



*Emissions Intensity Metrics*

	Busbar MWh	Percent of Total Load	Short Tons CO <sub>2</sub>	
Known Resources Serving WA	6,795,366	101.2%	1,909,523	
Unknown Resources Serving WA	(82,313)	-1.2%	(125,053)	% of 1990 CO <sub>2</sub>
	2017 Tons CO <sub>2</sub>		1,784,470	157.6%

1990 Short Tons CO<sub>2</sub> 1,131,957

**II. PRIOR 10-YEAR ANNUAL METRICS**

WAC 480-109-300 requires reporting of ten years of annual metrics for all generating resources serving Washington customers as part of the annual Report. Required data includes:

- Average MWh per residential customer;
- Average MWh per commercial customer;
- MWh per capita;
- Annual CO<sub>2</sub> emissions in short tons;
- Ratios of annual CO<sub>2</sub> emissions to CO<sub>2</sub> emissions in 1990; and
- Subtotal metrics – Energy and emissions from unknown generation sources
  - Annual CO<sub>2</sub> emissions in short tons from unknown generation sources
  - Annual MWh delivered to retail customers from unknown generation sources
  - Percentage of load served by unknown generation source.

The first and second annual metrics cover the average MWh per residential and commercial customers over the past 10 years. The results are shown in Table 2 below. The annual values for both residential and commercial customers remain reasonably consistent from year-to-year, with an encouraging downward trend in commercial use per customer over the last three years. The trends are discussed in section III of this Report.

**Table 2: Average MWh per Residential and Commercial Customer 2008 – 2017**

	<b>Average MWh per Residential Customer</b>	<b>Average MWh per Commercial Customer</b>
<b>2008</b>	11.9	94.3
<b>2009</b>	12.2	94.3
<b>2010</b>	11.7	92.6
<b>2011</b>	12.0	92.6
<b>2012</b>	11.6	92.8
<b>2013</b>	12.0	92.0
<b>2014</b>	11.6	92.3
<b>2015</b>	11.3	91.9
<b>2016</b>	10.7	88.2
<b>2017</b>	11.7	89.0

The third annual metric covers the MWh per capita over the past 10 years. The results are shown in Table 3 and are discussed in Section III, as well as shown in Chart 2. The trend shows a general decrease in MWh per capita.

**Table 3: MWh per Capita 2008 – 2017**

	<b>MWh per Capita</b>
<b>2008</b>	10.80
<b>2009</b>	10.71
<b>2010</b>	10.75
<b>2011</b>	10.93
<b>2012</b>	10.68
<b>2013</b>	10.95
<b>2014</b>	10.84
<b>2015</b>	10.85
<b>2016</b>	10.26
<b>2017</b>	10.64

The last two annual metrics show the amount of Avista’s annual CO<sub>2</sub> emissions from 2008 through 2017 compared to Avista’s 1990 CO<sub>2</sub> emissions and as a percentage of the 1990 CO<sub>2</sub> emissions. Table 4 shows the annual emissions results and comparisons to 1990 levels.

**Table 4: Annual CO<sub>2</sub> Emissions in Short Tons 1990 and 2008 – 2017**

	<b>Annual Emissions</b>	<b>1990 Emissions</b>	<b>% of 1990 CO<sub>2</sub></b>
<b>2008</b>	2,227,850	1,131,957	197%
<b>2009</b>	2,152,998	1,131,957	190%
<b>2010</b>	2,405,434	1,131,957	213%
<b>2011</b>	1,706,476	1,131,957	151%
<b>2012</b>	1,943,987	1,131,957	172%
<b>2013</b>	2,054,319	1,131,957	181%
<b>2014</b>	1,978,299	1,131,957	175%
<b>2015</b>	1,761,888	1,131,957	156%
<b>2016</b>	1,677,885	1,131,957	148%
<b>2017</b>	1,784,470	1,131,957	158%

The calculations for energy and emissions for each year are included in the workpapers provided with this report. The workpapers for each year include the annual CO<sub>2</sub> emissions in short tons from unknown generation sources, the annual MWh delivered to retail customers from unknown generation sources, and a calculation of the percentage of load served by unknown generation sources. The adjustments made to the data for this Report are described below.

