Meeting of the Oregon Global Warming Commission

2015 Report to the Legislature

Today's topics
- Review first draft material from April meeting
- Describe new material in current version
- Discuss next steps

Other changes in response to Commission feedback

New Material: Effect of a Carbon Price?

Proposed 2035 Goal and Emission Reduction Measures

Next Steps...
Today's topics

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Emissions: Historical and Projection

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Other changes in response to Commission feedback

Proposed 2035 Goal and Emission Reduction Measures

Next Steps...
Emissions: Historical and Projection

2010 GHG Goal: Arrest Growth, Begin Decline

2020 and 2050 GHG Goals

Oregon's Current Business As Usual ("BAU") Forecast
2010 GHG Goal: Arrest Growth, Begin Decline

Historical GHG emissions (1990 to 2012)
2020 and 2050 GHG Goals

- 10% below 1990 levels: 51.2 MMT
- 75% below 1990 levels: 14.2 MMT

Historical GHG Emissions (1990 to 2012)

2020 and 2050 Goals Trajectory
Oregon's Current Business As Usual ("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
Reminder: Now Included in the BAU Forecast...

- Effects of Oregon's RPS - using forecasts from utilities
- Boardman - current (as of last IRP) projection of what will occur
- Clean Fuels - estimate in-boundary emission reductions
- Fuel economy standards - incorporated into EPA's projection tool
Comparison of Previous and Current Forecasts
Emissions: Historical and Projection

2010 GHG Goal: Arrest Growth, Begin Decline

2020 and 2050 GHG Goals

Oregon's Current Business As Usual ("BAU") Forecast
Proposed 2035 Goal and Emission Reduction Measures

Proposed 2035 Interim Goal

"Wedges" of Measures to Achieve 2035 Goal
- Energy Efficiency - adapted from MACC outputs
- Transportation - adapted from MACC and STS outputs
- Agriculture, Materials and Waste - MACC outputs and DEQ data
- Power Generation - GHG reduction by two largest utilities

Emission Reduction Wedges: Results
Proposed 2035 Interim Goal

- Historical GHG emissions (1990 to 2012)
- Current Business as Usual Forecast
- 2020 and 2050 Goals Trajectory

- 2010: "arrest growth and begin decline"
- 2020: 51.2 MMT
- 2035: 32.7 MMT
"Wedges" of Measures to Achieve 2035 Goal

- Energy Efficiency - adapted from MACC outputs
- Transportation - adapted from MACC and STS outputs
- Agriculture, Materials and Waste - MACC outputs and DEQ data
- Power Generation - GHG reduction by two largest utilities
Energy Efficiency

Assumes additional policy support from state and federal government
- 80% of achievable potential

Includes:
- Residential HVAC, Weatherization, and Lighting,
- Commercial Lighting, Daylight, and Lighting Controls,
- Commercial Appliances,
- Industry-specific measures
- and many more
Energy Efficiency results

- Business as usual forecast
- 2035 and 2050 Goal trajectory
Transportation

Strategies include:
  • Reducing driving
  • Advanced vehicle technologies
  • More efficient freight
  • Air travel efficiencies

Data sources:
  • Statewide Transportation Strategy
  • MACC measures
Transportation results
**Materials and Waste**

Includes:
- Biogas energy from waste and wastewater treatment plants
- Landfill gas collection and destruction
- Reducing new building materials embedded carbon emissions
- Prevention of food and packaging waste

**Data Sources:**
- DEQ
- MACC measures
Materials and Waste results

- Business as usual forecast
- 2035 and 2050 Goal trajectory

Graph showing the trend of Million Metric Tons of Greenhouse Gases (CO2e) from 2012 to 2035.
Agriculture

Includes:

- Food waste reduction
- Management and reduction of methane emissions from dairy production
- Agricultural nutrient management

Data source:
- MACC measures
Agriculture results

The graph illustrates the trend of Million Metric Tons of Greenhouse Gases (CO2e) from 2012 to 2035. The line graph shows the projections under different scenarios:

- **Agriculture**
- **Business as usual forecast**
- **2035 and 2050 Goal trajectory**

The goal trajectory is aimed at reducing greenhouse gas emissions to meet the targets set for 2035 and 2050.
Power Generation

