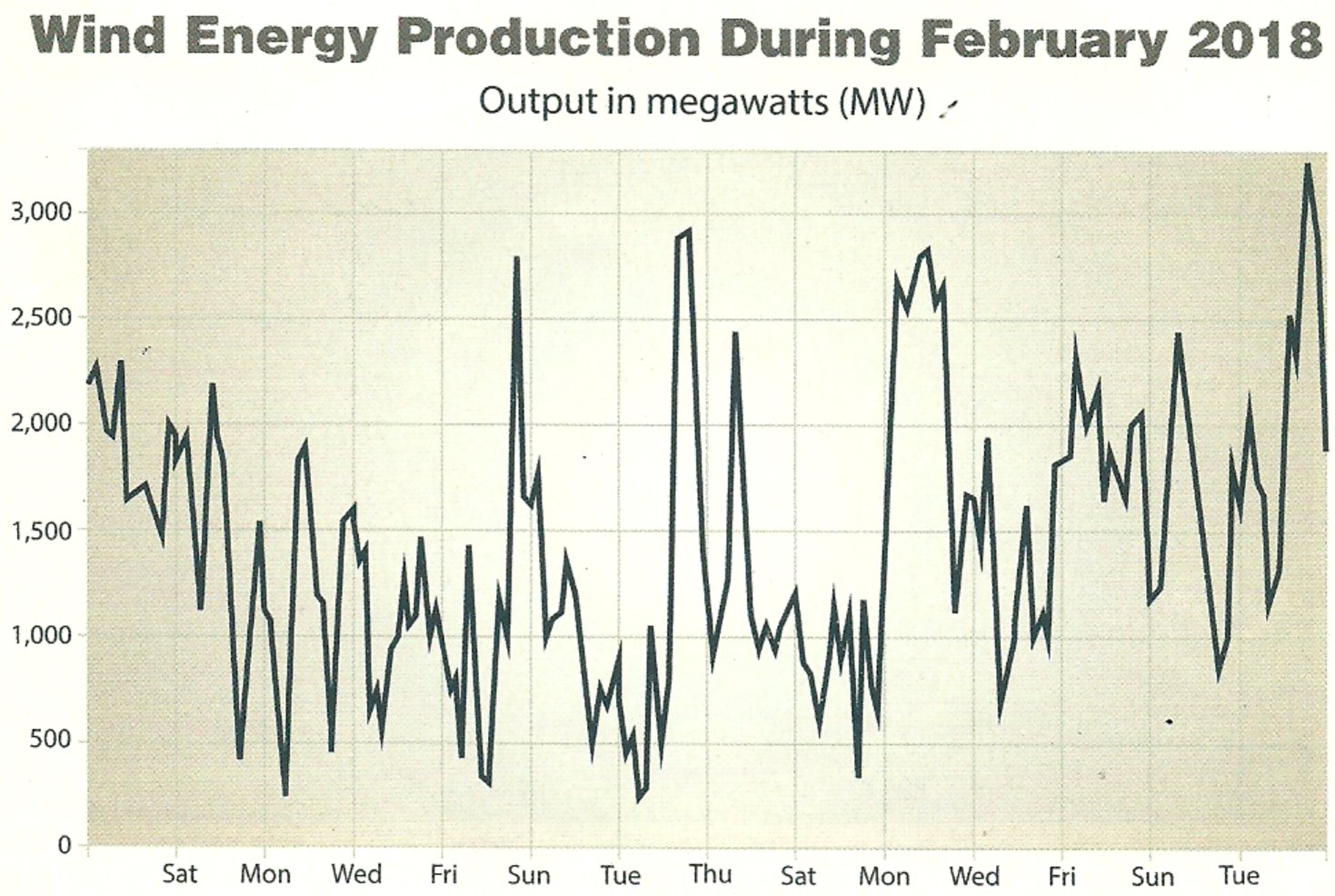
their generating needs based on "peak power," the time of greatest energy demand. In New York, the peak is about 175 percent of the average demand. So using that figure as our base, the country actually needs 1,221,000 new wind generators, not 698,000. These turbines can't be stacked together lest their airflow "cover" the downwind turbines and the turbulence caused by the upwind blades then wreak destruction on the downwind machines. So for omnidirectional wind farms, the recommendation is 10 to 15 diameters of space between the turbines. Using an average value, we need an open area of 2,000 feet by 2,000 feet, or about 92 acres, for each turbine. (Coming from a less-agricultural part of the country, you may not be familiar with acres. An NFL football field is about 1.32 acres — including end zones.)