Known resources include all of Avista’s owned generation and contracts from known sources, such as purchases of a percentage of specified Mid-Columbia hydro projects and the power purchase agreement for the Lancaster combined cycle combustion turbine. The individual yearly spreadsheets identify the known resources and type of resource supplying the generation. Emissions from the EPA Acid Rain Report were used where available and the emissions from the World Resources Institute (WRI) protocol were used for known thermal sources that are not part of the Acid Rain Program as in previous reports. Applicable Avista owned or controlled plants in the Acid Rain Program include Colstrip, Coyote Springs 2, Lancaster and Rathdrum.

This Report treats the purchases and sales from the Bonneville Power Administration (BPA) as unknown resources and assigns the appropriate regional, or Avista emission factor based

on net sales per year. This change from the Company’s prior EEI reports was done at the request of Commission Staff to make the reports consistent across the utilities. Resources specifically assigned to serve Idaho load were not included in the emissions calculations. Total sales to non-Avista customers were netted from the emissions calculation in the unknown resources section of the workpapers. The busbar MWh and short tons of CO<sub>2</sub> of the Energy and Emissions Annual Report spreadsheets were multiplied by 65 percent to only show the Washington share of customers.

This Report uses the net-by-counterparty approach for unknown resources that applies the Department of Commerce fuel mix emissions intensity factor for transaction partners that the Company is a net purchaser with, and applies the fleet-wide emission intensity factor for transaction partners that the Company is a net seller with. Please refer to Table 5 for the Avista and Commerce pounds of CO<sub>2</sub>/MWh emission factor numbers for 2008 through 2017.

**Table 5: Commerce and Avista Emissions Factors (Pounds CO<sub>2</sub> per MWh)**

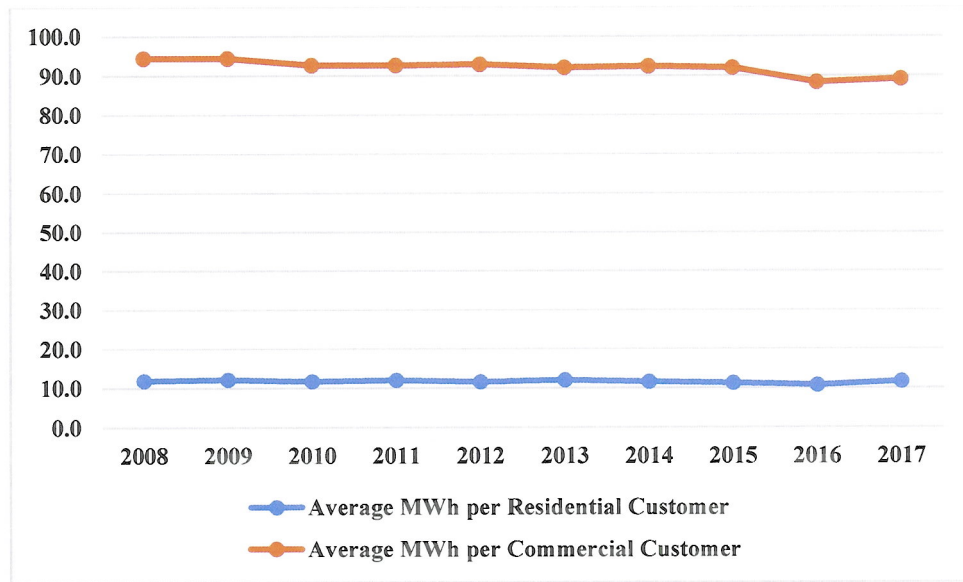
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Avista</b>	631	531	647	492	564	553	548	635	569	562
<b>Commerce</b>	1,024	1,119	1,192	908	903	1,132	1,014	1,074	895	1,004

### III. TREND ANALYSIS NARRATIVE AND GRAPHICS

The average MWh use per customer has experienced fairly minor variation from year-to-year, which started decreasing on the residential side in 2014. Commercial customers exhibit gradual decreases. Please refer to Chart 1 for the average use per commercial and residential customers. Avista’s own energy efficiency efforts combined with regional efforts, improved energy efficiency technologies and more stringent codes and standards are expected to be driving

