PACIFIC POWER
A DIVISION OF PACIFICORP

PacifiCorp d/b/a Pacific Power & Light Company

Washington Energy and Emissions Intensity Metrics 2022 Report

June 1, 2023

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 WAC 480-109-300, pertaining to the reporting of energy and emissions intensity metrics. On May 7, 2019, Washington Legislature passed the Clean Energy Transformation Act (CETA), which commits Washington to an electricity supply free of greenhouse gas 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 RCW 19.405.070 and 19.405.020(22), by defining the method for calculation of the greenhouse gas 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 CO_2e emissions; and*
> *(e) Comparison of annual million short tons of CO_2e emissions to 1990 emissions.*

PacifiCorp d/b/a Pacific Power & Light Company (PacifiCorp or Company) submits this 2021 Energy and Emissions Intensity Report (Emissions Report) to the Commission in accordance with reporting requirements established as part of the Energy Independence Act 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 equivalent emissions associated with serving PacifiCorp's Washington customers between 2013 and 2022, compared to an estimate of the company's 1990 carbon dioxide emissions. PacifiCorp's 1990 carbon dioxide 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 historical Washington-allocated emissions from 2013 to 2022 to be between 3.2 and 2.9 million metric tons of carbon dioxide equivalent annually, or between 122 and 135 percent of 1990 emissions[1].

Table 1

Year	Total Annual CO_2e Emissions (Short Tons)	Total Annual CO_2e Emissions (Metric Tons)	Ratio of Annual CO_2 Emissions to 1990 Emissions
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%
2021	2,984,983	2,707,932	124.42%
2022	2,932,065	2,659,926	122.22%

[1] The ratio of Annual Emissions to 1990 Emissions is likely overstated because the 1990 emissions did not include CO_2 equivalent measurements of N_2O and CH_4, 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 megawatt-hour 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)
2013	17.32	303,352	99.10	15.07
2014	16.64	302,069	108.42	15.15
2015	15.91	300,450	111.11	15.16
2016	16.15	301,905	102.30	14.68
2017	17.21	303,749	106.02	15.18
2018	15.33	296,875	107.02	14.69
2019	16.52	305,829	104.00	14.91
2020	15.55	308,836	99.72	14.43
2021	15.93	307,849	100.74	14.91
2022	17.06	313,990	100.36	14.80
10-Year Average	**16.36**	**304,490**	**103.88**	**14.90**

PacifiCorp's Washington population had steady year-over-year growth between 2012 and 2022, except for slight reduction in 2021 from 2020. In 2022 the average MWh per residential customer increased as did the population, with residential customers increasing 2.5% from 2021.

[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 Sources[3]

The table below shows the annual Washington-allocated energy, emissions, and percentage of load served from unknown generation sources.

Table 3

Unknown Resource - Annual Metrics[3]			
Year	**MWh**	**CO_2e Metric Tons Emissions**	**Percentage of Load Served**
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%
2021	824,812	360,443	17.90%
2022	987,740	431,642	21.04%

[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.

