Oregon Climate Action Roadmap to 2030

Commission Recommendations

KeepOregonCool
Oregon Global Warming Commission

March 2023

KeepOregonCool
Oregon Global Warming Commission

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INTRODUCTION

The Oregon Climate Action Roadmap to 2030 provides extensive analysis and recommendations for how to achieve the important work ahead.

Thanks to Oregon's recent bold energy and climate change policy advances, Oregon is projected to be able to meet its Executive Order 20-04 2035 greenhouse gas emission reduction goal, but there is a great deal of work that needs to be done before then. Existing programs and regulations need to be implemented and operated as planned with necessary staffing and resources. In addition, the best available climate science indicates the need to go further and faster to avoid the worst impacts of climate change – necessitating achievement of the 2035 goal by 2030. Doing so will require implementing several additional state climate actions. Further study and analysis of consumption-based emissions and sequestration efforts is also needed to identify opportunities to more completely address Oregon's carbon footprint. Governance and accountability improvements are needed to keep efforts on track. And recent federal funding opportunities need to be channeled for maximum impact. The *Oregon Climate Action Roadmap to 2030* provides extensive analysis and recommendations for how to achieve the important work ahead.

Oregon Climate Action Roadmap to 2030 Background

Climate change is already having a measurable impact on Oregon's landscape, communities, and economy. Oregon is experiencing increased temperatures, changing precipitation patterns, reduced snowpack, drier summers, and more frequent and damaging wildfires. Extreme heat events, severe drought conditions, and high-intensity wildfires have inflicted significant damage on Oregonians, communities, the environment, and the economy. These impacts are projected to become more frequent and severe as temperatures increase and climate change is left unchecked. A more detailed description of the latest climate impacts can be found in the Oregon Global Warming Commission's 2023 Report to the Legislature.[1]

At the same time, actions to mitigate climate change can significantly benefit Oregon's communities, economy, and environment. Well-designed climate mitigation actions can make Oregonians healthier and Oregon's communities more resilient, especially communities that have suffered the greatest impacts from climate change and many other social injustices.

Recognizing the importance of addressing climate change, Oregon has had greenhouse gas (GHG) emission reduction goals since 2007. Unfortunately, according to preliminary emissions data, Oregon missed its 2020 GHG emission reduction goal by 13 percent. In 2021, the latest emissions data available, emissions grew to 19 percent above the 2020 goal. Back in 2011, the Oregon Global Warming Commission (OGWC), developed and delivered a *Roadmap to 2020* to the Legislature, outlining actions that could be taken to achieve the 2020 goal.[i, 2] The OGWC provided a progress report on the Roadmap to 2020 in 2013 highlighting the need for further action, and in 2015, the OGWC continued to raise the alarm that Oregon was off track to meet the 2020 goal.[3, 4] Yet, Oregon still missed its goal — an outcome

[i] The Oregon Global Warming Commission is an independent body established in 2007 that identifies strategies to reduce GHG emissions and recommends policy measures and other actions to be carried out by state and local governments, as well as non-governmental partners. The OGWC includes 25 members: 11 eleven voting and 14 non-voting members. The voting members include six members with specific sector experience and five At-Large members all designated by the Governor. The non-voting members include: three members representing state agencies or academic institutions; seven members who are state agency directors representing specified state agencies; and four Legislators appointed by the Senate President and House Speaker. Details about the OGWC can be found at: https://www.keeporegoncool.org

that speaks to the need for better governance and accountability to Oregon's GHG goals moving forward, including adequate resourcing for state agency climate efforts.

The *Oregon Climate Action Roadmap to 2030* (Roadmap) is aimed at ensuring Oregon does not miss its next GHG emission reduction goal. The OGWC, with grant funding from the U.S. Climate Alliance, worked with consulting firm Sustainable Solutions Group (SSG) to develop an Oregon-specific model that forecasts the potential emission reductions from existing and new mitigation actions Oregon could take. This analysis was called the Transformational Integrated Greenhouse Gas Emissions Reduction (TIGHGER) Project.

The TIGHGER analysis found that with continued implementation of existing programs and policies as planned, Oregon is on track to meet the Executive Order 20-04 2035 goal of at least 45 percent below 1990 levels by 2035. In addition, the TIGHGER analysis considered what it would take to accelerate achievement of the 2035 goal to 2030 consistent with the ambition required by the best available climate science. The TIGHGER analysis found that Oregon can feasibly achieve the accelerated goal—while also creating thousands of new jobs and more than $120 billion in economic and health cumulative net benefits in the state. A suite of additional climate actions was identified to achieve the accelerated goal. A more detailed discussion of the TIGHGER analysis and results, including an executive summary, can be found in the TIGHGER Project Report.[5]

The TIGHGER findings, and OGWC discussions regarding the findings, serve as the basis for the Roadmap Recommendations that follow.

