

Oregon Clean Fuels Program

Calculating the Carbon Intensity of Electricity used in the CFP

2012-2016, effective for the 2018 compliance period

This document explains the calculation of carbon intensity of electricity used in the Clean Fuels Program for both the statewide electricity mix and several utility-specific mixes. The values provided here will apply to the 2018 compliance year and the same methodology will be applied to future years.

General Methodology

The CFP calculates the carbon intensity of transportation fuels on a lifecycle basis, which means that both direct and indirect emissions are accounted. For electricity, that means looking at both the direct emissions from the smokestacks of power plants as well as the indirect, upstream emissions from the extraction and transportation of the source of the electricity to the power plant. CFP uses the most recent five years' worth of data to develop the carbon intensity values; in this case, 2012 - 2016 data for the 2018 compliance period.

Direct Emissions

The electric sector is one of many that is required to report annually to DEQ's Greenhouse Gas Reporting Program. Utilities and electric generators report how much electricity they produce or procure and the source of their electricity generation. The emission rates are reported in tons per megawatt-hours and then converted to grams CO₂e per megajoule of energy by using the following factors:

- 1 mt = 1,000,000 g
- 1 MWh = 1,000 kWh
- 1 kWh = 3.6 MJ

Indirect Emissions

For electricity, indirect emissions represent anything upstream from the power plant. In the case of natural gas, it includes energy used at the wellhead and throughout the transmission system including fugitive methane emissions. In the case of coal, it includes energy used in mining and transportation to the power plant. There is no single set of data that contains the generation mixes of all of the utilities in Oregon so DEQ used a combination of 2015 statewide and BPA data. The OR-GREET 2.0 model was used to calculate the upstream emissions associated with that generation mix.

Statewide Mix Carbon Intensity for 2018

Statewide Direct Emissions

Here are the emission rates as reported to the GHG program for the statewide mix:

	2012	2013	2014	2015	2016	Average
mt/MWh	0.351	0.359	0.367	0.380	0.336	0.359
gCO ₂ e/MJ	97.44	99.76	101.98	105.59	93.28	99.61



State of Oregon
Department of
Environmental
Quality

Oregon Clean Fuels Program

<http://www.oregon.gov/deq/aq/programs/Pages/Clean-Fuels.aspx>

700 NE Multnomah St.
Portland, OR 97232
OregonCleanFuels@deq.state.or.us

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

Statewide Indirect Emissions

Here is the generation mix as reported to DEQ for the statewide mix and related upstream emissions as calculated in OR-GREET 2.0:

Fuel Type	Total Statewide (MWh)	Statewide %	gCO2e/MJ
Biogas	89,155	0.19%	
Biomass	76,106	0.16%	0.02
Coal	15,670,702	32.78%	5.21
Geothermal	55,766	0.12%	
Hydro	19,006,777	39.76%	
Natural Gas	8,044,610	16.83%	4.59
Nuclear	1,470,584	3.08%	0.09
Other Biogenic	50,733	0.11%	
Other Non-Biogenic	61,556	0.13%	0.03
Petroleum	38,327	0.08%	
Solar	53,328	0.11%	
Waste	42,553	0.09%	
Wind	3,142,712	6.57%	
Total	47,802,939	100.00%	9.95

BPA Indirect emissions for 2018

Here is the generation mix for the Bonneville Power Administration, which serves a number of smaller utilities in Oregon:

Fuel Type	Total BPA (MWh)	BPA %	gCO2e/MJ
Biogas	0	0.00%	
Biomass	17,425	0.13%	0.02
Coal	270,522	2.06%	0.31
Geothermal	0	0.00%	
Hydro	11,389,969	86.56%	
Natural Gas	125,766	0.96%	0.26
Nuclear	1,342,153	10.20%	0.08
Other Biogenic	4,204	0.03%	
Other Non-Biogenic	5,163	0.04%	0.01
Petroleum	2,660	0.02%	
Solar	0	0.00%	
Waste	0	0.00%	
Wind	0	0.00%	
Total	13,157,862	100%	0.67

Utility-specific Calculations

Utility-specific Direct Emissions

Here are the emission rates as reported to the GHG program for individual utilities in Metric Tones CO₂e per Megawatt-Hour:

	2012	2013	2014	2015	2016	Average
Clatskanie PUD	0.073	0.086	0.064	0.073	0.030	0.065
Emerald PUD	0.014	0.017	0.017	0.015	0.025	0.018
Springfield Utility Board	0.015	0.017	0.017	0.015	0.012	0.015
Hermiston Energy Services	0.015	0.017	0.017	0.015	0.012	0.015
Columbia River PUD	0.015	0.017	0.017	0.015	0.012	0.015
EWEB	0.013	0.020	0.014	0.013	0.010	0.014
Central Lincoln PUD	0.015	0.017	0.017	0.015	0.012	0.015
Lane Electric Cooperative	0.015	0.020	0.019	0.018	0.012	0.017
Tillamook PUD	0.015	0.017	0.017	0.014	0.012	0.015
Umatilla Electric Cooperative	0.014	0.055	0.085	0.139	0.092	0.077

Utility-specific Indirect Emissions

For utilities that reported a mix of BPA and other sources, DEQ applied the BPA indirect emissions to their first 4.18 grams of carbon intensity and then prorated the statewide mix upstream emissions value for the remainder.

Carbon Intensity Values for 2018

DEQ provided the utilities that registered for a utility-specific carbon intensity with a proposed value on Dec. 14, 2017. As per the regulation, utilities had seven days to review that proposed value and provide DEQ with an explanation of why it believes the proposed carbon intensity is not accurate. The carbon intensity values provided here are now final.

	Direct Emissions (gCO ₂ e/MJ)	Indirect Emissions (gCO ₂ e/MJ)	Carbon Intensity (gCO ₂ e/MJ)
Statewide Mix	99.61	9.95	109.56
Clatskanie PUD	18.06	2.05	20.11
Emerald PUD	4.98	0.75	5.72
Springfield Utility Board	4.18	0.67	4.85
Hermiston Energy Services	4.18	0.67	4.85
Columbia River PUD	4.18	0.67	4.85
EWEB	3.86	0.64	4.50
Central Lincoln PUD	4.18	0.67	4.85
Lane Electric Cooperative	4.67	0.71	5.38
Tillamook PUD	4.14	0.67	4.81
Umatilla Electric Cooperative	21.36	2.38	23.74

Want more information?

For information about the Clean Fuels Program, go to the program webpage at: <http://www.oregon.gov/deq/aq/programs/Pages/Clean-Fuels.aspx>.

Accessibility

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1- 800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us