



Oregon

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Topic: Draft TIGHGER Actions Recommendation

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This memo describes the process to develop the recommendation on the TIGHGER-analyzed actions and provides our prioritization of action recommendations.

Purpose of Evaluation Criteria and Scoring

The purpose behind the effort to create weighted evaluation criteria, and then score and rank the actions, was to provide decision-makers with more detail about how to prioritize the implementation of the list of more than two dozen actions in each scenario. Prioritization is necessary because while all of the actions need to be implemented to meet the 2030 accelerated GHG emissions reduction goal; with limited human, political, and financial resources it is highly unlikely Oregon can implement all of these actions all at once. The evaluation criteria and scoring process was designed to help the Commission prioritize the list of actions for implementation. The end result of the process was a grouping of actions in tiers (e.g., Tier 1, Tier 2, and Tier 3) that provides direction to decision-makers about which actions should be funded and implemented first, second, and third.

Overview of Scoring and Ranking Process and Results

Prior to the scoring and ranking process, the Commission developed a set of evaluation criteria to assess each action. The Commission then weighted the evaluation criteria so that each action could be scored using a 100-point scale. The scores were used to rank the actions and inform a prioritization recommendation for implementation.

The six evaluation criteria approved by the Commission are: GHG reduction amount, cost-effectiveness, equity co-benefit, health co-benefit, jobs and economic prosperity co-benefit, and risk and uncertainty. The Scoring and Ranking Spreadsheet was used to do the analysis. The analysis allows for the ranking results to be viewed using different evaluation criteria. For example, one could look at the scoring and ranking of the actions based on all of the evaluation criteria or just a subset – looking through different lenses if you will. Results were provided to the Commission ranking the actions based on the following lenses:

1. GHG reduction amounts (MTCO₂)
2. Cost-effectiveness (\$/MTCO₂)
3. Co-benefits only (equity, health, and jobs and economic prosperity co-benefits)
4. Total evaluation criteria score
5. Risk and uncertainty

The ranking of the actions was different for each of these lenses. So, the final prioritization recommendation of the actions depends on which of the lenses were deemed most important.

Electrification Scenario Prioritization Analysis

A prioritization analysis was conducted for both scenarios, first on the 27 actions in the Electrification Scenario, followed by an identical process on the 25 Hybrid Scenario actions. The following description of the analysis process is intended to be read along with the PowerPoint slides for the January 13, 2023 OGWC meeting entitled “Draft Recommendations on Actions.”

On Slide 4 the actions are shown ranked in the order of the GHG Reduction Amount they create. The height of the bar reflects the amount of GHG reduced. The three circles on the graph group actions into three tiers for priority of implementation. To help identify the Tier 1 actions throughout the analysis and on all the following graphs, the Tier 1 action bars are colored green.

Slide 5 resorts the actions of the GHG Reduction Amount graph by their cost-effectiveness ranking while maintaining the heights of the bars indicating the amount of GHG reduction. The most cost-effective actions are on the left side of the graph and the least cost-effective actions are on the right side of the graph. The Tier 1 highest GHG Reduction Amount actions retain their green bar color. It is clear from the graph that the most cost-effective group of actions are not the actions with the highest GHG Reduction Amount. In fact, some of the actions with the highest GHG Reduction Amounts (the green bars) are toward the least cost-effective side of the graph. If the prioritization recommendation were based on cost-effectiveness, it would not prioritize the highest GHG Reduction Amount actions.

Slide 6 resorts the actions in the GHG Reduction Amount graph by their ranking based on only on their score of the three Co-Benefits. The actions with the highest Co-Benefits scores are on the left side of the graph and the actions with the lowest Co-Benefits scores are on the right side of the graph. While most of the green bars representing the highest GHG Reduction Amount remain as high priority actions on the left side of the graph, not all of them do. If the prioritization recommendation were based on Co-Benefits some relatively low GHG Reduction Amount actions would become prioritized. In fact, the two lowest GHG Reduction Amount actions would become high priorities.

