



PacifiCorp dba Pacific Power & Light Company
Washington Energy and Emissions Intensity Metrics
2020 Report

May 28, 2021

Introduction

In November 2006, Washington voters approved Initiative 937, establishing the Energy Independence Act (EIA), which requires electric utilities serving at least 25,000 retail customers to use renewable energy and energy conservation in serving those customers. In September 2015, the Washington Utilities and Transportation Commission (Commission) adopted new administrative rules to implement several legislative changes to the EIA, including introducing Washington Administrative Code (WAC) 480-109-300, pertaining to the reporting of energy and emissions intensity metrics. On May 7, 2019, the Washington Legislature passed the Clean Energy Transformation Act (CETA), which commits Washington to an electricity supply free of greenhouse gas (GHG) emissions by 2045. The Commission amended WAC 480-109-300 effective January 28, 2021, following rulemaking by Washington Department of Ecology in WAC 173-444 that established compliance mechanism under CETA Revised Code of Washington (RCW) 19.405.070 and 19.405.020(22), by defining the method for calculation of the GHG emissions content in electricity an electric utility supplies to its retail electric customer in Washington state. Specifically, it provided for methodology for determining the emissions factor for a specified generating unit and established an emissions rate for unspecified electricity.

Revised WAC 480-109-300 states, in relevant part:

(1) A utility must report its greenhouse gas content calculation and metrics of energy and emissions intensity to the commission on or before June 1st of each year. The report must include annual values for each metric for the preceding ten calendar years. Each value reported must be based on the annual energy or emissions from all generating resources providing service to customers of that utility in Washington state, regardless of the location of the generating resources. When the metrics are calculated from generators that serve out-of-state and in-state customers, the annual energy and emissions outputs must be prorated to represent the proportion of the resource used by Washington customers.

(2) Each utility must perform its greenhouse gas content calculation in accordance with the rules enacted by the department of ecology, consistent with RCW 19.405.020 (22)

(3) In addition to the greenhouse gas content calculation, the report shall include the following metrics:

(a) Average megawatt-hours per residential customer;

(b) Average megawatt-hours per commercial customer;

(c) Megawatt-hours per capita;

(d) Million short tons of CO₂ emissions; and

(e) Comparison of annual million short tons of CO₂ emissions to 1990 emissions.

PacifiCorp dba Pacific Power & Light Company (PacifiCorp) submits this 2020 Energy and Emissions Intensity Report to the Commission in accordance with reporting requirements established as part of the EIA and WAC 480-109-300 effective January 28, 2021.

This report is consistent with the collaborative workshop documents addressing annual reporting requirements, in Docket UE-131723.

Executive Summary

This report includes the estimated carbon dioxide (CO₂) equivalent emissions associated with serving PacifiCorp’s Washington customers between 2011 and 2020, compared to an estimate of the company’s 1990 CO₂ emissions. PacifiCorp’s 1990 CO₂ emission level is estimated to be 2,399,078 short tons or 2,176,408 metric tons, as established during workshops in Docket UE-131723, regarding the emissions reporting requirements.

As shown in Table 1 below, PacifiCorp estimates the Washington-allocated emissions from 2011 to 2020 to be between 2.5 and 2.9 million metric tons of CO₂ annually, or between 115 and 135 percent of 1990 emissions.

Table 1

| Year | Total Annual CO₂e Emissions (Short Tons) | Total Annual CO₂e Emissions (Metric Tons) | Ratio of Annual CO₂¹ Emissions to 1990 Emissions |
|-------------|--|---|---|
| 2011 | 2,750,690 | 2,495,385 | 114.66% |
| 2012 | 2,950,333 | 2,676,498 | 122.98% |
| 2013 | 3,186,585 | 2,890,822 | 132.83% |
| 2014 | 3,000,296 | 2,721,824 | 125.06% |
| 2015 | 3,152,164 | 2,859,596 | 131.39% |
| 2016 | 2,916,164 | 2,645,500 | 121.55% |
| 2017 | 3,154,615 | 2,861,820 | 131.49% |
| 2018 | 2,946,128 | 2,672,683 | 122.80% |
| 2019 | 3,234,494 | 2,934,285 | 134.82% |
| 2020 | 2,897,337 | 2,628,421 | 120.77% |

¹ The ratio of Annual Emissions to 1990 Emissions is likely overstated because the 1990 emissions did not include CO₂ equivalent of nitrogen dioxide (N₂O) and methane (CH₄), nor emissions associated with generation used to cover transmission losses.

