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Date: 7/11/2013 5:53 PM
Subject: Q&A on Offshore Wind
Attachments: Offshore Wind Q&A.docx

Dear Stacey & Brian:

I enclose our response to the suggestion that offshore wind power can be a substitute for the repowering of the BL England facility.

As discussed, please provide us with the list of follow-up questions and/or information needs arising from the last P&I Committee meeting.

Best regards,

Pete

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Q: Is offshore wind energy an alternative to repowering BL England with natural gas?

A: No. Near-term development of offshore wind energy in New Jersey is presently uncertain in the absence of regulations providing a financial compensation mechanism to induce private investment in this more expensive source of electricity. *More importantly, the successful development of offshore wind power in New Jersey will require additional back-up power from readily dispatchable generation sources like a repowered BL England.* Because electricity supply must always meet electricity demand substantial penetration of variable electricity sources like wind and solar power must be supported with adequate spinning reserves to meet demand when the wind and/or sun is not available. Combined cycle natural gas technology—such as that proposed for repowering the BL England plant—is the only currently available generation technology capable of providing rapid power to balance load. Countless studies by grid operators, energy consultants, and various federal and state agencies all conclude that significant penetration of wind power is not feasible without adequate, readily dispatchable reserve power to balance electricity supply when the wind is not blowing. *See* Trembath, A., Luke, M., Schellenberger, M. & Nordhaus, T., *Coal Killer: How Natural Gas Fuels the Clean Energy Revolution*, June 2013, pp. 28-29, at http://thebreakthrough.org/images/main_image/Breakthrough_Institute_Coal_Killer.pdf; ISO New England, *New England Wind Integration Study*, Dec. 2010, p. 21, at http://www.uwig.org/newis_es.pdf; National Renewable Energy Laboratory, *Operating Reserves and Wind Power Integration: An International Comparison,* Oct. 2010, http://www.nrel.gov/docs/fy11osti/49019.pdf; Rigos, D., Shapiro B., Levitan, R., *Leaning on Line Pack Green energy mandates might overburden gas pipelines,* Public Utilities Fortnightly, Jan. 2011 at http://www.levitan.com/wp-content/uploads/2012/10/PUFLinePack1_11_11.pdf. This consistent finding again was confirmed by very recent Princeton University modeling of large scale wind development off the Mid-Atlantic coast which finds that the difficulty in forecasting "precipitous drops in wind in the hour-ahead time frame [will] require additional spinning reserves, namely, the ability to ramp up (or down) a significant amount of (fast) generation within a relatively short period of time (say, 10 min)." Simao, H. & Powell W., *SMART-ISO: Modeling Uncertainty in the Electricity Markets,* Princeton University Laboratory for Energy Systems Analysis, Presentation to Federal Energy Regulatory Commission, Staff Technical Conference, June 2013, at www.ferc.gov/EventCalendar/Files/20130625081929-T1A_Simao.pdf. Therefore, contrary to popular statements that offshore wind power can replace the need for a repowered BL England, in fact, a repowered BL England will be essential to the successful deployment of offshore wind energy in our state. The synergy between natural gas powered electricity and renewable electricity recently was explained recently by the progressive think-tank, Breakthrough Institute:

> Gas-fired power provides cheap, low-carbon, and flexible backup support for intermittent wind and solar. Grid operators depend on reliable power production from power plant operators to match grid supply and demand and ensure consistent price signals. As intermittent renewables — particularly wind — continue to occupy a greater share of the nation's electricity output, power system operators will need to increasingly rely on capacities of backup and firming power. Natural gas–fired power plants offer the best currently available solution.

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> Natural gas power — and particularly power from natural gas combined cycle (NGCC) plants — provides a readily substitutable alternative to baseload and older load-following coal plants. Flexible gas plants provide support for electric power grids that are increasingly occupied by intermittent wind and solar. A study from researchers at Carnegie Mellon University suggests that for every 4 MW of wind capacity, 3 MW of NGCC capacity will be needed to operate the grid reliably. The expansion of gas-fired power plants could accelerate the integration of intermittent power into existing grid systems. New natural gas plants have ramping rates of approximately 8 percent per minute and can reduce their output to 80 percent capacity with minimal heat rate penalty. New NGCC plants that are specifically designed to offer flexibility to a renewables-heavy grid system can ramp to 150 MW in 10 minutes and to full load in 30 minutes. General Electric's new fleet of gas-fired power plants is designed to optimize integration with variable power sources and can ramp as fast as 100 MW per minute. Modeling efforts at the National Renewable Energy Laboratory (NREL) find that "large quantities of variable renewable energy and flexible gas generation work synergistically to maintain system reliability requirements."

Trembath, et al., *Coal Killer: How Natural Gas Fuels the Clean Energy Revolution.*