Meeting of the Oregon Global Warming Commission

2015 DRAFT Report to the Legislature – Discussion Slides

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2010 GHG Goal: Arrest Growth; Begin Decline
2020 and 2050 Goals

Million Metric Tons of Greenhouse Gases (CO2e)

Historical GHG Emissions (1990 to 2012)

- 10% below 1990 levels: 51.2 MMT
- 75% below 1990 levels: 14.2 MMT
Business As Usual (BAU) Projection: Where Are We Headed?

- Using EPA Projection Tool and Oregon-specific electric sector forecast
- New forecast includes:
  - Effects of Oregon’s RPS – using load and emissions intensity forecasts from the utilities
  - Boardman – current business-as-usual assumptions about what will occur
  - Clean Fuels – estimate what this policy will achieve
  - Fuel economy standards – incorporated into EPA’s projection tool
Our Current “BAU” Forecast

Historical GHG emissions (1990 to 2012)

- Current Business as Usual Forecast
- 2020 and 2050 Goals Trajectory

2010 - "arrest growth"
2020: 51.2 MMT
Current vs. Previous GHG Forecast

Historical GHG Emissions (1990 to 2012)
- Current Business as Usual Forecast
- Previous Business as Usual Forecast
- 2020 and 2050 Goals Trajectory
Proposed 2035 Interim Goal

Why 2035 interim goal?
• Prevent deferral of meaningful action
• Near enough to focus efforts without assuming technological bailouts
• Exactly between 2020 and 2050
• 20 year planning horizon consistent with utility planning
• Consistent with MPO GHG reduction strategy timelines
• EPA’s Clean Power Plan will be fully implemented
• Data sets available to the State project emission reductions for 2035
Two major updates since last GWC report

1. Better integration of power supply and demand measures to reduce “double counting”
   • New Integration Tool allows users to see all combinations of supply and demand scenarios

2. Updated transportation measures with new modeling results (from the STS); gaps in original analysis eliminated
   • Strategies to reduce driving now align with STS findings
   • Vehicle measures are above and beyond federal fuel economy standards
Analytical Updates: Carbon Tax Study

• PSU Northwest Economic Research Center (NERC) completed study in December 2014

• Used REMI economic model and Oregon emissions to demonstrate impact of various levels of carbon tax
Carbon Tax Study Results

• In all cases, emissions decrease after introduction of tax
• Amount of emission reduction depends on tax rate
• Above $45/ton, reductions continue at a slower pace – diminishing returns
• When revenue is repatriated to the economy, small impacts on employment and output
Measure “Wedges” to Achieve 2035 Goal

Steps to construct GHG reduction “wedges”:

1. Estimate projection of Oregon emissions
2. Compile analysis on reduction measures Oregon can implement
3. Include most cost-effective measures from previous analysis
4. Minimize overlap between measures
5. Compile measures into 2035 reduction scenario
6. Determine additional reductions possible with a carbon price, if needed*

*Not completed yet
Measures to Achieve 2035 Goal

- **Energy efficiency** – Residential, Commercial, Industrial
  - MACC outputs for GWh of electricity savings, and Gbtu of natural gas savings

- **Transportation** – Ground, freight, air
  - Ground transportation reductions: from MACC outputs, updated to reflect STS
  - Freight reductions: MACC outputs, scaled to STS results and in-state boundaries
  - Air travel: STS results, scaled to in-state boundaries

- **Agriculture and Waste**
  - MACC outputs

- **Power Generation**
  - GHG reduction goal (80% below 2005 levels by 2050) for two largest utilities
Residential, Commercial, Industrial Energy Efficiency

• Original analysis from Regional Technical Forum (2009) and Energy Trust of Oregon (2011)
• “Scenario 3” from MACC analysis – assumes additional policy support from state and federal government
  • 10% more savings beyond the less-supportive scenarios (80% of achievable potential)
• Includes things like Residential HVAC, Weatherization, and Lighting, Commercial Lighting, Daylight, and Lighting Controls, Commercial Appliances, Industry-specific measures, etc.
Residential, Commercial, Industrial Energy Efficiency Results