ROADMAP RECOMMENDATIONS

Recommendations Summary

Informed by the TIGHGER analysis and OGWC discussions, the OGWC recommends six overarching strategies for maintaining and increasing Oregon's climate action ambition:

1. **Support robust and continuous implementation of existing climate programs and regulations.**
2. **Adopt updated state greenhouse gas goals consistent with the best available science.**
3. **Advance a set of additional climate actions – the TIGHGER Actions – that can help Oregon meet an accelerated greenhouse gas emission reduction goal of 45 percent below 1990 levels by 2030.**
4. **Support further study and analysis to continue to guide effective climate action over time.**
5. **Strengthen governance and accountability for Oregon climate action.**
6. **Position Oregon to take full advantage of federal investments in climate action.**

Each of these recommended strategies include several sub-recommendations. A total of 26 sub-recommendations are provided.

Table 1 summarizes the recommendations all in one place and each recommendation and sub-recommendation is detailed in the next section. While the TIGHGER analysis and Roadmap

recommendations focus on climate mitigation to stem the tide, it is important to note that adaptation efforts are also necessary to protect Oregonians from worsening climate impacts.

Table 1: Summary of Roadmap Recommendations

Recommendation 1: Support robust and continuous implementation of existing climate programs and regulations. A. Implement and operate existing climate programs and regulations as planned and provide necessary staffing and resources. B. Support complementary programs, regulations, and investments that help facilitate, accelerate, or maximize implementation of existing climate programs and regulations. C. Ensure equitable implementation of existing climate programs and regulations.
Recommendation 2: Adopt updated state greenhouse gas goals consistent with the best available science. A. Establish that it is the policy of Oregon to pursue action at a level and pace that is consistent with pathways to limit global warming to 1.5℃. 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℃ 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 95 percent below 1990 levels by 2050.* C. Set additional statutory goals to 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 track and evaluate progress towards these goals consistent with net zero accounting best practices. D. Direct the OGWC to recommend natural and working lands sequestration goals to the Legislature by January 2025 and provide updated recommendations for how Oregon can achieve those goals. The sequestration goals should be separate from and in addition to Oregon's sector-based emission reduction goals. E. Better enable periodic updates to Oregon's sector-based GHG emission reduction, net zero/net negative, 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.
Recommendation 3: Advance a set of additional climate actions – the TIGHGER Actions – that can help Oregon meet an accelerated greenhouse gas emission reduction goal of 45 percent below 1990 levels by 2030. A. 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. 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. 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.

Recommendation 4: Support further study and analysis to inform decision makers and continue to guide effective climate action over time.

A. Provide funding to the OGWC for a biennial, detailed forecast of emissions and reductions to ensure there is up-to-date data and analysis to assess progress toward meeting Oregon's GHG emission reduction, net zero/net negative, and sequestration goals.
B. Provide resources to produce and refine the essential data needed to deliver an updated Roadmap every four years.
C. Direct and fund ODOE to develop a statewide energy strategy.
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.
E. Direct DEQ to evaluate and report on opportunities to reduce Oregon's consumption-based emissions in consultation with the OGWC.

Recommendation 5: Strengthen governance and accountability for Oregon climate action.

A. Provide additional necessary staffing and resources for the OGWC.
B. Expand the statutory list of OGWC ex-officio non-voting members to include additional state agencies involved in climate action.
C. Expand the voting membership of the OGWC to include a youth representative and a member with experience in environmental justice.
D. Require agencies to regularly report on their climate work and progress to the OGWC.
E. Provide funding for the OGWC to create and maintain a state climate action, emissions, and sequestration dashboard and clearinghouse as part of the OGWC's statutory tracking and education responsibilities.
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.
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.

Recommendation 6: Position Oregon to take full advantage of federal investments in climate action.

A. Ensure coordination across state agencies on the pursuit and use of the IIJA and IRA funds.
B. Support complementary programs, regulations, and investments that increase the likelihood of receiving and maximizing the use of the funds.
C. Provide opportunities for public input, engagement, and outreach on the pursuit and use of the funds, particularly for environmental justice communities.

Detailed Roadmap Recommendations

Recommendation 1: Support robust and continuous implementation of existing climate programs and regulations.

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

The TIGHGER analysis specifically analyzed 15 of Oregon's climate programs and regulations adopted or under development at the time, plus the federal CAFE standards for cars and trucks. The two programs

and regulations "under development" were eventually adopted and the full group of programs was referred to as the Programs and Regulations Adopted (PRA).[ii] The Programs and Regulations Adopted includes the following:

- 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 Grant Program
- Landfill Program
- Manufactured home replacement
- Recycling Modernization Act
- Oregon Solar + Storage Rebate Program
- CAFE standards (federal)

Oregon's existing climate programs and regulations provide a strong foundation for achieving the state's GHG emission reduction goals.