Slide 7 resorts the actions in the GHG Reduction Amount graph by their Total Evaluation Criteria score using all of the Commission’s weighted evaluation criteria. The actions with the highest Total Evaluation Criteria score are on the left side of the graph and the actions with the lowest Total Evaluation Criteria score are on the right side of the graph. A recommendation based on the Total Evaluation Criteria score would preserve all of the green action bars as high priority actions, but three below average GHG Reduction Amount actions would also become prioritized.

Slide 8 resorts the actions in the GHG Reduction Amount graph by only their Risk and Uncertainty score. The actions with the lowest Risk and Uncertainty are on the left side of the graph and the actions with the highest Risk and Uncertainty are on the right side of the graph. The analysis shows actions with the highest GHG Reduction Amounts (the green bars) are distributed throughout the graph. A recommendation based on the Risk and Uncertainty score would preserve some of the high GHG Reduction Amount actions as high priority actions, some as medium priority actions, and leave one as a relatively low priority action.

This analysis demonstrates that using the different lenses to develop a prioritization recommendation can result in significantly different prioritization of actions.

OGWC Discussion on Approach To Using the Lenses

At the December 16, 2022 OGWC meeting, the Commission had a robust discussion on what was the preferred way of using the lenses to come up with a recommendation to prioritize the actions. Commissioner Jackson suggested we cannot do all of the actions at once, and given the short timeline, the main focus of the prioritization recommendation should be on those actions with the biggest GHG reduction amount. She said it would be of concern if we focused on the smaller GHG reduction amount actions -- even if they are easier. Focusing on the actions that offer the biggest results or outcomes first, would allow us to demonstrate a path forward with early actions that have the greatest impact. After

considering the GHG reduction amount, she said we should then take into consideration which are the most cost-effective and which have co-benefits. Risk and uncertainty could be used to help determine which actions need further study. This approach was agreed to by the majority of the Commission.

Electrification Scenario Prioritization Development

Using this guidance, staff started the development of a prioritization recommendation with the priority order of actions based on GHG Reduction Amount evaluation criteria. Three priority groupings, or tiers, were readily discernable. Staff then looked to see if the tiers should be modified by the cost-effectiveness order of the actions, the co-benefits order, the total evaluation score order, the alignment with the opportunities for federal funding from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), and finally by the risk and uncertainty order.

Slide 11 shows the actions ranked in the order of the GHG Reduction Amounts they create with the three circles grouping the actions into three tiers.

Slide 12 shows the same GHG Reduction Amount graph with the top 10 most cost-effective actions noted by the numbers 1-10 above the red colored bars of the actions. Using the guidance on the prioritization process from the Commission, staff looked at whether any of the highly cost-effective actions should be moved up in priority. The one that stood out was the “Food Waste Program” which ranked second in cost-effectiveness. We recommend the Food Waste Program action be move from Tier 3 into Tier 2.

Slide 13 shows the GHG Reduction Amount graph with the top 10 highest co-benefits scoring actions noted by the vertical hatching in their bars and the numbers 1-10 above the action’s bar. The graph shows that most of the high co-benefits scoring actions are already in Tiers 1 and 2. The notable exception are the two lowest GHG Reduction Amount actions that ranked 7th and 8th for co-benefits. Because of their low GHG Reduction Amounts we do not recommend moving either of these actions up in the prioritization scheme.

Slide 14 shows the GHG Reduction Amount graph with the top 10 Total Evaluation Criteria score actions noted by the bubble hatching in their bars. Most of the high Total Evaluation Criteria scoring actions are already in Tiers 1 and 2. The notable exception is the Food Waste Program that ranked 9th. We recommend the Food Waste Program action be move from Tier 3 into Tier 2.

Slide 15 shows the GHG Reduction Amount graph with the actions that are likely to have direct federal grant funding or tax credits made available to incentivize the action. Federal funding is indicated by a green dollar symbol (\$) above the action’s bar and with cross-hatching in the bar. Federal funding would have to be made available either through direct grants or tax credits to Oregon actors to affect the desired GHG reduction via an Oregon program or action. General national funding (e.g., for Amtrak) or funding for support infrastructure (e.g., charging stations for EVs) would not be considered federal funding for this analysis. Staff conferred with other agency staff to verify the applicability of federal funding to individual actions. It is notable that nearly all of the proposed actions would receive some form of federal funding through a direct grant or tax credit.¹ The Food Waste Program is being developed by DEQ but does not yet have a dedicated funding source, and since it was already recommended to shift from Tier 3 to Tier 2, access to federal funding would also support this move.