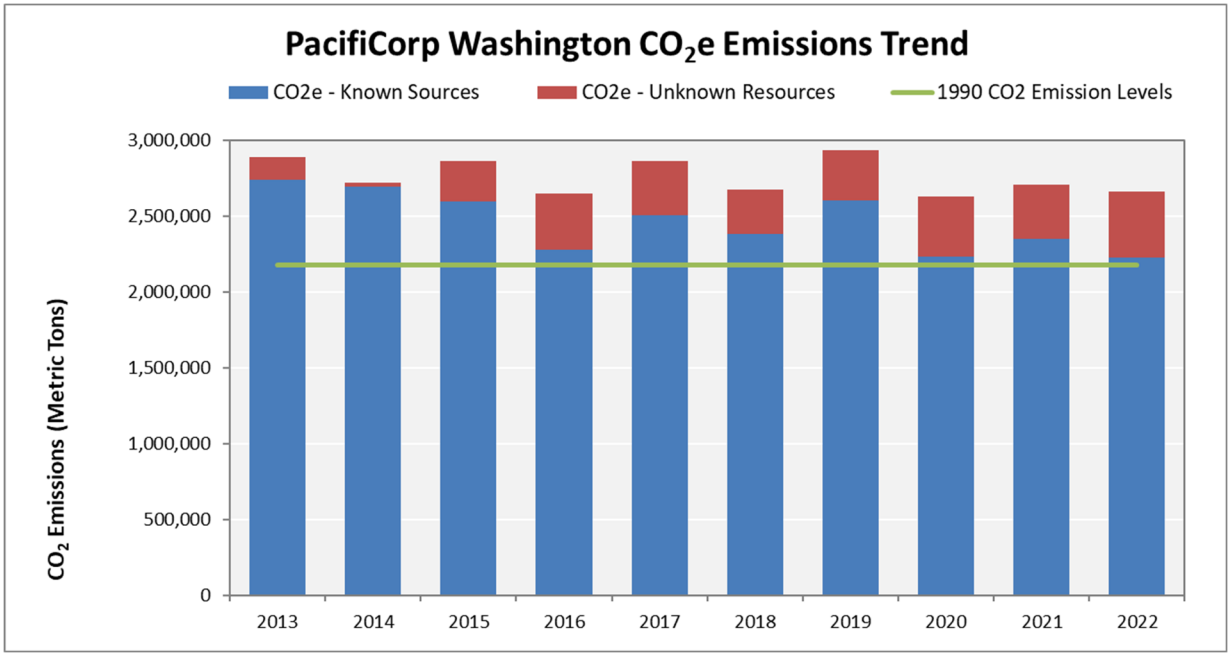
Carbon Emissions Trend Analysis

There are multiple factors that generally impact a utility's carbon dioxide 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 carbon dioxide equivalent emissions between 20132 and 2022. The quantity of total emissions associated with Washington over this period is generally between 2.5 and 2.9 million metric tons of carbon dioxide equivalent annually. As the figure shows, emissions fluctuate up and down between 2013 and 2022. 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. 2021 was only slightly higher than 2020 corresponding to load growth, and 2022 total emissions were in line with 2021.

Figure 1



Given the many factors that contribute to the level of emissions over time, it is very difficult to identify a single contributing factor to substantiate emissions trends. 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, several correlations may be drawn about PacifiCorp's estimated emissions in Figure 1:

- Hydro conditions can have a substantial impact on annual emissions:
    - 2013 and 2015 had the lowest hydro generation over the ten-year period. Consequently, emissions from unknown resources in those years were two of the highest, as the Company relied more heavily on the market to meet demand.
    - 2018 had a lower hydro year due to lower generation.
    - In 2021 hydro generation decreased and was replaced with added solar, geothermal, and wind.
- In 2008, PacifiCorp acquired the 520-megawatt natural gas Chehalis Generating Facility, which could have contributed to the increase in emissions from known resources.
- PacifiCorp added over 1,800 megawatts 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.
- 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 decline in 2020 may have also been influenced by a 2.2 percent decrease in load attributed to the COVID 19 pandemic.

.

Changes from Prior Years

PacifiCorp's 2022 Washington-allocated emissions decreased by 1.6% compared to 2021, while Washington load showed a1.2% increase.

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 2013 through 2022. 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 WAC 173-444 GHG calculation methodology

Table 1 – Summary Energy and Emissions Intensity Report – 2022

Summary Energy and Emissions Intensity Report - 2022

Utility :	PacifiCorp	
Reporting for year :	2022	**MWh per Capita**
Population Served :	**313,990**	**14.80**

Energy Intensity Metrics

	MWh at Meter	MWh Proportion	Customer Count	MWh per Customer
Residential Customers	1,929,861	41.5%	113,137	17.06
Commercial Customers	1,694,424	36.5%	16,883	100.4
Industrial Customers	840,837	18.1%	469	1,793.5
Irrigation	177,033	3.8%	4,996	35.4
Public Street & Highway Lighting	4,262	0.1%	222	19.2
Total Load Served	4,646,416		135,706	

Emissions Intensity Metrics

	Busbar MWh	Percent of Total Load	**Metric Tons CO_2e**	
Known Resources Serving WA	3,706,445	79.0%		
EPA Methodology			2,228,283	
EIA Methodology				
Unknown Resources Serving WA	**987,740**	**21.0%**	**431,642**	**% of 1990 CO_2**
TOTAL GHG Content	2022 Tons CO_2e		**2,659,926**	**122.22%**

1990 Short Tons CO_2	2,176,429

See UTC Docket UE-131723, General Order R-581, Page 7, Paragraph 19.

