

Carbon Effects of Clean Electricity and Coal Transition Plan (HB 4036)

Attached is the current draft of the carbon effect of the proposed bill, measured against a combined GHG reduction curve for the two utilities that is proportional to the State's overall reduction trajectory, but modified to reflect a baseline date of 2005 (vs. 1990) and a 2050 reduction from that point of 80% (vs. 75% from a 1990 baseline). This modified utility trajectory and target were presented in the 2015 OGWC Biennial Report to the Legislature. Assumptions are detailed in the inset, are derived from ODOE reported and projected data, and are intentionally conservative (e.g., assuming 50/50 renewable and gas CT replacement resource).

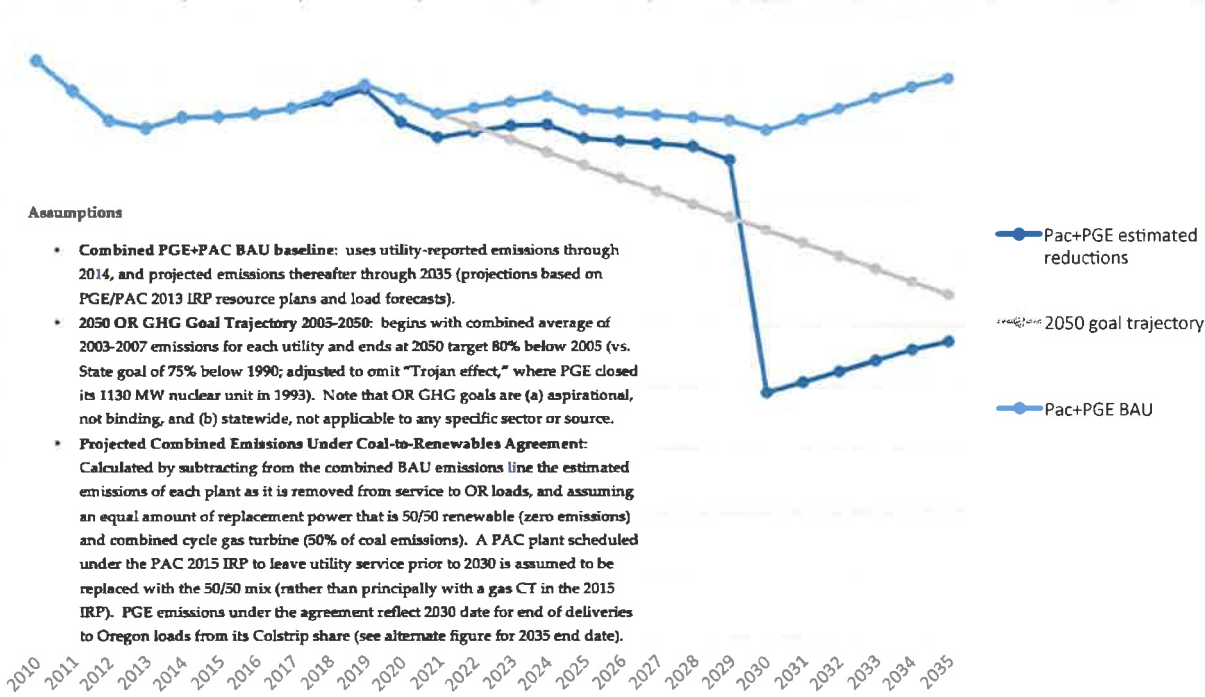
- Meeting Oregon's electricity GHG goals: Backing coal out of service to Oregon loads and ramping up to a 50% by 2040 RPS has the effect of bringing carbon emissions from the electricity sector into consistency with Oregon goals by 2030, and at least through 2035 (see Figure One), as we presently account for carbon relative to Oregon's goals.
- Net Reductions from Coal-by-Wire Plants: If the out-of-state coal plants no longer delivering to Oregon loads choose to redispatch, and transmission is available to enable redispatch to other loads within the western grid, it is conceptually possible – but unlikely – that there could be no net emissions reduction resulting *directly* from the coal reduction elements of the bill. Certainly the effects of EPA Clean Power Plan regulation will have the greater effect. However, California's experience with utility divestment of out-of-state coal deliveries is that facility closures have occurred in general proportion to such divestment (see LADWP at Navaho; SCE at Four Corners; CA COU's at San Juan; DADWR at Reid Gardner; etc).
- Carbon Effects of Reduced Reliance on New Baseload Gas: The effect of coal withdrawal and RPS ramp-up should largely preclude new additional baseload CCGT capacity added to the PGE and PAC systems serving Oregon loads, thus avoiding the 30 year+ capital commitments to fossil fuels that would imperil Oregon's ability to meet its out-year (2030-2050) emissions goals. Added gas capacity is most likely to be in the form of units devoted to integrating the increased variable renewable resources.
- Carbon Intensity in Western Grid: As a practical matter of generation dispatch within the western grid, a greater proportion of renewable resources in PAC and PGE system should have the result of lowering carbon intensity throughout the grid. As has been historically true with hydro, so wind and solar resources, with their low marginal operating costs, are likely to be dispatched first to power pool loads.
- Oregon's Transportation GHG Reduction Goals: Meeting Oregon's transportation sector GHG emissions goals depends on (a) \geq 50% fleet turnover from ICE (internal combustion engine) to EV (electric vehicle) by 2050, and (b) electrical charging service from utilities also in compliance with the State's 2050 GHG reduction goal. The bill will substantially lower the carbon intensity of electricity fueling the EV fleet.

Angus Duncan, Chair
Oregon Global Warming Commission

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
PGE	9.36	8.62	7.42	6.85	7.34	7.30	7.34	7.37	7.63	7.90
reductions due to agreement estimates										
PAC	9.16	8.93	9.18	9.52	9.36	9.42	9.48	9.61	9.73	9.85
reductions due to agreement estimates									(0.15)	(0.15)
Pac+PGE estimated reductions	18.52	17.55	16.60	16.37	16.69	16.72	16.82	16.98	17.21	17.60
Pac+PGE BAU	18.52	17.55	16.60	16.37	16.69	16.72	16.82	16.98	17.36	17.75

2005-2050 goal trajectory

Mt/yr CO₂



Assumptions

- **Combined PGE+PAC BAU baseline:** uses utility-reported emissions through 2014, and projected emissions thereafter through 2035 (projections based on PGE/PAC 2013 IRP resource plans and load forecasts).
- **2050 OR GHG Goal Trajectory 2005-2050:** begins with combined average of 2003-2007 emissions for each utility and ends at 2050 target 80% below 2005 (vs. State goal of 75% below 1990; adjusted to omit "Trojan effect," where PGE closed its 1130 MW nuclear unit in 1993). Note that OR GHG goals are (a) aspirational, not binding, and (b) statewide, not applicable to any specific sector or source.
- **Projected Combined Emissions Under Coal-to-Renewables Agreement:** Calculated by subtracting from the combined BAU emissions line the estimated emissions of each plant as it is removed from service to OR loads, and assuming an equal amount of replacement power that is 50/50 renewable (zero emissions) and combined cycle gas turbine (50% of coal emissions). A PAC plant scheduled under the PAC 2015 IRP to leave utility service prior to 2030 is assumed to be replaced with the 50/50 mix (rather than principally with a gas CT in the 2015 IRP). PGE emissions under the agreement reflect 2030 date for end of deliveries to Oregon loads from its Colstrip share (see alternate figure for 2035 end date).

- Pac+PGE estimated reductions
- 2050 goal trajectory
- Pac+PGE BAU

