

**From:** Eric Strid <ericwstrid@gmail.com>  
**Sent:** Monday, April 13, 2015 2:59 PM  
**To:** Patrino Beth  
**Subject:** Written testimony on carbon pricing bills

Dear members of the House Environment and Energy Committee:

Thank you for the opportunity to comment on some of the carbon-pricing bills.

**Summary:**

**1. Renewables will keep getting cheaper, enabling energy independence, local job creation, and much lower energy costs.** Renewables are a technology, not a fuel—technologies get cheaper with time, while fuels get more scarce. The impressive cost reductions in solar and battery technologies will continue, and overwhelm the incumbent industries. Cost tipping points are coming fast now, with solar power cheaper than grid electricity in 36 states by 2016, commuter electric vehicles already the lowest cost of ownership, China building out renewables to cut both costs and pollution, etc. A buildout of renewables will create resilient smart grids and microgrids, roughly 25,000 net jobs in Oregon, and a future of energy options that keep getting cheaper, all with zero fuel cost. Multiple studies of state and national buildouts estimate payback periods of 10-20 years, not counting the significant social costs of healthcare and climate change.

**2. Oregon should charge for greenhouse gas pollution and use the fees to ensure and accelerate the energy transition.** Besides the long-term societal benefits, the short-term economic benefits of a renewables buildout are massive—Oregon spends almost twice as much on fossil fuels as K-12 education. Oregon could be economically benefitting vs states and countries that are still paying for their fuels. The economically efficient policy to help individuals and businesses receive these benefits is to get the costs right, by charging for the social cost of carbon. Given the enormous benefits of the buildout, the best use of the revenues is to fund more buildout (as California is doing). Such funding should also be efficient, perhaps as rebates for clean-energy purchases that further reduce emissions. Pollution fees would start to pay for our costs of fossil fuel pollution, just like gasoline taxes pay for our costs of road maintenance. But road maintenance will always be necessary, whereas carbon pollution fees would taper off as we build out the future.

**More detail:**

**1. Renewables will keep getting cheaper, enabling energy independence, local job creation, and much lower energy costs.**

We needn't debate climate change or how much the sea will rise (it will) or how many species will go extinct (a lot), because there are massive savings available in updating our energy infrastructure. Stopping pollution is only one of the economic advantages in building out renewable infrastructure.

*a. Renewables are a technology, not a fuel—technologies get cheaper with time, while fuels get more scarce.*

Amore Lovins and the Rocky Mountain Institute [1] have for years been advocates of saving money through efficiencies and renewables. In 2013, then-FERC chairman Jon Wellinghof and then-Secretary of Energy Stephen Chu predicted that the plunging costs of solar power options would overwhelm all other sources, and when the cost of batteries fell enough, it would be "game over" for traditional utilities [2]. The impressive cost reductions in solar and battery technologies continue, and cost tipping points are coming fast now. For example:

- Deutsche Bank forecasts that solar power will be cheaper than grid electricity in 36 states by 2016. Multiple companies will quote solar power on your roof and finance it all, in exchange for a portion of the savings.
- A small electric vehicle (EV) such as the Nissan Leaf is already the lowest cost of ownership for commuter distances. Tesla is building a battery factory with capacity for building 500,000 cars/year.
- Utility-scale solar in desert locations is predicted to achieve 4 cents/kWh by day and 9 cents/kWh by night [3]
- China is building out more renewables than any other country, to cut both costs and pollution. By 2030 China will build enough wind and solar to power the whole US.

For the technologically savvy or those watching these markets, these tipping points are not at all surprising. Solar, batteries, and wind are all in virtuous business cycles of increasing volumes and decreasing costs.

*b. Renewables are the path to energy independence.*

The current world oil market dynamics imply that the US could never achieve energy independence through fossil fuels. By comparison, renewables can scale to far more than our current energy usage, and will enable all countries to do the same. Renewables are necessary for climate mitigation—the DoD and State Department both consider climate change to be a massive risk to world peace.

The buildout of renewables will use resilient smart grids and microgrids. The technology for such “smart grids” is in development now, and there are multiple Oregon companies pursuing such products, some of which are being piloted now.

*c. Renewables will enable local job creation.*

Whether fixing inefficient houses and buildings, installing solar panels, or setting up wind turbines, clean-energy jobs can't be outsourced. A buildout of 100% renewables would create roughly 25,000 net jobs in Oregon. According to the Political Economy Research Institute at the University of Massachusetts, an investment of \$1 million creates 5 jobs in natural gas, or 12 jobs in smart grid, 13 jobs in wind, 14 jobs in solar, or 17 jobs in building retrofits.

