The Atlantic Coast Pipeline - Renewables are Ready

The rapid warming of the planet, disruption of climate systems, and acidification of the oceans foretell a difficult world for our descendants unless we quickly begin to get the energy we need from sources that do not burn anything and emit greenhouse gases. As author and acclaimed environmentalist Bill McKibben said, "See, the scientists and engineers have done their job. The scientists have given us ample warning, the engineers have now provided us with the technology that we need. The price of a solar panel has dropped 80% in the last seven or eight years."

The classic brush-off to renewable energy is that "the wind doesn't always blow and the sun doesn't always shine." If one is trying to find a simple way to demean and dismiss renewable energy, this phrase ought to do it—or not. One can imagine makers of riding tack for horses in the 1910's commenting on automobiles, saying something like, "When that contraption breaks down, then how are you going to get to the general store?" Or, perhaps, "Where are you going to get all that gasoline for that thing? No one sells gasoline."

Just because it is a change to a century-old paradigm does not mean that it cannot be done. It must be done. Public utilities are already beginning to manage the grid today in a way that makes use of renewables, and ramping up renewables to be more significant every year is a challenge easily within the grasp of modern technology. The reality is that the grid must be sourced *totally* by renewable energy in the not-too-distant future. The good news is that it can be.

The idea that wind and solar intermittency make them unacceptable sources for the power grid is patently untrue even though shareholder owned utilities want you to believe differently. A 2015 *Scientific American* article[1] makes these comments about the intermittency of solar and wind:

> Because wind and solar increase the magnitude of sudden power generation shortfalls or excesses, the grid operator requires more reserve power ready to respond at a moment's notice to ensure the grid remains balanced. … While renewables disrupt the grid's operation in a number of ways, it is not impossible to compensate for the additional intermittency and uncertainty. In fact, many of the strategies to overcome renewable variability are simpler than you might realize. … Integrating a large share of intermittent renewable energy into our daily electricity operations will require a mix of sources that complement each other to roughly equal our total energy demand over the day. This is technically possible because continental wind energy tends to peak at night, coastal wind energy tends to peak during the day, and solar can peak at various times over the day, depending on which way it is oriented.

Even with the intermittencies that occur with wind and solar, countries around the world are already proving that renewables can today supply a very significant portion of energy demand. On May 8, 2016, Germany got 87% of its power from wind and solar. A 2016 article[2] said, "Critics have argued that because of the daily peaks and troughs of renewable energy—as the sun goes in and out and winds rise and fall—it will always have

only a niche role in supplying power to major economies. But that's looking less and less likely. Germany plans to hit 100% renewable energy by 2050, and Denmark's wind turbines already at some points generate more electricity than the country consumes, exporting the surplus to Germany, Norway and Sweden."

A 50-states plan, called the **Solutions Project**, to transition to a carbon-free energy supply has been developed by Dr. Mark Jacobson of Stanford and other scientists, along with entertainment figure Mark Ruffalo. This plan establishes a matrix for each state to achieve fossil-fuel-free energy supplies by 2050. Dr. Jacobson published a paper in 2015 called "Low-cost solution to the grid reliability problem with 100% penetration of intermittent wind, water, and solar for all purposes." From its Abstract[23]:

> This study addresses the greatest concern facing the large-scale integration of wind, water, and solar (WWS) into a power grid: the high cost of avoiding load loss caused by WWS variability and uncertainty. It uses a new grid integration model and finds low-cost, no-load-loss, nonunique solutions to this problem on electrification of all US energy sectors (electricity, transportation, heating/cooling, and industry) while accounting for wind and solar time series data from a 3D global weather model that simulates extreme events and competition among wind turbines for available kinetic energy. Solutions are obtained by prioritizing storage for heat (in soil and water); cold (in ice and water); and electricity (in phase-change materials, pumped hydro, hydropower, and hydrogen), and using demand response. *No natural gas, biofuels, nuclear power, or stationary batteries are needed* (emphasis added). The resulting 2050–2055 US electricity social cost for a full system is much less than for fossil fuels. These results hold for many conditions, suggesting that low-cost, reliable 100% WWS systems should work many places worldwide.

And according to the Wind Industry Foundation, "The United States boasts some of the best wind resources in the world, with enough accessible kinetic energy to produce 3.7 trillion kilowatt-hours of electricity annually—or nearly 10 times the country's existing power needs."

The resistance to adding wind and solar to the existing power grid comes not from technological limitations. It comes from pressure from shareholders at large utilities that fear that a transition to renewables may result in lower earnings per share, with no concern whatever about the climate chaos and losses resulting from a continuation of prodigious fossil fuel use.

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1. Fares, Robert. (March 11, 2015). Renewable energy intermittency explained: challenges, solutions, and opportunities. Scientific American. Retrieved from the World Wide Web on February 23, 2017 :https://blogs.scientificamerican.com/plugged-in/renewable-energy-intermittency-explained-challenges-solutions-and-opportunities/.

2. Coren, Michael. (May 10, 2016) PLUGGED IN. Germany had so much renewable energy on Sunday that it had to pay people to use electricity. Retrieved on February 25, 2017 from the World Wide Web: https://qz.com/680661/germany-had-so-much-renewable-energy-on-sunday-that-it-had-to-pay-people-to-use-electricity/.

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Published by the Alliance to Protect our People and Places We Live - http://www.apppl.org/