Prior 10-year Annual Metrics for all Generating Resources Serving Washington Customers

Table 2 below provides the average megawatt-hour (MWh) per residential and commercial customer, the average MWh per capita, and estimated population served over time.²

The MWh per customer is determined by dividing the proportional MWh for each customer class by the number of customers for the same customer class. The MWh per capita represents the total annual load for the year, divided by the estimated population served for the year.

Table 2

| Year | Average MWh per Residential Customer | Population (Residential) | Average MWh per Commercial Customer | MWh per Capita (Total) |
|------------------------|--------------------------------------|--------------------------|-------------------------------------|------------------------|
| 2011 | 17.47 | 87.52 | 14.90 | 299,135 |
| 2012 | 16.99 | 90.90 | 14.88 | 301,385 |
| 2013 | 17.32 | 99.10 | 15.07 | 303,352 |
| 2014 | 16.64 | 108.42 | 15.15 | 302,069 |
| 2015 | 15.91 | 111.11 | 15.16 | 300,450 |
| 2016 | 16.15 | 102.30 | 14.68 | 301,905 |
| 2017 | 17.21 | 106.02 | 15.18 | 303,749 |
| 2018 | 15.33 | 107.02 | 14.69 | 296,875 |
| 2019 | 16.52 | 104.00 | 14.91 | 305,829 |
| 2020 | 14.43 | 99.72 | 15.55 | 308,836 |
| 10-Year Average | 16.40 | 101.61 | 15.02 | 302,359 |

PacifiCorp's Washington population had steady year-over-year growth between 2011 and 2020. However, the average MWh per residential customer has generally stayed flat or declined, which could indicate increased adoption of energy efficiency.

² In this report, the term 'customer' represents the number of customers billed. The term 'population' refers to the estimated number of people served within the residential customer count.

Subtotal Metrics – Energy and Emissions from Unknown Generation Sources³

The table below shows the annual Washington-allocated energy, emissions, and percentage of load served from unknown generation sources. Unknown resources, or “Spot Market” purchases,

Table 3

| Unknown Resource - Annual Metrics⁴ | | | |
|--|------------|--|----------------------------------|
| Year | MWh | CO₂e Metric Tons Emissions | Percentage of Load Served |
| 2011 | 265,797 | 116,153 | 6.02% |
| 2012 | 369,810 | 161,607 | 8.32% |
| 2013 | 342,608 | 149,719 | 7.45% |
| 2014 | 58,961 | 25,766 | 1.31% |
| 2015 | 596,016 | 260,459 | 13.28% |
| 2016 | 847,919 | 370,540 | 19.73% |
| 2017 | 815,875 | 356,537 | 17.78% |
| 2018 | 662,441 | 289,486 | 15.64% |
| 2019 | 756,345 | 330,523 | 17.20% |
| 2020 | 901,501 | 393,956 | 20.39% |

³ Energy supply where the source of generation cannot be specified is categorized under, “Unknown Resources,” such as market purchases and sales. In contrast, “Known Resources” are those where generation can be directly attributed to a specific facility, such as an owned resource or long-term contract.

