

Wind: Beginning Of End Of Oil-Generated Electricity?

By CHARLES W. KLEEKAMP

Abundant wind power, with no fuel cost, is destined to replace the most expensive source of electrical generation—and that is from oil-fueled power plants. Allow me to explain. In New England, unlike the rest of the country, oil-generated electricity plays a large but diminishing role. Almost a quarter of the installed capacity of all power plants here use oil as fuel.

Understanding how electricity is dispatched on the grid is crucial to the explanation. The Independent System Operator called ISO New England, based in Holyoke, is responsible for the reliable operation of the power system by dispatching power plant production and providing a fair wholesale market to sell and buy power.

Dispatch is regulated by a day-ahead hourly bid stack with offers from merchant power plants arranged from lowest bid to highest. The unit of trade is the megawatt-hour (MWh). That's a thousand kilowatt-hours, a unit more familiar to most of us and enough to run a modest home for about two months. As the New England load for each hour is matched with offers, a "clearing price" is established by ISO at the point where the expected load exactly meets that level of offers. All plants offering power below the clearing price are allowed to dispatch (inject) their

power onto the grid. Those above, are not. This assures the lowest cost for all consumers. Since power cannot be stored on the grid, the load must be exquisitely balanced with power dispatched at every moment.

What is not perceived by most of the public is the fact that this so-called "clearing price" is paid to all providers of power that gets dispatched. This means, for example, a power plant owner which offers power at \$40/MWh for a period when the clearing price becomes \$80/MWh, that owner will be paid \$80/MWh as will all others whose power is dispatched.

Six years ago the cost of oil and natural gas were roughly equivalent in price per unit of energy, with coal at about half that. Since then, oil and gas have dramatically increased by a factor of roughly four with respect to the price of coal. Knowing the efficiency of generating plants one can calculate the cost of fuel alone to generate electric power. For oil-fueled plants it's now at least \$93/MWh. For modern natural gas plants, about \$48/MWh. And for coal plants, approximately \$18/MWh. It's obvious who's making the most profit and who is being squeezed.

The impact of more costly oil has been to dramatically diminish production from the region's large oil-generating plants. For example, the

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oil-fired Mirant Canal Plant in Sandwich (1,120 MW) had a capacity factor (actual production divided by maximum possible production) of 58 percent in the late 1990s, consuming some 8 million barrels of oil a year and producing around 6 million MWh. Incidentally, that oil consumption rate is equivalent to almost two days' production of all the oil wells in the continental United States for this one power plant in our back yard.

However, last year the canal plant, the third largest in Massachusetts, was operating at a capacity factor of only about 17 percent producing some 1.7 million MWh by consuming about 2.3 million barrels of oil (96 million gallons). Compared to the expected output of the Cape Wind project of 1.6 million MWh one wonders if the canal plant could simply be replaced.

Further north, at the Salem

Harbor plant, the fifth largest in the state, where its oil-fired Unit #4 (436 MW), which is bigger than all three of its coal units combined, was down to a capacity factor of just five percent. And most surprising, the oil-fired Unit #4 (446 MW), at Brayton Point, the second-largest plant in the state, was down to 1 percent. It is simply turned off most of the year. Currently, coal profitably fuels the other three units at both those power plants.

Of course, for wind and hydro plants, the cost of fuel is zero. By ISO rules these zero cost fuel generators can bid in at the bottom of the stack, hence are always dispatched. And when they are, they bump from the top the most expensive bids, which are almost always from the oil-fueled power plants, and next, from natural gas units. This saves all consumers money by lowering the clearing price of wholesale electricity while providing a competitive return, which is the "clearing

price" to wind and hydro plants. Savings for the New England region from the Cape Wind project alone could be some \$50 million a year.

For a nation addicted to oil, the importance of the impact of utility scale wind power on national security, energy independence, and sustainability cannot be overlooked as it replaces imported oil first and then natural gas. Certainly 20 percent of New England's electricity can be reasonably generated from wind. The avoidance of a million tons of carbon dioxide from oil burners by the Cape Wind project alone, in addition to thousands of tons of unhealthy sulfur and nitrogen oxides, is reason to be optimistic about the future of offshore wind in New England.

As this flagship project leads the way to more offshore projects in Massachusetts and Rhode Island, I believe it will be not only the beginning of the end, but the

coup de grâce of base-load oil generation.

By the way, the canal plant is for sale, along with the rest of Mirant's plants.

(Charles W. Kleekamp, Professional Engineer, ret., is vice president of Clean Power Now.)

Clean Power Now is a nonprofit volunteer organization that informs citizens and empowers them to support viable renewable energy projects and policies, and to secure their local and regional benefits. More information is at cleanpowernow.org.