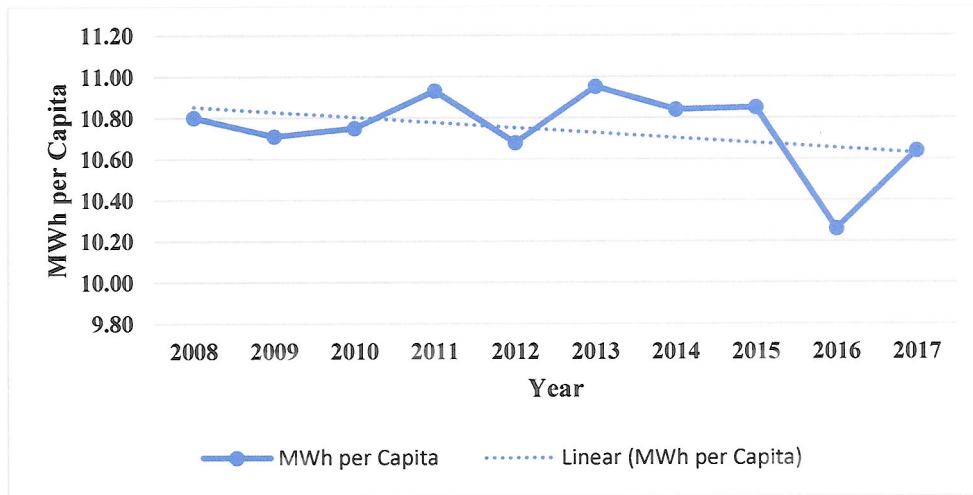
these decreases. The scope of commercial customers is wide enough to make detailed analysis difficult, if not impossible to identify any specific causes for the fluctuation. This analysis is based on actual load data and is not normalized for weather.

**Chart 1: Average MWh per Commercial and Residential Customers 2007 – 2017**



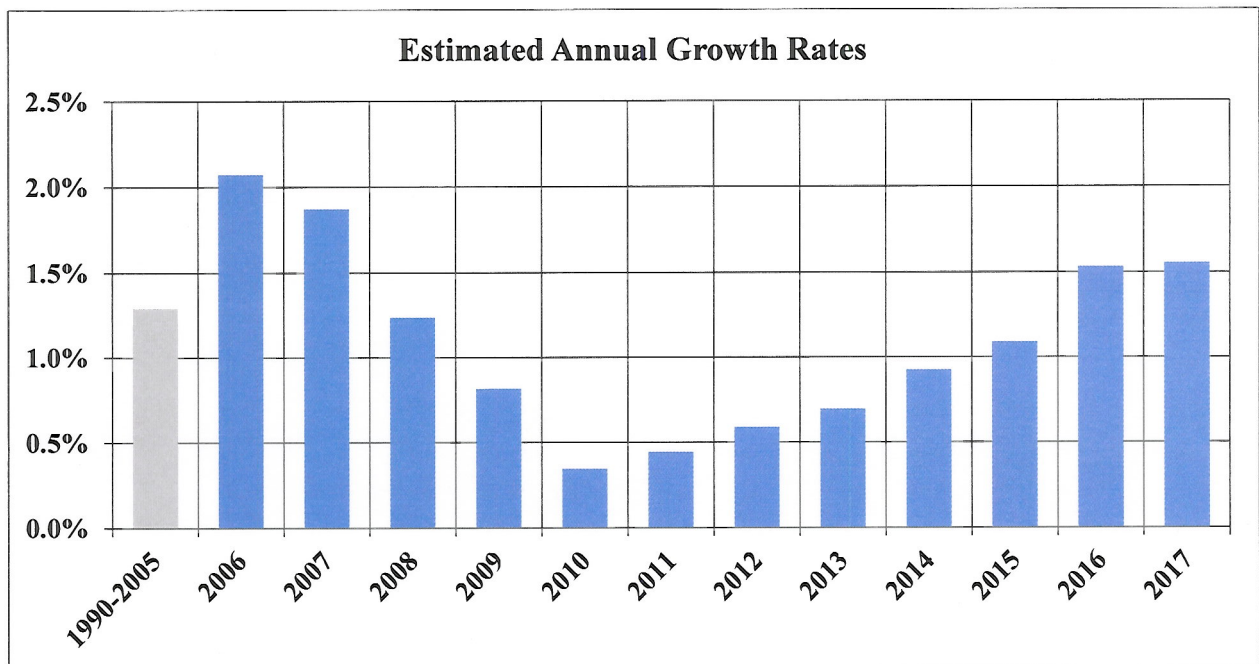
The next metric covers the amount of MWh/capita from 2008 through 2017. The specifics underlying the population calculation for Avista’s service territory are in Appendix B – Population Methodology. The trend line shows a pronounced decreasing MWh per capita trend, with a significant decrease from 2015 to 2016 pulling the trend downwards as shown in Chart 2. This is a short enough trend to make it difficult, if not impossible, to determine the ultimate root cause but the downward trend is encouraging considering the effort towards energy efficiency programs.

