Notes from Davis Besse re-licensing community hearing

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Figure 1 Overview of Presentation on 12/18/2010

In section 7.2.2.2 of the Davis Besse Nuclear Power Station License Renewal Application, Environmental Report, First Energy dismisses all forms of renewable energy as a replacement for the 910MW from Davis Besse. Two types that are largely researched and widely used today are solar and wind power, both of which First Energy does not feel are satisfactory forms of energy production to be applied to the grid. The reasons they state are intermittency of power production, large land requirements for installation of either type, the low wind and sunlight irradiance in Ohio compared to other states, associated aesthetic impacts and the high costs per kilowatt-hour of capacity. Low wind speeds and irradiance in the area and costs are discussed in the notes by Dr. Alvin Compaan.

It is true that solar panels will only produce power during the day when the sun is shining, and that both wind speeds and solar irradiance change throughout the day and year; however, by looking at systems that are already in place in the area and around the world, we will be able to gain a better understanding of how to use these different types of renewable energy. This study specifically shows the case for Northwest Ohio and how it can in fact, be applied to the grid.

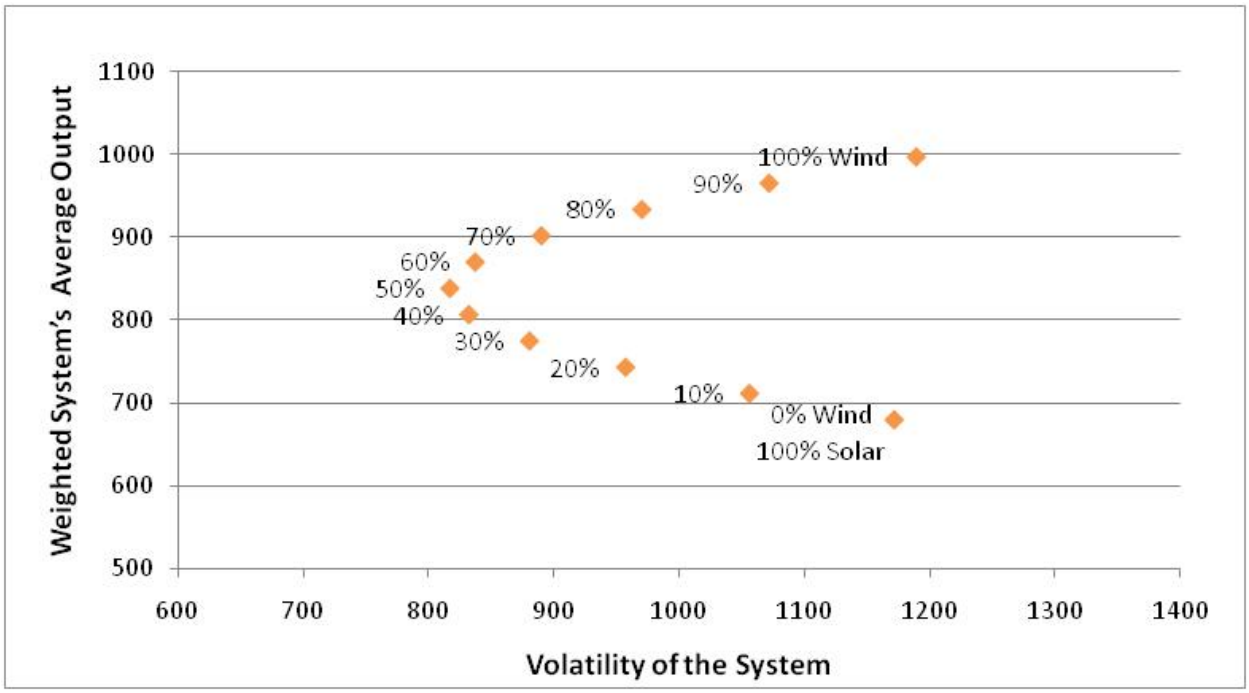

Figure 2 Volatility vs Maximum Output of several hypothetical combination systems of solar and wind

I have used two functioning systems in the area, one wind turbine owned by Bowling Green Municipalities and one solar array on a home located about 20 miles north of the turbine in Toledo. With detailed statistical modeling, the above graph shows the volatility or intermittency of 10 hypothetical systems versus their output. Each hypothetical system is a different weighted combination of solar and wind, from 0 - 100% wind. As you can see, the system with the least volatility (most stable) is an even combination of 50% solar and 50% wind.

