Oregon Greenhouse Gas Emissions and Recent Climate Change Developments

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Interagency Sustainability Coordinators Network (ISCN)

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Greenhouse Gas Emissions: Multiple Perspectives

- The 2010 inventory year is a milestone year – the first of Oregon's greenhouse gas reduction goals.
- Comprehensive reporting data available for 2010.
- Different inventory accounting frameworks provide different perspectives on emissions and policy.
- In recognition ODEQ, ODOE, and ODOT have worked together to produce first multi-perspective Oregon greenhouse gas inventory (coming soon).
  - In-Boundary w/Electricity Use (reporting data for 2010)
  - Consumption-Based (2010 update using earlier study)
  - Expanded Transportation (Statewide Trans. Strategy)

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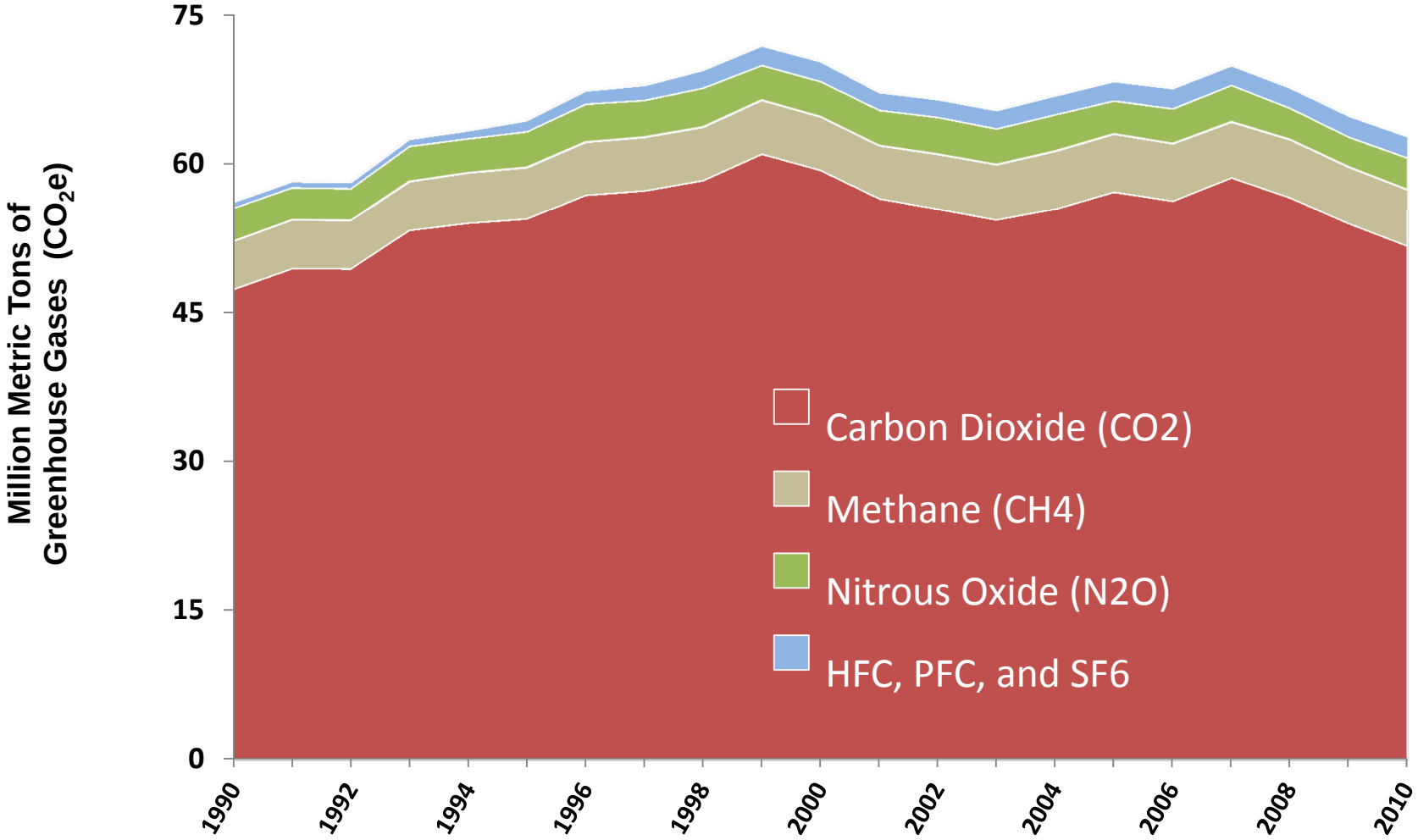
Oregon Greenhouse Gas Emissions



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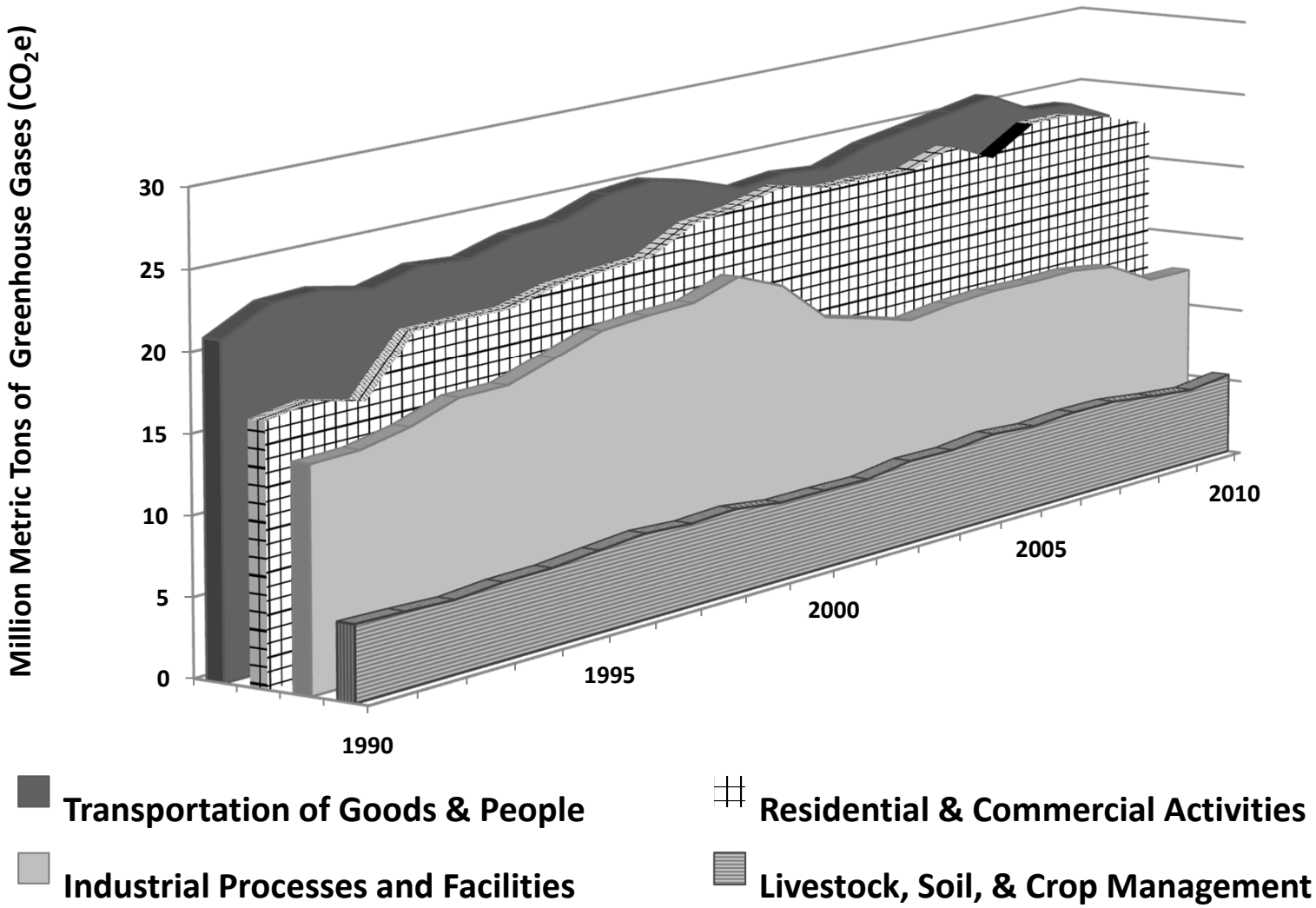
Oregon GhG Emissions by Sector



