Direct and fund ODOE to develop a statewide energy strategy. ODOE found in its 2022 Biennial Energy Report that Oregon would benefit from a strong statewide energy strategy to align policy development, regulations, financial investments, and technical assistance. ODOE explained that a strategy, if done right, would inform how to best optimize pathways to meet our clean energy goals, prioritize equity, balance tradeoffs, maximize benefits and minimize harms. The OGWC endorses the need for this strategy.

C.D. Direct and fund ODOE, in partnership with the OGWC and other state agencies, to develop a robust statewide natural and working lands (N&WL) inventory, baseline, and metrics to inform carbon sequestration efforts. In 2021, the OGWC approved its Natural and Working Lands Proposal which recommended the state adopt carbon sequestration goals and identified the need to develop metrics to inform carbon sequestration efforts. The OGWC recommended that these goals should be separate from, and in addition to, Oregon’s sector-based emission reduction goals – the state’s current GHG emission reduction goals. Recommendation 2C to establish a net zero [and net negative](#) state goal underscores the central role carbon sequestration efforts will play in the state’s climate action moving forward. As a result, it is important that there is a robust statewide lands inventory, baseline, and metrics, as well as policy and program development, to inform and advance N&WL efforts. [As part of this effort, a study of workforce and training needs and opportunities is necessary to ensure economic opportunities are maximized for this sector.](#)

D.E. Direct DEQ to evaluate and report on opportunities to reduce Oregon’s consumption-based emissions [in consultation with the OGWC.](#) The purchase of materials and services results in significant greenhouse gas emissions both in-state and elsewhere. Many of these emissions are under the direct control of Oregon and many others can be influenced through in-state programs and policies that could further reduce emissions.

Oregon’s 2015 consumption-based inventory estimates that the state contributed to emissions of 89 million metric tons of CO₂-equivalent as a result of consumption. Of those emissions, 38 million metric tons (43%) are included in the State’s sector-based inventory and have been subject to consideration through other State policies, such as clean electricity. However, 51 million metric tons (57%) are “imported,” primarily in materials such as food and building materials. These imported emissions present significant additional emissions reduction opportunities. However, the policies and programs that might achieve such reductions are generally not as well understood as sector-based emissions, and have not been evaluated in a methodical manner to date.

The Legislature should direct DEQ to deploy existing resources and produce an assessment in the form of a report to be delivered [to the Legislature and the OGWC](#) by September 2024 ~~(in advance of the 2025 Legislative Session)~~. The report should update Oregon’s consumption-based GHG emissions inventory and identify opportunities to reduce consumption-based

emissions through policies or programs that the state might advance, with a particular focus on materials management ~~(given that fuels and electricity are already addressed through other policy, and services generally have low emissions intensity)~~. The assessment should include evaluation of greenhouse gas reduction potential and other potential impacts/benefits, considering economic, environmental, and social factors, and could include recommendations for legislation. The report should be developed in consultation with the OGWC and should also include recommendations regarding regularly updating the consumption-based inventory moving forward to support the state's climate action efforts.

5. Strengthen governance and accountability for Oregon climate action.

According to draft preliminary emissions data, Oregon missed its 2020 GHG emission reduction goal by approximately 11 percent, and in 2021, the latest emissions data available, emissions grew to approximately 19 percent above the 2020 goal.²⁴ This is an unfortunate outcome given the OGWC's work to set the state up for success in achieving its GHG emission reduction goals. The OGWC developed a Roadmap to 2020 and delivered it to the Legislature back in 2011, with an additional update to the Legislature in 2013.²⁵ In addition, the OGWC first raised the alarm that Oregon was off track to meet the 2020 goal back in 2015.²⁶ Yet, Oregon still missed its goal. This outcome speaks to the need for better governance and accountability to the state's GHG goals moving forward, including adequate resourcing for state agency climate efforts.

As the TIGHGER analysis demonstrates, with the addition of several new programs and regulations since 2020, Oregon has laid a strong foundation to meet its GHG emission reduction goals moving forward. At the same time, as Recommendation 1 makes clear, there is still more work to do to ensure the existing programs and regulations deliver as planned. Further, as Recommendations 2 and 3 make clear, stronger GHG emission reduction goals consistent with the best available science are needed, as well as a suite of additional actions to meet those goals. In addition, the state's goals should be periodically re-assessed and updated to make sure they are consistent with best available science. Similarly, as Recommendation 4 makes clear, there are a number of key issues to study to inform future climate action efforts. As a result, there is significant additional work, coordination, and analysis ahead to ensure Oregon stays on track to meet goals consistent with the best available science.

