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Menoufiya University

Faculty of Engineering at Shebein El Kom

Electrical Engineering Department

LOAD MANAGEMENT EFFECTS ON LOAD PROFILE FOR ELECTRICAL POWER SYSTEMS

A Thesis submitted by

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For the Award of Master of Science Degree in

Electrical Engineering

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ABSTRACT

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In the last years, the growing electricity demands for the large industrial customers resulted in the increase of the total electricity demand during the power system peak load period.

Demand Side Management (DSM) is used to make changes in utility's load shape in order to achieve a balance between the utility's power capacities and customer needs, while taking into account the economic considerations.

There are five strategies of load shape objectives; peak clipping, valley filling, load shifting, load building and strategic conservation. Industrial load management (ILM) involves the use of any or a combination of the listed first four objectives.

The target of this thesis is to evaluate the potential and impacts of load management when applied at large industrial customers representing different industrial subsectors in Egypt.

The thesis starts with a review of the previous studies on the load management theory, impacts and applications.

A full analysis of the Egyptian power system load profile during the period 1998-2001 is presented. This analysis takes in account the monthly, seasonal, day type and hourly variations.

The potential of peak clipping and load shifting for the large industrial customers supplied at extra-high voltage (EHV) and high voltage (HV) levels is evaluated.

In addition, the impacts of the employed ILM techniques on the power system load profile are provided.

Lastly, the economic evaluation of the ILM applications in terms of the avoided capacity costs, avoided energy costs, energy saving, fuel saving and total financial saving is presented.

Based on the contents of this thesis, the following paper has been published:

Sh. A. Mahmoud, Abo El-Ela and S. El-Sheikh, "Potential and impacts of industrial load management in Egypt", 40th International University Power Engineering Conferenence (UPEC'2005), cork, Ireland, Sept. 2005.

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