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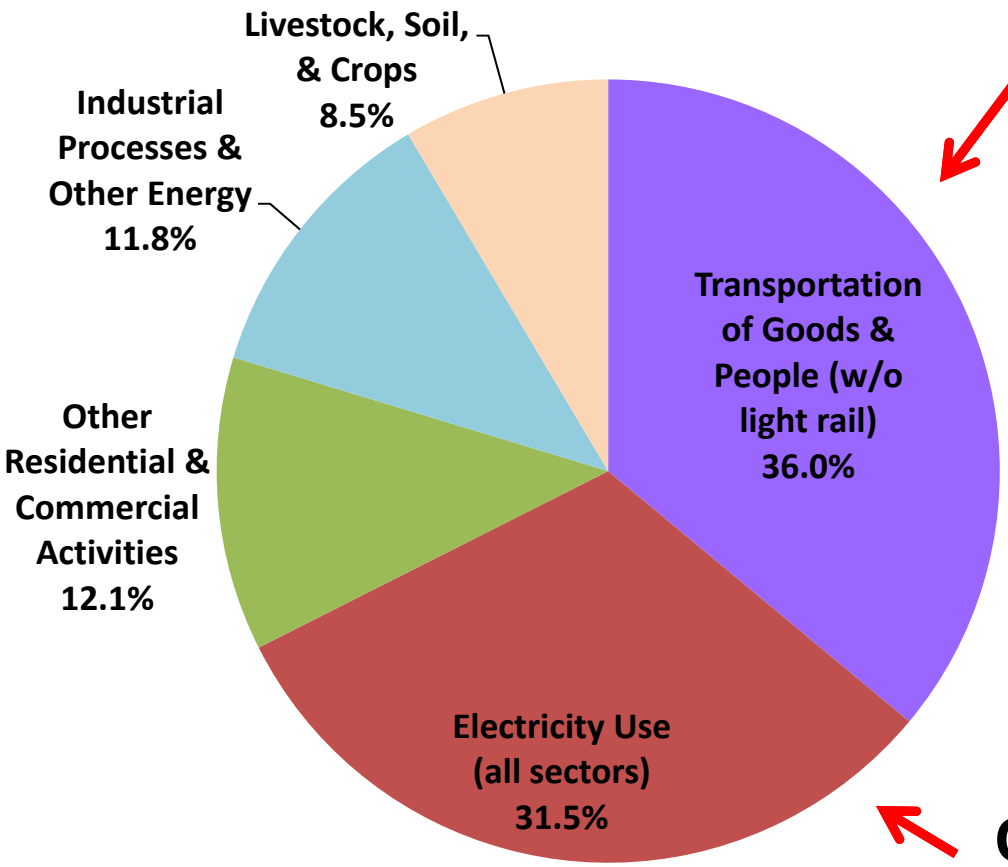
Oregon Greenhouse Gas Emissions 2010
(with electricity broken out from sectors)

Cars = about ¼ of OR total



"Cars and Coal" together equal to about half of total Oregon greenhouse gas emissions

Coal = about ¼ of OR total

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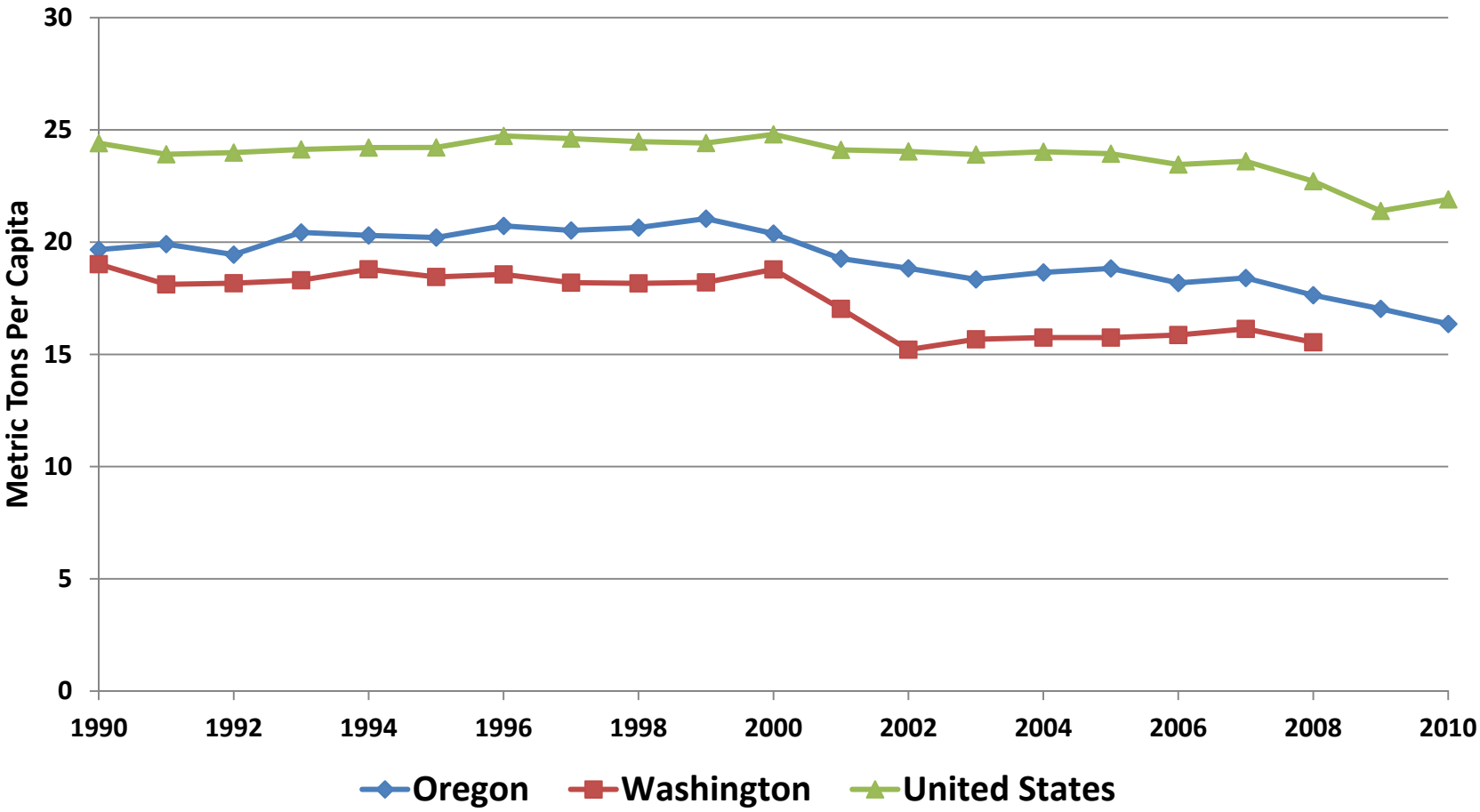
Per Capita Greenhouse Gas Emissions



Note: OR and WA inventory totals have been slightly modified to make per capita comparison "apples to apples" between inventories.