	1990 Metric Tons CO_2	Short Tons CO_2
Avista	*1,026,905*	*1,131,957*
Pacific Power	*2,176,429*	*2,399,078*
Puget Sound Energy	*6,301,428*	*6,946,064*

I. Energy Intensity Metrics

A. Megawatt-hours (MWh) per Capita

WAC 480-109-300(3)(c) requires a utility to annually report the number of megawatt-hours 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:

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

A.1 Total Annual Washington Retail Load

Annual Washington retail load is derived from the company's 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 current cost allocation methodology. 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 Docket 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 2013 and 2022, Census block-level ACS data was used to calculate an average household size.[4] The average household size was then applied to the number of residential customers by county, to determine a total population served for each year. Method 1 uses the following formula:

$$County\ Average\ Household\ Size\ \ x\ \ Washington\ Residential\ Customers\ Served$$

B. Megawatt-hour per Customer

WAC 480-109-300(3)(a) and (b) require a utility to annually report the "average number of megawatt-hours per residential customer and per commercial customer." The average MWhs 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.

$$\frac{Total\ Annual\ Retail\ Load\ Serving\ the\ Customer\ Class}{Annual\ Customers\ in\ Class}$$

[4] United States Census Bureau *American Communities Survey* (ACS) data for reporting years 2011 through 2022 were derived from *Detailed Tables* and *Block Group Data* accessed from https://www.census.gov/geo/maps-data/data/tiger-data.html.

Annual retail load (MWhs 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 CO_2e emissions (millions of metric tons).

A. Annual CO_2e Emissions

The company's total annual emissions are calculated by aggregating the emissions from all generators allocated to serving Washington customers. The generation identified to have served Washington is consistent with the Commission-approved cost allocation methodology effective during the year of reporting. Through 2020, Washington allocation were based on Commission-approved Western Control Area (WCA) methodology, which isolates costs associated with the assets, purchases and sales in the west control area. Starting in 2021, the cost allocation methodology transitioned to Washington Interjurisdictional Allocation Methodology (WIJAM) which includes renewable generation across PacifiCorp system but continues to attribute only western control area thermal generation.

To calculate total annual emissions, the company first assigned an annual emission factor to each generation source according to WAC 173-444, adopted by Department of Ecology in January 2021. The emission factor was then applied to Washington's allocated share (MWhs) 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 for Washington Allocated megawatt hour generation. Washington's share of generation (MWh) of each resource is based on the state's cost allocation methodology (WIJAM) and control area generation allocation factors consistent with Net Power Cost application. Megawatts are consistent with generation reported on FERC Form 1.

Washington Allocated MWh = Annual MWh x CAGW Allocation Factor (%)

(b) Assign each resource an annual emission factor (pounds of CO2 equivalent per megawatt hour).

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) EPA plant GHG emissions - Emissions for each resource were calculated by using emissions and heat rate information published by Environmental Protection Agency (EPA) in its EPA *Air Markets Program*.[5] Emissions for coal and gas units from N_2O or CH4 were calculated and converted to CO2 equivalent 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 Energy Information Administration's (EIA) form EIA-923 program.
3) Cogeneration correction factor – Accounts for nonelectric heat used at the power plant calculated from EIA-923
4) WAC 173-444-040(2)(b) allows the use of the most recent five year rolling average published emissions values.

$$Plant\ Emission\ Factor\left(\frac{MT}{MWh}\right) = \frac{(EPA\ plant\ GHG\ (metric\ tons)\ x\ cogeneration\ correction\ factor)}{Plant\ net\ electric\ generation\ (MWh)}$$

5) 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% as determined by PacifiCorp Washington 2018 Electric System Loss Study dated June 2020.

$$Plant\ Emission\ (MT) = (WA\ Allocated\ MWh\ )x\ (1 + Trans.Loss\ Factor) * Plan\ Emission\ Factor\ \left(\frac{MT}{MWh}\right)$$

B. Ratio of Annual CO_2 Emissions to 1990 CO_2 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.

$$\frac{Annual\ Short\ Tons\ of\ CO_2\ Emitted}{1990\ Short\ Tons\ of\ CO_2\ Emitted}$$

The 1990 carbon emission values for each utility were developed in Docket UE-131723 workgroups. 1990 values were calculated by Washington Department of Commerce following

[5] EPA's *Air Markets Program* Data (AMPD) contains current and historical data collected as part of the EPA's emissions trading programs. Accessed from: https://ampd.epa.gov/ampd/.

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 173-444 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.).