

# No Fuel Compressed Air Energy Storage Plants Applied to Enhancing the Utilization of Renewable Generation Resources

Dr. Robert B. Schainker<sup>1</sup> and Sebastian Freund<sup>2</sup>

<sup>1</sup>EPRI in Palo Alto CA (USA); <sup>2</sup>General Electric in Garching b. Muenchen (Germany)

## ABSTRACT

A new type of Compressed Air Energy Storage plant which uses no fuel (i.e., an Advanced Adiabatic CAES plant) is described (Figure 1), highlighting thermodynamic engineering trade-off analyses used to finalize a plant design that has low capital cost and high performance metrics when applied to better utilizing and enhancing the use of renewable generation resources. In this type of plant, low cost (e.g., off-peak kWh) electricity is used to compress air into an above or below ground air storage system, which produces heat that is stored and later used to generate on-peak electricity. This paper/poster also describes the ISO/RTO economic benefits (Figure 2) of an adiabatic CAES plant to smooth out the intermittency and fluctuating power from renewable generation resources. The paper concludes with a brief description of on-going efforts of Canada's HydroOne and Germany's RWE utilities to build utility scale pilot plants demonstrating the operating and capital costs of adiabatic CAES plants.

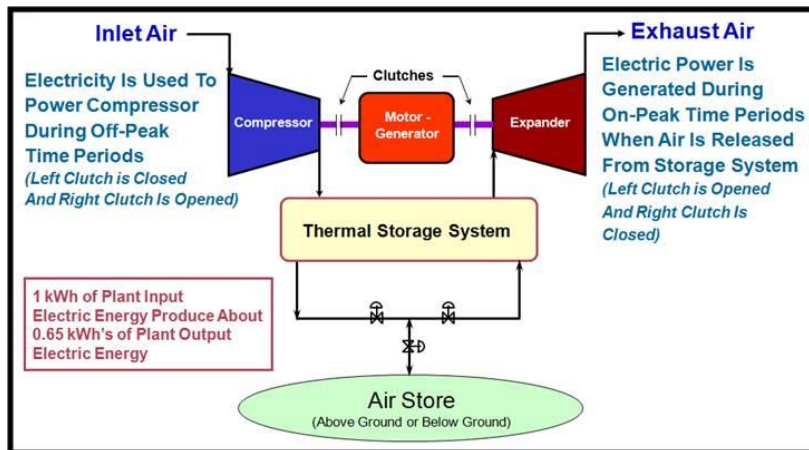


Figure 1: Simplified Schematic of No-Fuel Adiabatic CAES Plant

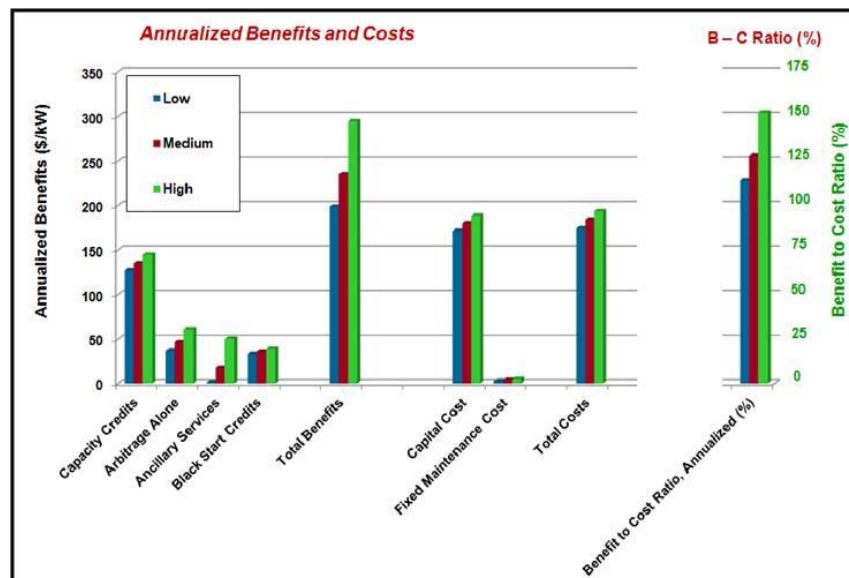


Figure 2: Benefits and Costs for Deploying Adiabatic CAES Plant: Preliminary Results