

**EVALUATION OF THE ECONOMIC BENEFITS OF
SHIFTING AIR CONDITIONING LOADS FROM
EVENING AND DAY PEAKS TO OFF PEAK HOURS**

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149290U

Degree of Master of Science

Department of Electrical Engineering

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree
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DECLARATION OF THE CANDIDATE & SUPERVISORS

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(Eng. Chandana N. Dalugoda)

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ABSTRACT

With the development of industries and changes in living standards of the society, demand for electricity is rapidly increasing in every year. In order to maintain the demand supply balance and to provide uninterrupted supply, utility has to supply the electricity demand in the most economical way. Building new power plants is not always the most economical solution. The trend now, is towards reducing and controlling the demand through Demand Side Management (DSM) techniques which is almost always an economical and environment-friendly solution.

In this thesis, Heating, Ventilation and Air Conditioning (HVAC) system of Cinnamon Lakeside Hotel is analyzed to identify the potential DSM options that can be implemented. Thermal Energy Storage (TES) was selected as the DSM option to store cooling load in off-peak hours of the day and use it in peak and day hours of the day. Technical viability and potential saving that can be achieved through TES in hotel sector of Sri Lanka is further analyzed.

Benefits of Thermal Energy Storage systems to the industry and to the utility is separately analyzed in this study.

The conclusion of the thesis is that Thermal Energy Storage technology is a viable DSM method for the hotel industry in Sri Lanka. It is the responsibility of the Government and the Utility to promote DSM methods to its customers and motivate them to invest.

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LIST OF ABBREVIATIONS

Abbreviation	Description
BST	Bulk Supply Tariff
CEB	Ceylon Electricity Board
COP	Coefficient of Performance
CWS	Chilled Water Storage
DSM	Demand Side Management
FOM	Figure of Merit
GP	General Purpose
GV	Government
H	Hotel
HVAC	Heating Ventilation and Air Conditioning
I	Industrial
IPP	Independent Power Producer
IRR	Internal Rate of Return
kVA	kilovolt Ampere
kW _e	kilowatt (electrical)
kWh _e	kilowatt hour (electrical)
kWh _R	kilowatt hour (cooling)
MW	Megawatt
PUCSL	Public Utilities Commission of Sri Lanka
TR	Ton of Refrigeration
TRh	Ton of Refrigeration hour
SPP	Small Power Producer
TES	Thermal Energy Storage
TOU	Time of Use