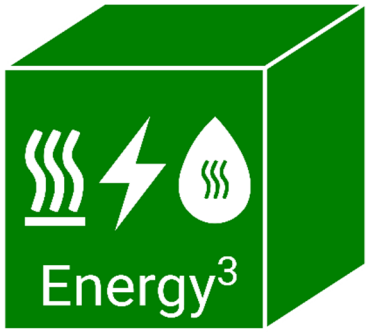
Energy^3 : A thermal energy storage system to reduce the cost of large-scale energy generation.



Application

The Energy^3 is a modular thermal energy storage system capable of storing 40 MWh in a 40 foot shipping container and is charged using electricity.

Benefits

- This 40 MWh of thermal energy can be extracted as heat and hot water, or electricity if coupled with a gas or steam turbine.
- Can be integrated with district heating schemes to provide heating and hot water.
- The Energy^3 can reduce the fuel costs of combined-cycle gas turbine operators by storing electricity when inexpensive and providing heat, in the place of fuel, when generation is required.
- This upgrade results in further emission reductions.
- Can retrofit existing combined-cycle gas turbines and steam turbines in increments of 40 MWh with simple modifications to combustion systems.
- Competing electrochemical energy storage systems that provide electricity have limited lifetimes (approximately 10 years). The thermal energy storage system is predicted to last 25 - 100 years.

Technical Details

- The core of the Energy^3 has an energy density over 800 kWh/m^3 exceeding existing electrochemical technologies.
- Excellent thermal insulation with a maximum energy loss of 220 kWh per day, (less than 0.6% per day).
- Response time to produce electricity can range from 15 mins with a gas turbine to 45 mins with a steam turbine. Chargeable in 30 mins with a 67 MW connection.
- Electricity generation efficiencies up to 62% due to high temperature storage.

Technology

The Energy^3 is heated up to 900°C. A unique insulation structure ensures that so little heat escapes that the surface is safe to touch. Heat is extracted by a solid-to-gas heat exchanger. When needed, the heat from the Energy^3 drives a turbine and generator to produce electricity.

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