

# **Ice Thermal Energy Storage (ITES) for air-conditioning application in full and partial load operating modes**

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## **Abstract**

One method for reducing electricity consumption in an air-conditioning (AC) system is using ice thermal energy storage (ITES) system. ITES systems are divided into two categories, full and partial operating modes (FOM and POM). In this study, an AC with ITES system is first modeled and analyzed in energy, exergy, economic and environmental (4E) aspects in two full and partial load operating modes. Multi-objective optimization technique and Genetic Algorithm were used for computing the optimum 2 values of design parameters. Exergy efficiency and total annual cost were considered as two objective functions in multi-objective optimization. The comparison of ITES system in full and partial operating modes with that for traditional system showed reduction in electricity consumption (11.83% for FOM and 10.23% for POM) due to the fact that ITES system produced just as much as cooling load was required. Additionally switching electricity consumption from on-peak to off-peak hours caused a reduction in electricity consumption cost (32.65% for FOM and 13.45% for POM).

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