Claims

1. A hybrid storage system for a cooling system, the hybrid energy storage system comprising:

a thermal storage system;

said thermal storage system arranged to provide cold energy to a cooling medium of the cooling systems so as to generate chilled water, and;

an energy storage system;

wherein said thermal and energy storage systems are arranged to operate cooperatively such that as the thermal storage system is arranged to discharge energy for demand variability, the energy storage system is arranged to discharge said demand during a time lag until the thermal storage system to fully meet said demand..

2. The hybrid storage system according to claim 1, wherein the hybrid storage system is arranged to be activated by a signal, said signal indicating any one of grid frequency lower than nominal, an intermittency of a mains electricity supply or a cut-off of the mains electricity supply.

3. The hybrid storage system according to claim 2, wherein the thermal storage system is arranged to increase production of chilled water upon activation, further including chillers that are arranged to progressively reduce chilled water

production, and further that a cumulative volume of chilled water generated by the thermal storage system and the chillers is equal to an end user demand.

4. The hybrid storage system according to claim 1, wherein the energy storage system is arranged to maintain at a state of charge at idle state according to a predetermined support time during reserve service.

5. The hybrid storage system according to claim 4, wherein the state of charge is 50%, 75% or 100%.

6. The hybrid storage system according to any one of claims 1 to 5, wherein the thermal storage system includes an ice tank for a district cooling system.

7. The hybrid storage system according to any one of claims 1 to 6, wherein the energy storage system includes a battery, having a battery controller for managing a discharge and re-charge of said battery.

8. The hybrid storage system according to any one of claims 1 to 7, further including at least one isolation transformer arranged to selectively electrically isolate the energy storage system from a grid supply.

9. The hybrid storage system according to claim 7, when claim 7 is dependent upon claim 2, wherein the battery controller includes an uninterruptable power supply

system arranged to continue operation in the event of the main electricity supply being lost.

10. The hybrid storage system according to claim 8, when claim 8 is dependent upon claim 7 and claim 7 is dependent upon 2, wherein the battery controller includes an uninterruptable power supply system arranged to continue operation in the event of the main electricity supply being lost.

11. A method of supplying energy for a cooling system by a hybrid storage system, the method comprising the steps of:
discharging cold energy, and so generating chilled water for demand variability by a thermal storage system, and;
simultaneously discharging power for said demand by an energy storage system during a time lag until the thermal storage system to fully meet said demand.

12. The method according to claim 10, further including the steps of:
the thermal storage system increasing production of chilled water upon activation by a signal;
providing chillers, said chillers progressively reducing chilled water production, such that a cumulative volume of chilled water generated by the thermal storage system and the chillers is equal to an end user demand.

13. The method according to any one of claims 10 to 11, further including the steps, prior to the discharging steps, of:

detecting a fall in grid frequency below a pre-determined value, and;

sending an activation signal to the hybrid energy storage system.

14. The method according to claim 11 or 12, wherein the progressively reducing step includes the step of progressively shutting down each chiller, so as to progressively reduce demand by the electrical power requirement of each chiller.

15. A method of control for an integrated cooling network comprising:

receiving a predictive analysis of future demand;

determining strategies for a discharge and recharge of a thermal storage system so as to optimize timing of either action relative to the predictive analysis; and

monitoring and controlling a discharge of an energy storage system so as to ensure an availability of energy for discharge by the energy system according to predictive analysis of future demand.