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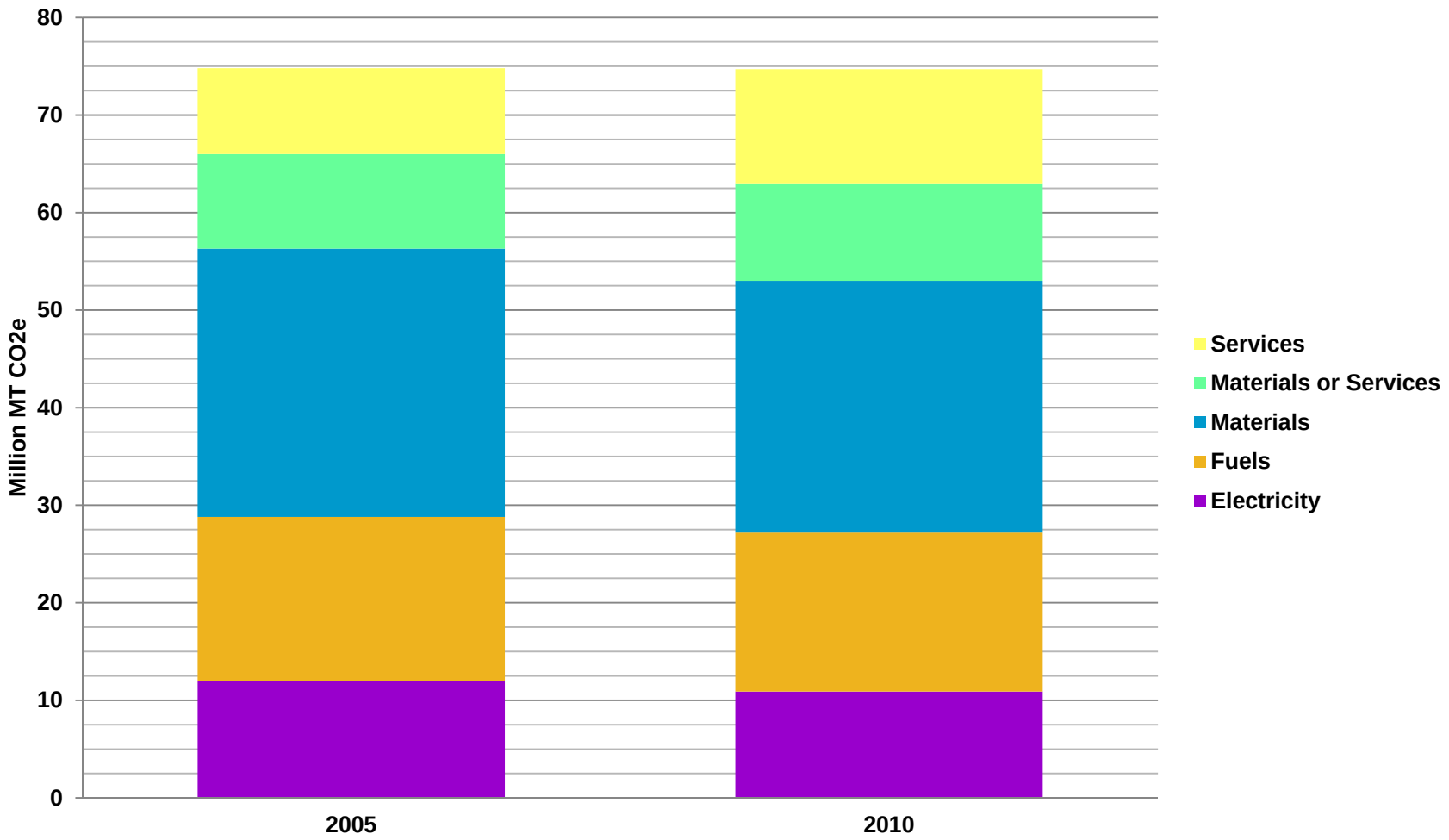
Oregon Consumption-Based GhG Emissions, by Meta-category



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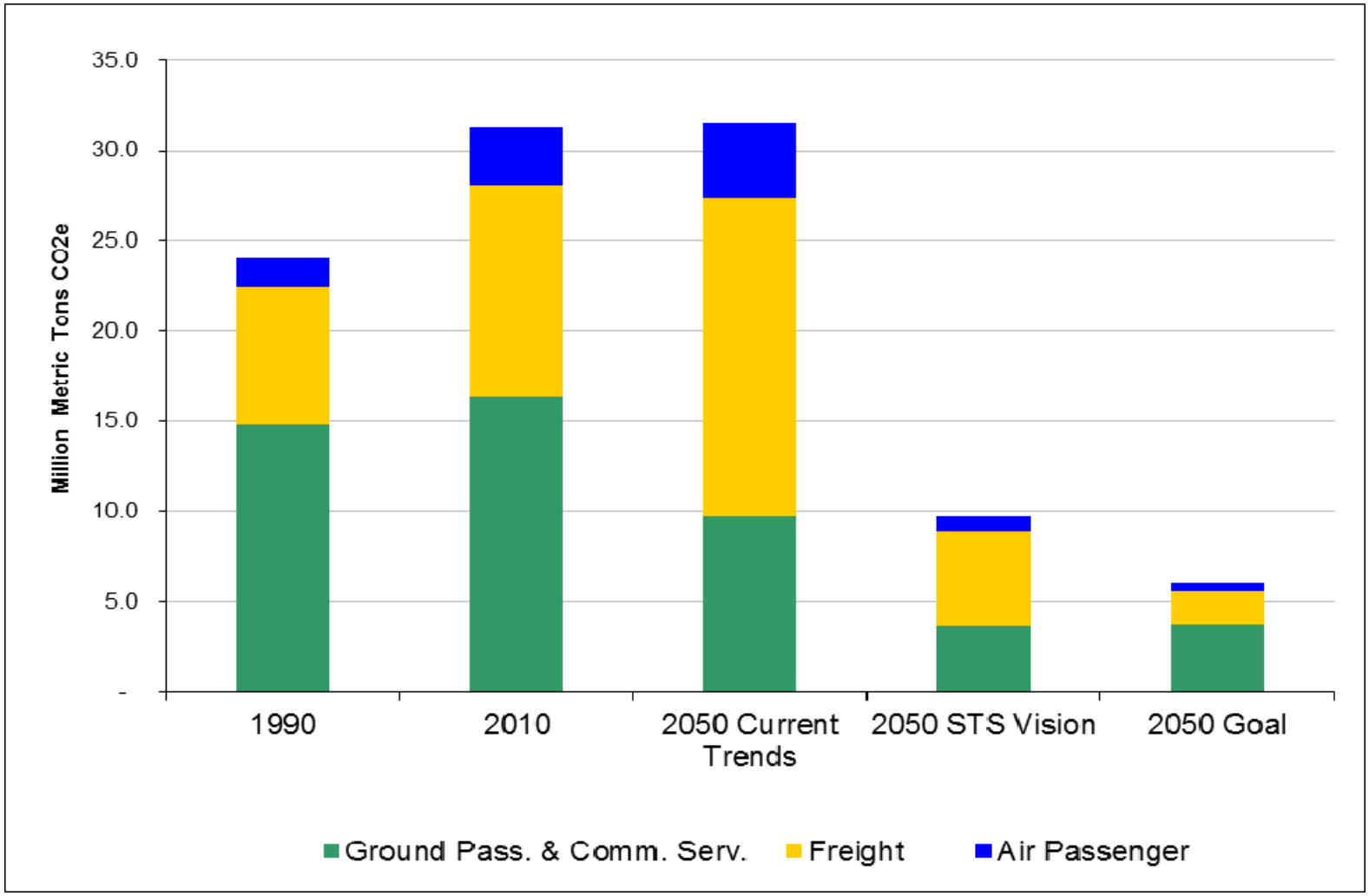
Transportation Sector GhG Emissions from Statewide Transportation Strategy



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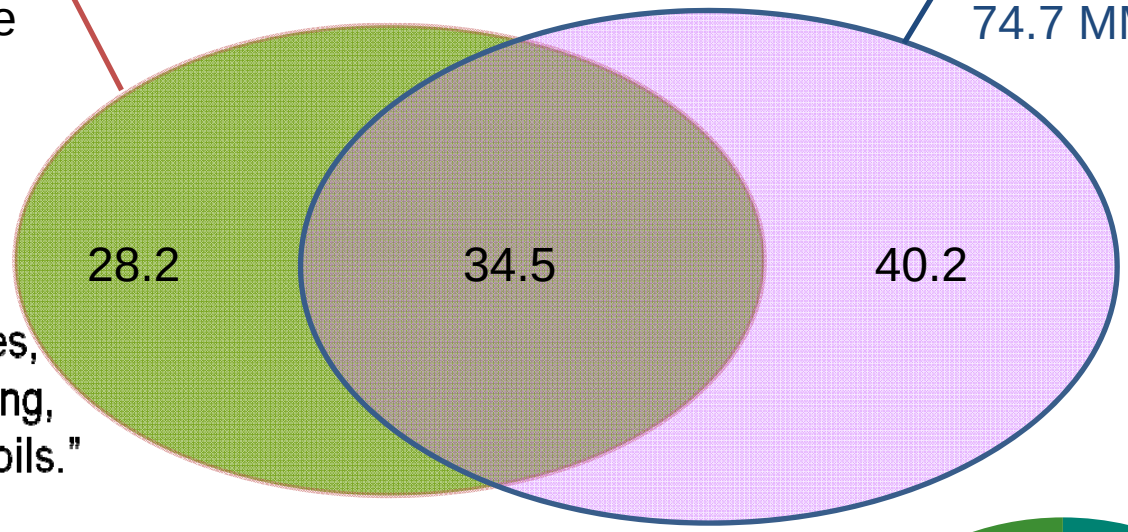
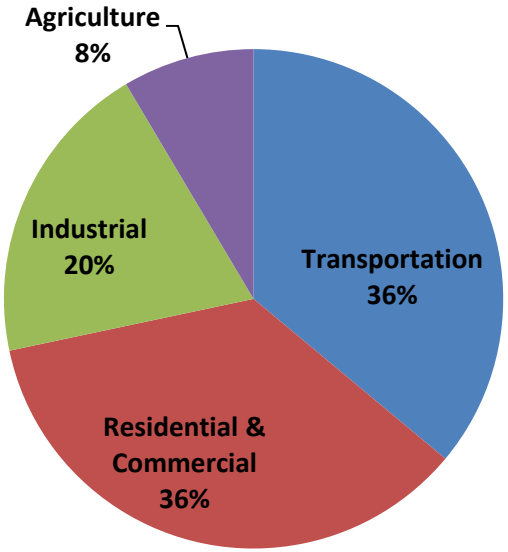
Oregon 2010 Greenhouse Gas Emissions: Two Perspectives

