

DATE: April 13, 2015

TO: Chair Jessica Vega Pederson, Members of the House Energy and Environment Committee

FROM: Ken Dragoon, Director, Flink Energy Consulting

SUBJECT: Testimony to the House Energy and Environment Committee on Carbon Pricing (House Bills 3470, 3252 and 3250)

Committee Chair Vega Pederson and Members of the Energy and Environment Committee:

Thank you for the opportunity to comment on the subject bills, and especially for taking up this vitally important topic. I want to add my voice in support of legislative action to reduce Oregon's carbon emissions. As I am sure the Committee realizes, we need to drastically reduce carbon emissions globally, or risk almost unimaginable hardships as our legacy. Oregon has a responsibility to act, and an opportunity to lead the country in efforts to address carbon emissions.

Flink Energy Consulting¹ is a new venture started in October 2014, dedicated to facilitating the transition toward carbon-neutral energy sources. My career in the Northwest's electric power industry spans more than three decades, beginning with fifteen years at the Bonneville Power Administration (BPA), followed by nine years at PacifiCorp and shorter stints with Renewable Northwest, the Northwest Power and Conservation Council, and Ecofys.

My career began at BPA as a hydro resource planner where I became familiar with managing a power system reliant primarily on a renewable resource whose power output varies widely in time, is not entirely predictable, and is prone to both great excesses and scarcity. That turned out to be good training for what has come to pass, and I have been able to apply that expertise to other variable resources that have become of significant importance: wind and solar power. I conducted PacifiCorp's first wind integration cost study in 2003 and have written several published articles and reports on that subject. I authored a book on wind integration cost methodology in 2010².

I have never been so optimistic about our ability to reduce carbon emissions as I am today. Wind and solar costs have come down to the point where they are competitive with traditional resources. Although the cost comparison includes federal subsidies, I am convinced that a fair comparison of resource costs, absent all subsidies (including environmental and health "externalities" of fossil resources), would show that indeed wind

¹ See www.flinkenergy.com

² *Valuing Wind Energy on Integrated Power Systems*, Elsevier, September 2010.

and solar are least cost resources in many regions of the country today even without subsidies.

Some electric utilities are finding the least cost power comes from wind and solar—despite the historically low price natural gas prices that have made gas-fired power plants the industry standard for new conventional generation. The price of natural gas will almost surely rise from where it is today, driven partly by business cycles and partly by increasing environmental requirements on the new “fracking” technology. The cost of renewable energy, especially solar, is expected to continue to decline³ as the technology, supply chains, and economies of scale mature. This is a very exciting time.

Oregon must transition away from power derived from burning fossil fuels. The scheduled closing of Washington’s Centralia coal plant and Oregon’s Boardman plant is a great start. These closings were primarily economic decisions, albeit driven by the increased internalization of environmental and health costs of coal due to stricter federal regulations. The promise of the bills under consideration is really to internalize more of the current cost externalities of fossil fuels, and is an appropriate step to level the playing field for non fossil resources.

I urge legislators to closely scrutinize suggestions that the cost and reliability impacts of reducing carbon emissions from power plants are unacceptable. Here are a few facts to keep in mind:

- 1) Approximately half our power bills are not related to the cost of the power⁴, but to the cost of the infrastructure to deliver the power (transmission and distribution lines, labor, taxes, fees, overhead). Replacing a fraction of the generation fleet with a resource of fractionally higher cost to half the end users’ rates is not likely to result in large rate impacts—in other words, a percent of a percent of a percent is a fairly manageable number.
- 2) Old carbon-intensive power plants will one day need to be retired, and the replacement power (from whatever source) will be more expensive and tend to increase rates. However that cost is offset by other benefits. The Environmental Protection Agency (EPA) evaluation of their proposed carbon rules suggest that reduced carbon emissions results in a net economic benefit to society as a whole⁵—so while it is possible rates may increase, the State’s economy may well be better off overall.