The TIGHGER analysis projects that with continued implementation of the Programs and Regulations Adopted as planned, Oregon 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 Oregon 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 EO 20-04 GHG emission reduction goals.

However, continued efforts are needed to solidify that foundation and ensure success over the long run. This includes necessary 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 Oregon support their implementation. Further, assuming the Legislature updates Oregon'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 emission reduction goals (see Recommendation 3) as well as potential future expansions of the programs and regulations as happened with the Clean Fuels Program.

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 for a variety of reasons. For example, DLCD's Climate-Friendly and Equitable Communities program provides direct emission

[ii] 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 (EQC) 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 EQC 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 likely not change significantly with the higher adopted percent target because fuels are covered under multiple programs. The higher adopted percent target would likely instead redistribute the amount of reductions among these programs, resulting in the Clean Fuels Program Expansion accounting for a higher share of emission reductions.

reduction benefits through local land use and transportation changes, and enables conditions for advancing transportation options that reduce emissions. Several research, data, and education programs also support state climate action. A more complete list of Oregon's climate mitigation programs is listed in ODOE's 2022 Biennial Energy Report section cataloging state agency climate programs that also require similar support and attention.[6]

Sub-Recommendations

A. **Implement and operate existing climate programs and regulations as planned and provide necessary 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 necessary 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.

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., rebates 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 coordination and partnerships – such as the Every Mile Counts multi-agency partnership 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 communities bear a disproportionate burden of climate impacts and have the potential to benefit the most from the co-benefits of climate actions.[iii] 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, and 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 to ensure equitable implementation. This work will need additional resources and focused attention into the future.

[iii] 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.

Recommendation 2: Adopt updated Oregon greenhouse gas 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 that 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.

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

In 2020, through Executive Order 20-04, Governor Brown added a 2035 interim goal similar to the OGWC-recommended goal 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 higher ambition of the EO 20-04 goals, the TIGHGER analysis considered progress toward achieving the EO 20-04 goals instead of the statutory goals.

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

The TIGHGER analysis found that with continued implementation of existing programs and policies, Oregon 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.

The best available science indicates the need to go further and faster than Oregon's EO 20-04 goals.

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 the accelerated goal would be achievable with a suite of additional climate actions — and there are substantial economic and health cumulative net benefits from accelerating the 2035 goal to 2030 (more than $120 billion through 2050 and beyond).

To inform the Roadmap's recommendations, the OGWC considered the best available science from the Intergovernmental Panel on Climate Change; 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 would need to be counterbalanced by removing the same amount of emissions from the atmosphere.[v] The OGWC also observed that some states directly connect their climate policy to the 1.5℃ 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 five recommendations detailed below including: making it state policy to pursue action to limit warming to 1.5℃ (Recommendation 2A); setting specific 2030, 2040, and 2050 goals to align with the 1.5℃ limit and other similarly ambitious state and national goals (Recommendation 2B); setting a net zero and net negative goal (Recommendation 2C); directing further development of carbon sequestration goals for natural and working lands (Recommendation 2D); and better enabling updates to all the goals based on the best available science (Recommendation 2E).

Table 2 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 2 shows how Oregon's total emissions would be reduced if the respective targets were applied to Oregon's emissions. Table 2 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.

[v] See Recommendation 2C for further explanation of net zero.

Table 2: Comparison of GHG Reduction Goals Applied to Oregon Baseline Emissions.

GREENHOUSE GAS REDUCTION GOALS		OREGON EMISSIONS (MMTCO2e)					
SOURCE	**TARGET**	**BASELINE[vi]**	**2030**	**2035**	**2040**	**2045**	**2050**
OGWC Roadmap Recommendations 2B and 2C	**45% below 1990 by 2030; 70% by 2040; 95% by 2050**	**57**	**31**	**-**	**17**	**-**	**3**
	Net zero by 2050 or as soon as practicable; net negative thereafter						**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[vii]	42-43% below 1990 levels by 2030; 56-60% by 2035; 66-69% by 2040; 71-73% by 2045; 76% by 2050	57	33	25-23	19-18	17-15	14
Oregon DEQ CPP Targets[viii]	50% below 2017-2019 levels by 2035; 90% by 2050	63	-	31	-	-	6
IPCC 1.5℃ Special Report[ix, 7]	All GHGs: 40-50% below 2010 by 2030	64	38-32	-	-	-	-
	CO_2: 45% below 2010 by 2030; net zero by 2050	64	35	-	-	-	NZ
IPCC 6th Assessment (1.5℃ pathways)[ix, 8]	All GHGs: 43% below 2019 by 2030; 69% by 2040; 84% by 2050	63	36	-	20	-	10
	CO_2: 48% below 2019 levels by 2030; 80% by 2040; (net zero by 2050-2055)[x, 9]	63	33	-	13	-	*NZ*
Federal Goals / U.S. NDC[10]	50% below 2005 by 2030; net zero by 2050	67	33	-	-	-	NZ
Washington[11]	45% below 1990 by 2030; 70% by 2040; 95% by 2050	57	31	-	17	-	3
	Net zero by 2050						NZ
California[12]	*48% below 1990 by 2030;[xi, 13]* 85% by 2045	57	*30*	-	-	9	
	Net zero by 2045 or as soon as possible; net negative thereafter					NZ	NN

