

Oregon Clean Fuels Program

Calculating the Carbon Intensity of Electricity used in the CFP

2013-2017, effective for the 2019 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 2019 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, 2013 - 2017 data for the 2019 compliance period.



State of Oregon
Department of
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Quality

Oregon Clean Fuels Program

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

700 NE Multnomah St.
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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 3.0 model was used to calculate the upstream emissions associated with that generation mix.

Statewide Mix Carbon Intensity for 2019

Statewide Direct Emissions

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

	2013	2014	2015	2016	2017	Average
mt/MWh	0.364	0.369	0.380	0.335	0.334	0.356
gCO ₂ e/MJ	101.02	102.47	105.48	93.01	92.66	98.93

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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 3.0:

Fuel Type	Total Statewide (MWh)	Statewide %	gCO ₂ e/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



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BPA Indirect emissions for 2019

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 %	gCO ₂ e/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

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Utility-specific Calculations

Utility-specific Direct Emissions

Here are the emission rates as reported to the GHG program for individual utilities in grams of CO₂e per megajoule:

	2013	2014	2015	2016	2017	Average
Ashland Electric Department	4.81	4.71	4.07	3.23	2.48	3.86
Blachly-Lane Electric Cooperative	4.38	4.45	3.87	3.06	2.35	3.62
Central Electric Cooperative	4.78	4.71	4.05	3.21	2.46	3.84
Central Lincoln PUD	4.81	4.71	4.07	3.23	2.48	3.86
Clatskanie PUD	23.85	17.68	20.23	8.38	9.16	15.86
Columbia River PUD	4.81	4.71	4.07	3.23	2.48	3.86
Consumers Power, Inc	4.54	4.45	3.84	3.05	2.35	3.65
Emerald PUD	4.84	33.83	39.06	30.09	26.50	26.86
Springfield Utility Board	4.81	4.71	4.07	3.23	2.48	3.86
Hermiston Energy Services	4.81	4.71	4.07	3.23	2.48	3.86
EWEB	5.58	3.93	3.52	2.73	4.65	4.08
Midstate Electric Cooperative	4.81	4.71	4.07	3.23	2.48	3.86
Lane Electric Cooperative	4.78	4.66	4.02	3.22	2.48	3.83
Tillamook PUD	4.77	4.66	4.03	3.22	2.48	3.83
Umatilla Electric Cooperative	4.64	5.23	2.77	3.66	5.05	4.27

Utility-specific Indirect Emissions

For utilities that reported a mix of BPA and other sources, DEQ applied the BPA indirect emissions to their first 3.86 grams of carbon intensity and then prorated the statewide mix upstream emissions value for the remainder.

Carbon Intensity Values for 2019

Below are the carbon intensity values for the statewide mix and utilities that have requested a utility-specific CI score.

	Direct Emissions (gCO ₂ e/MJ)	Indirect Emissions (gCO ₂ e/MJ)	Carbon Intensity (gCO ₂ e/MJ)
Statewide Mix	98.93	10.38	109.31
Ashland Electric Department	3.86	1.22	5.08
Blachly-Lane Electric Cooperative	3.62	1.22	4.84
Central Electric Cooperative	3.84	1.22	5.06
Central Lincoln PUD	3.86	1.22	5.08
Clatskanie PUD	15.86	1.23	17.09
Columbia River PUD	3.86	1.22	5.08
Consumers Power, Inc	3.65	1.22	4.87
Emerald PUD	26.86	1.24	28.10
Springfield Utility Board	3.86	1.22	5.08
Hermiston Energy Services	3.86	1.22	5.08
EWEB	4.08	1.22	5.30
Midstate Electric Cooperative	3.86	1.22	5.08
Lane Electric Cooperative	3.83	1.22	5.05
Tillamook PUD	3.83	1.22	5.05



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Umatilla Electric Cooperative	4.27	1.22	5.49
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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



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