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Subject: SB 990

My name is Peter Greenberg, I have been involved in the world of energy for a few decades both in Oregon and for US Embassies around the world. I would like to speak against SB 990. This bill violates votes by Oregonians, that I helped get passed. If in a world where Nuclear energy made sense, I am sure there are some advantages of small nuclear power plants over large ones and perhaps newer designs are somewhat safer than older designs. It's a low bar, when one considers the accidents over the decades. But, there are other considerations.

The NRC hasn't licensed these plants, there are no operating units and there is still no permanent repository for nuclear waste regardless of the size of a nuclear plant. Just because something is small and modular, nuclear waste is still made. The waste has to be guarded and cared for over many generations. This is not the job creation we want to make for millenia.

If one thinks small is inherently safer, the first fatal accident from a nuclear plant that is publicized, happened in 1961 in the same state where the first NuScale plant is scheduled to be built. In another small nuclear plant, a 3 MW plant, the SL-1, a serious accident happened, which was caused by sabotage. Is this new generation of nuclear plants 1,000% safe from sabotage or terrorism? Three men were killed as they moved fuel rods in a "routine" preparation for the reactor start-up. One technician was blown to the ceiling of the containment dome and impaled on a control rod thru his groin. His body remained there until it was taken down six days later. The men were so heavily exposed to radiation that their hands had to be buried separately with other radioactive waste, and their bodies were interred in lead coffins.

In the 37 years since Oregonians passed the moratorium on financing and construction of nuclear plants, the industry has ground to a halt, become exorbitantly more expensive and significantly less expensive and safer alternatives have arisen. Chernobyl, Three Mile Island, Fukushima have happened. Lesser know accidents include Kyshtym in the Soviet Union, resulted in a minimum of hundreds who died from cancers from radiation releases. An accident at the Windscale plant in England from a fire that was discovered after it had been burning for two days resulted in the release of radiation with estimates of up to a few hundred cancers.

Another fire was caused by a candle. Reading from an NRC report on an accident at the Browns Ferry plant in 1975, the fire started in the cable spreading room at a penetration through the wall between the cable spreading room and the reactor building for Unit 1. A slight differential pressure is maintained (by design) across this wall, with the higher pressure being on the cable spreading room side. The penetration seal originally present had been breached to install additional cables required by a design modification. Site personnel were resealing the penetration after cable installation and were checking the airflow through a temporary seal with a candle prior to installing the permanent sealing material. The temporary sealing material was highly combustible, and caught fire. Efforts were made by the workers to extinguish the fire at its origin, but they apparently did not recognize that the fire, under the influence of the draft through the penetration, was spreading on the reactor building side of the wall. The extent of the fire in the cable spreading room was limited to a few feet from the penetration; however, the presence of the fire on the other side of the wall from the point of ignition was not recognized until significant damage to cables related to the control of Units 1 and 2 had occurred. It was then shut down for a year, ran for 9 years, then shut down for 22 years.

Fermi 1, the first commercial breeder reactor in the U.S. Had a partial meltdown in 1966 which took 4 years to repair and then after 2 years the plant was dismantled.

Closer to home we have the WPPSS $2.25 billion default which was the 2nd largest default of municipal bonds in history.

According to the Union of Concerned Scientists (UCS), between 2002 and 2008 costs for new nuclear plants rose from $2 and $4 billion to $9 billion.

Nuclear power has gone from “Too cheap to meter” to too expensive to finance.

In a 2011 UCS study some estimates suggest that the taxpayers subsides are larger than the market value of the power generated.

Currently the State of NY is looking at legislation of $7.6 billion to bailout 3 nuclear plants.

New nuclear plants are being added to Georgia Powers Vogtle. These are the first in nearly 3 decades in the nuclear industry. Looking at their cost overruns, they will probably be the last. These started in 2009 with an estimated cost of $14 billion with an online date of 2016 to 2017. The most recent cost estimate is about $21 billion and the estimated completion is now 3 years away. Westinghouse has filed for Chapter 11. Fluor is the subcontractor under Westinghouse. Fluor is the partner of NuScale.

You can pick your option: Cost overruns, too expensive to build, no permanent waste respository, Voter refusal, targets for terrorists, destablizing on the grid relying on large plants.

The flip side which Oregon has been heavily involved in makes a lot more sense, that is efficiency and renewables. I have been involved in these areas on and off since 1985.

For 9 years we were involved in the energy efficient lighting business. We manufactured very efficient fixtures for industrial and commercial spaces in Eugene, which along with our retrofits of buildings resulted in about 110,000,000 kilowatt hours of savings per year. An example of our work is a replacement of a metal halide fixture which gave poor light, took 3 to 5 minutes to warm up and used 1,380 kwh/yr at a 3,000 hour run time. Our fixtures were twice as bright, came on almost instantly, used individual occupancy sensors reduced the energy use to about 540 kwh/yr. These can now be retrofitted with LED lamps to use 206 kwh/yr or a 85% reduction. It is a lot cheaper to save energy than produce it by any means.