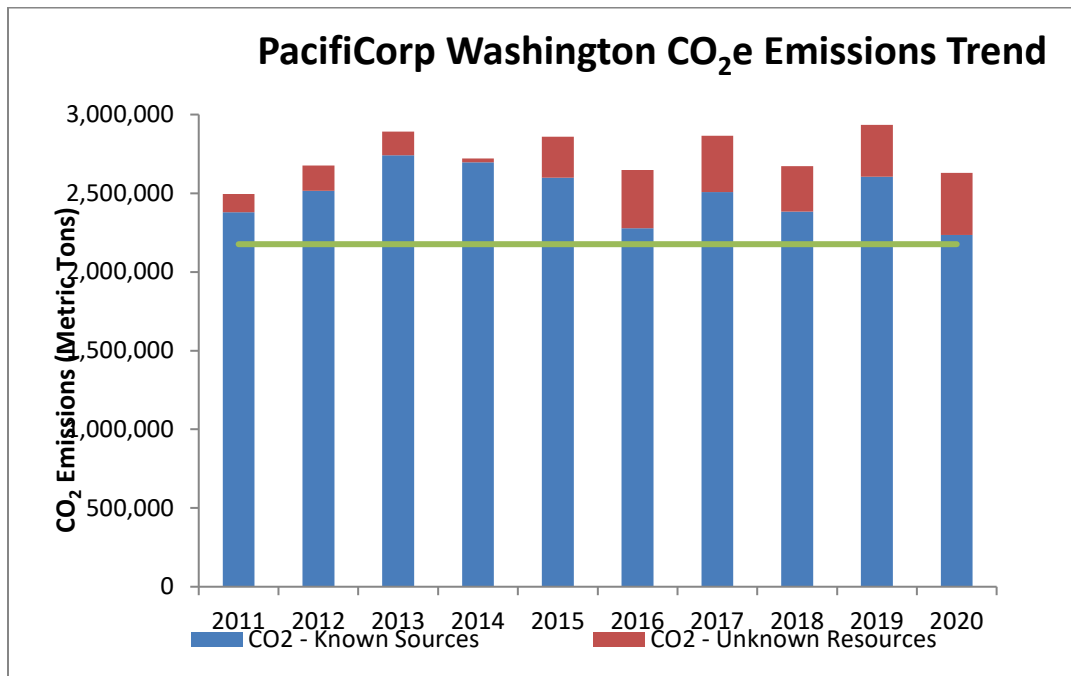
Carbon Emissions Trend Analysis

There are multiple factors that generally impact a utility's CO₂ emissions levels. These factors include, but are not limited to:

- Changes in demand due to economic growth or recession
- The price of different fuel and energy sources
- Variations in generation and the relative resource mix in a particular year
- State policy developments such as renewable portfolio standards and emissions performance standards
- Demand-side efficiency improvements

The figure below illustrates PacifiCorp's Washington-allocated CO₂ emissions between 2011 and 2020. The quantity of total emissions associated with Washington over this period of time is generally between 2.5 and 2.9 million metric tons of CO₂ equivalent annually. As the figure indicates, CO₂ emissions generally increased from 2011 through 2013, with a reduction in emissions in 2014. Emissions fluctuate up and down between 2015 and 2020. An uptick in emissions in 2019 was in part due to wind facilities being offline while undergoing capital upgrades to increase output and efficiency. Emissions dropped in 2020 as wind generation picked back up following repowering.

Figure 1



Given the many factors that contribute to the level of CO₂ emitted over a time period, it is very difficult to identify a single contributing factor to substantiate an emissions trend. Load levels, energy market prices and dynamics, hydroelectric resource levels, renewable penetration, energy efficiency and demand side management additions, participation in the energy imbalance market (EIM), and changes in PacifiCorp's resource fleet all contribute to the level of energy demand and associated emissions. However, a number of correlations may be drawn about PacifiCorp's estimated emissions in Figure 1:

- Hydro conditions can have a substantial impact on annual emissions:
 - The 2011 and 2012 hydro seasons began earlier and lasted significantly longer than in years prior to 2011, resulting in significant displacement of fossil-fueled energy over those years.
 - 2013 and 2015 had the lowest hydro generation over the 10-year period. Consequently, emissions from unknown resources in those years were two of the highest.
 - 2018 had a lower hydro year due to lower generation.
- In 2008, PacifiCorp acquired the 520-megawatt (MW) natural gas Chehalis Generating Facility, which could have contributed to the increase in emissions from known resources.
- Lower emissions in 2007 are likely a result of Marengo I and Leaning Juniper wind facilities coming online.
- PacifiCorp added over 1,800 MW of renewable capacity to its system during the period of 2006-2015.
- PacifiCorp has seen a decrease in its coal operations since 2016 and emissions from owned coal resources has continued at a lower level of emissions since then.
- The uptick in 2018 emissions is likely attributable, in large part, to lower hydro generation and an increase, over 2017, in the net system power mix emissions factor calculated by the Department of Commerce.
- A relatively large increase in emissions in 2019 was likely due to lower wind generation from wind facilities being offline for repowering. This trend was reversed in 2020 with wind facilities coming back online with increased generation from the repowering effort. Emissions in 2020 may have also been influenced by a 2.2 percent decrease in load from COVID 19.

Changes from Prior Years

PacifiCorp's 2020 Washington-allocated emissions decreased by 10.4 percent compared to 2019 and 1.7 percent compared to 2018 Washington-allocated emissions. This net decrease over time is from higher wind generation in 2020 from repowered wind facilities as well as 2.2 percent decrease in Washington load.