A single solar array follows patterns in its power production: only produces in the day, not at night and also the production is higher in the summer on average than in the winter. A single wind turbine also follows patterns: not as much predictability from day to day, however they produce more on average in the winter than they do in the summer months. By combining these two sources at the optimal ratio for the area, a much more stable and predictable output can be obtained. The slide below shows the hypothetical combination system against a large city demand curve like Toledo. We can also look at the system over an entire year and see that the standard deviation (measure of volatility) is consistently lower than either by itself.

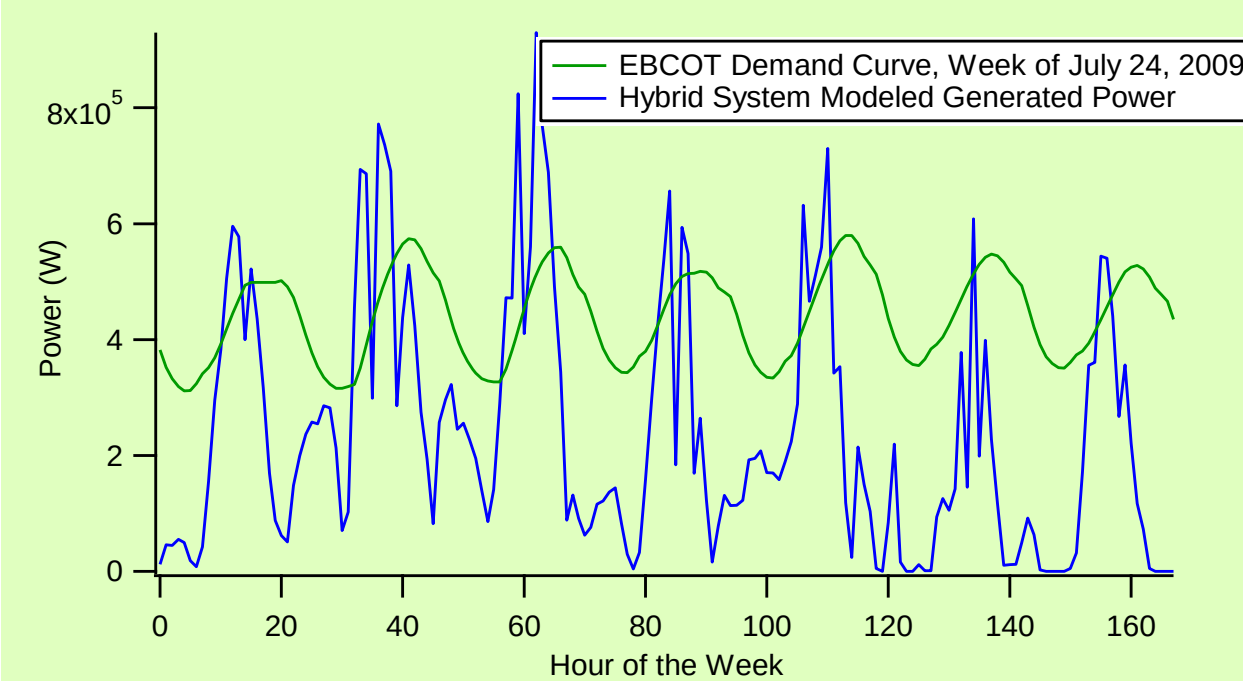

Figure 3 Output of hypothetical system vs demand curve from central Texas, similar to that of Toledo.

