To: Washington Utilities and Transportation Commission
From: Dan Jaffe

Re: Comments on Puget Sound Energy's 2013 Integrated Resource Plan. Docket # 120767
Date: 12 August, 2013

My name is Dan Jaffe and I am a professor of Science and Technology (Bothell campus) and Atmospheric Sciences (Seattle campus). I teach Chemistry, Air quality and Climate and do research on a variety of air quality issues including impacts and sources of CO_2, SOx, NOx, ozone, mercury, particulate matter and other pollutants. I have published more than 120 peer- reviewed articles in the scientific literature. My research has been funded by the National Science Foundation, NASA, EPA, NOAA and other agencies, and I have served on advisory panels for all of these agencies along with the US National Academy of Sciences.

The emissions from coal burning at the Colstrip power plant are the largest single source of CO_2, SO_2 and NOx in the four state PNW region (WA, OR, ID, MT). The substantial emissions of SO_2 and NOx have implications for acid rain and smog in the areas downwind of the power plant. I was curious to see if these large emissions could be detected from space. To this end, I examined data from the NASA Aura satellite, which measures atmospheric levels of NO_2 (nitrogen dioxide) from space. The figure below shows data from the OMI instrument onboard the Aura satellite for April 2008. The Aura NO_2 data clearly show the location of the Colstrip power plant, due to its substantial emissions of NOx. Other months show similar enhanced NO_2 in the vicinity of the Colstrip plant. These data are from the NASA Giovanni website: http://disc.sci.gsfc.nasa.gov/giovanni

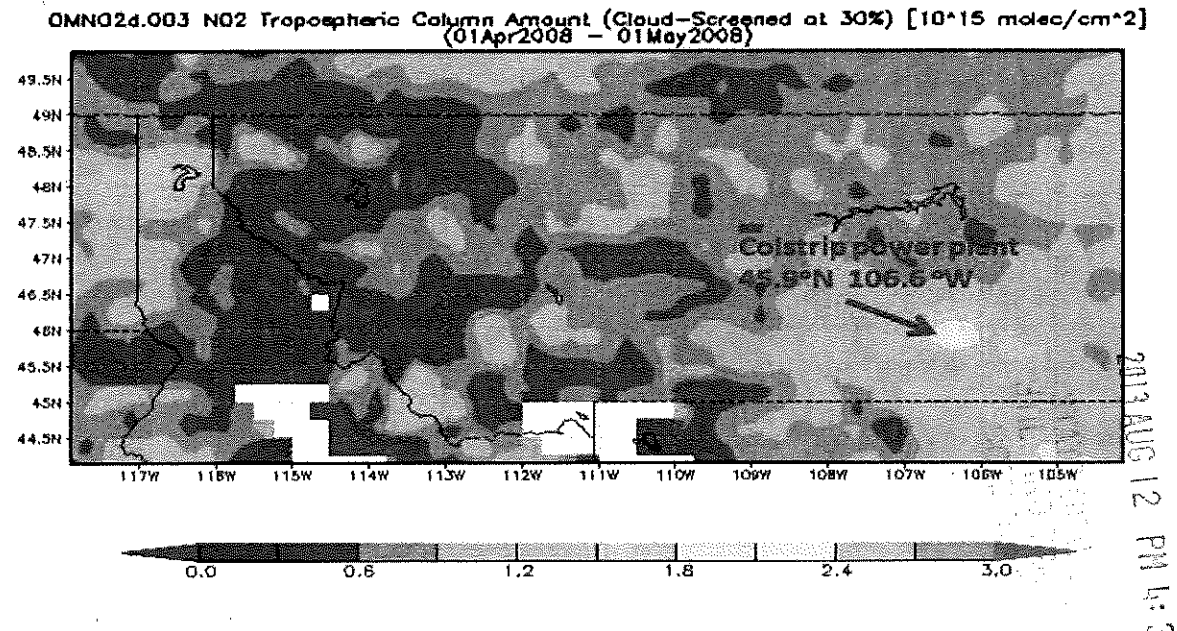

Figure 1. Satellite observations of NO_2 from the OMI instrument on-board the NASA Aura satellite for April 2008. The red arrow shows the location of the Colstrip power plant and the satellite data demonstrate the large emissions of NO_2 from the power plant.