- Assumes PGE and PacifiCorp reduce emissions to 80% below 2005 levels by 2050
- Energy efficiency impacts occur "first," followed by generation changes
- Illustrative to show impact of achieving proportional target
Power Generation results

![Graph showing power generation results, with lines indicating different scenarios and a shaded area representing the goal trajectory.](chart.png)
Emission Reduction Wedges: Results

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
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<tr>
<td><strong>BAU forecast</strong></td>
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<td><strong>Emissions after measures</strong></td>
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<table>
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<th><strong>Emission reduction measures:</strong></th>
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<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
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<tr>
<td>Transportation</td>
<td>0.5</td>
<td>2.7</td>
<td>5.0</td>
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<td>RCI energy efficiency</td>
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<td>1.5</td>
<td>2.7</td>
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<td>1.9</td>
<td>2.0</td>
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<td>1.5</td>
<td>2.0</td>
<td>2.1</td>
<td>2.2</td>
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<td><strong>Total Reductions</strong></td>
<td>1.9</td>
<td>8.0</td>
<td>12.4</td>
<td>15.8</td>
<td>20.8</td>
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</table>

| **2035 Goal Trajectory**       | 57.3 | 51.2 | 45.1 | 38.9 | 32.7 |
| **Gap to meet goal**           | 1.7  | 2.8  | 3.7  | 6.9  | 10.6 |
Proposed 2035 Goal and Emission Reduction Measures

Proposed 2035 Interim Goal

"Wedges" of Measures to Achieve 2035 Goal

- Energy Efficiency - adapted from MACC outputs
- Transportation - adapted from MACC and STS outputs
- Agriculture, Materials and Waste - MACC outputs and DEQ data
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Emission Reduction Wedges: Results
Today's topics

- Review first draft material from April meeting
- Describe new material in current version
- Discuss next steps
New Material: Effect of a Carbon Price?

Question: Can a carbon price ($60/ton) help reduce emissions further to close the gap to meet our goal?

Approach: Similar to original PSU study for Oregon as a whole (no sub-regions), but with new baseline emissions and fuel prices resulting from the emission reduction measures.

Results and Comparisons:
- 2035 emission reductions due to carbon price:
  - 7.2 MMT (this analysis) vs. 14.5 MMT (original study)
- Total 2035 emission reductions:
  - 28.9 MMT (this analysis) vs. 14.5 MMT (original study)
- Emission reduction measures work together with carbon price to achieve more than either separately.

Graph: Emission Reduction Measures plus Carbon Price: Results
Results and Comparisons

2035 emission reductions due to carbon price
  - 7.2 MMT (this analysis) vs. 14.5 MMT (original study)

Total 2035 emission reductions
  - 28.9 MMT (this analysis) vs. 14.5 MMT (original study)

Emission reduction measures work together with carbon price to achieve more than either separately
Emission Reduction Measures plus Carbon Price: Results
Other changes in response to Commission feedback

Inclusion of per-capita and per-GDP emissions

Question: How can we use these data to assess the impact of our conservation efforts? (Top-left chart)

While data is available, how do we use it to inform decision making? (Middle-left chart)

Black Carbon

Question: What is it, and where does it belong in our climate change plan? (Middle-right chart)

Not able to include in GWP inventory yet, but new chart box addresses the importance of BC (Page 14 of Final Draft).

Utility Emissions: Goals vs. Projected Emissions

Question: Can we provide more clarity about how the power sector goals compare to projections? (Bottom-left chart)

Conclusions and Recommendations to the Legislature

- Set a 2035 interim goal
- Develop a long-term strategy to meet our goals, including benchmarks
- Encourage technological development
- Begin with targeted emissions reductions from our highest contributors
- Set state and local policies to support and leverage federal action
- Consider adopting consumption-based goals

Feedback?
Inclusion of per-capita and per-GDP emissions

Question: How can we be sure that recent declines in our emissions are not due to net migration or loss of economic activity?

While in-boundary emissions have declined since 2000, per capita emissions and the carbon intensity of our economy have also declined, while our state population and GDP have risen over the same time period.