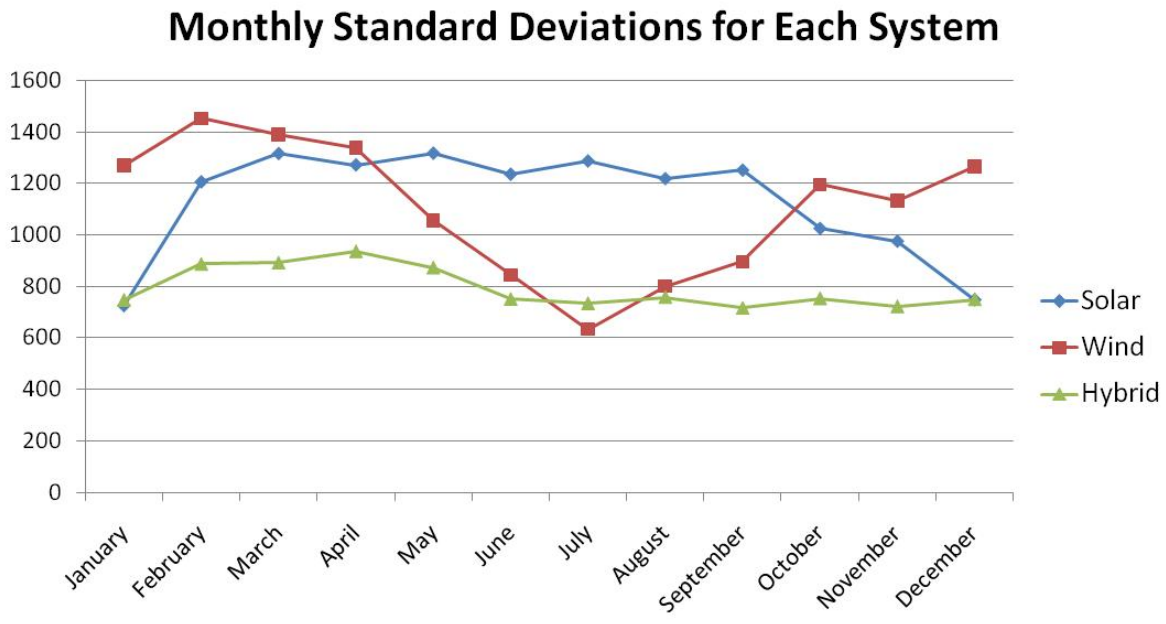

Figure 4 Standard deviation of power production of a solar, wind and hybrid systems.