[vi] DEQ provided the Oregon Global Warming Commission with draft emissions data as the Roadmap was being developed and published updated data in February 2023. The emissions data in Table 2 reflects the published data.

[vii] The targets here are calculated from the emissions projections of the two TIGHGER scenarios – electrification and hybrid. These scenarios are key 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.

[viii] Oregon DEQ's Climate Protection Program (CPP) is an economy-wide program that covers approximately half of Oregon's GHG emissions. The depiction in Table 2 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.

[ix] These numbers correspond to the IPCC 1.5℃ 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 CO_2 emissions reductions. The numbers for all GHGs and those for CO_2 emissions are commonly cited in the public interchangeably, as CO_2 emissions account for the majority of GHG emissions.

[x] Not all of the 1.5℃ pathways achieve net zero CO_2 emissions, but all that do would do so between 2050-2055.

[xi] California's statutory goal is 40 percent below 1990 levels by 2030, but California's 2022 Scoping Plan sets a goal of 48 percent below 1990 levels by 2030.

Sub-Recommendations

A. Establish that it is the policy of Oregon to pursue action at a level and pace that is consistent with pathways to limit global warming to 1.5℃. 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℃ into their climate policy frameworks. For example, in its 2020 climate bill, the Washington legislature noted the projected impacts of 1.5℃ of warming; found that avoiding warming of 1.5℃ 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℃ 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 manifest if temperatures increase beyond 1.5℃. Second, it would indicate an intent to take action consistent with reducing Oregon's emissions at the speed and scale necessary to avoid warming of more than 1.5℃. Third, it would provide a foundation for updating Oregon's GHG 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℃ 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 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 2 above for a comparison). The OGWC is recommending separate net zero/net negative and sequestration goals (see Recommendations 2C and 2D), so the focus here is on the numerical sector-based emission reduction goals.

According to the IPCC, limiting warming to 1.5℃ requires immediate action to substantially reduce emissions in the near-term. The acceleration of Oregon's EO 20-04 2035 GHG emission reduction goal (at least 45 percent 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 analysis, there are substantial health and economic benefits from achieving the accelerated goal.

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 analysis, Oregon would be on track for a 66 to 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.[xii]

[xii] 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 2022 Scoping Plan 2030 goal to California's 2045 statutory goal.

Finally, the OGWC recommends the 2050 goal be updated to at least 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.[xiii] 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) thanks to HB 2021. Therefore, a 2050 goal of 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 emission 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 95 percent below 1990 levels by 2050.

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

C. Set additional statutory goals to 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 track and evaluate progress towards these goals consistent with net zero accounting best practices. 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 GHGs removed from the atmosphere over that same 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. It calls for both a numerical emissions reduction by 2030 and net zero emissions by 2050.[xiv] 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.[14] The more quickly emissions are reduced, the easier it is to achieve net zero emissions, and the less net negative emissions need to be relied on to keep temperatures within the 1.5°C limit.

[xiii] 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.

[xiv] This target references net zero CO_2 emissions. Net zero GHG emissions would be achieved later under relevant IPCC scenarios. The earlier net zero CO_2 target is commonly used and cited generically as CO_2 emissions account for the majority of GHG emissions.

Given the science, jurisdictions have incorporated both numerical emission reduction goals and net zero/net negative goals into their climate policy frameworks. The federal government includes these dual goals 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 emission reduction goals that are significantly driving down emissions in the same year that they are aiming to achieve net zero emissions. Washington state requires both a 95 percent reduction in 1990 emissions by 2050, and economy-wide net zero emissions in 2050. After achieving both an 85 percent emissions reduction and net zero emissions in 2045, California includes an additional goal to achieve and maintain net negative emissions thereafter.

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 IPCC's approach for calculating net zero emissions exclusively focuses on anthropogenic emissions and removals, which are emissions and carbon removals directly resulting from human activities.[15]

The OGWC recommends that the Legislature set a net zero and net negative goal in addition to the sector-based emission reduction goals discussed in Recommendation 2B and direct the OGWC to track and evaluate progress towards meeting the goals consistent with net zero accounting best practices.