The OGWC₇ has been, and continues to be, the focal point for analysis and recommendations to ensure Oregon stays on track to meet its climate goals. The amount of state climate work for the OGWC to track and analyze has expanded exponentially, particularly in the last few years. In 2020, Executive Order 20-04 directed multiple state agencies to take action to address climate change. This has led to a multitude of new agency climate programs and actions, including from agencies that have not historically had extensive climate programming and do not currently hold seats on the OGWC. Similarly, EO 20-04 tasked the OGWC with recommending carbon sequestration goals – a whole new area of work for the OGWC and the state's climate framework. In addition, the Legislature passed a variety of important new climate policies over the last couple of years including HB 2021 (2021). ODOE in its 2022

²⁴ DEQ provided the Oregon Global Warming Commission with draft preliminary emissions data for 2020 and 2021. Total emissions for those years are 58 and 62 MMTCO_{2e}, respectively. Oregon's 2020 GHG emission reduction goal was to achieve 10% below 1990 levels. Oregon's emissions in 1990 were 57 MMTCO_{2e}.

²⁵ <https://www.keeporegoncool.org/roadmap-to-2020>.

²⁶ See OGWC 2015 Biennial Report to the Legislature.

Biennial Energy Report identified over [more than 130 programs and actions across 17 agencies related to climate change.](#)²⁷

The increased extent and breadth of climate-related efforts and the accelerating impacts of climate change are making the OGWC's role in ensuring a comprehensive climate action plan even more important. However, the OGWC continues to be minimally staffed (0.3 FTE), at a level that has not changed since 2007. The need for additional staffing and resources for the OGWC has been recognized for years and was a key recommendation in the OGWC's 2020 Report to the Legislature. [The exponential expansion of climate programming since 2020, only has underscored that need.](#)

Fortunately, the OGWC was able to secure one-time grant funding from the U.S. Climate Alliance for the TIGHGER analysis and the OGWC's Natural and Working Lands (N&WL) efforts. However, relying on future grant funding to regularly update this analysis and advance the OGWC's N&WL efforts creates uncertainty in the OGWC ability to provide important and timely information to decision-makers. And, continued analysis on both fronts is crucial to assessing and ensuring the state stays on track to meet its GHG emission reduction and carbon sequestration goals.

~~Further, the amount of state climate work for the OGWC to track and analyze has expanded exponentially, particularly in the last few years. In 2020, Executive Order 20-04 directed multiple state agencies to take action to address climate change. This has led to a multitude of new agency climate programs and actions, including from agencies that have not historically had extensive climate programming and do not currently hold seats on the OGWC. Similarly, EO 20-04 tasked the OGWC with recommending carbon sequestration goals—a whole new area of work for the OGWC and the state's climate framework. In addition, the Legislature passed a variety of important new climate policies over the last couple of years including HB 2021 (2021). ODOE in its 2022 Biennial Energy Report identified over 130 programs and actions across 17 agencies related to climate change.²⁸~~

Beyond the lack of funding and resources for the OGWC to track and analyze the growing number of climate efforts, there are also governance and accountability challenges due to the current executive branch structure and authorities. As mentioned above, many agencies that are taking important climate action are not members of the OGWC. Similarly, there is no consistent, overarching requirement for agencies to report on their progress on climate actions to the OGWC or otherwise. There is also currently no one-stop-shop for the public or decisionmakers to track progress and opportunities for engagement on all the multitude of actions in real-time. Further, the OGWC only has the ability to recommend action, but not require action. EO 20-04 directs agencies to prioritize climate action in all activities. While Governor Brown's Carbon Policy Office provided oversight of the EO 20-04 work, that office no longer exists and there is not a current mechanism to ensure consistent adherence and level of ambition across agencies.

Finally, focused governance and accountability efforts are needed to ensure equitable outcomes. Several climate programs and regulations have specific directives to prioritize environmental justice communities. EO 20-04 also directs agencies to prioritize actions that will help vulnerable populations and impacted communities adapt to climate change and consult with the Environmental Justice Task Force (now the Environmental Justice Council) on evaluating climate actions, but these efforts are just getting off the ground. As a result, attention to ensuring this work happens and is successful will be key

²⁷ <https://energyinfo.oregon.gov/ber>.

²⁸ <https://energyinfo.oregon.gov/ber>.

moving forward. Having additional voices on the OGWC from these communities would be an important step.

SUB-RECOMMENDATIONS

- A. Provide additional staffing and resources for the OGWC.** The OGWC has a number of statutory duties including, but not limited to: report to the legislature once a biennium on the state’s progress in meeting its GHG emission reduction goals; make recommendations for statutory and administrative changes, policy measures, funding mechanisms, and other actions state and local governments, businesses, nonprofit organizations, or residents should take to reduce GHG emissions; coordinate state and local efforts to reduce GHG emissions; track and evaluate the potential for carbon sequestration; educate Oregonians about the scientific aspects and economic impacts of global warming; and inform Oregonians on ways to prepare for the effects of global warming.

