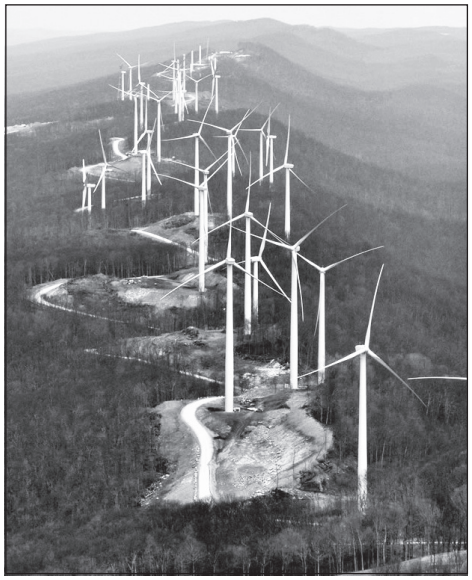
POWER HUNGRY

What's the biggest problem with windmills? The heart-rending sight of Amazon.com drones fluttering helplessly to the ground with your delivery of a Kindle Paperwhite and an infinity scarf. Those 196-foot blades are also a danger to birds, and to humans (how would you like to have to put a tower together or take one apart?), and there's a whole lot of carbon dioxide produced.



Before we explain why that is, let's stop a moment to celebrate the fact that coal is declining as a fuel of choice for power generation. Coal has declined from 55% of the nation's power generation in 1990 to 39% today, mostly because fracking brought down the price of natural gas; and there's been an even faster decline in the number of deaths caused by coal emissions of mercury, lead, arsenic, and fine particulate matter such as sulfur dioxide. Every few years ABT Associates estimates the deaths caused by power-plant emissions of fine particulates; they declined from 24,000 per year in 2004 to "just" 13,000 per year in the United States in 2010, and they're still falling.

Still, that's *more than half a million* coal-related deaths in the last 40 years, which is about how long our 104 nuclear plants have been running. The fatalities that resulted from those 40 years (times 104 plants = 4,160 years) of operation totaled . . . *zero*. United Nations scientists say that there were only 60 deaths at Chernobyl, and you'll be shocked to learn that there weren't any radiation-exposure deaths that resulted from the Fukushima disaster. Look it up! In fact, those nuclear plants would still be running if a diesel generator (responsible for pumping cooling water) hadn't been destroyed by the tsunami.

In the 1980s protests stopped the construction of nuclear plants, causing our nation to burn more coal. The result was that **hundreds of thousands of people were killed in the U.S. alone,** from coal-plant emissions. And carbon dioxide emissions skyrocketed, because coal produces the most carbon dioxide and nuclear produces the least.

The point is that energy policy can go awry, wildly, without anybody noticing. And when it does the effects are **HUGE**.

In the book Power Hungry, author Robert Bryce emphasizes that Americans have no idea of the extraordinary scale of their energy consumption. If you use as a yardstick the London Array—175 very new and powerful Siemens wind towers in the London Estuary that reach almost 500 feet into the sky—coupled with the American Wind Association's estimate that U.S. wind towers produce about 33% of their rated maximum power, you find that you would need **1,093** big new wind towers to match the output of the Seabrook nuclear plant.

Imagine fifty New Hampshire mountaintops, each with 22 turbines that are 500 feet tall . . . And it's actually worse than that, because wind turbines produce lots of power at inconvenient times—and little when you really need it.

The greatest power demand occurs in the middle of the day, especially on those HHH summer days when the AC is running full blast and the wind turbines are barely turning. Along with the 1,093 wind towers we're building to replace Seabrook we're going to need a big industrial park, filled with enough natural-gas-fired power plants to produce all the power that goes missing when the wind dies. We'll buy "peaking" natural-gas plants, which are the kind that sit idle much of the time but quickly fire up to meet "peak" demands for power.