D. Direct the OGWC to recommend natural and working lands sequestration goals to the Legislature by January 2025 and provide updated recommendations for how Oregon can achieve those goals. The sequestration goals should be separate from and in addition to Oregon's sector-based emission reduction goals. Oregon's natural and working lands — including forests, grasslands, rangelands, farmlands, tidal and subtidal wetlands, and the parks and open spaces in urban environments — provide a range of environmental, social, health, and economic benefits statewide including opportunities to increase carbon sequestration to help address climate change. Executive Order 20-04 directed the OGWC to work in coordination with the Oregon Department of Agriculture, Oregon Department of Forestry, and the Oregon Watershed Enhancement Board to develop and submit a proposal for setting a carbon sequestration and storage goal for Oregon's natural and working lands.

In its 2021 Natural and Working Lands Proposal, the OGWC recommended Oregon establish carbon sequestration goals – in addition to but separate from the current sector-based goals. The OGWC recommended preliminary carbon sequestration goals as part of the proposal. However, given the complexity of the topic, there is more work to do to refine these goals. The OGWC has convened a Natural and Working Lands Advisory Committee to continue to develop the necessary foundational data to better inform these goals. With additional analysis (see Recommendation 4D) the OGWC can recommend refined carbon sequestration goals to the Legislature for adoption in statute as well as provide updated recommendations for how to best achieve the goals.

E. Better enable periodic updates to Oregon's sector-based GHG emission reduction, net zero/net negative, 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 Oregon'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 Oregon'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 Oregon to pursue action at a level and pace that is consistent with pathways to limit global warming to 1.5℃ 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 Oregon'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 sector-based GHG emission reduction, net zero/net negative, 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 sector-based GHG emission reduction, net zero/net negative, and sequestration goals consistent with the best available science.

Recommendation 3: Advance a set of additional climate actions – the TIGHGER Actions – that can help Oregon 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 TIGHGER 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.[xv] The resulting TIGHGER Action list focused on actions that reduce sector-based emissions – which is what Oregon'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 renewable natural gas and renewable hydrogen to meet the goal). As a result, the OGWC developed a Hybrid Scenario that augmented alternative fuels actions with electrification actions. The Electrification Scenario focused exclusively on energy efficiency and incentivizing efficient electric equipment.

The Commission explored two action scenarios to achieve an accelerated 2030 goal: an electrification scenario and a hybrid scenario that included alternative fuel actions paired with electrification actions.

Given the need for numerous electrification actions in both scenarios, the majority of actions were common to both scenarios with 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 3.[xvi] The TIGHGER Actions that are unique to either the Electrification or Hybrid Scenario are shaded green and orange, respectively; all the non-shaded actions are common to both scenarios. Table 3 also categorizes the actions based on their primary focus area (e.g., building energy efficiency, transportation, etc.).

Table 3: TIGHGER Actions Sorted by GHG Reduction Amount

TIGHGER Action Description	Action Category
RNG Use at Full Potential by 2050 (47.5 tBTU by 2050, with 10.6 tBTU from Oregon, and 36.5 tBTU from Imports)	Renewable Natural Gas
Weatherize 95% of Existing Commercial Building Envelopes by 2040 (to achieve 50% reduction in energy use)	Building Energy Efficiency
Weatherize 95% of Existing Residential Home Envelopes by 2040 (to achieve 50% reduction in energy use)	Building Energy Efficiency
Industrial Renewable Hydrogen Adopted by 70% by 2050	Renewable Hydrogen
Rooftop Solar 16.3 TWh by 2035	Renewable Electricity

[xv] See the TIGHGER Final Action List. Subsequent to the list being developed, DEQ provided analysis of an additional action regarding embodied carbon in building materials that showed a very large emission reduction potential, but complete data was not available to include in the analysis and the majority of emissions reductions were consumption-based emissions. See Slide 11 in the December 16, 2022 OGWC Meeting Presentation for more details. This action supported OGWC interest in further study of consumption-based emissions as part of Recommendation 4E.

[xvi] The actions in Table 3 are sorted by GHG emission reduction amount using the actions' highest potential 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.