Currently, the OGWC is expected to do this work with 0.3 full-time equivalent staff support from ODOE. This has proven challenging, especially with the recent exponential growth in state climate actions and the multiplying climate impacts. As a result, the OGWC has had to be very selective in its work.

Additional staffing and resources are needed for the OGWC to fulfill its statutory duties and critical role. One full-time position would add necessary capacity to allow the OGWC to do [its core functions of providing](#) timely and needed tracking, analysis, and public engagement around the expanded and growing body of state [and local](#) climate activities. An additional full-time position is necessary to do the required work to further research, plan, and track implementation of the Roadmap recommendations (particularly Recommendation 3). In addition, ongoing funding is also needed to contract with experts to update emission projections every biennium (see Recommendation 4A) [and specific resources for public engagement and co-benefits analyses as needed for updates to the Roadmap every four years \(see Recommendation 4B\)](#).

Further, through its Natural and Working Lands Proposal (N&WL Proposal) and one-time grant funding, the OGWC is continuing to lay the groundwork to establish a carbon sequestration baseline for natural and working lands, set carbon sequestration goals, and advance programs to meet those goals. As a result, the OGWC anticipates also needing a full-time position to plan, coordinate, advance, and track the work called for across agencies in the OGWC’s N&WL Proposal. An additional full-time position also will be required to do the necessary technical research and data collection as well as ongoing funding to contract experts to update the Activity Baseline, Natural and Working Lands Inventory, and the Community Impact metrics.

Additional funding to develop and maintain a climate action and emissions dashboard would further bolster the OGWC’s overall tracking and public education efforts (see Recommendation 5E).

- B. Expand the statutory list of OGWC ex-officio non-voting members to include additional state agencies involved in climate action.** More than seventeen state agencies now have significant climate programming. Only about half of those have seats on the OGWC. Agency participation in the OGWC is critical to ensuring coordinated action. As a result, the following agencies should

be specifically added to the OGWC membership: Business Oregon, Department of Administrative Services, Department of Consumer and Business Services, Department of Land Conservation and Development, Oregon Department of Fish and Wildlife, Oregon Health Authority, Oregon Housing and Community Services, and Oregon Watershed Enhancement Board.

- C. **Expand the voting membership of the OGWC to include a youth representative; ~~and a member with experience in environmental justice; and a local government representative.~~** Climate change has disproportionate impacts on Oregonians from environmental justice communities, including our youth. However, membership from these segments of the population is not currently required to be represented on the OGWC. In addition, the OGWC is charged with helping coordinate state and local climate efforts, yet there is not a specific seat for local government on the OGWC. The OGWC recommends adding specific seats to provide for representation of these voices.

The OGWC currently has 11 voting members, with six allocated to have specific expertise and perspective. Those specific seats include manufacturing, energy, transportation, forestry, agriculture, and environmental policy. The other five are At-Large seats. Adding a seat for youth ~~and~~; a seat for environmental justice communities; and a seat for local government would bring the total number of voting members to ~~13~~14. To maintain an odd number of members to facilitate OGWC business (i.e., avoiding tie votes), the OGWC recommends reducing the amount of At-Large seats from five to four – for a total of 13 voting members. The details of the youth representative appointment can follow the model of the Environmental Justice Council, whose youth representative is between the ages of 16-24 and serves a two-year term instead of a four-year term like the other members.

- D. **Require agencies to annually-regularly report on their climate work and progress to the OGWC.** While the OGWC has the responsibility to track and monitor progress toward achieving Oregon’s GHG emission reduction goals and recommend additional actions needed to ensure Oregon meets its goals, there is no consistent, overarching requirement for state agencies to report to the OGWC – or otherwise – on their progress on climate actions. Some state agencies are required to report to the Legislature on particular climate-related programs or goals, but that reporting does not cover the gamut of state climate programming and spans different time frames.

Regular reporting covering the gamut of state climate programming is critical to inform the OGWC’s efforts. In addition, agency reporting to the OGWC will can also provide interested parties and the public with consistent and regular updates on agency actions. Therefore, At least the state agencies holding seats on the OGWC (including those recommended to be added in Recommendation 5B) should be required to annually-regularly report to the OGWC, and the OGWC should be given the authority to require additional agencies to report to the OGWC as needed. Existing agency reporting on particular programs will be assessed and leveraged to inform this reporting. Reporting to the OGWC will also provide interested parties and the public with consistent and regular updates on agency actions.

- E. **Provide funding for the OGWC to create and maintain a state climate action, ~~and emissions,~~ and sequestration dashboard and clearinghouse as part of the OGWC’s statutory tracking and education responsibilities.** A lot of data and information needs to be tracked and monitored to

understand Oregon’s progress on addressing climate change. This includes emissions data as well as information on the programs and actions agencies are taking to address climate change.