- Assumes EE measures “done first”
  - Apply statewide emission rate to new load forecast
  - Emission reductions are due solely to the reduction in electric load and natural gas use
- -0.21% average load growth for first 10 years; -0.03% average load growth for remainder to 2035
  - Compared to ~1.2% annual load growth in BAU
- 1.7 million MWh lower in 2035 than 2015
Transportation – Ground Travel

• Strategies to reduce driving
  • “Scenario 3” from MACC analysis updated to STS results
  • Strategies such as shifting single-occupancy vehicle trips, pay-as-you-drive insurance, transportation demand management, and parking management

• Vehicle technology strategies
  • EV + PHEVs: from 3.6% of fleet in 2022 to 43% in 2035 (consistent with CARB ZEV mandate)
  • Advanced ICE: 20 g/mile lower GHG standard for cars and light trucks than EPA MY2017-2025 rule; all new LD vehicles except EV + PHEV in 2021 and beyond
Transportation – Freight and Air

• Freight strategies scaled from STS; emission reductions outside Oregon eliminated
  • Includes Land Use Policy Changes, Idling reduction Strategies More Energy Efficient Transporter Operations, and Advanced ICE (20% more fuel-efficient than EPA 2014-2018 rules)

• Air strategies from STS
  • Includes reductions from more efficient ground vehicles and service equipment, improvements in aircraft (scaled to Oregon in-boundary emissions)
Transportation Results

- Many ground transportation strategies are highly cost effective – 6 out of 10 of the least-cost measures in the MACC
- 2035 transportation sector emissions are 36% lower than 2012
- More emission reductions from transportation will require altering key assumptions, such as electrification of vehicles
Waste Results

- Includes 5 MACC strategies:
  - Waste prevention
  - Biogas at MSW digesters
  - Converting aerobic to anaerobic digestion at waste-water treatment plants
  - Landfill gas collection, and
  - Materials management in new construction
Agriculture Results

- Includes 3 MACC strategies:
  - Food waste reduction
  - Management and reduction of methane emissions from dairy production
  - Agricultural nutrient management
Power Generation

• Basic assumptions
  • COUs and other small LSEs: emissions decline at rate of statewide emissions decline due to EE measures
  • PGE and PacifiCorp: load and emissions decline due to EE measures, plus change in generation mix needed to achieve proportional 2035 goal

• PGE and PacifiCorp 2035 reduction target: 80% below 2005 levels (2003-2007 average) by 2050
  • Illustrative to show impact of achieving proportional target
  • Potentially significant: PGE + PacifiCorp = 92% of 2012 electricity emissions

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<th>Emission levels – 2005 and future targets (million metric tons CO2e)</th>
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<td>PGE</td>
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<tr>
<td>PacifiCorp</td>
<td>13.5</td>
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</table>
Power Generation Results

- 2035 power sector emissions are 37% lower than 2013 levels
- 2035 emissions relative to 2013 levels
  - PacifiCorp: 41% reduction (18% from EE measures)
  - PGE: 42% reduction (14% from EE measures)
- Emission rates (MT/MWh) in 2035 required to meet target:

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<th>2013</th>
<th>2035</th>
<th>Percent reduction</th>
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Measure “Wedge” Results

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<td>Emissions after</td>
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<td>Power generation</td>
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<td>2035 Goal Trajectory</td>
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<td>Gap to meet goal</td>
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Next Steps

- Assess the efficacy of a carbon tax, after the effect of the measures
  - Change the “base case” in PSU’s emissions and economic models
  - Apply carbon tax to new base case assumptions to see revised impact
- What will it take to achieve these measures?
  - Add discussion of the scale of the changes, level of effort
- Anything else?
Discussion and Questions