³ *Solar Energy Prices See Double-digit Declines in 2013; Trend Expected to Continue PV pricing to drop another 3 - 12 percent in 2014*, News Release NR-3714, National Renewable Energy Laboratory, October 2014 (<http://www.nrel.gov/news/press/2014/15405.html>)

⁴ *Understanding Your Electric Bill*, Oregon Public Utilities Commission (<http://www.puc.state.or.us/consumer/Understanding%20Your%20Electric%20Bill.pdf>)

⁵ See: <http://www.epa.gov/climatechange/EPAactivities/economics.html>

- 3) Power derived from carbon-intensive coal plants will become increasingly uneconomic as the amount of power from renewable sources increases. Coal plants also make it more difficult to accommodate variable generation from wind and solar. There have already been times when wholesale market prices turn negative⁶ and the BPA limited output at wind projects while regional coal plants continued operation—effectively losing money for every unit of energy they generated during that time.⁷ The reason is that there are costs associated with shutting down and starting up coal plants that the operator avoided by continuing operation through the surplus period events. This points up the issue that coal plants are not flexible— they cannot quickly adjust their output over a wide range as needed to accommodate the more dynamic renewable resources. Coal plants are an impediment to accommodating high levels of renewable generation, effectively increasing the cost of fully utilizing those resources.
- 4) Power systems can accommodate very high levels of renewable generation, even if it primarily comes from variable wind and solar resources. Last year Denmark generated 39% of its electricity with wind power,⁸ with a target of 50% by 2020. If the Northwest matched Denmark’s performance, combined with hydro, more than 90% of our power would come from renewable resources⁹.
- 5) Despite the claims that the power system is at its limit for accommodating variable resources, there is a lot more that can be done to accommodate more at relatively little expense. Technical adjustments to how power is traded such as shorter operating periods now mandated by the Federal Energy Regulatory Commission, and sub-hourly markets such as the energy imbalance market that PacifiCorp recently joined increase the ability of the grid to handle such fluctuations. PacifiCorp’s action not only makes it easier and less expensive to accommodate variable wind energy, but also saves money overall. Much, much more can be done. BPA is finding that the least cost sources of grid flexibility and storage can be found in certain end use technologies—consumers of power that have the ability to change their consumption patterns to benefit the power grid. These include irrigation pumps, pulping mills, municipal waste treatment facilities, municipal water pumping, and a host of others. Our ability to accommodate variable resources has barely been tapped.

⁶ Negative wholesale electric market prices mean that producers of electricity must pay counterparties to take delivery of power.

⁷ Personal communication with utility staff.

⁸ Boosting Denmark wind power will require more links –operator, Reuters, 3/20/15 (<http://uk.reuters.com/article/2015/03/20/denmark-windpower-idUKL6N0WM3TU20150320>).

⁹ More than half the Northwest’s electricity is supplied by hydro power— See: <http://www.nwcouncil.org/energy/powersupply/>.

It might be argued that since the Northwest has one of the lowest carbon footprints due to its reliance on hydropower, there is little need for more effort. As you may know, many Oregonians get power from utility companies with limited access to federal hydropower. Moreover, I would argue that the Northwest has a special obligation to act—it will be easier for our region to wean off fossil fuels because of our access to renewable hydro power. No other region will have an easier time transitioning away from fossil fuels.

Another argument that has been raised is that we cannot act alone, that events in Asia make any actions we take insignificant. I have been to China, specifically invited to describe our efforts at integrating renewable energy. China is desperately trying to balance a surging economy and the deadly toll of their coal plants. They are not sitting idly by—China has the largest fleet of wind turbines in the world, and the largest solar power manufacturing facilities as well. It is we who are lagging. Moreover, irrespective of the gross tons of carbon saved, we can add to the growing body of evidence that moving away from fossil fuels is not only possible, it can help drive economic growth.

I am not a policy expert, so cannot weigh in on the relative merits of the different proposed solutions. I note merely that experts I have spoken with feel that any of the alternative approaches can be made to work. Managing the potential for outsized impacts on particular industries and individuals is an important aspect. I am confident that a solution can be found that does not end up unduly taxing those among us who are least capable of absorbing additional costs.

Finally, I note that I personally participate in PacifiCorp's Blue Sky program and Northwest Natural's Smart Energy program in which the entirety of my home energy usage is matched with renewable energy purchases. I look forward to the electrification of my personal transportation, at which time our home energy use will be almost entirely fossil-free. The cost of these programs is relatively modest, and indicative of the cost for all Oregonians enjoying fossil free energy sources. It is not a bridge too far!

Thank you for this opportunity.

Sincerely,



Ken Dragoon
Director, Flink Energy Consulting
k.dragoon@flinkenergy.com