**Chart 2: MWh per Capita 2007 – 2017**



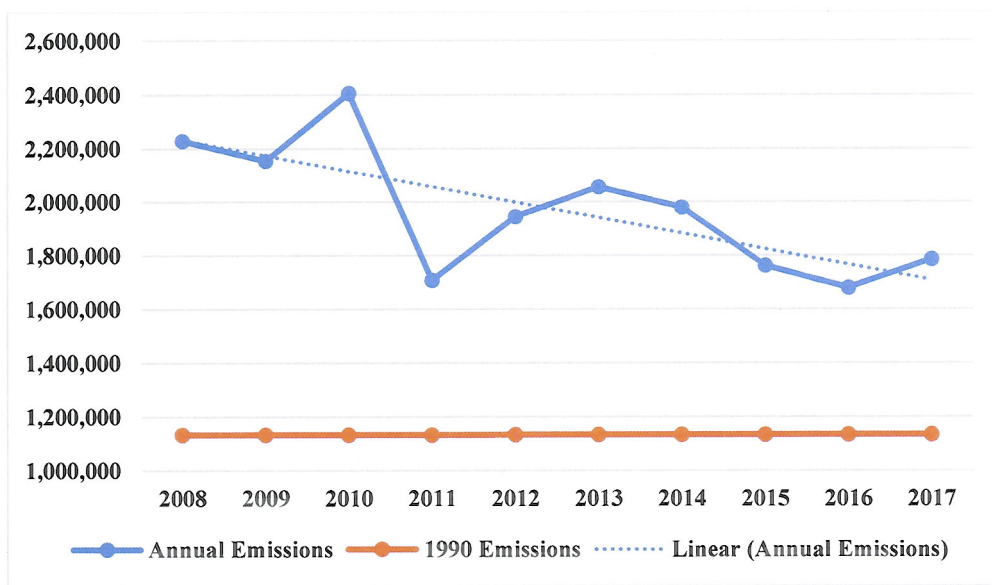
As shown in Chart 3 below, the estimated annual population growth is also trending up towards previous levels. This upward trend in population growth, combined with lower average megawatt hours per capita, indicates the benefits of energy efficiency programs, as well as better building codes and standards.

**Chart 3: Estimated Annual Population Growth Rates**



The last two metrics include the annual CO<sub>2</sub> emissions in short tons from 2008 through 2017 and a comparison of those emissions with the 1990 emissions data. Chart 4 shows the emissions data for this Report. Emissions increased from 2007 through 2010, with another increase from 2012 to 2013 followed by an overall downward trend. There is an expectation that emissions will decrease over time as a higher percentage of zero emitting resources are added to the regional mix under the EIA and as regional coal plants retire. This trend is expected to accelerate with the projected addition of more renewable generation under expected future policies to promote the development of additional zero emitting resources.

