

**PUBLIC SERVICE COMMISSION
OF UTAH**

Docket No. 13-035-184

Exhibit SC___DRM-4

Emissions Estimates

Emissions Estimates

The choice of carbon intensity value has important implications for assessing greenhouse gas (GHG) impacts of rate design. A simple cycle combustion turbine (CT) was used in the E3 study and is the marginal electricity generator throughout this testimony. In this testimony we employed GHG intensity values that reflect consensus on GHG emissions displaced by clean energy installations such as those offered from NEM customers. The regional approach to emissions factors is justified in the life cycle analysis literature because electricity markets are regional, so attempts to apply emissions standards at the utility level are not always justified.

The EPA uses regional Emissions & Generation Resource Integrated Database (eGRID) data to estimate the GHG emissions displaced from clean energy installations.¹ The table below shows eGRID CO2 Emission Factors and Heat Rates by NERC Region and eGRID Subregion (2009 year data). The grid region selected is the WECC, and the subregion is NWPP.

Table C1. eGRID data used to estimate emissions reductions from NEM facilities.²

<i>Displaced electricity</i>	<i>heat rate</i>	<i>Emissions factor</i>
	<i>btu/kWh</i>	<i>lb/MWh</i>
WECC Northwest All Generation	4,505	819
WECC Northwest Fossil Average	9,651	1,793
WECC Northwest Non-baseload	7,580	1,405

To estimate the GHGs associated with increased electricity consumption, eGRID data was also used. However, the EPA uses a different emissions factor for electricity GHG inventories, than it does for displaced emissions. Since it was not clear when electricity consumption would increase, we used the annual output WECC Northwest NWPP emission factor. C2 below shows both the annual output and annual non-baseload output emissions factor used to model emission increases from increased electricity consumption in Utah.

Table C2. eGRID Utah Emissions Factors for WECC Northwest NWPP

<i>CO2 (lb/MWh)</i>	<i>CH4 (lb/GWh)</i>	<i>N2O (lb/GWh)</i>	
902.24	19.13	14.9	Annual output
1333.64	49.28	18.73	Annual non-baseload output

To convert eGRID emissions data into a single GHG metric, we relied on the IPCC 4th Assessment Report's Global Warming Potential. These Global Warming Potentials are listed in Table C3.

¹ EPA. 2014. eGRID. <http://epa.gov/cleanenergy/energy-resources/egrid/index.html>

² EPA. 2012. Fuel and Carbon Dioxide Emissions Savings Calculation Methodology for Combined Heat and Power Systems. http://www.epa.gov/chp/documents/fuel_and_co2_savings.pdf

Table C3. IPCC Global Warming Potentials Used to Estimate GHGs³

IPCC GWPs	
CO2	1
CH4	25
N2O	298

For criteria air pollutants sulfur oxides and nitrogen oxides, we present the emissions factors in Table 4 of the testimony. To estimate PM₁₀ displaced we used data from the Commission on Environmental Cooperation.⁴

Table C4. Particulate Matter Displacement estimate

No	Plant Name	Country	State /Province	Primary Fuel	Electricity Generation (MWh)	Emission Rate (kg/MW-h)	Total Emissions (t)
88	Hunter	United States	Utah	Coal	9,742,633.00	0.21	2,078.96
89	Huntington	United States	Utah	Coal	6,381,332.00	0.27	1,722.12
90	Bonanza	United States	Utah	Coal	3,716,271.00	0.16	590.27
91	Carbon West Valley Generation	United States	Utah	Coal	1,349,857.89	0.31	413.53
92	Project Carrant Creek	United States	Utah	Natural Gas	343,889.00	0.03	10.78
93	Creek	United States	Utah	Natural Gas	204,424.97	0.04	8.17
94	Gadsby Little Mountain	United States	Utah	Natural Gas	198,763.00	0.02	4.36
95	Mountain	United States	Utah	Natural Gas	94,666.94	0.04	4.11
96	Payson Primary Childrens Medical Center	United States	Utah	Natural Gas	1,690.89	1.16	1.96
97	Center	United States	Utah	Natural Gas	4,847.02	0.14	0.68
98	Whitehead	United States	Utah	Natural Gas	8,920.89	0.05	0.44
99	Heber City Bountiful	United States	Utah	Oil	13,196.86	0.02	0.33
100	City	United States	Utah	Natural Gas	4,674.84	0.04	0.19
101	Provo	United States	Utah	Natural Gas	1,962.91	0.02	0.04

³ IPCC. 2007. 4th Assessment Report. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

⁴ Commission for Environmental Cooperation. North American Power Plants. http://www2.cec.org/site/PPE/pm10emissions?page=1&order=field_plant_state_value&sort=desc