

Iowa Stored Energy Park¹

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The following information about the Iowa Stored Energy Park is largely adapted from the Executive Summary of the Market Feasibility Assessment conducted by Paul D. Reising, P.E. of Reising & Reising, Inc.

The Iowa Stored Energy Park (the “Park”) as contemplated by the Park developers is expected to provide an alternative technology for electric power generation consisting of a compressed air storage cycle and an electric generation cycle. It is contemplated that air will be compressed into an aquifer during off-peak hours and stored underground. Stored, compressed air will be released during on-peak periods to assist in energy delivery and improve the efficiency of electric generation and of the transmission system.

The concept is that energy needed to compress and store air will be purchased from regional energy markets, wind farms, or other sources during off-peak hours when market prices are low. Electric energy will be generated during peak periods when revenues from sales into regional energy markets or sales to other buyers would be high. By operating in this fashion, it is anticipated that the Park would produce a net revenue stream sufficient to cover all of the fixed costs of ownership and costs of operation of the Park while providing intermediate capacity and energy competitively with conventional technologies such as combined cycle generation facilities and simple-cycle combustion turbine generating units.

The primary technical attributes of the Park² include the following:

- Plant consists of two Dresser-Rand units with high-pressure and low-pressure expanders³ each having a net generating capability of 134 MW
- The compressors and expanders are in separate trains with a dedicated conventional generator driven by each expander train
- The compressors consist of 4 low and high pressure compressor pairs each driven by a dedicated electric motor
- No wind generation at the plant site is included⁴
- Generation meets NOx emissions control requirements by using selective catalytic reduction (“SCR”) technology
- Development start date: 3rd Quarter 2007
- Projected Park Commercial Operation Date: 2nd Quarter 2012
- Park auxiliary power requirement – 4 MW
- Total Park generating capability – 268 MW
- Gross power requirement for each of four compressor trains – 50 MW
- Net heat rate (HHV) – 4,500 Btu/kWh
- Energy Ratio – 0.75⁵ kWh to compressors per kWh delivered from storage
- Plant storage capacity is designed for a 5 day by 16 hr/day generating cycle with a 5 day by 8 hour plus a 2 day by 24 hour compression cycle

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² Source: Technical Parameters Provided by Electricity and Air Storage Enterprises, LLC (“EASE”).

³ Facility design is similar to the McIntosh Plant, a compressed air energy storage generating facility operated by the Alabama Electric Cooperative.

⁴ Prior Park studies assumed that the CAES facility would be integrated with wind generation facilities that would be constructed in conjunction with the CAES facility. The current study examines the feasibility of the CAES facility as a stand-alone Park. Wind energy would be connected via the grid.

⁵ Energy ratio is defined as kWh compression/kWh generation.

- Maximum working air storage capacity – 10,304 MWH Compression (13,738 MWh continuous Generation)
- Weekly air storage utilization – 16,192 MWH Compression (21,589 MWh weekly peak period Generation)

More detailed descriptions of the technical details and attributes of the Park can be found in prior studies commissioned by the Iowa Association of Municipal Utilities.⁶

The market feasibility assessment consists of a 30-year life-of-unit analysis of the net present value of the Park as a merchant facility and a resource portfolio assessment comparing the operating costs and characteristics of the Park to those of competing technologies. The Park net present value analysis estimates the annual revenue stream resulting from sales of Park generation output into the regional energy market and the annual Park operating and ownership costs, including the cost of energy purchased from the regional energy market for air compression and storage. The resource portfolio analysis examines the annual fixed and variable costs of the Park compared to the annual fixed and variable costs of a comparably sized combined cycle generating facility and a comparably sized simple-cycle combustion turbine generating facility.

The Park is estimated to yield a positive net margin on sales of capacity, energy and ancillary services having a discounted net present value of approximately \$187 million.

On the basis of the assumptions underlying the Base Case, the Park would compare favorably against the competing resource types.

⁶ “Conceptual Design and Preliminary Capital Cost Estimate,” Burns & McDonnell, November 2003. “ISEP Economic Feasibility Analysis,” Black & Veatch Corporation, March 2005.