Big Surprise!

By Howard “Cork” Hayden, The Energy Advocate, February 2025

Reward some behavior, and you get more of it. Everybody who has been paying attention has noticed that wind and solar have been highly subsidized. Unsurprisingly, we now have more of it.

Since the advent of the so called “climate crisis,” supposedly caused by “carbon emissions” (correctly, carbon dioxide, CO2, a product of combustion) coal has been regarded as a villain because it emits more CO2 per unit energy produced than do either natural gas or petroleum. In a mere 20 years, the amount of electricity produced by coal has dropped by about 60%. [1].

Two things have promoted the growth of natural gas. (1) It produces less CO2 than coal, for any given amount of energy produced; in today’s intellectual climate, that is regarded as a climate-saving virtue; and (2) large natural-gas/combined cycle power plants are about 60% efficient, versus coal which uses a steam cycle at about 35% efficiency.

Solar and wind are considered “natural” energy sources, although there is nothing un-natural about coal, oil, natural gas, or uranium. They are also considered “cheap” because we don’t have to buy sunlight or wind. However, the cheap designation is faulty because of the unreliability of sunlight and wind. Can you buy one kilowatt-hour of midnight solar energy for $1 million? Solar energy is cheap only when sunlight is strong. Wind energy is cheap only when wind speed is high. The rest of the time, solar and wind are very expensive, and the more renewable energy is involved, the higher is the price to the consumer [2].

Suppose that a utility of yore invested in a power station fired by coal. Their investment was based on an expectation that the station would provide constant baseload power around the clock. Later, they added 100MW (nameplate) of wind turbines (with no subsidies) spread out over about 30 square miles (78 km2 ). The utility’s job is to produce (say) a steady 1 GW around the clock. In strong winds, they now produce 900 MW from coal and 100 MW from wind, but they still get the same amount of payment for 1 GW. They have lower fuel costs, but they also must pay for the wind installation and their coal station is generating less revenue.

Presumably, their maintenance costs are also larger now that they have about 30 square miles (80 km2 ) of wind turbines to look after. Another problem they face is that wind power can be highly variable over short times, and the power station must compensate for wind fluctuations by increasing and decreasing power from the coal units. Since they use steam turbines, there is a lot of thermal inertia to contend with—it takes a while to heat and cool the steam, and the rapid ups and downs reduce overall efficiency.

Needless to say, the engineering calculations involve a lot of what-ifs, and we pretend no expertise here. Perhaps the wind installation works to the advantage of the utility and perhaps not. But suppose that the utility has its coal-fired plant and the government strongly subsidizes a local wind farm installed by somebody else. Now the utility has to bear additional costs without the benefit of the “free” energy supplied by the wind.

In the auction process (occurring every five minutes), all producers offer certain amounts of power at some price. The transmission & distribution (T&D) company takes all the power from the lowest bidder, and some of the power from the highest bidder, but pays all of them the rate of the highest bidder. Therefore, the owners of the wind array get preferential treatment by making low-ball bids for their “free” electricity but get paid the same as the utility gets [3].

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Notes

[1] “U.S. Wind and Solar Overtake Coal Power,” e360.yale.edu/digest/us-2024-solar-wind-coal, 1/13/2025; graph from <https://rhg.com/research/preliminary-us-greenhouse-gasestimates-for-2024/>

[2] Bjorn Lomborg, “Green Electricity Costs a Bundle: The data make clear: The notion that solar and wind power save money is an environmentalist lie, Wall Street Journal, 1/1/2025

[3] Meredith Angwin, “Shorting the Grid: The Hidden Fragility of Our Electric Grid,” Carnot Communications, 2020