"In-boundary" inventory
62.8 MMTCO2e
Includes emissions associated with the use of electricity

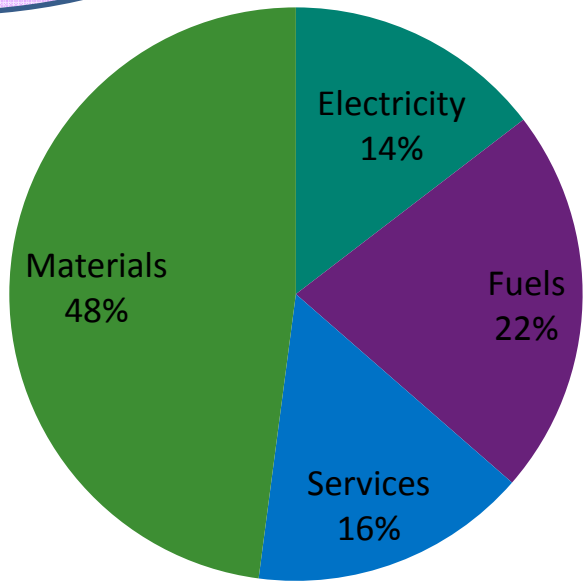
Consumption - based inventory
74.7 MMTCO2e



In-boundary Inventory
"Smokestacks, tailpipes, garbage, manufacturing, electricity, cows and soils."



Consumption-based Inventory
"Global footprint from stuff we buy, services & activities we do in Oregon."



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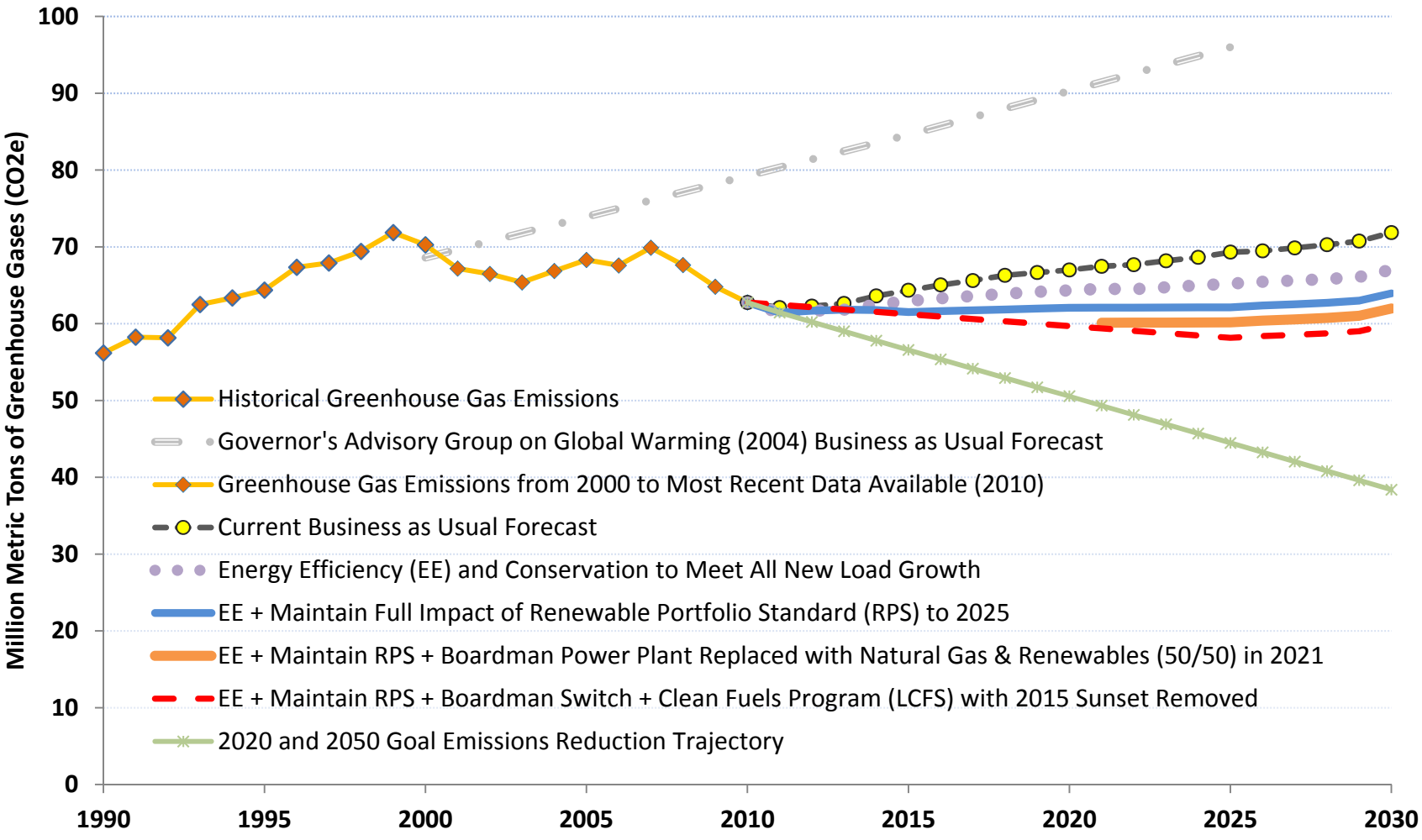
Progress Toward Legislature's Greenhouse Gas Reduction Goals



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Oregon Global Warming Commission

- Established by HB 3543 in 2007
- Charge: recommend actions and assess progress toward State greenhouse gas reduction goals set by Legislature, help prepare Oregon to adapt to impacts of climate change
- 2020 Goal: 10 percent below 1990 greenhouse gas levels

Commission Members

Voting

Angus Duncan, Chair (Bonneville Environmental Fdn)
Andrea Durbin (Oregon Environmental Council)
Jill Eiland (Intel)
Russ Hoeflich (Nature Conservancy)
Gregg Kantor (Northwest Natural Gas)
Eric Lemelson (Lemelson Vineyards)
Catherine Mater (Mater Engineering)
Jim Piro (PGE)
Bill Wyatt (Port of Portland)
Alan Zelenka (Kennedy/Jenks Consulting)
(1 vacancy)

Non-Voting

Dr. Mark Abbott, Vice Chair (OSU)
Susan Ackerman (OPUC)
Bill Bradbury (NW Power Council)
Katy Coba (ODOA)
Doug Decker (ODOF)
Senator Chris Edwards
Matt Garrett (ODOT)
Representative Bob Jenson
Dr. Mel Kohn (State Epidemiologist)
Dick Pedersen (ODEQ)
Lisa Schwartz (ODOE)
Phil Ward (ODWR)
(2 legislative vacancies)

Oregon Global Warming Commission: 2013 Report to the Legislature

KeepOregonCool

Oregon Global Warming Commission

Oregon's Roadmap to 2020

http://www.keeporegoncool.org/content/roadmap-2020

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Scoring Oregon's Share
2010 "Roadmap to 2020" Recommendations:

A On track to meet State goals or Roadmap outcomes

B Partial but significant GHG reductions or progress toward outcomes

C Business and usual; insignificant or no reductions or progress

D Significant measurable slippage away from goals or outcomes

Overall, Oregon's doing about C+ work; we're gaining ground but not enough and not fast enough.

