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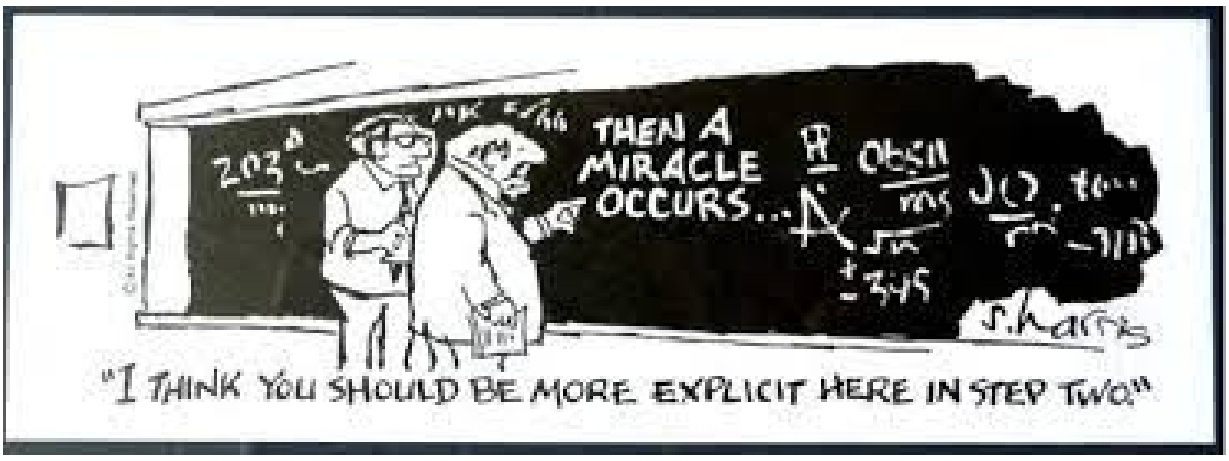
Committee on Energy, Utilities and Technology

LD 101: An Act to Prohibit Offshore Wind Energy Development

Testimony of Dr. Richard Silkman in Opposition

Senator Lawrence, Representative Berry, members of the Committee, my name is Dr. Richard Silkman. I am submitting this testimony in opposition to LD 101 - An Act to Prohibit Offshore Wind Energy Development.

A little over a year ago, I published a study – A New Energy Policy Direction for Maine: A Pathway to a Zero-Carbon Economy by 2050 – that describes how Maine can virtually eliminate carbon from our economy through beneficial electrification and decarbonization of our electricity generation sector … and, most importantly, do so without increasing the total amount of money we spend on energy economy-wide. I undertook this work, because I was dissatisfied with the lack of any analysis underpinning aspirational goals proclaimed by states, cities and towns across the country claiming to achieve major reductions in carbon by dates certain. All too often, support for these goals was best depicted in this renowned cartoon:

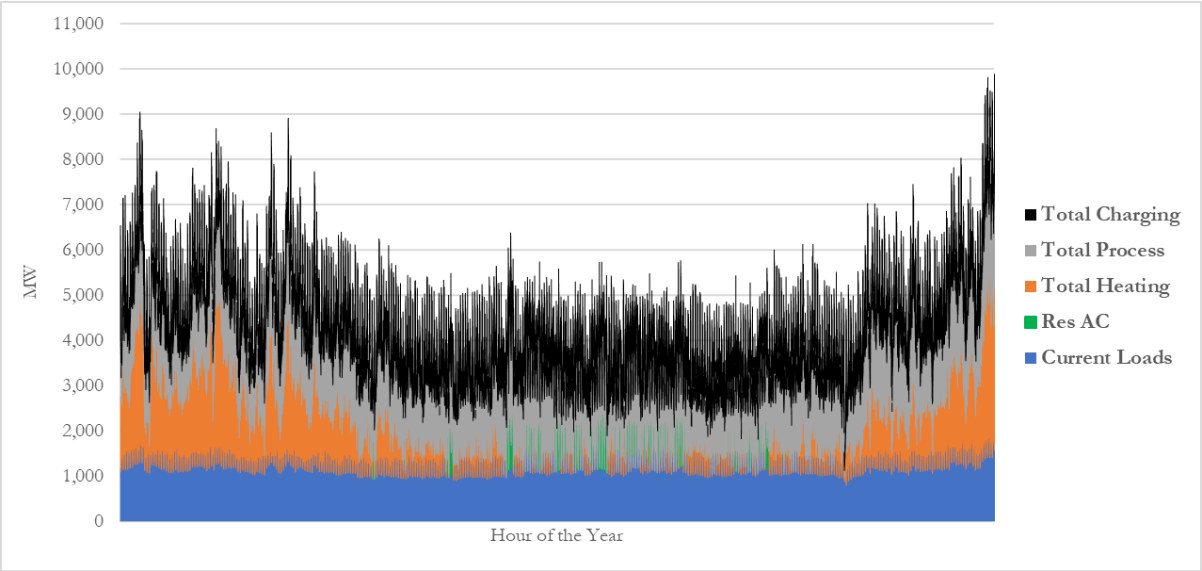


I encourage you to read my book. It is an attempt to fill in the "then a miracle occurs" gap – to marry aspirations with reality. It is available in digital format at https://www.competitive-

energy.com/zero-carbon-maine. For those of you who wish a hard copy, please get in tough with me, and I will send you one.