TIGHGER Action Description	Action Category
Improve Energy Efficiency of Existing Non-CPP Covered Industrial Facilities by 50% by 2050	Industrial Energy Efficiency
Implement the Medium and Heavy Duty Zero Emission Plan by 2035 (beyond Advanced Clean Trucks) (Fuel shares of: 60% EV, 20% Hydrogen, 20% Biodiesel; and Hybrid has 10% Fuel Cell EVs)	Transportation
Commercial Code Energy Reduction 60% by 2030	Building Energy Efficiency
100% Heat Pumps & Water Heaters in New Residential Homes by 2025[xvii]	Building Energy Efficiency
Electrification of Industrial Process Loads 70% by 2050[xviii]	Industrial Electrification
Residential Code Energy Reduction 60% by 2030	Building Energy Efficiency
Injection of 15% Renewable Hydrogen into Distribution System by 2035	Renewable Hydrogen
Increase Amtrak Ridership	Transportation
Carshare Increases in Urban Areas by 2035	Transportation
100% of Existing Residential Homes retrofitted with Heat Pumps by 2043[xvii]	Building Energy Efficiency
100% of Existing Residential Homes retrofitted with Heat Pump Water Heaters by 2043[xvii]	Building Energy Efficiency
100% Heat Pumps and 50% Water Heaters in New Commercial by 2025[xvii]	Building Energy Efficiency
50% of New Off-road Vehicles Sales (farm, forestry, construction, and recreation) are ZEVs by 2035, 100% by 2050[xviii]	Transportation
100% of New Transit Buses are ZEVs by 2035[xviii]	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	Renewable Hydrogen
100% of Existing Commercial Buildings retrofitted with Heat Pumps by 2043[xvii]	Building Energy Efficiency
Increase Integrated Solar Generation on New Building Facades 4 TWh by 2035	Renewable Electricity
Food Waste Program Diverting 50% of Organics and Capturing Methane by 2030	Waste
Water 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
Energy Storage of 14 kWh in 25% of Residential Homes by 2035	Renewable Electricity
Reduced Residential Floor Area of New Homes	Land-Use
Higher Residential Density in Urban Areas	Land-Use
5% of Fuel Share from Pyrolysis of Biomass by 2035[xviii]	Biomass

[xvii] 100% electric in Electrification Scenario, and a 50/50 split electricity/natural gas for the Hybrid Scenario.

[xviii] The action's GHG emission reduction amount was calculated and included in the scenario analysis to meet the accelerated goal, but there was not sufficient cost data to score and rank the action along with the other actions.

TIGHGER Action Description	Action Category
100% of Existing Commercial Buildings retrofitted with Heat Pump Water Heaters by 2043[xvii]	Building Energy Efficiency
Transfer 10% of Medium Duty Vehicle Miles Traveled to Light Duty/Electric Micro-Mobility in Urban Counties by 2035	Transportation
100% Heat Pumps and 50% Water Heaters in New Commercial by 2025	Building Energy Efficiency
Diesel Backup Power 100% Conversion to Battery Storage by 2035	Renewable Electricity
100% New Appliance Sales for Commercial Buildings are Electric by 2035	Building Energy Efficiency
100% New Appliance Sales for Residential Homes are Electric by 2035	Building Energy Efficiency

While some actions could be attributed to multiple categories, Table 4 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 4, the actions span a variety of categories – with more than a third addressing Building Energy Efficiency.

Table 4: Summary of TIGHGER Actions by Category

Action Category	Number of Actions
Building 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

The net cumulative economic and health benefits total over $120 billion through 2050 and beyond.

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 cumulative economic benefit from the TIGHGER actions is approximately *$47 billion*** through 2050 and beyond. **An additional *$74-76 billion* in health benefits** is projected through 2050 and beyond. The cumulative economic and health benefits for Oregon are, in **total, over *$120 billion***. The analysis also shows that the Electrification Scenario will create an additional 357,000 net job-years[xix] through 2050, and the Hybrid Scenario will create an additional 283,000 net job-years. The peak years for job creation are in 2026-2027 with more

[xix] A job-year is equivalent to one full-time job for one year.

than **32,000 additional job-years** per year in the Electrification Scenario and more than 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.

While the scoring exercise provided 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 around certain co-benefits. 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. 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, the fact that **ALL** of the identified actions 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** of the actions from both scenarios. Future planning around the energy system (see Recommendation 4C) as well as continued public engagement (see Recommendation 3C) could help inform the prioritization of actions moving forward.

To facilitate advancement of these actions, an Action Implementation Plan (AIP) should be developed for each action. AIPs should include the specifics on who (which agency takes the lead in development), what, where, when, and how the action could/should be implemented. Some of the actions build on existing programs and regulations, while others may require new authority or direction. In addition, there may be enabling conditions that can help maximize implementation of an action or multiple actions (e.g., more compact land use supporting a number of the transportation actions). The AIPs will need to: include discussion of the items above, identify funding needs and suggest funding sources (as practicable), 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. The OGWC also identified higher risk and uncertainty surrounding some of the actions that should be further considered in developing AIPs for those actions. Similarly, the four actions that did not have sufficient cost data to be included in the scoring and ranking analysis will need further investigation as part of developing AIPs for those actions.

Development of these AIPs is a large undertaking that will need focused attention and 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.