The CO_2 emissions from the Colstrip power plant alone are more than 21% of the emissions for the entire state of Washington, including all sources. These emissions make a substantial contribution to global warming.

The problem of global warming and climate change is a serious problem that will have to be addressed by our children and grand-children. The year 2012 was the hottest year ever for the contiguous US and the second hottest year ever for the entire US, according the NOAA National Climate Data Center (http://www.ncdc.noaa.gov/news/ncdc-announces-warmest-year-record-contiguous-us). The scientific community has unequivocally confirmed the reality of human caused climate change in numerous assessments, reports, and policy statements by the Intergovernmental Panel on Climate Change (IPCC), the US National Academy of Sciences, the American Geophysical Union and the American Chemical Society. The details of each statement can be read on their respective websites. These statements represent the combined expertise of the most knowledgeable climate scientists in the world. A good example of the seriousness of the climate change issue is given by the recent policy statement by the American Geophysical Union, which was re-affirmed by the AGU Board just this month (August 2013). The lead sentence to this statement reads:

"Humanity is the major influence on the global climate change observed over the past 50 years. Rapid societal responses can significantly lessen negative outcomes."

Note that AGU is the largest Atmospheric-Geophysics scientific society in the world, with over 60,000 members. The AGU's full statement on climate change can be read at the AGU website (http://www.agu.org/sci_pol/positions/).

In the Pacific NW, the impacts of global warming have already been felt and will continue to become more severe. These impacts largely occur due to changes in the winter snowpack and reduced water availability in summer. The broader impacts include many other key human and natural systems in the PNW, such as salmon, wildfires, agriculture, availability of water to cities, biodiversity, etc. While there are many scientific publications documenting climate change in the US and the impacts, a good recent paper demonstrating climate change in the western US is:

Dulière, V, Y Zhang, EP Salathé 2013: Changes in 20th century extreme temperature and precipitation over the western United States from regional climate model simulations and observations. J. Climate, in press. doi:10.1175/JCLI-D-12-00818.1

Quoting from this paper:

"Trends in extreme temperature and precipitation in two regional climate model simulations forced by two global climate models are compared with observed trends over the western United States. The observed temperature extremes show substantial and statistically significant trends across the western United States during the late 20th century, with consistent results among individual stations. The two regional climate models simulate temporal trends that are consistent with the observed trends and reflect the anthropogenic warming signal."

Coal burning is the largest single source of CO_2 to the atmosphere, both in the US and globally. On a per kwh basis coal burning produces more CO_2 than any other fossil fuel source. At present, there is no viable way to reduce the greenhouse gas emissions from coal burning. While carbon sequestration might be an option in the distant future, at present it is not realistic. Carbon sequestration, if it ever becomes viable, will be an expensive and marginal fix at best. It is clear that the CO_2 emissions from coal burning have external costs that are not included in the price of electricity from the Colstrip power plant. As such, these external costs are being passed on to our children and grand-children.

On the other hand we have other options. Wind power now generates more than 7 billion kwh in Washington State alone. Since I have taken measures to reduce the energy consumption in my own home, my family of four consumes only about 3600 kwh per year. So the wind production in Washington State alone is enough to power over 1.9 million homes in the state. This shows that conservation and renewable energy sources are powerful tools that we can use to combat global warming.

I believe that the PSE Integrated Resource Plan must fully account for environmental and carbon impacts from any coal plant that provides power to Washington consumers. For the specific IRP submitted by Puget Sound Energy, I am disappointed to see PSE commit to at least another 20 years of coal burning at the Colstrip power plant. Equally disappointing is the fact that PSE believes they will not have to be accountable for carbon emissions in the final recommendations or "preferred portfolio."

Please ensure that PSE fully accounts for its environmental and carbon impacts. I believe that if this is done, you will find that continued reliance on coal burning at the Colstrip power plant is not in the best interests of PSE or its customers.

Sincerely

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