Progress Summary: Key Sector Actions by 2020 from "Roadmap to 2020" Process

Energy	Develop State Energy and Climate Policy	B	Page 14
	Energy Efficiency	A-	
	Support and Plan for New Transmission	B-	
	Ramp Down Emissions Associated with Coal Generation	B/C	
	OUS Energy Research Priorities	B	
	Modern Gas Infrastructure	C	
	Smart Grid and Integration of Resources	C+	
Transportation and Land Use	Change the Way We Fund Transportation	C+	Page 21
	Develop New Funding Sources	C	
	Expand Urban Transit	B-	
	Create Complete Communities	C+	
	Keep Urban Footprints Compact	A	
	Move Freight the Low-Carbon Way	B-	
	Embed Climate Change in Transportation Planning	B+	
	Expand Intercity Transportation Options/Choice	C+	
	Reduce Demand by Increasing Options	B	
	Manage and Price Parking	C	
	Support Electric Vehicles	B	
	Adopt Low-Carbon Fuel Standard (now referred to as the Clean Fuels Program)	D+	
Industrial	Accelerate Use of Energy Efficient Technology and Practice	B	Page 28
	Establish Greenhouse Gas Leadership Recognition Program	A	
	Improve Access To Financing and Incentives	C	
	Build Human Capacity To Innovate and Execute Industry Process Improvements	C+	
Agriculture	Increase Nutrient Use Efficiency	C	Page 30
	Increase Carbon Sequestration in Crop Management	B	
	Develop Manure to Energy Methods	A-	
	Proactively Prepare for and Adapt to Climate Change Impacts on Water Supply	B+	
Forestry	Carbon Inventory	B	Page 32
	Reforestation/Afforestation/Acquisition	C+	
	Research	B	
	Biomass	B	
Materials Management	Advocate for Carbon Price Signal Across Life Cycle of Products & Materials (either by an emissions cap and/or a carbon tax), Including Imports (border adjustment mechanism/carbon tariff if necessary)	C	Page 36
	Conduct Research To Develop a Consumption-Based GHG Inventory and Inventory Methodology; Consider Integration with State's Conventional Inventory, Identify High-Carbon Product Categories	A	
	Develop and Disseminate Information: Easy-To-Use Life Cycle Metrics for Different Food Types	C	
	Standards, Incentives, and/or Mandates For Carbon Footprinting, Labeling of Products	C+	
	Focus Product Stewardship on Upstream Emissions, and Design For Appropriate Durability, Repairability, Reusability, Efficiency, and Recovery	C+	
	Establish Higher Standards For New Buildings: "Net Zero" Plus Offset of Materials	C	
	Provide Information and Outreach to Consumers on Product Impacts and Opportunities to Reduce Those Impacts	C	
	Reduce (Prevent) Waste of Food at the Retail and Consumer Level By 5 to 50 Percent	C+	
	Conduct Research on Highest/Best Use for Organic Wastes and Waste To Energy and the Carbon Impact of Different Conversion Technologies	C+	

Progress Scores

A On track to meet State goals or Roadmap outcomes

B Partial but significant GHG reductions or progress toward outcomes

C Business as usual; insignificant or no reductions or progress

D Significant measurable slippage away from goals or outcomes

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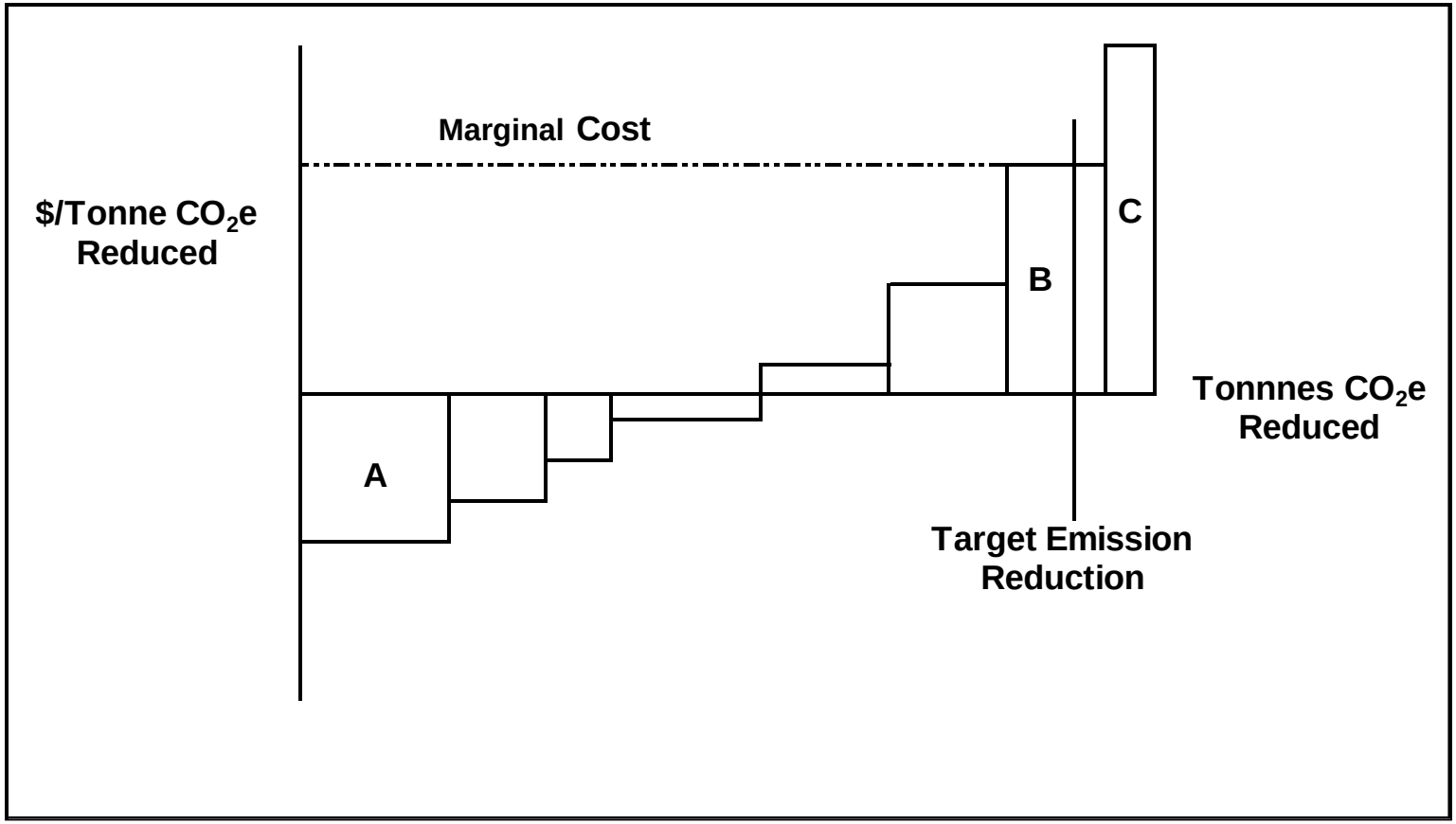
Marginal Abatement Cost Curve Conceptual Framework



Background

- The Oregon Energy Task Force Resource Mix team asked for "McKinsey-like" greenhouse gas abatement cost curves, referring to the work done by McKinsey & Company in 2007.
- ARRA (federal stimulus) money was available.
- Competitive bid process initiated with ARRA money, Center for Climate Strategies wins bid.
- After procurement process, the project team had about three months to finish the project.

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Project Limitations

- ARRA money dictated that the project had to be finished by July 31, 2012. No exceptions.
- By comparison, similar efforts have had 12 to 18 months (at least) to produce results.
- Little time for original analysis meant heavy reliance on existing studies and state efforts.
- Cost curve work closer to "meta-analysis" used in statistics rather than modeling.