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 Oregon to achieve the accelerated 2030 goal, the OGWC looked at whether the actions had existing delivery mechanisms. Six 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. Therefore, the OGWC identified this subset of six actions as top priority in the immediate term.

Six of the largest GHG emission-reducing TIGHGER actions common to both scenarios already have long-standing avenues for implementation.

The six actions include:

- Weatherize 95 percent of existing commercial building envelopes by 2040
- Weatherize 95 percent of existing residential home envelopes by 2040
- Improve energy efficiency of existing non-CPP covered industrial facilities by 50 percent by 2050
- Commercial code energy reduction 60 percent by 2030
- 100 percent heat pumps and water heaters in new residential homes by 2025
- Residential code energy reduction 60 percent by 2030

While some of these actions have dates that extend beyond the date of the accelerated 2030 goal, near-term action is necessary to be able to be on pace to achieve the long-term goal. For example, to achieve the *weatherize 95 percent of existing residential home envelopes by 2040* action, it was assumed that rapid uptake in the near term would be necessary, resulting in over half the residential buildings being weatherized by 2030.

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 Oregon to the accelerated 2030 emission reduction goal – purposefully it did not focus on "how" the programs should be designed and implemented. Commissioners noted that the "how" was particularly important to maximize the co-benefits (e.g., health and equity) of the actions. For example, Commissioners 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 and developing the Action Implementation Plans (see Recommendation 3A).

The co-benefits analysis conducted as part of the scoring and ranking of 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.

This public engagement can and should also 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.

Recommendation 4: Support further study and analysis to inform decision makers and continue to guide effective climate action over time.

The TIGHGER analysis provides important data to inform state climate action. Until the TIGHGER analysis, the OGWC did not have a detailed forecast of emission reductions based on current policies and programs, yet this information is crucial to assessing Oregon's progress toward its GHG emission reduction goals. Further, the TIGHGER analysis provides county level data on climate actions that Oregon has not had before. However, the TIGHGER analysis is 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, science, and data.

The TIGHGER scenario analysis underscored that there are different approaches to achieving Oregon's GHG emission reduction goals. Those different approaches specifically involve a distinct set of 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 a short period of time to be able to meet the OGWC's recommended 2030 goal (see Recommendation 2B), the OGWC recommended moving forward ALL of the actions from both scenarios (see Recommendation 3). Planning around Oregon's energy system could help further inform these and future choices and actions.

The TIGHGER analysis also focused only on actions addressing sector-based emissions – which is the basis for Oregon's GHG emission reduction goals. Sector-based emissions only include those emissions that occur inside Oregon's borders from various economic sectors, as well as emissions associated with electricity used in Oregon regardless of where that electricity was generated. But Oregon also contributes emissions outside its borders through consumption of goods and services (e.g., cars, food, appliances, and clothing). Further, Oregon's natural and working lands provide a key opportunity to bolster efforts to address climate change by sequestering carbon. Analysis of additional opportunities to further 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.

Finally, more work is needed to fully assess the co-benefits of climate action moving forward so they can be maximized – particularly for environmental justice communities. While the TIGHGER co-benefits analysis was informative, the co-benefits analysis was not able to assess the full extent of the benefits the TIGHGER actions contribute. As part of future Roadmaps, resources are needed to conduct a more robust analysis of co-benefits to more accurately assess costs and benefits of different actions in terms of health, equity, and economic prosperity to better inform Oregon policy makers moving forward.

Sub-Recommendations

A. **Provide funding to the OGWC for a biennial, detailed forecast of emissions and reductions to ensure there is up-to-date data and analysis to assess progress toward meeting Oregon's GHG emission reduction, net zero/net negative, 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 DEQ's Climate Protection Program will become clearer in the next few years, as will actions Oregon 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 that will inform new policies and programs that may need to be put into place. Ongoing regular data collection and analysis will aid Oregon 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). Given the modeling expertise required to do this forecast, sufficient funding is needed to contract for the analysis.

B. **Provide resources to produce and refine the essential data needed to deliver an updated Roadmap every four years.** The Roadmap serves an important function in identifying and coordinating a pathway to achieve Oregon's climate goals. Given the pace and scale of climate action necessary and the need for continual research, analysis, planning, and tracking of implementation to achieve Oregon's GHG goals, updating emission projections every biennium (see Recommendation 4A), as well as 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 detailed forecast of emissions and reductions that serves as the basis for the development of the Roadmap, there is significant public engagement required to identify and analyze necessary 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. Input from communities who are on the frontlines of climate change can help ensure the most impactful actions are identified and designed to ensure equitable implementation.

Input from communities who are on the frontlines of climate change can help ensure the most impactful actions are identified and designed to ensure equitable implementation.

