

August 26, 2020

Connecticut General Assembly, Energy & Technology Committee

RE: Millstone Nuclear 10-year contract

Let me state upfront that I support renewable energy efforts where it makes economic, reliability, and environmental sense. But there are limitations.

Take, for example, Germany's aggressive effort to scale-up green energy. This has led to the highest electricity costs in the industrialized world at over 30 cents per kilowatt-hour (kWh).

In New England, the predominant fuel for electricity is natural gas, representing over 50% of total generation. Historically, the price typically ranges between 1.6 and 6 cents per kWh depending on time of year and time of day, with an average around 3.8 cents. Of course, natural gas fired generation emits greenhouse gases. Moreover, there can be severe pipeline constraints during the winter months when consumers demand gas for home heating in addition to electricity generation.

Power from the Millstone nuclear power plant is fixed for 10 years at about 5 cents. It does not create greenhouse gases as it generates power. It is a clean energy source though not considered "renewable" in the classical or legal sense.

If your neighbors install roof-top solar energy panels, utility companies are required to buy any excess electricity at the standard rate of around 7.4 cents per kWh. That is far above the prevailing wholesale prices in the region and that of the Millstone plant. In essence, utility customers without solar are subsidizing a small fraction of their neighbors. This is not sustainable.

Connecticut has immediate plans to bring in up to 804 MW of offshore wind with an ultimate goal of over 2,000 MW. The potential costs have not been made public, but offshore wind costs are listed as between 8.4 and 9.8 cents per kWh in Rhode Island and Massachusetts.

Offshore wind power is considered a Class 1 renewable energy source by the State of Connecticut, enabling owners to take advantage of clean energy credits in the market. The potential benefit is variable but could be as much as 4.5 cents per kWh. This is a benefit not available to nuclear power plants even though these plants provide clean energy and do not emit greenhouse gases. This creates an unfair condition substantially penalizing nuclear power. Smaller, single-unit nuclear plants such as Vermont Yankee and the Pilgrim plant have permanently shut down, in part, because of such an uneven playing field.

The current state goals are to have 40% of electricity production from renewable energy by 2030, and 80% reduction in greenhouse gases by 2050. Governor Lamont wants 100% renewable energy by 2040. Unless a miraculous source of electricity can match natural gas at pennies per kWh, or nuclear at 5 cents, this isn't going to happen without significant rate increases.

Moreover, 100% renewable energy is not achievable. Let's look at the data.

After the sun sets solar energy production drops to zero. When a high pressure dome settles over the region the wind often vanishes as we have seen for most of this summer. During those conditions there

can be less than 100 MW of wind generation out of 1,400 MW of wind capacity in New England. Estimates by the offshore wind industry are that 20% of the time wind generation would be less than 20% of capacity. So, while some 15,600 MW of wind energy has been proposed in New England through the coming decade, there will be times when actual generation will be about 3,000 MW or less.

So, on an evening when regional demand is a typical 15,000 MW we could be very short of power: zero electricity from solar and only 3,000 MW from wind. Include some interties with Canada and New York State, and minor contributions from biomass plants, and we could still be short close to 10,000 MW.

Are batteries the answer? Let's assume to make it through a cold, low-wind winter night we needed about 10,000 MW of battery capacity. We currently have about 20 MW of battery storage in New England with plans for up to 2,400 MW. So we would be very short of capacity. And most batteries only have 1, 2 or 4 hours of storage, not 12 to 16 hours. If we needed 10,000 MW of battery power for a minimum of 12 hours overnight we would need a minimum of 120,000 megawatt-hours (MWH) of storage.

The largest battery storage facility in the world has been built by Tesla in Australia. It can provide 129 MWH of battery-supplied energy. So, we would need to build the equivalent of about 1,000 such large battery storage facilities in New England to meet the demand on a cold, low-wind night. Not going to happen.

Our state legislators should be told the honest truth regarding reliance on renewable energy. The state-mandated renewable energy targets must be realistic, and one must expect to pay a very high cost for greenhouse gas free emissions. There is no free lunch.

Given these limitations, nuclear power from Millstone at 5 cents per kWh is very reasonable.

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