Six years ago, when the Variable Incentive Rate solar program started thru legislation from the legislature, I spoke against it at first thinking that solar was too expensive and the money would be better spent in efficiency. Once the program started, I figured why not and did very well over the years. We installed about 30% of the capacity of the program, much of it on schools, churches, non profits, farms and an Indian reservation. We get paid more than standard solar programs and are sharing it well, paying a much higher premium than the large solar farms, resulting in our hosts earning about $400,000 per year for the next 15 years for leasing us space. At the end of the contract they then get the system for even more earnings. Over the last few years an interesting thing has happened, the price of solar has dropped significantly, while efficiency never stops innovating and improving. Larger solar systems can now be installed on trackers that follow the sun that cost less today for the entire installation than just the solar panels did 6 years ago. Today in much of the country large scale solar electricity is less expensive and certainly cleaner than coal and gas powered electricity and without the terrible risks of nuclear power, no matter the size and any newer designs.

This decentralized, localized, safe and clean path of expanding energy efficiency, better motors, more efficient heat pump water heaters, local, community owned, utility scale solar, much more efficient LED lighting, electric cars that get 240 miles per charge and various other concepts are charging along unstoppable in an economy that favors lowest cost, safety, simplicity, resilancy with no worries of toxic effects.

Wind is significantly cheaper way to produce power than nuclear and many times is complimentary to solar in its production.

Yes the sun doesn't shine at night and the wind doesn't always blow, but this is more predictable than larger centralized power plants, or even 50 MW NuScales going down which causing massive disruptions in our energy supply in milliseconds. Grid reliability has been shown in many other areas in the world with high levels of renewables. One such study on the closed Texas grid shows in 2050 their usage, first can be dropped with more efficiency, then enough wind and photovoltaics to meet 86% of the need, 14% with dispatchable renewables such as solar thermal, small hydro, geothermal, feed lot biogas. The excess would be put into cool storage, hot water and electric cars, plus adding in some flexible demand in industry.

Complementary techologies such as electric cars have been improving fast from advances in battery techology starting in the cell phone industry. A few years ago the Nissan Leaf was the gold standard at 80 miles per charge. Today there are 400,000 pre orders for the soon to be released Tesla 3 at around 215 miles per charge. The other car companies have taken notice with the Chevy Bolt now on the market getting 240 miles per charge, the 2018 Leaf coming out at the end of the year with many others to compete at the new standard of over 200 miles per charge.

All of this is leading to ways that can help our electric grid and makeup for the fact that the sun doesn't shine at night, a true but not complete point made by proponents of nuclear and fossil fuels. Electric cars along with time of day pricing can help the grid provide power at night with vehicle to grid scenarios. Heat pump water heaters use 1/3 of the energy of electric water heaters with a payback of a few years. These can easily be utility controlled to power up at the right times of the day for them and provide plenty of hot water for our showers. Ice storage for cooling commercial buildings can be charged up when convenient. For cooling my house it is easy enough to simply open the windows at night and keep the coolth in the house during the day, with just a modest amount of AC from a ductless heat pump if needed. Building codes if as strict as many in Europe would provide for many more near or net zero houses, such as the one built by Benton Co. Habitat. The 110,000,000 kwh per year that our lighting customers are saving can now be increased by another 40,000,000 kwh/yr by retrofitting our very efficient lights with LED lamps which depending on operting hours have a payback of months to a few short years.

In 2014, these countries without or very modest bulk electric storage had the following renewable amounts of their power:

Portugal 64%

Denmark 59%

Scotland 50%

Spain 46% (21% wind, 14% hydro, 5% solar)

Germany 27% (2013 peak>70%, 2015 peak >80%)

Italy 33%

Ireland 22%

UK 19%

Denmark over the last 3 decades has been switching from centralized plants to a renewable micro grid, making for a much more reliant system. This makes cascading grid failures impossible, such as in times of large earthquakes.

Renewables are not just solar PV technology, but a whole mix of technologies. As with an orchestra, not all piece are played at once, but together the mix sounds perfect.

The US went from a horse and buggy transportation system to automobile based in just a decade.

Solar PV has become 60% to 80% cheaper in just 5 years.

Firms hampered by old thinking simply won't be a problem as they won't be around, as in the case of the latest bankruptcy in the worlds largest Nuclear producer Westinghouse.

Oregon has one of the highest rates in the country of people buying into the green energy programs of Pacific Power and PGE. Investors flee even faster than customers. Capital flows to what will work in the future, hence the market capitlization of Tesla being greater than GM.

Let's not go backwards to an unwanted, dangerous, terrorism prone, grid destablizing, too expensive to meter technology while the answers lie all around us.

The Voters have spoken almost 40 years ago, technology has vastly improved, the Legislature must heed the will of the voters.

Yesterday, Tucson Electric turned on a line a 100 MW solar electric at .03/kilowatt hour for 20 years. This is the cheapest anywhere in the world I have read about and beats the operating cost of nuclear, not considering what it costs to build or then eventually deal with the waste.

To quote Amory Lovins, the worlds foremost energy expert, "Making electricity with Nuclear is like cutting butter with a chainsaw."

When their is an actual tested and NRC approved product (that investors will back) a permanent repository, siting which makes sense considering any 9.0 Earthquakes and voters approve it, then perhaps this would make more sense. I would still not back nuclear, but at least the intent of the moratorium would be met.

Sincerely,

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