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Methods - Overall

- Four Sectors
  - Power Supply (PS)
  - Residential, Commercial, and Industrial (RCI)
  - Transportation and Land Use (TLU)
  - Agriculture, Forestry, and Waste (AFW)
- All costs adjusted to 2010 dollars
- Discount rate (time value of assets): 5%/year real
- Analysis time period 2013 to 2035, with MACCs developed for 2022 and 2035 as "snapshots"
- Three scenarios reflecting different levels of "effort and commitment" to GHG reduction

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MACC - Methods

- Scenario 1 (Modest Effort, Continued State and Federal Policies)
  - Represents continuation of state and federal policies and action at approximately current levels.
  - *Minimal "effort and commitment" by external drivers.*

- Scenario 2 (Moderate Increase in Federal Action):
  - Represents increased Federal action, relative to Scenario 1 (i.e., the level of state effort remains the same as in Scenario 1). Uses recently proposed legislation as models to estimate the effect of new Federal policy in Oregon.
  - *Moderate "effort and commitment" by external drivers.*

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MACC - Methods

- Scenario 3 (Moderate Increase in Federal Action plus additional State Action):
  - *Moderate "effort and commitment" by internal and external drivers.*
  - Represents a moderate increase in both Federal and State programs, relative to Scenario 1 and Scenario 2.
    [RCI Exception: Scen. 3 Fed = Scen. 2 Fed, Scen. 3 State > Scen. 2 State.]
  - Moderate state action component represents a hypothetical collection of policy and program actions representative of historical and proposed best practice at the state energy and climate policy level.
  - State action scenario is not necessarily a representation of the 10-Year Energy Action Plan, although because many of the proposed elements of the 10-Year Energy Action Plan have been vetted in other policy venues there may be similarities in some cases.

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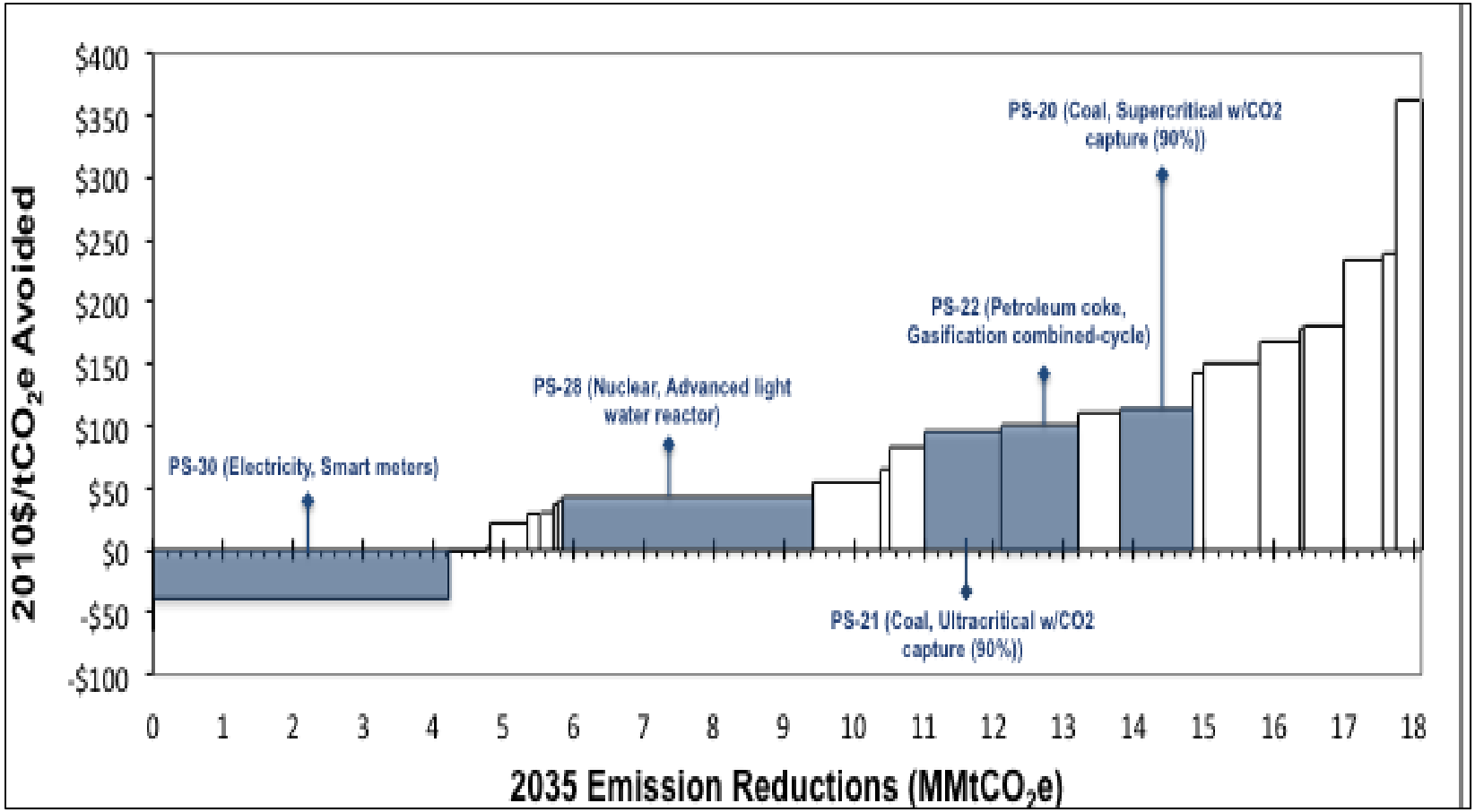
Power Supply Sector
MACC for Scenario 3, Year 2035



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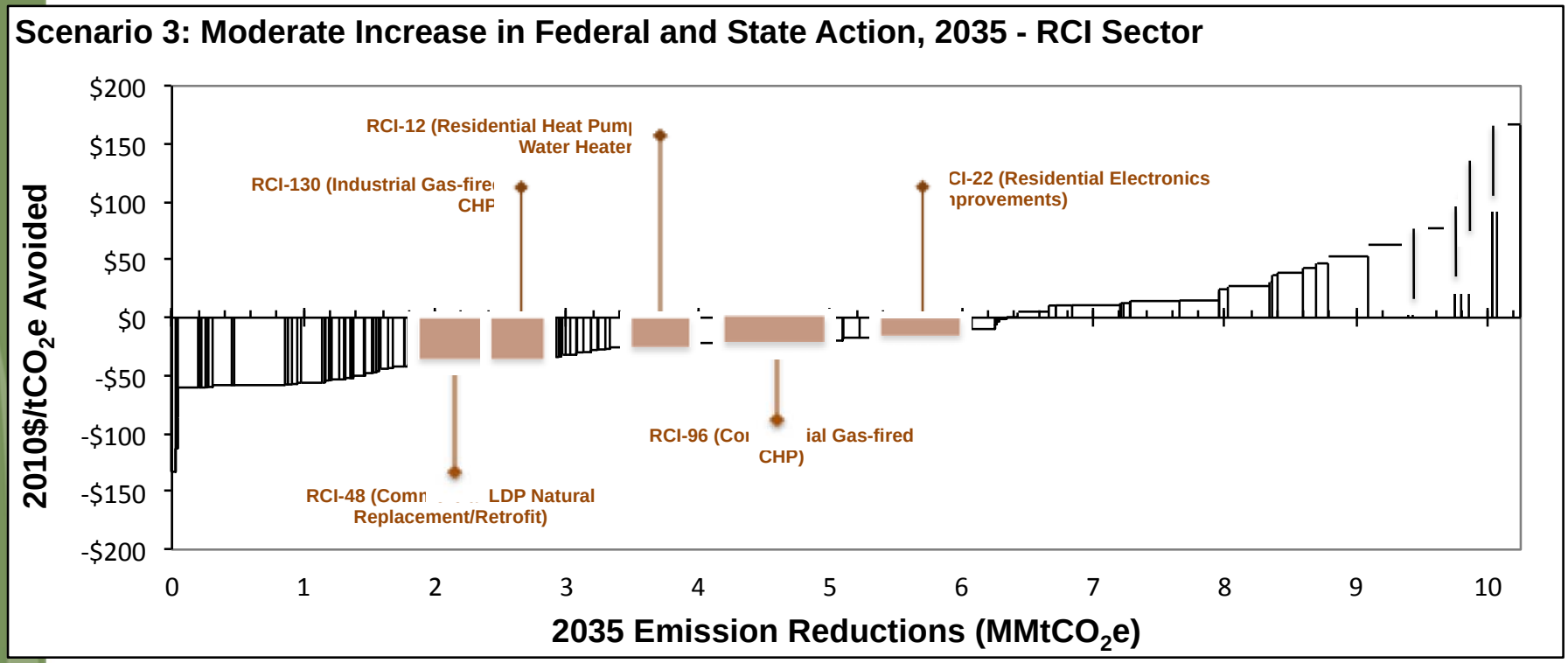
Residential, Commercial, Industrial MACC for Scenario 3, Year 2035



Note: RCI-1 (Residential Cooling Appliances) has a cost-effectiveness value of $648/MMtCO2e and RCI-20 (Home Energy Monitor) has a cost-effectiveness value of $3,206/MMtCO2e. These measures are not included in the chart due to the effects of the large cost-effectiveness values on the Y-axis scale.

