100% RENEWABLE ENERGY PLAN

Updated: June 8, 2020

Since the 2018 Commentary was written, there have been some significant developments in the Alaska renewable energy landscape. Chugach abandoned the Community Solar project, but moved ahead with net-metered residential solar and there is currently about 1MW installed on about 200 homes. Of those, between 20-30 homes are 100% solar with electric bills showing zero net-energy purchases on an annual basis. Low interest loans and tax credits (which expire in 2021) have made this program so popular that solar installers can't keep up with demand.

I wondered what the upper limit is for residential solar in Anchorage. Discussions with Alaska solar industry leaders and research on the number of homes with favorable rooflines revealed a conservative estimate of over 4,000 homes with excellent solar potential. The typical home rooftop installation is about 5KW, which gives a total potential of 20MW for residential solar.

Commercial rooftop solar potential is far greater. The Egan Center solar project, rated at 77KW, is one of only a handful of commercial solar installations in Anchorage. The Anchorage School District encompasses over 900 buildings, many with very large roofs. Most schools could support up to 100KW solar arrays. If only half of the ASD buildings were outfitted with solar panels, the total capacity could exceed 45MW.

Maxing out residential and commercial solar in Anchorage has the potential to generate over 65MW. In the original commentary, I noted that the average load for Chugach Electric in 2017 was 138MW. Thus, using solar in the way it is currently being installed would provide just under 50% of the average load. Together with the **existing** wind and hydro capacity, this is a blueprint to achieve 100% renewable capacity in a very short time.

Moreover, the current **installed** price for solar is about 4.5 cents/KWh, compared to a **fuel cost** of about 8 cents/KWh for gas generated electricity. This means that solar power could substantially reduce the high electric rates we pay in Anchorage. For those 200 solar homes, it already has.

The bad news is that net-metering caps how much solar power Chugach will accept. The cap is 1.5% of total power, which works out to about 2MW of the 138MW average load. Chugach does have the choice to raise the cap. Homer Electric, Matanuska Electric and Golden Valley Electric have all raised their caps to 3%. Still, the net-metering approach limits solar energy to a tiny fraction of what could be produced to lower everyone's electric bills.

Why do utilities have regulations that deliberately limit the use of solar power? There are technical reasons and there are political reasons. The technical reason is that solar power is a variable energy source. When a storm front comes through and clouds block the sun, solar production suddenly drops off. This can be managed if solar is limited to a few percent. The present electric grid was never designed to utilize variable energy sources as the primary source of energy and can't handle a sudden loss of 50% of the power to the grid. This is also the reason why Chugach often can't handle the full wind power output from Fire Island and is forced to sell the excess at a loss to other utilities.

What's missing in the current design of the grid is large-scale energy storage. The cheapest, most efficient form of energy storage is Pumped-hydro Energy Storage (PES). In widespread use worldwide for decades, it is the only proven technology that can do utility-scale storage at a reasonable cost with minimal environmental impact. Because it is a closed-loop hydrologic system, PES can often be designed to regulate reservoir levels in ways which enhance fish and wildlife habitat. Another advantage is that mega-dams are not needed. The hydraulic head used to generate electric power comes from the elevation difference between upper and lower reservoirs, not from the height of a dam.

The Eklutna PES proposal for the Alaska railbelt is currently being studied by the Alaska Energy Authority. The proposal would build off the existing Eklutna Hydroelectric Project in a way which would restore full flow (and hopefully salmon) to the Eklutna River. The water tunnel to the existing power plant is already constructed like a PES system, but is not a closed loop. More details on this project can be found at chugachgreenenergy.org .

Eklutna is only one possible site for PES in Alaska, but has the significant advantage of the existing power plant infrastructure, is already tied into the electric grid, and is midway between the major population centers in Southcentral Alaska.

Another possible PES site is the Cooper Lake project. At 20MW, it is much smaller than the Eklutna proposal and has limited expansion potential. However, Chugach designed this project with the flexibility to incorporate PES. With PES, Cooper Lake appears to have sufficient storage capacity to absorb the full output from Fire Island and eliminate the curtailments and revenue loss that have delayed the Phase II expansion of Fire Island for almost a decade.

I hope by now it is clear that 100% renewable energy is a realistic goal that is achievable fairly quickly if we want to make it happen. It requires two things: an increase in generation capacity from all forms of renewable energy (wind, solar, hydro) and large-scale energy storage to level out the fluctuations in the variable sources (wind & solar).

I want to end by noting that 100% renewable is only the first milestone and doesn't take us to where we ultimately want to be. Electric utilities account for about 30% of greenhouse gas emissions in the U.S. Converting electric utilities to renewable energy would make a huge reduction in emissions from utilities. But the real payoff is in electrifying the transportation industry, which contributes another 30% of the total greenhouse gases. Together, greenhouse gases could easily be reduced by over 50%, the electricity would be far less expensive than what we are paying today, and our planet would be significantly healthier. What's not to like?