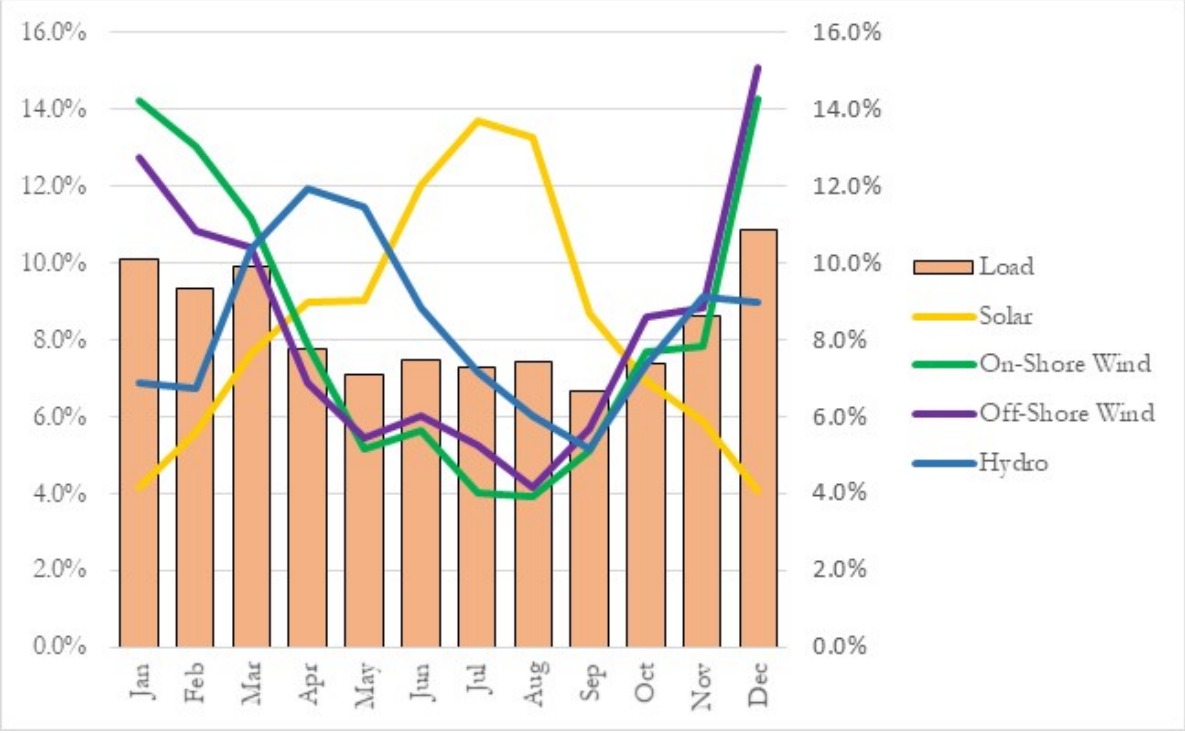
What I found when I dug into the data and began to model energy use and electricity generation was most interesting. Among the more important observations is the growth in electricity consumption during the winter months as electricity (Air Source Heat Pumps) replaces heating oil, natural gas and propane as the source of spacing heating in our homes and businesses.

The graph below reproduces Figure 2-7 in my book. The graph shows the amount of electricity Mainers will use each hour of the year from January 1st to December 31st once all transportation, space heating and industrial and commercial processes have been converted to electricity. The blue area at the bottom of the graph shows Maine's current use of electricity. Beneficial electrification will expand electricity use significantly – and most importantly, it will shift it from a pattern of relatively flat use over the year to a pattern of highest use in the winter season. The orange area shows the amount of electricity that will be used for space heating purposes. This is anything but flat – with strong winter seasonality … precisely when there is less sunlight available to generate electricity from solar.



So, where is the electricity going to come from to meet this heating load, given that it cannot come from carbon-emitting fossil fuels?

The best source of renewable power to meet Maine's heating loads is wind. This is because turbines in Maine – whether located on-shore or off-shore – generate higher amounts of electricity during the winter season than during the summer season – exactly the opposite of solar. The graph below is also taken from my book – Figure 2-9. The bars in this graph convert the hourly electric loads in the previous graph into the percent of electricity use that occurs in each month of the year. The lines show the percent of annual generation from each source of renewable, zero-carbon generation that occurs in each month. You can see the mismatch between solar generation (the yellow line) and loads. If we are to rely on solar alone, we would have to store all the surplus generation in the summer months and release it to the grid during the winter months. This would require enormous battery systems and cost a fortune – far more than Maine could ever possibly afford.



But look what happens when we add wind to the graph. The green and purple lines show the percent of generation from on-shore and off-shore wind projects, respectively, each month. These show highest generation in the winter when electric heating loads are high – and lowest in the summer when solar is plentiful. The combination of wind and solar – with existing hydroelectric generation in Maine thrown in – does a good job of matching electricity use, enabling Maine to achieve zero-carbon emissions at a reasonable cost.

Notice from the above figure that BOTH on-shore and off-shore wind provide very similar complementarity to solar and good matches for loads. The problem, however, quickly becomes one of scale. There are not enough locations with suitable wind conditions on-shore to meet the total electric needs of Maine. We must supplement on-shore wind generation with off-shore wind generation.

Simply put – without off-shore wind generation from large wind farms in the Gulf of Maine, Maine cannot meet its emission targets.

And what is true for Maine, is equally true for New Hampshire and Massachusetts. Neither state can wean itself off fossil fuels and eliminate carbon from their respective economies without developing large wind farms in the Gulf of Maine.

If this Committee or the legislature more generally acts to prohibit offshore wind energy development as proposed in this bill, then it should be honest with Maine people and simultaneously strike all emission targets and related state policy. It is simply not financially possible to meet Maine's aggressive climate goals without the development of off-shore wind.

Thank you for your consideration. I would be happy to respond to any questions you might have.