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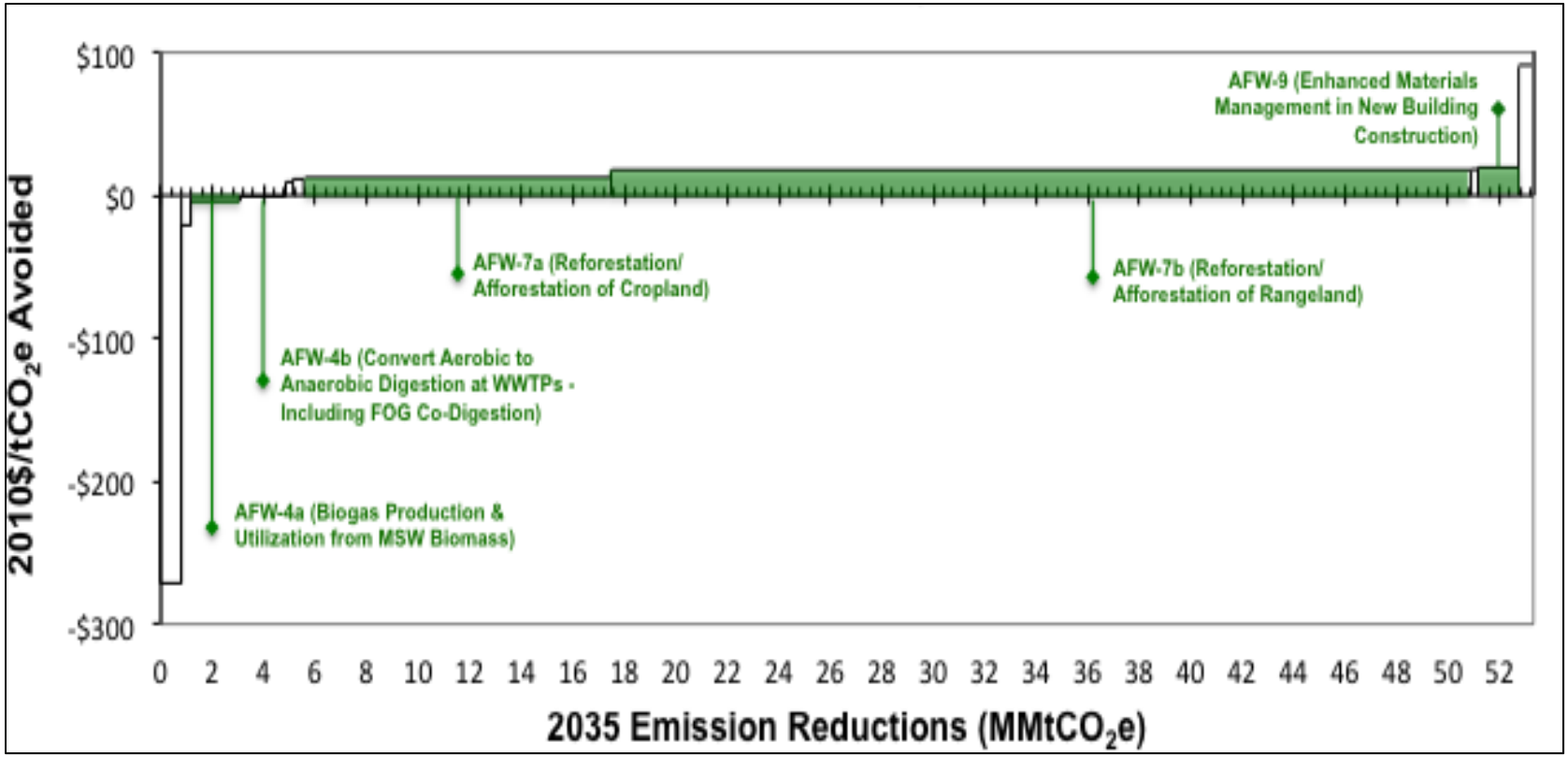
Ag, Forestry, Waste Sector
MACC for Scenario 3, Year 2035



Note: AFW-6 (Urban Forestry) has a cost-effectiveness value of \$331/MMtCO_2e and AFW-8b (Forest Management - Riparian Zones) has a cost-effectiveness value of \$746/MMtCO_2e. These measures are not included in the chart due to the effects of the large cost-effectiveness values on the Y-axis scale.

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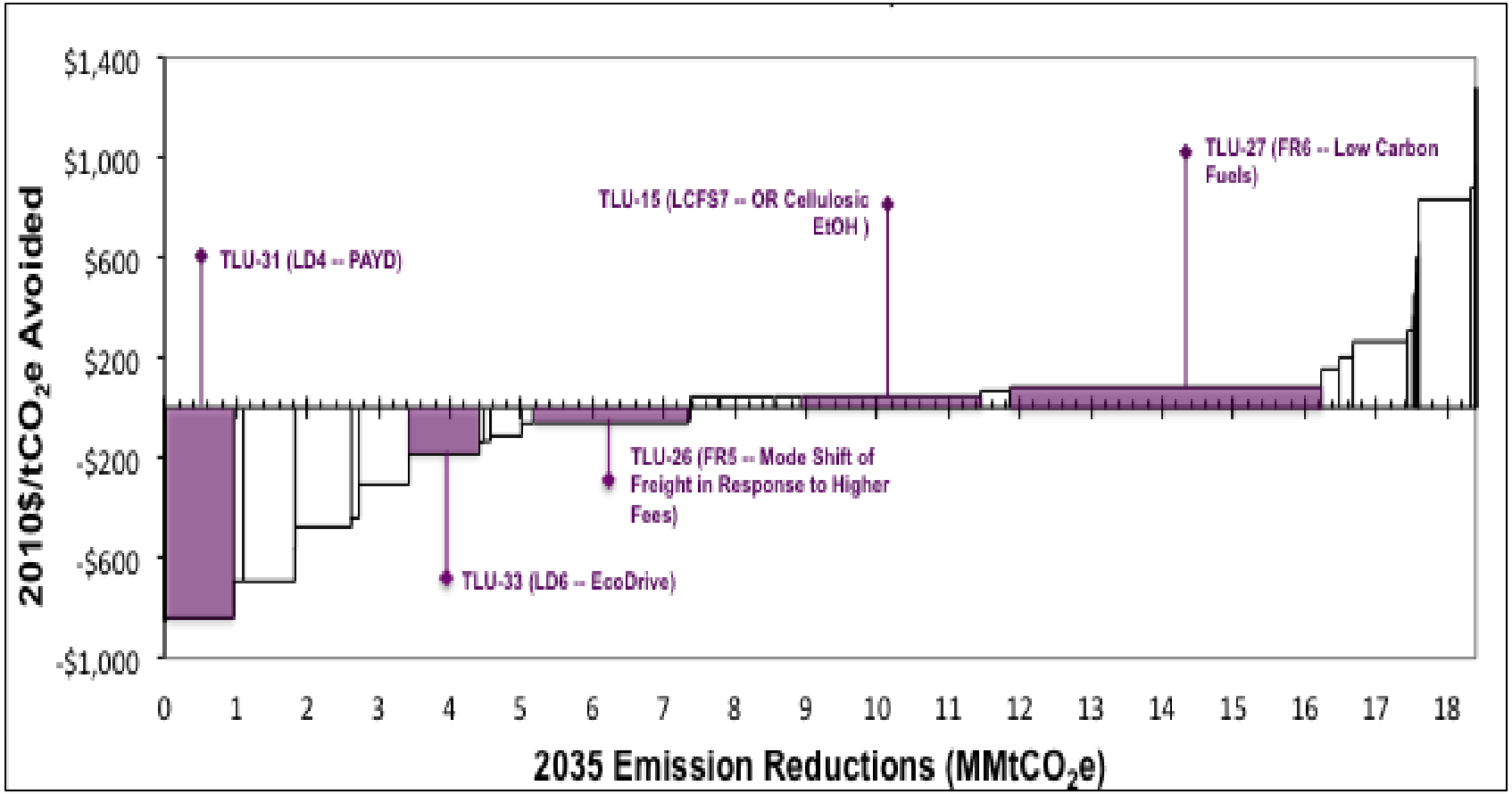
Transportation/Land Use Sector MACC for Scenario 3, Year 2035