*d. Renewables will enable much lower energy costs.*

The energy cost reductions available to families is illustrated by my early-adopter project. I can report that my wife and I nest and get around very comfortably by powering our house and two EVs from our solar array. No “freezing in the dark”. Our total monthly energy cost (except air travel) dropped from hundreds of dollars a month to a \$17 grid connection fee. Yes, our transition cost some money, but the payback periods for solar, heat pumps, LEDs, building efficiencies, EVs, wind, etc. keep shrinking.

Multiple experts are concluding that massive savings are possible by kicking the fossil fuel habit. Recent studies [1,4-7] all conclude that moving whole states and countries to renewables is more than paid for through fuel savings (Oregonians spend \$11B/year on fossil fuels, almost twice as much as K-12 education). So Oregon should ensure and accelerate this transition, by discouraging investments in fossil fuel infrastructure and encouraging updates to our energy systems, thus saving more money.

The potential benefits of renewables for Oregon can be approximated by per-capita prorating the results from a study for Washington state [5] on transitioning Washington to 100% renewables by 2050:

For Oregon, the roughly \$120B of investments would be paid by fuel savings in 8 to 17 years, plus

- 25,000 net permanent jobs created
- \$4B of annual savings on health care
- \$6B of annual savings on climate change
- 500 premature deaths avoided annually
- Plus other benefits to Oregon clean-tech companies

These studies demonstrate the economic story in the vision of 100% renewables—the *technologies keep getting cheaper and the fuel cost is zero*. Energy markets used to be about the supply and demand for oil; energy markets will soon be more like buying a smart phone—consumer-driven, technology-enabled, continuous price reductions, and multiple deregulated service providers ready to finance your purchase. The hurdle is shrinking to a financial question—how can we best finance the transition? Once again solar companies are innovating, prominently advertising zero cost to homeowners in exchange for a share the savings.

Renewables are also inherently safer—they already spill most of their energy. When we have a massive solar energy spill, we just call it a nice day. When we have a massive wind energy spill, we go windsurfing. But when it comes to socializing the costs of oil spills or oil train explosions, the arrogance of Big Oil knows no bounds.

**2. Oregon should charge for greenhouse gas pollution and use the fees to ensure and accelerate the energy transition.**

*a. Why do we need a price on carbon when renewables will get cheaper and grow in the “free” market anyway?*

i. Renewables are being systematically targeted by well-funded fossil fuel interests, so adoption in the US is not assured. Solving the climate problem requires that trillions of dollars of fossil fuel assets be left in the ground, so spending a few billion to delay the inevitable is an entirely logical, though amoral, business strategy for the fossil fuel industry and their investors.

ii. Besides the long-term societal benefits, the short-term economic benefits of a renewables buildout are massive. Yes, Oregon has numerous clean-energy programs, but Oregon spends almost twice as much on fossil fuels as K-12 education, and nearly all of our fossil fuel spending flows out of the state.

iii. Oregon could be economically benefitting vs states and countries that are still paying for their fuels—or we could be falling behind. 11 states and 46 countries have a price on carbon, either a carbon tax or cap-and-trade system, or something in between. With the opportunities in renewables evolving so quickly, low-cost energy will become as expected as clean water or high-speed internet infrastructure. *As electricity costs fall, the Northwest could lose some of its energy cost advantage from hydro.*

iv. A pressing reason to not wait is that the cost of inaction keeps increasing. 2014 set another global temperature record, and this winter was so weird that even ALEC has stopped denying climate change. The International Energy Agency estimates that each dollar spent on renewables or efficiency before 2020 will save \$4.30 after then. A stitch in time saves nine.

v. Legislatures say they don't want to subsidize one industry over another, but of course the unpaid social cost of carbon (SCC) does exactly that. Without a price on carbon—or continually increasing subsidies for clean energy—we handicap Oregon clean-tech companies. The economically efficient policy to help individuals and businesses receive these benefits is to set the costs right, by charging for the social cost of carbon. (If we were to equally subsidize all clean energy sources instead of charge for pollution, the subsidy costs would spiral out of control as clean tech gets cheaper. At a SCC of \$40/tCO<sub>2e</sub>, we are subsidizing "clean" gas-fired power plants with 2.4 cents/kWh.)

*b. Oregon should use the fees to ensure and accelerate the energy transition.*

Revenues generated from a carbon tax or cap-and-trade system could be repatriated by distributing it to taxpayers, offsetting various business or personal taxes, funding specific programs, etc. But given the enormous benefits of the renewables buildout, the highest leverage use of the revenues is probably to fund more buildout (as California is doing with their AB32 funds). This use of revenue is also popular among Oregonians.

Such funding should also be efficient, perhaps as rebates for clean-energy purchases that further reduce emissions. Pollution fees would start to pay for our costs of fossil fuel pollution, just like gasoline taxes pay for our costs of road maintenance. But road maintenance will always be necessary, whereas carbon pollution fees would taper off as we build out the future. Each improvement frees up resources to fund more improvements, if the market has the right price signals to find the right solutions.