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 create pathways to meet our clean energy goals, prioritize equity, balance tradeoffs, maximize benefits, and minimize harms. The OGWC endorses the need for this strategy.

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 Oregon 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 – which are the basis of Oregon's current GHG emission reduction goals. Recommendations 2C and 2D to establish a net zero and net negative state goal and recommend an updated carbon sequestration goal to the Legislature underscore the central role carbon sequestration efforts will play in Oregon's climate action moving forward. Therefore, 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.

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 estimated that Oregon contributed emissions of 89 million metric tons of CO2-equivalent as a result of consumption. Of those emissions, 38 million metric tons (43 percent) 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 percent) are "imported," primarily in materials like 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. The report should update Oregon's consumption-based GHG emissions inventory and identify opportunities to reduce consumption-based emissions through policies or programs that Oregon might advance, with a particular focus on materials management. 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 Oregon's climate action efforts.

Recommendation 5: Strengthen governance and accountability for Oregon climate action.

According to preliminary emissions data, Oregon missed its 2020 GHG emission reduction goal by 13 percent, and in 2021, the latest emissions data available, emissions grew to 19 percent above the 2020 goal.[xx] This is an unfortunate outcome given the OGWC's work to set Oregon 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.[16] The OGWC provided a progress report on the Roadmap to 2020 in 2013 highlighting the need for further action, and in 2015, the OGWC continued to raise the alarm that Oregon was off track to meet the 2020 goal.[17, 18] Yet Oregon still missed its goal. This outcome speaks to the need for better governance and accountability to Oregon'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 policy foundation to meet its GHG emission reduction goals moving

[xx] DEQ provided the Oregon Global Warming Commission with draft preliminary emissions data for 2020 and 2021 as the Roadmap was being developed and published updated preliminary data in February 2023. Using the updated preliminary data, total emissions for those years are 58 and 61 MMTCO2e, respectively. Oregon's 2020 GHG emission reduction goal was to achieve 10 percent below 1990 levels. Oregon's emissions in 1990 were 57 MMTCO2e.

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, Oregon'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 OGWC 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.[xxi] 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, regulations, and actions, including some 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 Oregon's climate framework. The Legislature also 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 more than 130 programs and actions related to climate change across at least 17 state agencies, boards, and commissions.[19]

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), 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 has only underscored this 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 the Roadmap and advance the OGWC's N&WL efforts creates uncertainty in the OGWC's ability to provide important and timely information to decision-makers. Continued analysis on both fronts is crucial to assessing and ensuring Oregon stays on track to meet its GHG emission reduction, net zero/net negative, and carbon sequestration goals.

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 decision makers 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, 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

[xxi] The OGWC is charged with helping coordinate state and local climate efforts, the latter of which have also likely expanded exponentially in recent years but have not been cataloged by the OGWC due to resource constraints. The OGWC has benefited from members with experience in local government and while there is not a specific seat for local government on the OGWC, this perspective should continue to be sought after in member appointments.

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 existing 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 affected 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. Attention to ensuring this work happens and is successful will be key 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 Oregon's progress in meeting its GHG emission reduction goals; make recommendations for statutory and administrative changes, policy measures, funding mechanisms, and other actions that 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 (FTE) 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 and borrowed additional staff from ODOE.

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. 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.** At least 15 state agencies now have significant climate programming. Only about half of those have specific seats on the OGWC. Agency participation in the OGWC is critical to ensuring coordinated action. To facilitate this, 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.** 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.

Climate change has disproportionate impacts on Oregonians from environmental justice communities, including our youth.

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 would bring the total number of voting members to 13, maintaining an odd number of members to facilitate OGWC business (i.e., avoiding tie votes). 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 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 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 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 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 and other publicly available information on particular programs will be assessed and leveraged to help inform and streamline OGWC-required reporting. Required reporting will have an eye toward outcomes.

E. **Provide funding for the OGWC to create and maintain a state climate action, 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. Currently, there is not a central place across state government where decision makers and the public can find and track this information.

Therefore, a state climate action, 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 compiled statewide climate action and emissions data, including: the latest forecast of emissions and associated modeling; current information on agency efforts to address climate change; progress toward achieving Oregon's GHG emission reduction goals, net zero/net negative, and sequestration goals; and efforts to address consumption-based emissions. The dashboard and clearinghouse would help the OGWC and interested parties track Oregon's climate progress and associated outcomes, 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 multi-agency-developed Oregon Transportation Emissions dashboard on transportation-related actions and emissions, as well as other relevant state agency efforts.

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.

Recommendation 6: Position Oregon 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 TIGHGER 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

Oregon should apply for and maximize the use of federal investments in climate action.

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 IIJA and IRA funds.** The amount of federal funding that is coming available for climate, 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.

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