Appendix – Metrics Calculation Methodology, Information Sources and Formula Explanations

This appendix identifies the calculation methodologies, data sources and formulas used to compile the Energy and Emissions Intensity Summaries for 2011 through 2020. The metrics calculated in this report are consistent with the mutually agreed upon methodologies identified in the workshops in Docket UE-131723, WAC 480-109-300 effective January 28, 2021 and 173-444 WAC GHG calculation methodology

Table 1 – Summary Energy and Emissions Intensity Report – 2020

| Summary Energy and Emissions Intensity Report - 2020 | | | | | |
|--|-----------------------------|-----------------------|---|----------------------------|-------------------------------|
| Utility : | PacifiCorp | | | | |
| Reporting for year : | 2020 | MWh per Capita | | | |
| Population Served : | 308,836 | 14.43 | | | |
| <i>Energy Intensity Metrics</i> | | | | | |
| | MWh at Meter | MWh Proportion | Customer Count | MWh per Customer | |
| Residential Customers | 1,730,909 | 38.8% | 111,293 | 15.55 | |
| Commercial Customers | 1,647,356 | 37.0% | 16,519 | 99.7 | |
| Industrial Customers | 878,179 | 19.7% | 473 | 1,856.6 | |
| Irrigation | 196,491 | 4.4% | 5,039 | 39.0 | |
| Public Street & Highway Lighting | 4,847 | 0.1% | 218 | 22.2 | |
| Total Load Served | 4,457,782 | | 133,542 | | |
| <i>Emissions Intensity Metrics</i> | | | | | |
| | Busbar MWh | Percent of Total Load | Short Tons CO ₂ e | | Metric Tons CO ₂ e |
| Known Resources Serving WA | 3,519,548 | 79.6% | 2,463,076 | | 2,234,465 |
| Unknown Resources Serving WA | 901,501 | 20.4% | 434,262 | % of 1990 CO ₂ | 393,956 |
| TOTAL GHG Content | 2020 Tons CO ₂ e | | 2,897,337 | 120.77% | 2,628,421 |
| | | | 1990 Short Tons CO ₂ | 2,399,078 | |
| | | | <i>See UTC Docket UE-131723, General Order R-581, Page 7, Paragraph 19.</i> | | |
| | | | | 1990 | |
| | | | | Short Tons CO ₂ | |
| | | Avista | | 1,131,957 | |
| | | Pacific Power | | 2,399,078 | |
| | | Puget Sound Energy | | 6,946,064 | |

I. Energy Intensity Metrics

A. MWh per Capita

WAC 480-109-300(3)(c) requires a utility to annually report the number of MWh used per capita. The MWh per capita metric estimates the amount of energy consumed annually by each person in PacifiCorp's Washington service area, using the following calculation:

$$\frac{\textit{Total Annual Washington Retail Load}}{\textit{Annual Population Served}}$$

A.1 Total Annual Washington Retail Load

Annual Washington retail load is derived from the company's Federal Energy Regulatory Commission (FERC) Form 1 filings. Load data is not available by customer class, therefore Washington load by customer class was determined using the proportion of retail sales by customer class. The small difference between load and generation is a function of the allocation factors, which are applied based on the West Control Area (WCA). The total load served is metered data and the busbar MWh are allocated based on both load/energy and capacity.

A.2 Population Served

During the UE-131723 workshops, the United States Census Bureau *American Communities Survey* (ACS) was identified as the preferred data source for calculating population served.

For each year between 2011 and 2020, Census block-level ACS data was used to calculate an average household size.⁵ The average household size was then applied to the number of residential customers by county, in order to determine a total population served for each year. Method 1 uses the following formula:

$$\textit{County Average Household Size} \times \textit{Washington Residential Customers Served}$$

B. MWh per Customer

WAC 480-109-300(3)(a) and (b) require a utility to annually report the average number of MWh per residential customer and per commercial customer. The average MWh per customer is determined by dividing Washington's annual retail load (MWh at meter) serving a customer class by the number of customers in the same class, in any given year.

⁵ United States Census Bureau ACS data for reporting years 2010 through 2019 were derived from *Detailed Tables and Block Group Data* accessed from <https://www.census.gov/geo/maps-data/data/tiger-data.html>. Per the Census Bureau's data release schedule, 2020 information is not available as of the date of this report. The household size for 2020 was estimated using 2019 average household size multiplied by 2020 Washington customer counts.

Total Annual Retail Load Serving the Customer Class
Annual Customers in Class

Annual retail load (MWh sold) and number of customers are derived from PacifiCorp's annual FERC Form 1 filings.

II. Emissions Intensity Metrics

WAC 480-109-300(3)(d) requires utilities to report annual CO₂ equivalent (CO₂e) emissions (millions of metric tons).