¹ Several actions would likely not receive federal funding. The two code improvement actions would likely not be eligible for federal funding. Funding is being offered for improving codes to a level we are already at, or nearly at, and for development of a Zero Building Energy Code. These measures improve our already top tier code further to achieve a reduction of 60 percent from what it was in 2006, but they are not a zero-energy level building code. The funding for Amtrak is at the national level to increase ridership, but do not appear to be available at the state level. Finally, there does not appear to be federal funding available for programs to reduce the floor area of homes or to increase urban residential density.

Slide 16 shows the GHG Reduction Amount graph with the top 10 lowest Risk and Uncertainty actions noted by the vertical hatching in their bars. Most of the lowest Risk and Uncertainty actions are already in Tiers 1 and 2, and we do not recommend any action move based on having low Risk and Uncertainty.

Electrification Scenario Actions Recommendation

Slide 17 shows the table of Electrification Scenario actions rank ordered by their GHG Reduction Amount. In the table on the left the Tier 1 priority actions are shown in green, Tier 2 in blue, and Tier 3 in white. The table includes the recommended move, from the previous slides, of the Food Waste Program from Tier 3 to Tier 2. In addition, because we already have an existing funded program operated by ODOE – the Solar plus Storage Program – that already currently offers incentives for residential battery energy storage projects, we recommend moving the “Res 25% Energy Storage” action into Tier 2 from Tier 3 because it is relatively easy to bundle this action with the Rooftop Solar Tier 1 action.

In summary, the priority tiers for the Electrification Scenario are (the action number is in parens):

Tier 1 Electrification Scenario 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 Electrification Scenario 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 Buildings 25% with Energy Storage (#26)

Tier 3 Electrification Scenario 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)

Also, on Slide 17 the table shows the category or sector for each action. The smaller table to the right shows that most of the actions fall into the Building Energy Efficiency category with fourteen, followed by Transportation with six, Renewables with four, Industrial Energy Efficiency with two, and one action in the

Waste category. Tier 1 consists of mostly energy efficiency actions and one renewables action – Rooftop Solar. Tier 2 consists of four transportation actions, four energy efficiency actions, one renewables action, and one waste action.

To facilitate advancement of these actions, an Action Implementation Plan should be developed for each action. Action Implementation Plans would include the specifics on who, what, where, when, and how the action will be implemented. The plans 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. Development of these Plans is a large undertaking requiring additional staff resources (see Recommendation 5A).

Electrification Scenario Actions That Will Take More Study Prior to Full Implementation

There are numerous high priority actions that we know how to deliver and can easily fit into existing programs or pathways currently operated within Oregon (e.g., Rooftop Solar fits into ODOE’s existing Solar Plus Storage program, commercial and residential weatherization fits into existing ETO and utility programs, the code actions are already underway because of Executive Order #20-04, we already have existing ETO and utility energy efficiency programs for industry, and we have existing ODOE, ETO, and utility programs to promote heat pumps, and existing programs to promote efficient water heaters).

There are five proposed Tier 2 actions and five Tier 3 actions in Slide 18 that will need more study and development before we can develop an Action Implementation Plan. 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, but we need to ensure there is adequate staff resources to ensure they are fully developed in the near-term (see Recommendation 5A on additional OGWC staffing). 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 To Study Further” below. The actions that need more study and development before they can be fully implemented are:

Tier 2 Electrification Actions:

- 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)

Tier 3 Electrification Actions:

- 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)

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

Hybrid Scenario Prioritization Analysis

In Slide 20 the actions are shown ranked in the order of the GHG Reduction Amount they create. The height of the bar reflects the amount of GHG reduced. The three circles on the graph group actions into

three tiers for priority of implementation. Throughout the analysis and on all the following graphs, to help identify the Tier 1 actions that reflect the highest GHG reductions that are common to the Electrification Scenario their bars are colored green, and for the actions unique to the Hybrid Scenario their bars are colored purple.

