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TO: Interested Parties

FROM: Josh Freed, Senior Policy Advisor
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RE: Correcting the Record on Renewable Energy

Overview

In an op-ed in today's *Washington Post* (Getting Real on Wind and Solar), James Schlesinger and Robert Hirsch warn darkly about the limits of renewable energy. But as the energy debate proceeds in Congress, we believe it is vital to get the facts right, and unfortunately this piece clouds more than it illuminates. In this memo, we offer some responses to the claims made in the op-ed and try to set the record straight about the viability of wind and solar power.

To be sure, Third Way believes it is vital that policymakers recognize the limits of renewable energy sources like wind and solar and the urgent need to more fully develop other large-scale non-carbon solutions like nuclear power and carbon capture and sequestration. But if we are to achieve the clean energy future that many of us believe is required, it is critical that we take advantage of the successfully deployed technologies that we have today. The reality is that we need to deploy every available and potential clean energy resource if we are to revive our economy, create new jobs and reduce the threat of climate change.

CLAIM: Renewables are not on-demand.

> *"…solar cells and wind energy systems don't always provide electric power. But because both are intermittent electric power generators, they cannot produce electricity "on demand," something that the public requires."*

FACT: Variable grid management is not unique to renewables. America's electricity system is exceedingly complex. Grid operators are already tasked with managing variable sources (such as unexpected reductions in electricity output from conventional energy) or an unanticipated surge in electricity demand. We already have systems in place to deal with this complexity, so adding additional sources simply makes the process slightly more complicated.

FACT: Solar power is most useful at exactly the same time when it is most needed. While solar power is not a baseload power source, it produces the most electricity at times of greatest need. Particularly in the Southwest, where solar energy is most available, energy use peaks during the day and is lowest at night. This is exactly the time when the sun shines the hottest. Solar energy can, therefore, be used primarily to address increased demand during the peak demand times of day.[1] At night, some solar becomes unavailable, mirroring the time when there is very little electricity usage.

FACT: Wind power is quite predictable, and therefore does not need to be "on demand." Weather modeling has improved significantly in recent years, allowing grid operators to plan hours or days in advance of wind outages. While it is not baseload, in this way, wind power operates like any large-scale power source that from time to time must be taken off-line.[2] In fact, installing more wind turbines is actually better than only having a minimal amount because it reduces the likelihood of widespread, unexpected drops in generation.[3]

FACT: Solar and wind are not the only renewables. It is a common misperception that wind and solar are the only existing renewable energy sources and that all renewables are intermittent. Geothermal power, utilizing the earth's natural heat to generate electricity, is a particularly promising technology because it provides baseload power in the same way that a coal plant does. Additionally, biomass, burning unused or waste wood and plant products, holds significant potential in the Southeastern US, where other renewables are less prevalent. Other renewable resources are also in development, such as small-scale hydropower, tidal power and ocean thermal.

CLAIM: Energy storage is not viable.

> *"If large-scale electric energy storage were viable, solar and wind intermittency would be less of a problem. However, large-scale electric energy storage is possible only in the few locations where there are hydroelectric dams."*

FACT: Energy storage is on the horizon with the appropriate research and development. Most promising, centralized solar power plants, called Concentrated Solar Power (CSP), are able to store energy at low cost by heating up molten salt or other materials, and then utilizing that stored energy to generate steam, and therefore electricity. This can allow CSP to operate during cloudy periods and even at night. Near-term technology should give CSP a 4-12 hour window of backup. Another promising, although not yet commercial storage option is compressed air storage. This technology allows utilities to pump compressed air into caverns such as abandoned coal mines, saving excess electricity when demand is low for use later in the day when it increases.[4]

CLAIM: Renewables require 100 percent fossil fuel back-up.

> *"Solar and wind electricity systems must be backed up 100 percent by other forms of generation to ensure against blackouts. In today's world, that backup power can only come from fossil fuels."*

FACT: As wind is not a baseload resource, it does not require 100 percent back up to ensure replacement power is available when the wind is not blowing.[5] It would be a costly waste of resources to require a 1 megawatt to 1 megawatt redundancy. This, as a 2007 DOE report noted, is because the power grid functions as a *system*. Grid operators must balance the energy generated with the energy needed over the entire system. Because of this the grid as a whole operates with a 5-7% reserve, which is more than sufficient to account for unexpected changes in supply and demand.[6]

FACT: As renewable energy is more widely used, the risk of energy shortfalls decline. If all solar or wind were concentrated in one small area, there could be problems with reliability. That is why, just as locating coal or natural gas power plants in different areas to avoid being brought offline by natural disasters, a diversified grid, in both geography and power source, is better than one reliant on one particular technology or location.[7] It is highly unlikely that the wind stops blowing everywhere at the same time, for example.[8] And it is even less likely that wind and sun stop at the same time.

