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RE: Energy trends point to slower wind and solar power growth

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David T. Stevenson, Director

Rapid growth of industrial size wind and solar electric generating projects may be ready for a slowdown. Falling federal tax credits, fewer state mandates, rising electric rates, concerns about electric grid reliability, bird and bat kills, and visual blight are combining to limit the attractiveness of new projects. Meanwhile, the feasibility of competitive, base load, alternative zero emission technologies will be proven in the next few years. It makes sense to slow the rush into adding more expensive, intermittent wind and solar power.

The center of gravity of energy policy battles is moving away from federal policies to state energy policies. Twenty-four states, with half the U.S. population, have joined the Climate Alliance to use state laws and regulations to meet the goals of the Paris Climate Accord even as the federal government pulls out of the Accord. We have seen thirteen states and the District of Columbia extend and expand their wind and solar mandates, with some setting zero emission goals. Four states are considering joining the nine state carbon dioxide tax program on electric generators, and eight states are considering extending a similar program to gasoline and diesel fuels.

Regulated utilities, with state public utility commission approval, are using so called green energy policies as cover to offload potential investor liabilities for aging coal-fired power plants. The utilities also want approval to enter the electric vehicle charging market. Electric customers would be asked to finance early conventional power plant closings, large investments in wind and solar power plants, and public EV charging infrastructure. Non-EV owning electric customers would also pick up the risk of the charging investment. With EVs representing only about one half percent of the US light vehicle fleet, and 80 percent of charging done overnight at home, public charger investments are potentially a bad business investment.

Opposing trends also exist. Only 11% of national wind/solar sales were state mandate driven in 2018. Thirty-seven states originally had wind and solar mandates. Thirteen of those states have met their goals, five more will meet their goals by 2022, and another six by 2026. By 2027 only thirteen states will still have mandates. Zero emission goals using intermittent wind and solar power, and a switch to electric vehicles are impractical with current battery technology. Full battery EVs can cost twice as much as conventional vehicles, and building enough batteries to meet electric grid reliability could easily double or triple electric rates.

Proposals for economy wide carbon dioxide emission taxes have failed in progressive states such as Vermont, Washington, and Oregon, and have been overturned in Australia, France, and in some Canadian Provinces. Despite over two decades of efforts, the U.S Congress has failed to pass a national tax on carbon dioxide emissions. Efforts to join the regional carbon dioxide emission cap and trade program by governors in Virginia, Pennsylvania, and North Carolina have run into stiff legislative opposition.

In the short run, even 5 percent wind and solar added to the grid has increased air pollution by causing natural gas and coal plants to run inefficiently when cycling up and down to accommodate intermittent power. Federal Production Tax Credits (PTC) yield low to zero wholesale electricity market



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prices when wind turbines obtain a 10 to 50 percent market share that makes it impossible for even wind and solar projects to make a profit. Various studies show dangerous grid reliability problems at 25 to 30 percent wind and solar market penetration.

The inflation adjusted cost of industrial scale wind turbines has not fallen in twenty years, but rather has counted on federal tax credits to reduce apparent cost. The PTC has been withdrawn three times, and each time new installation rates have fallen 85 percent. The PTC ends again in 2019. Compounding the cost problem, legislation and voluntary utility projects will likely lead to more in-state installations in areas with poorer wind resources. Construction could rise almost 50 percent in locations in the northeast with half the wind speed yielding one quarter the power of the best wind turbine locations. Offshore wind projects are being pushed by northeastern states, but cost almost three times as much as onshore wind.

Industrial scale solar inflation adjusted costs have fallen 80 percent in the last decade, and solar is now comparable in cost to onshore wind. However, the cost curve has flattened, further significant cost improvements are unlikely, and federal tax credits are also disappearing for solar. Average system efficiency has improved 65 percent since 2007 with the use of single axis tracking, and improved cell efficiency, but further gains are less likely. More systems are being built in areas with lower sunshine.

New wind and solar installations appear to be comparable to new natural gas-fired power plants when just installation costs are considered. However, wind and solar require additional natural gas power plants be built for back-up, and are often built far from where the power is needed requiring transmission line and sub-station investment. Investments in conventional power plants also typically includes the cost of decommissioning which is ignored with wind and solar projects with only half the expected life. Including these factors doubles the actual cost of both wind and solar projects.

While barriers to adding more wind and solar power have risen, the feasibility of competitive, base load, alternative zero emission technologies will be proven in the next few years. New small modular reactors with designs similar to power plants used on submarines, and aircraft carriers are being approved by the Nuclear Regulatory Commission, and a small number may be installed by 2022-2024. A 50 MW natural gas-fired generating plant has just been completed by Net Power in La Porte, TX, to demonstrate the Allam cycle. Supercritical CO₂ is the working fluid allowing natural gas, or coal gas, combustion in pure oxygen. The bulk of the CO₂ is reused in the process with the rest concentrated and ready for use or sequestration. The process potentially produces power at a lower cost than conventional natural gas power plants. Very little water is used, and there are no air pollutants, or carbon dioxide, emitted with either of these options.

The bottom line is conflicting energy policy trends bring into question the current rush toward taxes on carbon dioxide emissions, adding more wind and solar power, and over-building EV charging infrastructure. There is currently adequate electric grid capacity to meet slow growing electric demand. The wisest course now is to slowdown investing in questionable measures, and see which energy technologies win the race to power the next generation.