

Concerning the Solar Business Festival in Austin Texas on December 2, 2016

Originally I was to talk about: “Calculating How Much Solar Power Can Be Injected Into The Grid” and I prepared my talk on this topic which is posted: <http://www.egpreston.com/PrestonTalk12-2-16.pdf>

On the day before I was to give the talk on Dec 2, I looked at the final program and saw my topic: https://s3.amazonaws.com/Ocoos_Sp_Content/3099/spdocument/2016_sbf_program-e5646b95a6f5a22af250c27234a0d2fe.pdf had changed to: “Off Grid Technologies and the Replacement of Fossil Fuels”.

Here are my comments on the off-grid and replacement of fossil fuels topic.

I had found a way to get 100% renewables in ERCOT but it required a six trillion dollar battery. A fellow in England suggested I change my battery to 70 GW for 14 hours ($1/10^{\text{th}}$ the energy). He thought this would also perform well. And his battery did show only 3% of the total annual ERCOT energy was fossil fuel <http://egpreston.com/CASE6A.txt> (2nd page from bottom). But the case also shows that fossil fuel capacity could only be reduced 2.22% to maintain system reliability.

Why is so little of the fossil fuel capacity retired? The reason is that renewables can have and will have gaps of many days of low production. It's in the historical record. The 14 hour battery does not have enough energy storage to ride through these periods of low production. Even if most of the energy is from wind and solar, we still have to keep those gas plants ready to operate on short notice. This is alien to the ERCOT market which relies on energy sales to keep power plants financially viable. If we do get 100% renewable energy, there will be a non-energy cost to all of us just to keep all the fossil fuel plants ready to run and in running order. It's not a feasible plan.

The other topic I was supposed to talk about was off-grid technologies. In February I gave this talk to the University of Texas Law School on microgrids: <http://egpreston.com/PrestonFeb2016.pdf> If you look on the last two pages there are many advantages for both ERCOT and the homeowner for staying on the grid. I know someone local to Austin off the grid. They have to routinely fire up their put-put gasoline generator because there are too many cloudy days and their solar energy production is too low. This form of being off the grid makes no sense. It's not solving the climate change problem. It's even more costly than staying on the grid. It makes no sense to go off the grid in Austin with nothing more than solar panels unless you want to live like a cave man for days on end. Possibly in Arizona or the west you could make such an off grid system work, but not here in Austin. It's just not practical for most folks.

So if we have everyone on microgrids and those microgrids are all talking to each other and to ERCOT as a class of customer, then ERCOT can tap into them for instant power, saving ERCOT a lot of energy cost. ERCOT would have this backup power scattered throughout the grid to give operators time to correct system problems, preventing blackouts and preventing shedding of the load. The microgrid owners could swap power among themselves as a microgrid cooperative. They could participate in buying low cost wind power at night to charge up their batteries. They can even level the daily ERCOT load profile. Collectively, one million microgrid owners could also build their own nuclear plant at a lower cost than solar for the same amount of annual energy, about 8000 kWh annually, from solar and from nuclear. This is the only pathway I know of to achieve a 100% non CO₂ plan that will actually work in a detailed engineering analysis.