The total area covered with new wind farms would be 1,221,000 times 92, or 112,332,000 acres. Or 175,518 square miles. This would equal an area greater in size than New York, Pennsylvania, Ohio, New Hampshire, Massachusetts, New Jersey, Delaware, Rhode Island, and Maryland — along with another 77 Districts of Columbia thrown in. (Perish the thought.) Of course, in reality, much more space would be needed than that: Remember we are talking about an area where, unlike the geophysical region specified above, there aren't houses, roads, trees, buildings, parks, or airports — just wall-to-wall wind turbines. Nor does it even include space needed for power lines, transformers, or other switch gear necessary to serve the customers.

What If the Wind Doesn't Blow?

Problem is, Alexandria, after we spend trillions for the wind turbines for the Green New Deal — the nation would be *powerless* if the wind isn't blowing. No wind. No electricity. Wonder what the death toll in the recent record-cold temperatures would have been had there been insufficient energy for heating, lighting, hospitals — because of iced turbine blades?

It is true that the wind is always blowing somewhere, but that somewhere might not be in this country — at least not at the 10 mph needed for our wind turbines. In the summer months a "dome of high pressure" often settles in over the middle of the country. Probably gets pretty sticky in New York, and more so in D.C. — especially when Congress is in session and certain members are contributing large amounts of hot air.



Wind worries: Wind electrical generation is variable and problematic. Shown here is the combined output of 60 wind farms in Australia. In this case, when the output is below 1,500 MW, fossil-fueled generators are called on to provide energy to make up for the loss of wind generation. When output is over 1,500 MW, the reliable generators must stop supplying (paid) energy to the grid and go into a "spinning reserve" mode during which they must keep their boilers or turbines on ready, burning fuel with no compensation.

Since there is little atmospheric pressure differential under this dome (the isobars are far apart), there is nothing to create wind — hence no wind energy generation.

Our mates in Australia have found out a similar lesson the hard way, as we can see on the graph above.

The graph shows the combined output of 60 wind farms in an area just smaller than the United States, clearly showing periods of insufficient wind to maintain the power to run the electrical network.

Maybe if we go to worldwide socialism, we can persuade the people in windy places to give up their energy to make us cool and comfortable or warm and cozy. Oh, we forgot: With socialism, the government can tell everyone what to do. Problem solved.

Energy Storage

We know what you're probably thinking: "If we don't have wind power and it is a cold night, we'll just have to store electricity and use it when we need it. Haven't you people at TNA heard about batteries?"

Yes, when considering energy storage, one's mind jumps immediately to rechargeable batteries that give us starting power for our autos, laptops, toothbrushes — all manner of things. So why not utility power? You may already know this, but when dealing with wind and solar you must determine the period of *autonomy* when the batteries must carry the entire load. This is a function determined not only by the capacity of the batteries, but also by the size of the power source that is required to charge the batteries while taking care of its normal loads. By some estimates it would take 30 to 40 percent additional wind generation to have the capacity to provide energy for immediate use and simultaneously charge backup batteries. But let us generously assume that only a 25-percent reserve charging capacity is needed. To provide that capacity, we'd now need to add an additional 283,000 wind turbines, pushing the total up to around 1,504,000. And of course another state or two.

Battery Storage: Batteries themselves are another problem. A typical car battery stores about 1.2 kWh of usable energy at 12 volts. It has a volume of about one cubic foot. A city of 700,000 requires an average of 1,000 MWh of energy every hour. So