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<td>65.2</td>
<td>70.8</td>
<td>69.0</td>
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<td>20.6</td>
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<td>17.1</td>
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<td>emissions (MT)</td>
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<tr>
<td>Multnomah Cty. per capita emissions (MT)</td>
<td>15.4</td>
<td>15.3</td>
<td>15.5</td>
<td>12.9</td>
<td>13.2</td>
<td>12.5</td>
<td>11.9</td>
<td>11.3</td>
<td>10.6</td>
<td>10.6</td>
<td>10.1</td>
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<tr>
<td>Carbon intensity (MT/$2009 million GDP)</td>
<td>877.0</td>
<td>795.9</td>
<td>535.9</td>
<td>447.5</td>
<td>406.5</td>
<td>407.4</td>
<td>375.6</td>
<td>363.0</td>
<td>332.9</td>
<td>316.9</td>
<td>296.0</td>
</tr>
<tr>
<td>State GDP ($2009 Million)</td>
<td>64.8</td>
<td>81.9</td>
<td>132.1</td>
<td>154.2</td>
<td>167.8</td>
<td>173.1</td>
<td>181.3</td>
<td>180.2</td>
<td>190.1</td>
<td>197.8</td>
<td>205.7</td>
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Over the past 15 years, Oregon's state GDP typically grew 1-2 percentage points faster than the nation as a whole.
**Inclusion of per-capita and per-GDP emissions**

Question: How can we be sure that recent declines in our emissions are not due to net migration or loss of economic activity?

*While in-boundary emissions have declined since 2000, per capita emissions and the carbon intensity of our economy have also declined, while our state population and GDP have risen over the same time period.*

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<td>69.0</td>
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<td>18.9</td>
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Black Carbon

Question: What is it, and where does it belong in our GHG tracking?

Not able to include in GHG inventory yet, but new text box addresses the importance of BC (Page 24 of Final Draft):

Black Carbon – Important Warming Agent?

Black carbon (BC) is a solid form of mostly pure carbon that is formed by the incomplete combustion of fossil fuels, biofuels and biomass. It is a significant part of particle pollution and absorbs solar radiation at all wavelengths. Recent research indicates that BC may play an important role in climate change and has been linked to a range of climate impacts, including increased temperatures, accelerated ice and snow melt and disruptions to precipitation patterns. BC is emitted directly to the atmosphere in the form of fine particulates (PM2.5) and is emitted along with other particles and gases. Its short atmospheric lifetime (days to weeks) combined with its strong warming potential make it a good target for reduction strategies that will provide climate benefits within the next several decades. In addition, emissions of BC and its effects are more localized than other greenhouse gases, meaning that mitigation actions will produce different climate results depending on the region, season, and sources in the area. Oregon does not yet track or attempt to directly mitigate our emissions of BC, largely due to the remaining scientific uncertainty about the particular global and regional climate effects and a lack of information and inventory protocols for doing so. However, given its potential importance for short-term climate change, the OGWC will track action at the federal level (via the US EPA) and may explore making recommendations about this pollutant in the future.
Utility Emissions: Goals vs. Projected Emissions

Question: Can we provide more clarity about how the power sector goals compare to projections?
Power Generation Measures

- *Reminder...*
  - Assumess PGE and PacifiCorp reduce emissions to 80% below 2005 levels by 2050
  - Energy efficiency impacts occur "first," followed by generation changes
  - Illustrative to show impact of achieving proportional target
Power Generation results

![Graph showing the comparison between business as usual forecast and the goal trajectory for metric tons of greenhouse gases from 2012 to 2035. The graph indicates a steady decrease in emissions by 2035 and 2050.]
PacifiCorp Emissions Projection and 2050 Goal Trajectory

*2014 actual reported emissions*
PGE Emissions Projection and 2050 Goal Trajectory

*2014 actual reported emissions
Conclusions and Recommendations to the Legislature

- Set a 2035 interim goal
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Feedback?
Next Steps...

Today: 1) Commission review additional suggested language changes (received prior to today's meeting)

2) Commission vote on whether to adopt draft report
   *May include additional language changes as discussed today*

By September 25: Staff will finalize changes and formatting

September 29: Legislative days presentation on Clean Power Plan and distribute Report to Legislative Committee Members

November Legislative Days: Possible Report presentation to Committees