

Statement in support of the TAG approved carbon accounting for proposal EP141
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INTRODUCTION

The proposed amendments to the WSEC (EP141 and EM051) are developed around the use of a energy assessment that distinguishes between the various energy sources that would be used in the proposed building. This is a departure from the provisions of all previous Washington State energy codes dating back to the 1980s. In those codes, performance comparisons were made based on “site energy.” Only the actual energy content of the fuel s delivered to the site and used was considered. The conversion efficiency of the fuel was all that was adjusted to compare various systems. This approach was unique compared to all the other commercial energy codes in the country. The proposed amendments change this method of performance evaluation from site energy to carbon emissions. The effect of this change is to assess building energy performance based on the projected carbon emissions that would be the result of various fuels including the electric energy that serves the state and the proposed building.

The accounting for the carbon emissions for most fuel burned on site is straightforward. The amount of carbon emitted is merely the carbon content of the fuel itself and those properties are readily available from standard sources. The Department of Commerce (WSDOC) has been charged by the legislature to compile these emission rates and make them publicly available. The problem is that for electricity there are a variety of sources for our electrical systems that vary by utility, time of day and season throughout the year. The WSDOC assess the sources of all delivered electricity throughout the state using records provided by each utility. To make this assessment the WSDOC uses all the electricity delivered in the year, determines the carbon emissions from each generating source and combines this information to give an overall carbon emissions factor for the entire Washington State electric system. Because the abundance of hydroelectric power in our state, the carbon emissions rates of our current electric system is among the lowest in the country. Nevertheless, about a quarter of our electricity is generated by coal and gas which do have significant carbon emissions (especially coal generators).

To determine the carbon emissions rate of new buildings built under the 2019 WSEC we have to assume features of the future electric system that will be built in response to load growth, public policy and consumer preferences across the State. This is further complicated by the fact that decisions made elsewhere also have a substantial influence on the carbon emissions rate in our state. Those factors must also be considered. Finally, the new buildings may be a factor in developing future electric generating resources thus the impact of new generating resources located anywhere in the Western United States and Western Canada could have an influence on the carbon emissions of the electric system and thus the new commercial buildings in the State of Washington

ELECTRIC SUPPLY

Washington is part of the Western Energy Coordinating Council (WECC) which maintains the Western electric grid. Thus, resources throughout the western United States and Western Canada are available to support electric needs throughout the west. This source (our resource of last resort) has substantial coal and gas generating resources and much higher emissions rates than our state or even the Pacific Northwest region (PNW) as a whole. It is, however, used sparingly in our region but is a significant part of the electric energy supply in California and other western states on the WECC grid. In the future if the demand for electricity grows there will be no new hydro resource for us to exploit and new generation sources would be required. In that case the WECC would be the “marginal” generating resource. That is the last resource we call on if the demand expands beyond our resources.

The Northwest Power and Conservation Council (NPCC) is responsible for planning and forecasting for the entire PNW especially the Columbia river system managed by the BPA. In this capacity they have very sophisticated planning tools and simulations that allow an hour by hour estimate of the status of the grid and the electric energy supply. It is in that context that the NPCC released a report last spring (March 2018) that estimated the future carbon emissions of the entire western grid and the impact of that emission rates on the marginal resources for the PNW. The purpose of this NPCC analysis is to assess the baseline conditions for carbon emissions from the existing WECC grid. This is a planning document which, as a forecast of the base case conditions, is very useful. That said, the goals for carbon reduction throughout the west (especially PNW and California) suggest that this base case forecast is a “straw man” which is a challenge that utility and state policies are meant to address. Specifically, the programs to reduce the amount of high carbon sources and the demand for those sources will change the carbon emissions landscape at least in the electric industry. Any carbon reduction goal will require such changes.

In terms of resource acquisition PNW utilities spend almost \$500 million a year on their efficiency programs and over the next ten years this investment would deliver about 300 MWa annually. If this were a combustion turbine there would be no debate as to its validity in calculating the marginal emissions rate. In fact, over the last 40 years led by the NPCC, efficiency is treated as a primary resource and planned our generation plants (or lack of new generation) using this output as though it were a real resource. That has worked and the investment in efficiency has delivered 6000 MWa. This effort has resulted in a consistent pattern of utilities delivering electricity to their expanding economies with little or no load growth. Seattle, for example, has not seen incremental load growth for over 15 years as the city experienced one of the most explosive economic and demographic growth periods in the last half century. Tacoma, as another example, has been in the same position for about 20 years.