The OGWC works to bring this information together once every two years in the OGWC’s biennial reports to the Legislature, but in the meantime, the information in the report remains static until it is updated in the next report. In addition, as was the case over the last few years, significant action happens in between the OGWC’s biennial reports. And, currently, there is not a central place across state government where decisionmakers and the public can find and track this information.

Therefore, a state climate action, ~~and~~ emissions, ~~and~~ [sequestration](#) dashboard ~~and~~ [clearinghouse](#) could fill an important information gap moving forward. It would provide a one-stop shop for the most up-to-date climate action and emissions data, including: the latest forecast of emissions and associated modeling; current information on agency efforts to address climate change; progress towards achieving the state’s GHG emission reduction goals and ~~recommended~~ carbon sequestration goals; as well as efforts to address consumption-based emissions. The dashboard ~~and~~ [clearinghouse](#) would help the OGWC and interested parties track the state’s climate progress, help inform and educate Oregonians about all the climate work being done within the state, and better highlight opportunities for public engagement. [In developing the dashboard and clearinghouse, the OGWC would leverage and learn from the Oregon Department of Transportation’s soon to be released dashboard on transportation-related actions and emissions.](#)

- F. Require state agencies to consider and integrate climate mitigation and adaptation in decision-making and provide adequate resources to build agency capacity to facilitate this process.** EO 20-04 included similar direction to agencies, but legislatively reinforcing this direction and providing adequate resources will help ensure consistent action. The OGWC included a similar recommendation in its 2020 Report to the Legislature.
- G. Require state agencies to consider and integrate equity into climate mitigation and adaptation efforts and provide adequate resources to build agency capacity to facilitate this process.** EO 20-04 included similar direction to agencies, but legislatively reinforcing this direction and providing adequate resources will help ensure consistent action. The OGWC included similar recommendations in its 2020 Report to the Legislature noting that agencies should adopt climate equity frameworks (following the lead of other state agency and commission equity work) and increase representation of traditionally underrepresented communities on all agency Rules Advisory Committees.

6. Position the state to take full advantage of federal investments in climate action.

The federal Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) will provide significant funds to implement climate actions, programs, and regulations. The federal government is still developing rules for how the funds will be distributed. Due to this timing, the potential funding provided by these two programs was not incorporated into the TIGHGER cost-effectiveness analysis. With that said, these programs are very likely to help reduce the costs and maximize the benefits of the additional climate actions identified in Recommendation 3, as well as help achieve the level of ambition identified in the TIGHGER analysis and Roadmap. In addition, a significant

amount of these funds will come with requirements to prioritize environmental justice communities (per the Justice40 Initiative), providing an important opportunity to further climate equity efforts. Oregon should position itself to apply for and maximize the use of these funds.

SUB-RECOMMENDATIONS

- A. Ensure coordination across state agencies on the pursuit and use of the IJJA and IRA funds.** The amount of federal funding that is coming available for climate, ~~and~~ clean energy, [and natural and working lands](#) projects is unprecedented and presents a huge opportunity for Oregon. Many of these programs will be competitive in nature – meaning Oregon will be competing with other states for limited funds. Oregon will need to be ready to apply for these funds with credible, well-thought-out programs and projects. Coordination across state government can help ensure that Oregon puts its best foot forward. Further, once Oregon has the funds in hand, coordination across state government will be needed to ensure the use of the funds is maximized.
- B. Support complementary programs, regulations, and investments that increase the likelihood of receiving and maximizing the use of the funds.** Oregon has a number of programs already in place that are potentially shovel-ready conduits for some of the federal funds (e.g., ODOE’s Solar + Storage Rebate Program; utility weatherization programs; heat pump rebate programs; ODF’s Urban and Community Forestry Program and Forest Legacy Program; and OWEB’s grant program, among others). Oregon may also need new programs or policies to best position itself for some of the federal funding opportunities. For example, discussions around implementation of the IRA’s Greenhouse Gas Reduction Fund have noted the need for green banks to assess and distribute the funds. While over twenty states have green banks, Oregon does not. The OGWC previously recommended creation of a green bank in its 2020 Report to the Legislature.
- C. Provide opportunities for public input, engagement, and outreach on the pursuit and use of the funds, particularly for environmental justice communities.** Maximizing use of the federal funds will require public engagement. The public can provide creative ideas and suggest priorities for the use of the federal funds. A network of engaged organizations and individuals could potentially support Oregon’s efforts to secure funds; advise on setting up the programming and application process for the funds; get the word out on the availability of the funds; and help design thoughtful projects to fund. Given the amount of funds Oregon may get, public awareness of the availability of the funds and application periods will be particularly important to ensure adequate applications and strong projects. Ensuring that environmental justice communities are centered in these public input, engagement, and outreach opportunities will be important to ensure the funds are maximized for these communities. Funding or technical assistance to these communities may be needed to support meaningful engagement.