

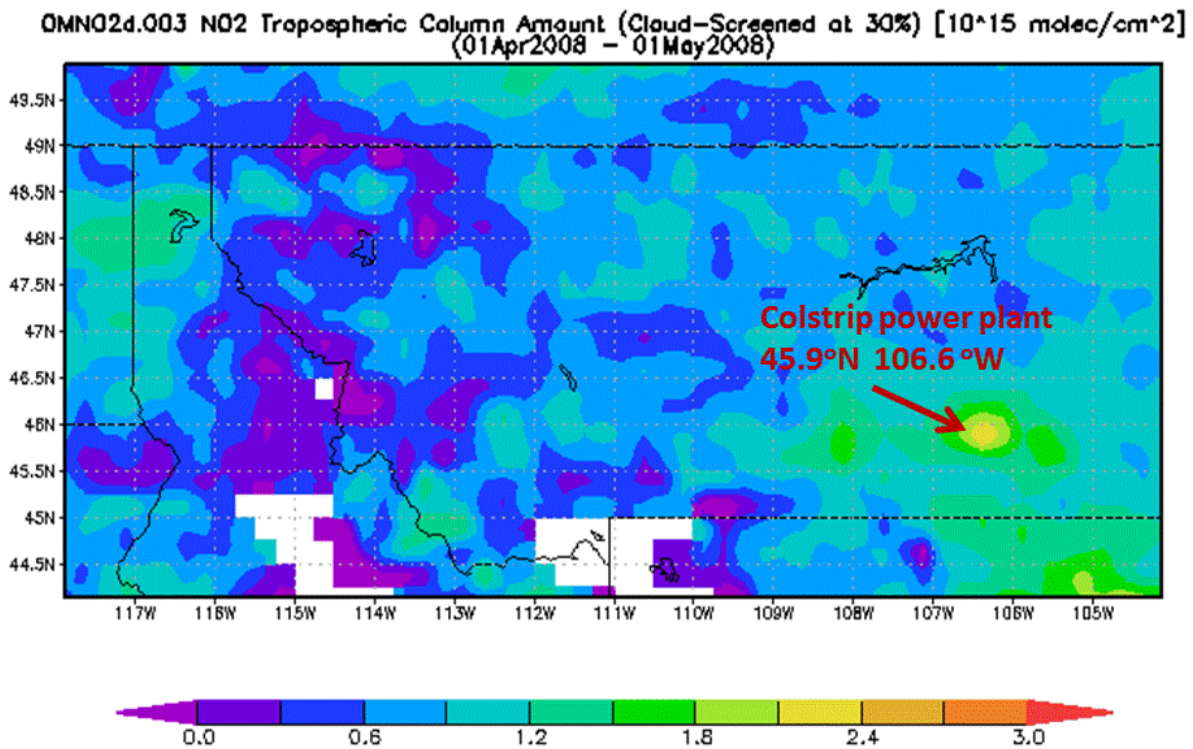
To: Lisa Wyse
RE: Docket # UG-141169 and UE-141170
March 1, 2016

From: Dan Jaffe,

My name is Dan Jaffe and I am a Professor and Chair of the Physical Sciences Division in the School of STEM at UW-Bothell. I am also a Professor of Atmospheric Sciences at UW-Seattle. I teach Chemistry, air quality and climate and do research on a variety of air quality issues including impacts and sources of SO_x, NO_x, 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 Colstrip are the largest single source of CO₂, SO₂ and NO_x in the four state PNW region (WA, OR, ID, MT). The substantial emissions of SO₂ and NO_x 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 measured atmospheric levels of NO₂ (nitrogen dioxide) from space. The figure below shows data from the OMI instrument onboard the Aura satellite for April 2008. Clearly visible is the location of the Colstrip power plant and its substantial emissions of NO_x. Other months show similar enhanced NO₂ in the vicinity of the Colstrip plant. These data are from the NASA Giovanni website:

<http://disc.sci.gsfc.nasa.gov/giovanni>



The 19 million tons of CO₂ emitted per year from the Colstrip power plants comprise about 20% 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 past decade was the warmest on record for the past 1000 years and 2015 was the hottest year ever based on NASA's analysis (<http://climate.nasa.gov/vital-signs/global-temperature/>)

The scientific community has unequivocally confirmed the reality of human caused climate change in numerous assessments and policy statements, including 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 groups represent the combined expertise of the most knowledgeable scientists in the world on this issue. 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 in August 2013. The opening 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://sciencepolicy.agu.org/agu-position-statements-and-letters/>)

In the Pacific NW, the impacts of global warming have already been felt and will continue to become more severe. These impacts include changes in the winter snowpack and reduced water availability in summer. This impacts many other key systems in the PNW, including salmon, wildfires, agriculture, availability of water to cities, etc.

Coal burning is the largest single source of CO₂ to the atmosphere, both in the US and globally. On a per kwh basis coal burning produces more CO₂ 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 there is no viable way to reduce the greenhouse impacts from coal burning. Carbon sequestration, if it ever becomes viable, will be an expensive and marginal fix at best. It is clear that the CO₂ 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 grandchildren.

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 each 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.

Sincerely

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