**Chart 4: Annual CO<sub>2</sub> Emissions in Short Tons and 2008 – 2017**

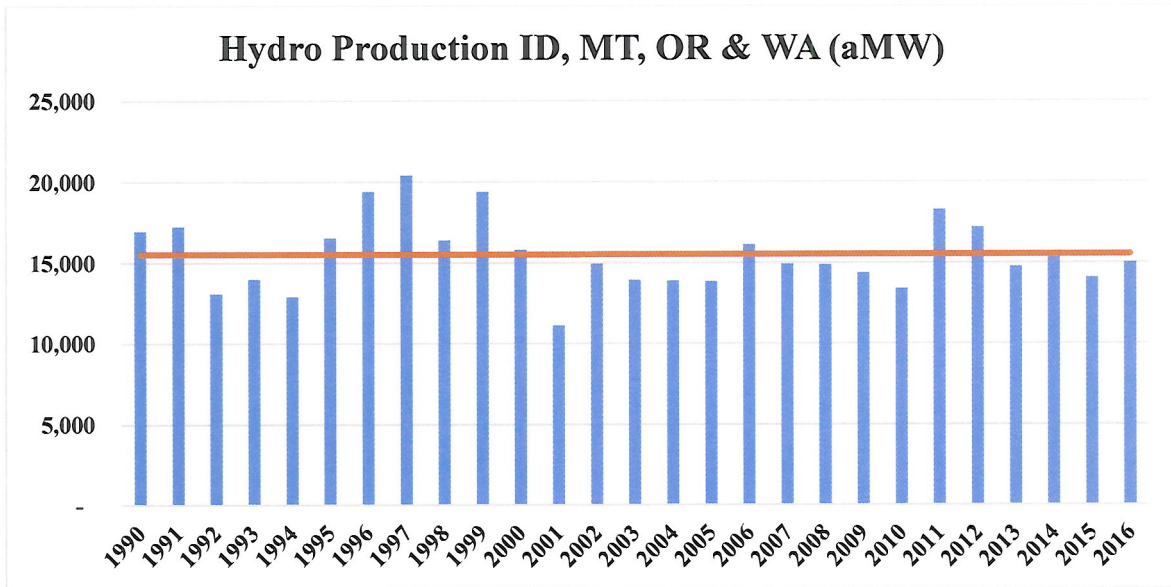


However, CO<sub>2</sub> emissions from year-to-year may still increase in any given year because the regional generation system is based on hydro generation. The addition of any formal CO<sub>2</sub> emissions cost will drive future emissions down. Also, regional emissions will be affected by the variable amount of hydroelectric and wind generation in any given year. Charts 5 and 6 show

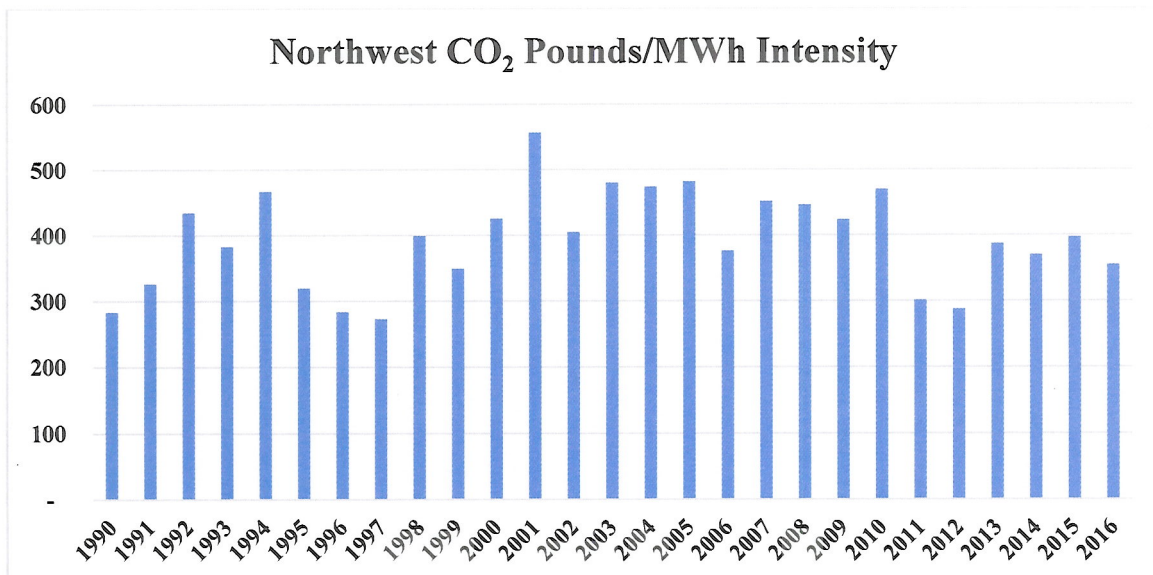


regional variability in hydro generation and the Northwest CO<sub>2</sub> emissions intensity, which tracks hydro production.

**Chart 5: Regional Hydro Variability**



**Chart 6: Northwest CO<sub>2</sub> Emissions Intensity**



## V. APPENDICES

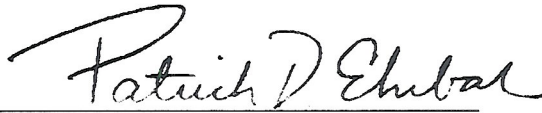
The following appendices provide details about Avista's 2017 Energy and Emissions Intensity Report. The spreadsheets with the raw data are included in the workpapers provided for this filing.

**Appendix A:** Summary Energy and Emissions Intensity Reports for 2008 – 2017

**Appendix B:** Population Methodology

RESPECTFULLY SUBMITTED this 31<sup>st</sup> day of May 2018.

AVISTA CORPORATION

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