A. Annual CO₂e Emissions

The company's total annual emissions are calculated by aggregating the emissions from all generation allocated to serving Washington customers. The generation identified to have served Washington is consistent with the Commission-approved WCA, which isolates costs associated with the assets, purchases, and sales in the west control area.

To calculate total annual emissions, the company first assigned an annual emission factor to each generation source following rule, Chapter 173-444 WAC, adopted by the Department of Ecology in January 2021. The emission factor was then applied to Washington's allocated share (MWh) of the resource's annual output. Annual company emissions is the sum of all plant emissions and emissions from unknown resources.

Identified below are the steps taken to calculate total carbon emissions per annum.

- (a) Calculation Washington Allocated megawatt hour generation. Washington's share of WCA generation (MWh) of each resource is based on the state's control area generation west (CAGW) allocation factor, as shown below. Megawatts are consistent with generation reported on FERC Form 1 for each specified resource and netted for specified sales.

$$\text{Washington Allocated MWh} = (\text{Annual MWh} - \text{EIM Specified Sales}) \times \text{CAGW Allocation Factor (\%)}$$

- (b) Assign each resource an annual emission factor (pounds of CO₂e per MWh).

Unknown Resources

Consistent with WAC 173-444-040(4), generation from unknown resources were assigned 0.437 metric tons CO₂e/MW of electricity converted to 963 pounds of CO₂e/MWh.

Known Resources

Non-carbon-producing resources as defined by WAC 173-444-020(23) such as wind, hydro, geothermal and biogas were assigned an emission factor of zero.

Carbon emitting resources such as coal and natural gas were assigned an emissions factor following WAC 173-444-040(2) outlined methodology.

- 1) Environmental Protection Agency (EPA) plant GHG emissions - Emissions for each resource were calculated by using emissions and heat rate information published by the EPA in its *EPA Air Markets Program*.⁶ Emissions for coal and gas units from N₂O or CH₄ were calculated and converted to CO₂e following 40 C.F.R. Part 98 methodology, then combined with direct CO₂ emissions to derive total CO₂e emissions for each plant.
- 2) Plant Net Electric Generation - Plant net electric generation was referenced from the EIA's form EIA-923 program.
- 3) Cogeneration correction factor – Accounts for nonelectric heat used at the power plant calculated from EIA-923

$$\frac{\text{Plant Emission Factor} \left(\frac{\text{lb}}{\text{MWh}} \right)}{\text{Plant net electric generation (MWh)}} = \frac{(\text{EPA plant GHG (short tons)} \times \text{cogeneration correction factor}) * 2000 \left(\frac{\text{lb}}{\text{short tons}} \right)}{\text{Plant net electric generation (MWh)}}$$

- 4) Transmission Losses were added to carbon emitting resource generation calculated under section (a) above consistent with WAC 480-109-300 (5). The energy transmission loss factor is 3.503 percent as determined by PacifiCorp's Washington 2018 Electric System Loss Study dated June 2020.

$$\frac{\text{Plant Emission (ST)} = (\text{WA Allocated MWh}) \times (1 + \text{Trans. Loss Factor}) * \text{Plan Emission Factor} \left(\frac{\text{lb}}{\text{MWh}} \right)}{2000 \text{ Short Tons per lb.}}$$

B. Ratio of Annual CO₂ Emissions to 1990 CO₂ Emissions

WAC 480-109-300(3)(e) requires utilities to report a comparison of annual million short tons to 1990 emissions. This metric is a simple percentage calculation of each reporting year's total calculated emissions as described above, relative to the utility's estimated carbon emissions in 1990: This ratio is presented in Table 1.

$$\frac{\text{Annual Short Tons of CO}_2 \text{ Emitted}}{1990 \text{ Short Tons of CO}_2 \text{ Emitted}}$$

The 1990 carbon emission values for each utility were developed in UE-131723 workgroups. The 1990 values were calculated by the Washington Department of Commerce following its methodology applied to Washington State Electric Utility Fuel Mix Disclosure Report. This methodology should be compared to the Department of Ecology adopted rules in WAC 173-

⁶ The EPA's *Air Markets Program* Data contains current and historical data collected as part of the EPA's emissions trading programs. Accessed from: <https://ampd.epa.gov/ampd/>.

444 to confirm appropriate comparison between the years to determine if both methodologies cover equivalent emissions (transmission losses, a consistent unspecified factor, non-CO₂ emissions, etc.).