The analysis of the marginal emission rate is based in part on the behavior of the entire western electric grid. In effect this says that our regional accomplishments in reduced emissions are partially countered by an increase somewhere else as the dirty plants operate to serve other areas. This argument would be more impressive if it were not for the fact that California (the 800-pound gorilla in the western grid) is embarked on an efficiency and emissions control program that is at least as aggressive as the PNW. Indeed, the California utilities spend over \$2 billion a year on their efficiency and site renewables programs and have set zero as the CO₂ emissions as a goal for their electrical system over the next 20 years. We will soon run out of excuses for the high emission generation sources.

CARBON EMISSIONS TABLE

The carbon accounting developed and passed by the TAG for evaluating individual building performance under WSEC performance code (Section C407) is based on the assertion that the marginal generation source supplies only a fraction of the incremental electric energy required by a new commercial building. The NPCC produces a planning document every 5 years to be used by the regions electric utilities and regulators to assess the needs for new generating systems and other investments important to the long-term health of the region’s electric grid. In 2016 the 7th Power Plan was published. This plan projects that the efficiency programs in aggregate would supply about 90% of the new load growth in the region between 2016 and 2026.

The proposed table for calculating the appropriate emissions rate for electricity supplied to new commercial buildings the effort was to be very conservative. The table was generated using the assumption that the NPCC Power Plan underestimated the need for new combustion-based resources either constructed by the local utilities or by purchasing from the WECC grid. In spite of this record the

calculation and electric emissions rate assigned only two thirds of the load growth through 2026 to efficiency and related demand-side programs. The remaining one third is taken from the NPCC marginal emissions rate. The result is a calculation that projects a 20% *increase* in marginal emissions in the State of Washington by 2026. Even at that, the proposed emissions table is a significant reduction over the marginal rate computed in the NPCC report and advocated by the gas industry’s minority report. Table 1 includes the carbon emissions rates for various fuels

Table 1: Carbon Emissions Factors

Fuel Type	CO ₂ /mmBTU*	CO ₂ /kWh**
Diesel fuel and heating oil	161	0.55
Gasoline	157	0.54
Propane	139	0.47
Natural gas	117	0.40
Electricity (2026 Social cost of carbon, marginal)	205	0.70
Electricity (2026 Forecast, average)	161	0.55†
Electricity (2016 Actual, WSDOC)	135	0.46
Site Renewable	0	0.00

* mmBTU delivered to the site

**kWh equivalent delivered to the site

† TAG proposal

The impact of this calculation as it currently appears in the carbon emissions table passed by the TAG is that gas maintains an emissions advantage over electric resistance heating. More efficient electric technologies like heat pumps would generally have an advantage over direct combustion gas heating. This advantage is partially or wholly offset by the fact that the gas technologies are well established throughout the engineering community and are generally favored over electric heat pumps. With this emissions table many applications would still use gas for this reason. But in the long run the development and use of heat pumps as the center piece of reduced emissions across the building sector in Washington depends on the adoption of emerging technologies which capitalize on the three to one COP advantage of these emerging heat pumps (e.g. CO₂ heat pumps and heat pump water heaters).

In 2014 Governor Inslee issued an executive order (1404) requiring the SBCC to include the social cost of carbon as a part of its effort to update the Washington State Energy code. The use of social cost of carbon has a clear impact on the calculation of the NPCC. While it does not include any impact of energy efficiency it does result in cleaner and less carbon intense electric generation sources at the margin. When that effect is included the emission rate in the 2021 to 2031 period are essentially in the same range as the values in the proposed carbon table passed by the TAG. Even at the high end of those estimates the emissions rate assigned to electricity is only about 25% higher than the current proposal. Such an increase does allow enough leverage to accomplish the original goals of the current proposal.

The overall picture is that the State and the region are committed to a substantial reduction in CO₂ emissions (80% by 2050) this calculation is meant to support that reduction and to provide the incentives and insights needed to change design practices in the face of these goals. It is true that the assumptions used in the calculations are drawn from diverse sources, but it is also true that this represents a direct effort support the State’s emission goals.