Those peaking plants consume 60% more fuel, and produce 60% more carbon dioxide and pollution, than the big expensive natural-gas plants that run all the time. The big plants are expensive because it takes a lot of additional equipment to reach a high level of efficiency. Nobody can afford that expense for

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a plant that's only going to run a few hours of day, and sit idle for weeks at a time when March roars in like a lion.

If we build a lot of wind towers, we should assume that 67% of "their share" of our power generation is actually going to come from natural gas, mostly from inefficient plants that consume lots of fuel and produce huge amounts of carbon dioxide. Seabrook produces no carbon dioxide and only about 33 tons (two cubic yards) of exhausted fuel rods in an entire year . . . The newest nuclear designs actually burn nuclear waste, and they can't melt down.

We do have kind words for solar power. It's expensive (and you'll need 31 square miles of panels to match Seabrook), but its greatest power output comes in the middle of a hot sunny day. The shade from rooftop panels will cut A/C demand further . . . Passive solar *heat* is a huge gift that northerners have been refusing for decades. All we have to do is make the right decisions, and not get lost in emotion and hype. ■

BLOWING HOT AND COLD

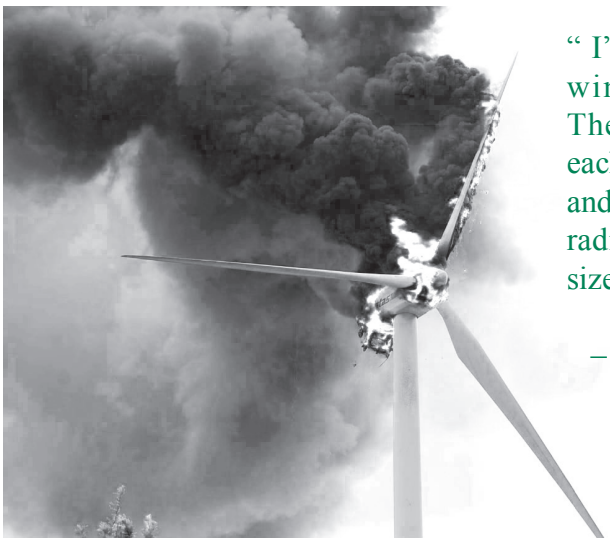
During the Cretaceous and Eocene periods of history, 34 million to 145 million years ago, the ocean temperature in the tropics approached 100 degrees Fahrenheit, and there was little ice to be found anywhere on earth. The last Ice Age, just 12,000 years ago, was so cold that it caused "mass extinction" of animals and plants.

Scientists say that we might still be in the Ice Age, with another glaciation period ahead; or we might be heading back to Jurassic Park. Either way, tinkering with our carbon dioxide output isn't going to make much difference. We'll need to find a way to reduce the amount of sunlight falling on the earth's surface, or cover the polar regions with carbon black so that they absorb more sunlight. Putting windmills on Mount Washington isn't going to help at all. ■

Hybrid cars are better than you imagine—if you need to be dazzled, check out the BMW i8—and we'll make huge strides as we reduce the weight of car and truck bodies with aluminum and carbon-fiber. That means smaller brakes, engines, and other parts, and a few hundred more pounds shed from the vehicle—and another round of smaller brakes, engines, and other parts . . . Future cars really *are* going to get 60 or 70 miles per gallon, and the impact on trucks will be even greater.

The Walmart truck in the photo is mostly made of carbon fiber—which reduced trailer weight alone by 4,000 pounds—and it's shaped to reduce aerodynamic drag by 20%. It has hybrid power and drive trains, and the Capstone turbine can burn diesel, LNG, or compressed natural gas.

They're not yet offering a mileage rating, but a similar effort from Airflow scored 13.4 MPG on a cross-country trip. That's better than a Hummer! The average big rig gets 6 miles per gallon. Walmart has already improved its fleet efficiency by 84% since 2005, and reduced miles driven by locating warehouses closer to metropolitan areas. ■



" I'm not going to have the windmills on my ranch. They're ugly. The hub of each turbine is up 280 feet, and then you have a 120-foot radius on the blade. It's the size of a 40-story building."

– Wind energy proponent
T. Boone Pickens