Slide 21 resorts the actions in the GHG Reduction Amount graph by their cost-effectiveness ranking while maintaining the heights of the bars indicating the amount of GHG reduction. The most cost-effective actions are on the left side of the graph and the least cost-effective action are on the right side of the graph. The Tier 1 highest GHG Reduction Amount actions retain their green color and the actions unique to the Hybrid Scenario maintain their purple color. Again, the most cost-effective group of actions are not the actions with the highest GHG Reduction Amount. In fact, some of the actions with the highest GHG Reduction Amounts (the green bars) and those unique to the Hybrid Scenario (the purple bars) are toward the least cost-effective side of the graph. If the prioritization recommendation were based on cost-effectiveness, it would not prioritize the highest GHG Reduction Amount actions.

Slide 22 resorts the actions in the GHG Reduction Amount graph by their ranking based on only on their score of the three Co-Benefits. The actions with the highest Co-Benefits scores are on the left side of the graph and the actions with the lowest Co-Benefits scores are on the right side of the graph. If the prioritization recommendation were based on co-benefits some of the GHG Reduction Amount actions (the green bars) would remain as high priority actions (the left side of the graph) but not all of them, and some relatively low GHG Reduction Amount actions would become prioritized. None of the unique Hybrid Scenario actions (the purple bars) would be prioritized despite some having high GHG Reduction Amounts.

Slide 23 resorts the actions in the GHG Reduction Amount graph by their Total Evaluation Criteria score using all of the Commission's weighted evaluation criteria. The actions with the highest total evaluation criteria score are on the left side of the graph and the actions with the lowest total evaluation criteria score are on the right side of the graph. A recommendation based on the Total Evaluation Criteria score would preserve most of the green action bars as high priority actions and two of the unique Hybrid Scenario high GHG Reduction Amount actions, but one below average GHG Reduction Amount action would also become prioritized.

Slide 24 resorts the actions in the GHG Reduction Amount graph by only their Risk and Uncertainty score. The actions with the lowest Risk and Uncertainty are on the left side of the graph and the actions with the highest Risk and Uncertainty are on the right side of the graph. The analysis shows actions with the highest GHG reduction amounts (the green bars) and two unique Hybrid Scenario actions (the purple bars) are distributed throughout the graph. A recommendation based on the Risk and Uncertainty score would not preserve most of the common and unique Hybrid Scenario high GHG Reduction Amount actions as high priority actions, some as medium priority common actions, and the other two unique Hybrid Scenario actions would have relatively low priority.

This analysis demonstrates that using the different lenses to develop a prioritization recommendation can result in significantly different prioritization of actions.

Hybrid Scenario Prioritization Development

Using the Commission's guidance on prioritization, staff started the development of a prioritization recommendation with the priority order of actions based on GHG Reduction Amount evaluation criteria. Three priority groupings, or tiers, were readily discernable. Staff then looked to see if the placement of the unique Hybrid Scenario actions (the purple bars) in the priority tiers should be modified by their cost-effectiveness order, their co-benefits order, their total evaluation score order, the alignment with the opportunities for federal funding from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), and finally by their risk and uncertainty order. The tier placement for the common actions were assumed to remain the same as they were developed in the Electrification Prioritization Development process.

Slide 26 shows the actions ranked in the order of the GHG Reduction Amounts they create with the three circles grouping the actions into three priority tiers.

Slide 27 shows the same GHG Reduction Amount graph with the four unique Hybrid actions cost-effectiveness ranking noted by the numbers above those action's bars. Using the guidance on the prioritization process from the Commission, staff looked at whether any of the unique Hybrid actions should be moved down in priority because of their relatively low cost-effectiveness ranking. We recommend the "RNG Full Potential by 2050" and the "Ind RH2 70% by 2050" actions be moved from Tier 1 into Tier 2, and the "RH2 Injection 15% by 2035" and "Home Fuel Cells 5% by 2030" actions be moved from Tier 2 into Tier 3.