*c. Implementation options*

i. Carbon tax vs. cap-and-trade: People get religiously attached to one or the other, but economists see little difference in the effects. Either you set a price per ton or you target an emission rate that creates a price per ton. Businesses would prefer a tax that is as consistent as possible for planning purposes; and British Columbia administers their carbon tax with a total of 12 FTEs. But proper operation of a cap-and-trade system probably requires some limits, which can become a tax, such as California's lower price limit. In any case, if the periods between resetting price or emissions targets is short enough, the two systems approach each other. Given the rapidly changing energy markets today, I would recommend revisiting the price or emission targets at least annually.

ii. Leakage: If Oregon's carbon price is more than about \$30 higher than neighboring states, especially Washington, "leakage" is likely to occur. (This is why BC stopped at \$30/tCO<sub>2e</sub>.) So the price setting may need to coordinate with neighboring states.

iii. Effects on low-income Oregonians: This can and must be addressed.

iv. The use of "carbon" emissions or a "price on carbon" or the "social cost of carbon" in this letter or in the entire debate must be understood as a shorthand for carbon dioxide and other greenhouse gases in proportion to their heating effectiveness. The notation "tCO<sub>2e</sub>" means metric ton of carbon dioxide or equivalent potency of greenhouse gas. In addition, legislation must address the entire lifecycle costs of a fossil fuel; importantly any definition of emissions from

natural gas must include emissions from drilling, transport, and storage, since only about one percent leakage of methane makes one kWh of gas-fired electricity just as bad a greenhouse effect as one kWh from coal.

## Conclusion

We are at a historic tipping point, for global ecosystems but also for the global energy transition to renewables. Those states that act wisely now will be more competitive in the future.

Again, thank you for this opportunity to affect the future of Oregon.

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cofounder and retired CEO  
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## References

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[http://www.ted.com/talks/amory\\_lovins\\_a\\_50\\_year\\_plan\\_for\\_energy?language=en#t-24734](http://www.ted.com/talks/amory_lovins_a_50_year_plan_for_energy?language=en#t-24734)
2. In 2013 the rise of renewables was predicted by the Secretary of Energy and the Chairman of FERC, along with "game over" when storage matures.  
<http://reneweconomy.com.au/2013/solar-and-storage-means-game-over-for-traditional-utilities-10680>
3. Regarding plunging solar costs, this article is about PV and CSP in the desert:  
<http://cleantechnica.com/2015/01/28/solar-will-soon-take-base-load-fossil-fuels-says-acwa-ceo/>  
The CEO predicts 4 cents/kWh for PV and 9 cents/kWh for CSP with storage. "When that happens the combination of ultra cheap solar PV and dispatchable solar thermal will mean solar can compete with base load fossil fuels. They will not just be cheaper than coal and gas, but just as reliable, cleaner, and will lock in a price for 25 years without fuel price volatility."
4. In 2014 the International Energy Agency concluded that \$44T of investment is required to deploy renewables worldwide through 2050—resulting in a fuel savings of \$115T:  
<http://www.iea.org/newsroomandevents/pressreleases/2014/may/taking-on-the-challenges-of-an-increasingly-electrified-world-.html>
5. In 2014 The Solutions Project published this report on decarbonizing Washington state by 2050, resulting in the creation of 42,000 jobs, \$7B annual savings for healthcare, ~\$10B of savings for climate change, avoiding 800 premature deaths annually, etc.:  
<http://web.stanford.edu/group/efmh/jacobson/Articles/I/WashStateWWS.pdf>
6. Paul Krugman, Could Fighting Global Warming Be Cheap and Free? NY Times Sept. 18, 2014  
[http://www.nytimes.com/2014/09/19/opinion/paul-krugman-could-fighting-global-warming-be-cheap-and-free.html?\\_r=0](http://www.nytimes.com/2014/09/19/opinion/paul-krugman-could-fighting-global-warming-be-cheap-and-free.html?_r=0)
7. CleanTechnica article: \$500 Billion A Year In Fossil Fuel Imports Could Be Saved In US, EU, & China In 100% Switch To Renewables  
"One of the more hilarious criticisms of renewable energy is that it costs too much."  
[http://cleantechnica.com/2015/04/06/500-billion-year-fossil-fuel-imports-saved-us-eu-china-100-switch-renewables/?utm\\_source=Cleantechnica+News&utm\\_medium=email&utm\\_campaign=a987bb3d72-RSS\\_EMAIL\\_CAMPAIGN&utm\\_term=0\\_b9b83ee7eb-a987bb3d72-332049233](http://cleantechnica.com/2015/04/06/500-billion-year-fossil-fuel-imports-saved-us-eu-china-100-switch-renewables/?utm_source=Cleantechnica+News&utm_medium=email&utm_campaign=a987bb3d72-RSS_EMAIL_CAMPAIGN&utm_term=0_b9b83ee7eb-a987bb3d72-332049233)