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Wind Energy Growth Not Just Hot Air

By Debra Hazel

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A wind turbine

Imagine looking out at New York Harbor and seeing vast fields of windmills, helping to power the city. Mayor Michael Bloomberg has. Speaking last month at the 2008 National Clean Energy Summit at the University of Nevada, Las Vegas, Bloomberg announced New York City's plans to develop new sources of renewable energy, which could include the power of air.

"Perhaps companies will want to put wind farms atop our bridges and skyscrapers, or use the enormous potential of powerful off-shore winds miles out in the Atlantic Ocean," Bloomberg said.

Bloomberg's proposal admittedly was just that, one of a group of ideas that also include geothermal energy. And the idea wasn't completely taken seriously in the New York media. But some individual urban buildings around the country are utilizing wind power, and with advancing technology more is possible. In March, Massport installed 20 six-foot building-integrated wind turbines on the roof of the Logan Airport Office Center. Massport says it expects that the wind turbines will provide an annual electrical output of approximately 100,000 kwh and save the Authority \$13,000 annually in utility costs with additional energy savings to be pursued.

The installation of wind turbines increased 45% in 2007, according to the American Wind Energy Association, Washington, DC. The new capacity will generate 16 billion kilowatt hours of energy, enough to power 1.5 million homes. Wind power is currently supplying 48 billion kilowatt-hours (kWh) of electricity annually in the United States, powering the equivalent of over 4.5 million homes.

The growth is being made possible as technology advances. The average wind turbine installed in 2007, at 1.6 megawatts (1.6 MW) of capacity, is twice as powerful as the average wind turbine installed in 2000 (0.76 MW). The largest wind turbines installed in the country, in California and Texas, have a capacity of 3 MW per turbine, the AWEA says.

There are some limitations: Turbines need to be placed in a clear smooth area, and the large windmill-like structures need to be placed a certain distance apart to avoid turbulence that will damage the units. And energy increases exponentially with wind speed--winds of 10 miles per hour produce one unit of energy, but a 20-mph wind will produce eight units. Units must also be placed in the direction of the prevailing wind to achieve maximum productivity.

Thus far, according to the AWEA, the largest users of wind energy are in states with wide, open spaces: Texas (4,356 megawatts) and California (2,439 megawatts). Rounding out the top 15 are: Minnesota, Iowa, Washington, Colorado, Oregon, Illinois, Oklahoma, New Mexico, New York, Kansas, North Dakota, Pennsylvania and Wyoming. Future growth is likely to take place around the United States, with the exception of the Southeast.

"The best wind resources in the United States are in the center of the country--stretching from Texas up through the Dakotas," said Tom Gray, AWEA's director of communications. "These areas are wide open spaces and the winds there are generally strong, consistent and predictable. Good wind resources are being tapped in other regions of the country as well, generating pollution-free, affordable electricity in more than 30 states, including New York, Oregon, Iowa, Colorado, Illinois and Pennsylvania." But new, much smaller turbines can allow individual buildings to generate some of their own power.

"There are approximately 120,000 possible locations viable for wind," says Steve Else, president of Dallas-based BroadStar Wind Systems, an engineering and technology firm specializing in wind power generation. He is also the creator of AeroCam, turbines which use smaller blades placed in a circular structure that can be placed on buildings or even between the larger windmill-like turbines, maximizing current wind farms.

BroadStar is working with JC Penney to install 20 small wind turbines at its 1.6 million-sf distribution

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center in Reno, NV, by November 2008. Should the six-month pilot program work well, the distribution center has room for 70 turbines that can produce 1.4 megawatts if the wind is 20 mph. And Penney could expand the use to up to 200 other locations.

Preparing for days that aren't windy is the challenge. "We can generate very meaningful power, just not all the time," Else explains. "We have to have storage."

The real key to even more growth is to reduce the systems' price and the proliferation of false assumptions about wind turbines. Previous prices of \$6 per watt are too high to be economical, Else says, and in fact should be below \$3 per watt. BroadStar's pricing is \$2.50 per watt. "And we want to make it a quarter of that," he adds.

Another obstacle is environmental, aesthetic and animal rights issues, only a few justified. "There's a lot of disinformation and misinformation about wind turbines," Else enumerates.

For one thing, turbines are not nearly as noisy as people assume, AWEA says: an operating modern wind farm using contemporary turbines is no noisier at a distance of 750 to 1,000 feet than a typical kitchen refrigerator. The same setbacks used to minimize noise pollution to nearby communities also offset any danger from blades throwing off ice. In addition, ice buildup on the turbine will be detected early on because it slows rotation, resulting in a system shutdown. And improved design now prevents blade throws.

Animal rights activists also need not be concerned, according to the AWEA--compared with other human-related activities, large turbines pose a minuscule danger to birds. For every 10,000 birds killed by human activities, less than one is killed by a wind turbine--the greatest cause of death is buildings and windows--bat mortality is on the rise, and is being studied.

Despite the challenges, however, wind is increasingly becoming an alternative being considered--regardless of whether Mayor Bloomberg's vision becomes a reality. "In the UK, there was tremendous resistance," Else says. "But we're going to need everything we can get."

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