Slide 28 shows the GHG Reduction Amount graph with the four unique Hybrid actions Co-Benefits score ranking noted by the numbers above those action's bars. Using the guidance on the prioritization process from the Commission, staff looked at whether any of the unique Hybrid actions should be moved down in priority because of their relatively low Co-Benefits score ranking. We recommend the "RNG Full Potential by 2050" and the "Ind RH2 70% by 2050" actions be move from Tier 1 into Tier 2, and the "RH2 Injection 15% by 2035" and "Home Fuel Cells 5% by 2030" actions be moved from Tier 2 into Tier 3.

Slide 29 shows the GHG Reduction Amount graph with the four unique Hybrid actions Total Evaluation Criteria score ranking noted by the numbers above those action's bars. Using the guidance on the prioritization process from the Commission, staff looked at whether any of the unique Hybrid actions should be moved in priority because of their relatively low Total Evaluation Criteria score ranking. We recommend the "RH2 Injection 15% by 2035" and "Home Fuel Cells 5% by 2030" actions be moved from Tier 2 into Tier 3.

Slide 30 shows the GHG Reduction Amount graph with the actions that are likely to have direct federal grant funding or tax credits made available to incentivize the action. Federal funding is indicated by a green dollar symbol (\$) above the action's bar and cross-hatching in the bar. Federal funding would have to be made available either through direct grants or tax credits to Oregon actors to affect the desired GHG reduction via an Oregon program or action. General national funding (e.g., for Amtrak) or funding for support infrastructure (e.g., charging stations for EVs) would not be considered federal funding for this analysis. Staff conferred with other agency staff to verify the applicability of federal funding to individual actions. It is notable that nearly all of the proposed actions would receive some form of federal funding with through a direct grant or tax credit, including the four unique Hybrid actions. No changes are recommended based on the availability of federal funding.

Slide 31 shows the GHG Reduction Amount graph with the four unique Hybrid actions Risk and Uncertainty score ranking noted by the numbers above those action's bars. Using the guidance on the prioritization process from the Commission, staff looked at whether any of the unique Hybrid actions should be moved down in priority because of their relatively low Risk and Uncertainty score ranking. We recommend the "RH2 Injection 15% by 2035" and "Home Fuel Cells 5% by 2030" actions be moved from Tier 2 into Tier 3.

Hybrid Scenario Actions Recommendation

Slide 32 shows the table of Hybrid Scenario actions rank ordered by their GHG Reduction Amount. In the table on the left the Tier 1 priority actions are shown in green, Tier 2 in blue, and Tier 3 in white. The table includes the recommended moves from the previous slides of the "RNG Full Potential by 2050" and the "Ind RH2 70% by 2050" actions moving from Tier 1 into Tier 2, and the "RH2 Injection 15% by 2035" and "Home Fuel Cells 5% by 2030" actions moving from Tier 2 into Tier 3. We also recommend moving the "Food Waste Program" action into Tier 2 from Tier 3 for the same reasons noted above in the Electrification Scenario Prioritization Development section.

In summary, the priority tiers for the Hybrid Scenario are (the action number is in parens and the unique Hybrid Scenario actions in *italics*):

Tier 1 Hybrid Scenario Actions:

- Weatherization in Existing Commercial Buildings by 2040 (#8)
- Weatherization in Existing Residential Building by 2040 (#7)
- Industrial Energy Efficiency (Non-CPP entities) of 50% by 2050 (#13)
- Medium-Duty/Heavy-Duty Zero Emission Plan (#14)
- Commercial Code 60% Reduction Compared to 2006-levels by 2030 (#4)
- Residential Code 60% Reduction Compared to 2006-levels by 2030 (#3)

Tier 2 Hybrid Scenario Actions:

- *RNG Deployed at its Full Potential by 2050 (#23)*
- *Industrial Renewable Hydrogen Use 70% by 2050 (#22)*
- Increase Amtrak Ridership (#17)
- Carshare Increases by 2035 (#18)
- Existing Residential Buildings 100% with Gas & Electric Heat Pump Water Heaters by 2043 (#10)
- Gas & Electric Heat Pumps and Water Heaters in 100% of New Residences by 2025 (#5)
- Increase in Micro-Mobility 10% by 2035 (#16)
- Food Waste Program (#21)

Tier 3 Hybrid Scenario Actions:

- *Renewable Hydrogen Injection at 15% by 2035 (#24)*
- *Home Fuel Cells in 5% of Residential Buildings by 2030 (#25)*
- Existing Commercial Buildings 100% with Gas & Electric Heat Pumps by 2043 (#11)
- Existing Residential Buildings 100% with Gas & Electric Heat Pumps by 2043 (#9)
- Water/Wastewater Systems Increase Energy Efficiency 20% by 2035 (#20)
- Congestion Pricing (#19)
- Reduced Residential Building Floor Area (#1)
- Higher Residential Density in Urban Areas (#2)
- New Commercial Buildings 100% with Gas & Electric Heat Pumps & 50% Water Heaters in by 2025 (#6)
- Existing Commercial Buildings 100% with Gas & Electric Heat Pump Water Heaters by 2043 (#12)
- Mode Shift of 10% from Medium-Duty and Heavy-Duty to Light-Duty Freight Vehicles (#15)

Also, on Slide 32 the table on the left shows the category or sector for each action. The smaller table to the right shows that most of the actions fall into the Building Energy Efficiency category with twelve, followed by Transportation with six, Hydrogen with three, RNG with one, Industrial Energy Efficiency with two, and one action in the Waste category. Tier 1 consists of entirely of energy efficiency actions. Tier 2 consists of one RNG action and one hydrogen action, three transportation actions, two energy efficiency actions, and one waste action.

To facilitate advancement of these actions, an Action Implementation Plan should be developed for each action. Action Implementation Plans would include the specifics on who, what, where, when, and how the action will be implemented. The plans 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. Development of these Plans is a large undertaking requiring additional staff resources (see Recommendation 5A).

Hybrid Scenario Actions That Will Take More Study Prior to Full Implementation

There are numerous high priority actions that we know how to deliver and can easily fit into existing programs or pathways currently operated within Oregon (e.g., commercial and residential weatherization fits into existing ETO and utility programs, the code actions are already underway because of Executive

Order #20-04, we already have existing ETO and utility energy efficiency programs for industry, and we have existing ODOE, ETO, utility programs to promote heat pumps, and existing programs to promote efficient water heaters).

Slides 33 & 34, however, shows that there is one Tier 1 action, six Tier 2 actions, and six Tier 3 actions that will need more study and development before we can develop an Action Implementation Plan. These actions should be made a high priority for Oregon to address, but we need to ensure there is adequate staff resources to ensure they are fully developed in the near-term (see recommendation on additional OGWC staffing). 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 To Study Further” below. The actions that need more study and development before they can be fully implemented are:

Tier 1 Hybrid Actions:

- Medium-Duty/Heavy-Duty Zero Emission Plan (#14)

Tier 2 Hybrid Actions:

- *RNG Full Potential by 2050 (#23)*
- *Industrial Renewable Hydrogen Use 70% by 2050 (#22)*
- Increase Amtrak Ridership (#17)
- Carshare Increase by 2035 (#18)
- Increase in Micro-Mobility 10% by 2035 (#16)
- Food Waste Program (#21)

Tier 3 Hybrid Actions:

- *Renewable Hydrogen Injection of 15% by 2035 (#24)*
- *Home Fuel Cells 5% by 2030 (#25)*
- Congestion Pricing (#19)
- 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 (#15)

Other Actions To Study Further:

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

Final Draft Recommendation for the TIGHGER Actions

A. Advance all the TIGHGER-analyzed actions using the OGWC’s recommended implementation prioritization as a guide. Given the need for urgent climate action, and since all of the identified actions for 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 4B) 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 should be developed for each action. Action Implementation Plans would include the specifics on who, what, where, when, and how the action will be implemented. The plans 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. Development of these Plans is a large undertaking requiring additional staff resources (see Recommendation 5A).

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 To Study Further” 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*

Recommendations Are Consistent with REBuilding Task Force Recommendations

Slide 35 shows the recommendations that recently were forward by the Resilient Efficient Building Task Force charged with making recommendations to the Legislature about decarbonizing buildings. The Task Force’s recommendations related to buildings are to promote and incentivize energy efficiency and heat pumps, and improve energy codes. The Final Draft Recommendation for the TIGHGER Actions is wholly consistent with the Task Force’s recommendations.