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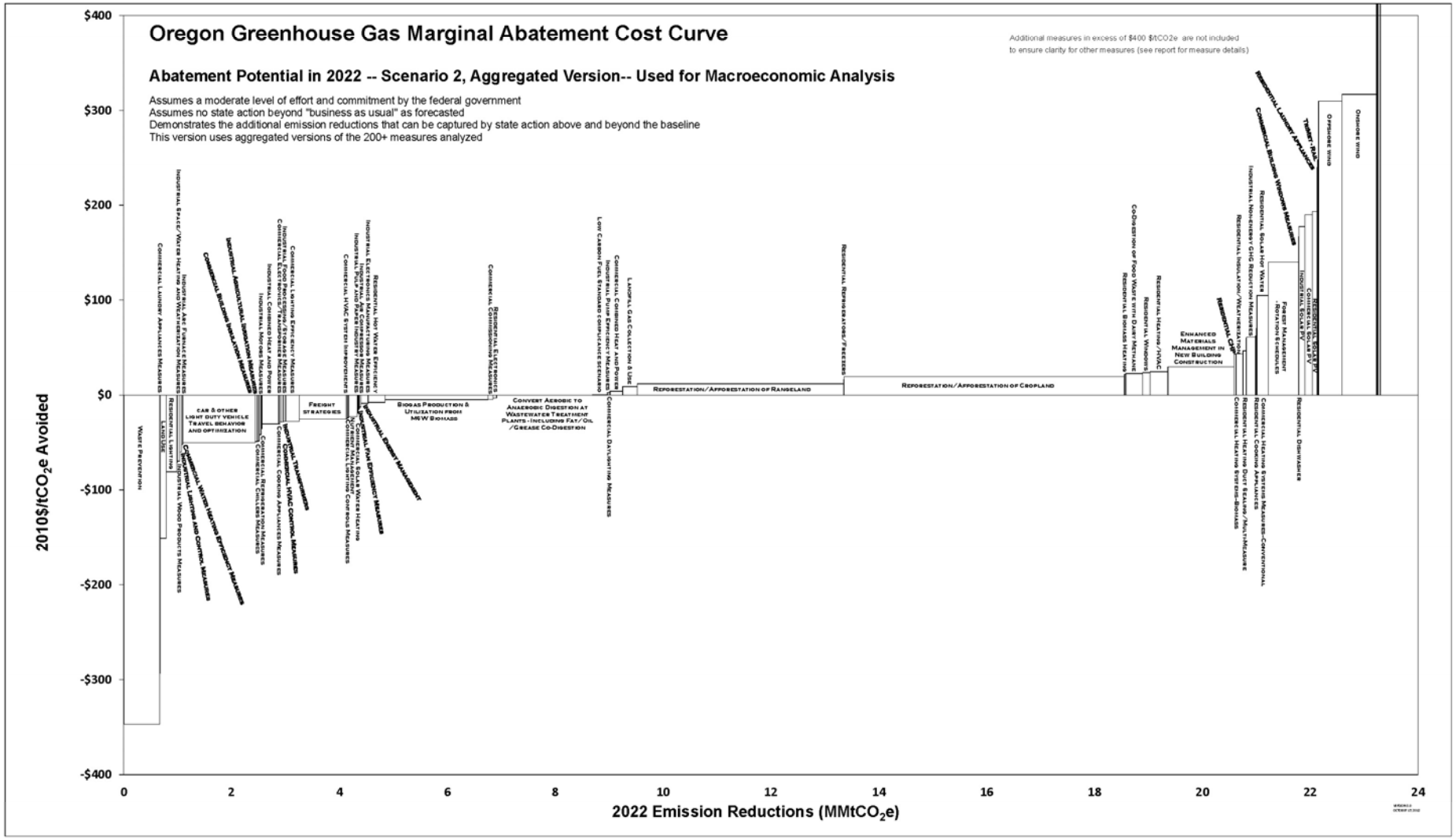
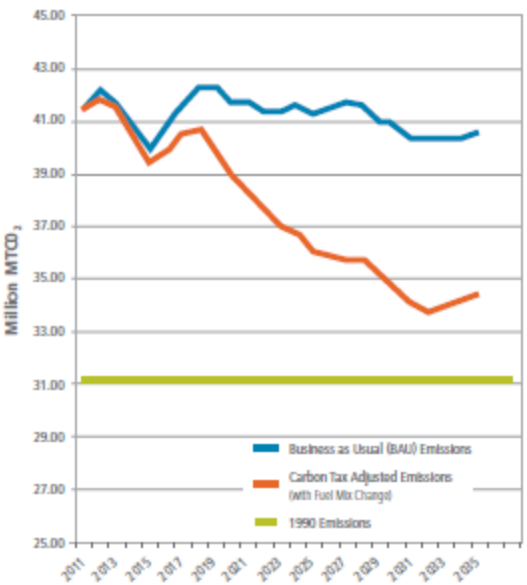
Aggregated MACC, Scenario 2 for 2022



A Carbon Tax in Oregon?

- Study by Portland State University NW Economic Research Center (NERC)
- Apply British Columbia-like Carbon Tax in OR

Figure A
Oregon's GHG Emissions at $60/ton Price, $10 Annual Increase

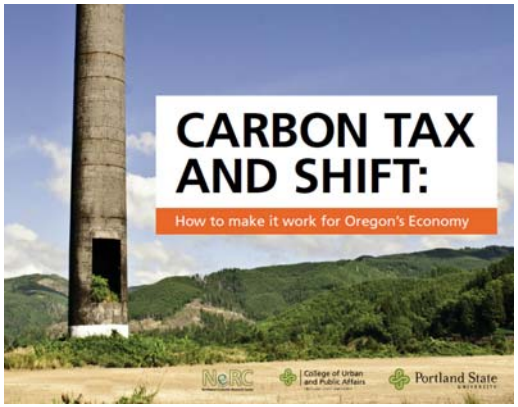


Recommended Scenario:
10% Reinvestment of Carbon Tax Revenue (Scenario 1.1)

Impact Type	Employment	Labor Income *(Million)*
Direct Effect	3,464	153
Indirect Effect	763	34
Induced Effect	-1,439	-66
Total Effect	**2,787**	**121**

Recommended Scenario:
25% Reinvestment of Carbon Tax Revenue (Scenario 1.2)

Impact Type	Employment	Labor Income *(Million)*
Direct Effect	2,191	93
Indirect Effect	538	25
Induced Effect	-1,498	-71
Total Effect	**1,231**	**47**



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Carbon Tax Study

- SB 306 (2013) directs the Legislative Revenue Office to report on the feasibility of instituting a tax or fee on greenhouse gas emissions.
- Preliminary Report: December 2013
- Final Report: November 2014
- Portland State University (NERC) contracted to complete study. Same entity did prior study.
- Revised study to use dynamic model (REMI) and also required to put cost and benefits in context of other emission reduction programs.

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Federal Action

- Obama Climate Action Plan – September 2013
- Section 111 (b) standards address new, modified and reconstructed power plants.
- Section 111 (d) for existing sources. States design programs that fit federal guidelines and achieve the required emission reductions.
- Some talk about offsets for 111(d). EPA has been pretty clear that won't be an option.
- Market-based approaches may be an option.

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Pacific Coast Collaborative

- Pacific Coast Action Plan on Climate & Energy
  - Governors of OR, WA, and CA, and Premier of BC, agree to, "Account for the costs of carbon pollution in each jurisdiction." (October 2013)
    - "Oregon will build on existing programs to set a price on carbon emissions.", "Oregon and Washington will link programs for consistency and predictability …".
  - Harmonize emission reduction targets
  - Low-Carbon Fuel Standard and other measures

Pacific Coast COLLABORATIVE

Leadership now for a sustainable tomorrow

Alaska
British Columbia
California
Oregon
Washington

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Reasons for Optimism

- Emissions in Oregon leveling off.
- New momentum from Federal government climate push.
- Governor's commitment to carbon pricing.

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For More Information

- **Oregon Climate Change Portal**
  http://www.orclimatechange.gov
- **Oregon Global Warming Commission**
  www.keeporegoncool.org
- **Oregon Climate Change Research Institute**
  http://www.occri.net

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