FACT: New technologies are under development that can reduce even currently modest backup requirements. The most important of these is a smart grid, which allows the power company or grid operator to proactively manage electricity demand in the case of unexpected outages. For example, the utility would be able to temporarily reduce the power usage of customer appliances such as refrigerators and air conditioners to reduce total demand, or supply power to the grid from a network of plug-in hybrid batteries.[9] While each individual reduction may be very low (1 to 2 degrees), the aggregate energy effect will be sufficient to balance supply and demand.

CLAIM: Renewables Require Costly New Transmission Lines.

> *"Finally, since solar and wind conditions are most favorable in the Southwest and the center of the country, costly transmission lines will be needed to move that lower-cost solar and wind energy to population centers on the coasts."*

FACT: Our current power system already relies on power facilities relatively far away from population centers. This is because few communities want a coal plant or nuclear plant in their backyard even as they take advantage of the jobs and power they produce. This is compounded by an aging transmission infrastructure which unreliably and expensively delivers such traditional, centralized power to consumers. Only renewable power, such as small scale, distributed solar panels or wind turbines require no transmission.

FACT: New transmission will be required whether we increase renewables or build more traditional power such as coal and natural gas.[10] This is, therefore, not a reason to reject renewable power.

CLAIM: Renewables Will Only Have a Limited Impact on Emissions

> *"Because solar and wind have the capacity to deliver only 30 to 40 percent of their full power ratings in even the best locations, they provide a carbon dioxide reduction of less than 30 to 40 percent, considering the fossil fuels needed for the "spinning reserve."*

FACT: Existing reserves for renewable energy, often large scale hydropower and natural gas both lead to carbon savings. Hydropower is easy and inexpensive to manipulate, and so is often scaled back when demand is low (in 2007, hydro only generated 42.5% of its potential).[11] This provides significant potential for "free" carbon-free energy if backup generation for solar and wind is required. Similarly,

natural gas plants operate far below capacity in order to have reserve capacity available when needed. They are not required to run at all times to account for this possibility. Instead, these plants are generally scaled back from full potential, producing and delivering only minimal power to the grid until needed. While natural gas is a fossil fuel, it is significantly cleaner than the coal power that renewables would displace.[12]

Conclusion

Schlesinger and Hirsch are correct in identifying some of the challenges we face in deploying wind and solar power, and they play only a tiny but growing role in America's current energy mix. That is why we believe that other large scale technologies, including nuclear, are also required over the long run to achieve a clean energy future.

But we simply can't get there without using everything—when it comes to carbon-free energy, we must be the proponents of all of the above. Wind and solar are important parts of this effort. In many parts of the country, solar and wind are ready to scale up, and the challenges that these technologies face can be overcome with a little American ingenuity. This is how we transition to clean energy; misstating the facts on how wind and solar are currently deployed and used will not help us get there.

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[1] http://www.nrel.gov/docs/fy01osti/31179.pdf

[2] Many studies, including a 2007 Department of Energy study have shown that, given proper planning, wind can supply 20% the nation's electricity need without imposing undue complications and costs on the power grid. DOE

[3] U.S. Department of Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," July 2008: p. 90

[4] Other technologies like fuel cells and advanced storage batteries are farther off but by no means impossible. It is important to realize that any projection of significant renewable integration into the grid is over a 20 year timeframe, more than long enough for American ingenuity to overcome current obstacles.

[5] U.S. Department of Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," July 2008: p. 88

[6] American Wind Energy Association, "20% Wind Energy by 2030: Wind, Backup Power, and Emissions,"

[7] http://www.iea.org/textbase/papers/2005/variability.pdf, p. 48

[8] U.S. Department of Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," July 2008: p. 90

[9] http://rechargeit.blogspot.com/2008/09/vehicle-to-grid-v2g-overview.html

[10] U.S. Department of Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," July 2008: p. 76

[11] Author's calculation (http://www.eia.doe.gov/cneaf/electricity/epm/table1_1.html; http://www.eia.doe.gov/cneaf/electricity/epa/epat2p2.htm): 77, 644MW of capacity yields 680,161,440 MWh of possible energy, but only 289,246,000 was generated in 2007. 289,246,000/680,161,440 = 42.5%

[12] Natural gas produces approx. half as much CO_2 as coal. http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html