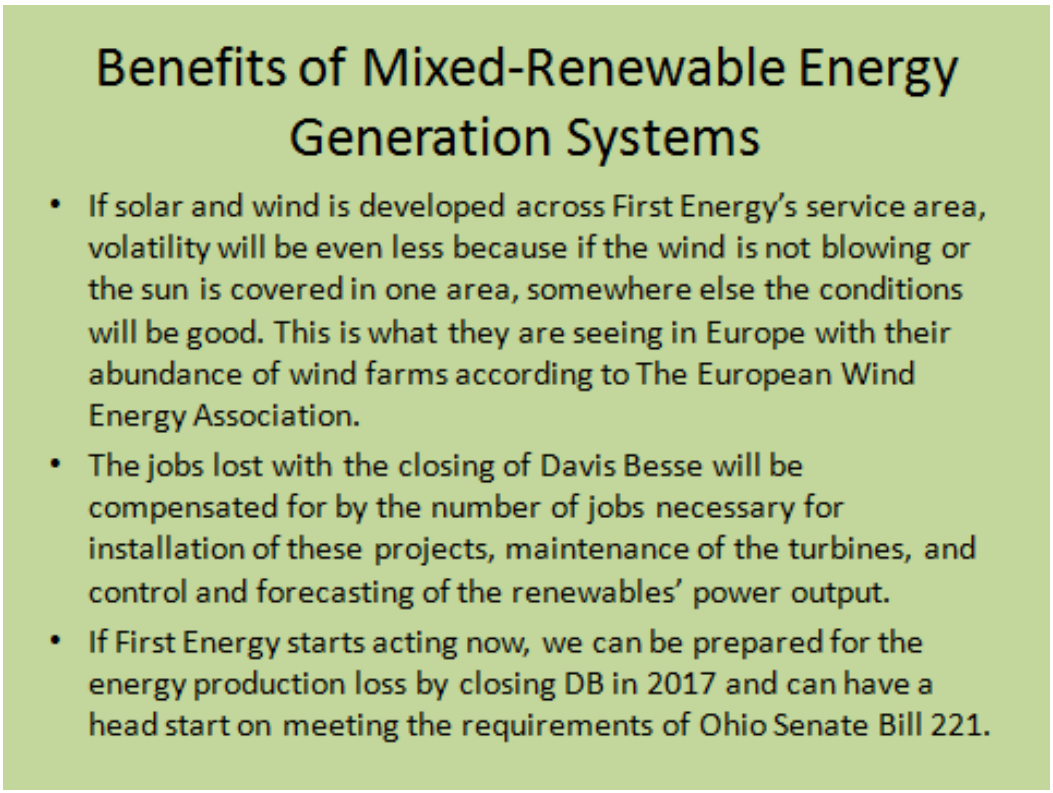

Figure 5 Closing points

It is important to remind here that the work presented here is only based on two specific systems and not a complete representation of a solar or wind farm. If First Energy were to use its resources to install these renewable forms of energy throughout the region that they service, the volatility would be even less. The European Wind Energy Association's annual report put out in November 2010 reported that the intermittency of wind speeds in one location negligibly affects the overall base load that their wind farms produce. When wind is stale in one location, it is blowing in another so the drop in overall production is not seen as great as it is with the one single turbine I studied. The same concept can be applied to solar: when it is a severely overcast day in Toledo, it may be only partly cloudy in Cleveland (Compaan discusses how diffuse light from a cloudy day also produces power, not just direct sunlight). By expanding the area over which the power is produced, the effects of weather changes will not alter the base load as would be expected.

The EWEA report also provided a description of the forecasting which takes place to know what kind of wind speeds to expect. They are able to predict wind speeds 4 hours and up to a whole day even, in advance so they know how to plan for a sharp change. Extensive research and development would be needed in this area, however a mastering could really revolutionize the industry.

In many news articles that are being published about the re-licensing of Davis Besse, they refer back to how many jobs DB provides to the Sandusky area and the economic impact it has. Implementing renewable energy sources such as solar and wind would create hundreds of jobs for each project including planning, licensing, installation, maintenance, research, forecasting and monitoring.

In section 7.2.2.2 of the Environmental Report of the License Renewal Application of Davis Besse, First Energy states that the criteria for analyzing energy alternatives including wind and solar is whether they can provide generation of approximately 910MW of electricity as a base-load supply. This sentence is a contradiction for the fact that 910 MW is the peak production capacity of Davis Besse, however DB only provides 8.3% of all of First Energy's electricity provided, so it is not a base-load. Their analyses are based on the fact that solar alone or wind alone cannot satisfy a base load, but the issue should not be looked at from one form of energy, it is extremely important to understand that their energy will be generated by a combination of all these types and that combination will be optimized to provide the best possible production for the Northwest Ohio area.

Between the two testimonies given at the community hearing on December 18th, 2010, we have negated almost every reason First Energy provided for their dismissal of renewable energy as a suitable replacement of Davis Besse. If more time for gathering of respectable sources would allow, the others could be easily annulled as well. On the basis of these studies, First Energy has no reasonable backing to argue that there are not options available for the replacement of the power lost by the closing of Davis Besse.

References:

1 . EWEA, "Powering Europe: Wind Energy and the Electricity Grid," (2010).

2. Hoepfl Compaan & Solocha, "Comparison of Solar and Wind Power Output and a look at Real-Time Pricing," (2010).