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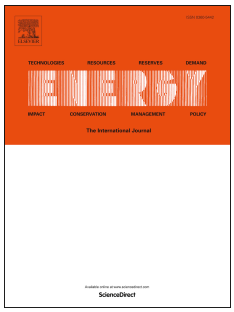

Exploratory data analysis of the electrical energy demand in the time domain in Greece

Hristos Tyralis, Georgios Karakatsanis, Katerina Tzouka, Nikos Mamassis

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Exploratory data analysis of the electrical energy demand in the time domain in Greece

Hristos Tyralis*, Georgios Karakatsanis, Katerina Tzouka, Nikos Mamassis

* Department of Water Resources and Environmental Engineering, School of Civil Engineering, National Technical University of Athens, Iroon Polythechniou 5, GR-157 80 Zografou, Greece, (montchrister@gmail.com)

Abstract: The electrical energy demand (EED) in Greece for the time period 2002-2016 is investigated. The aim of the study is to introduce a framework for the exploratory data analysis (EDA) of the EED in the time domain. To this end, the EED at the hourly, daily, seasonal and annual time scale along with the mean daily temperature and the Gross Domestic Product (GDP) of Greece are visualized. The forecast of the EED provided by the Greek Independent Power Transmission Operator (IPTO) is also visualized and is compared with the actual EED. Furthermore, the EED pricing system is visualized. The results of the study in general confirm and summarize the conclusions of previous relevant studies in Greece, each one treating a single topic and covering shorter and earlier time periods. Furthermore, some unexpected patterns are observed, which if not considered carefully could result to dubious models. Therefore, it is shown that the EDA of the EED in the time domain coupled with weather-, climate-related and socio-economic variables is essential for the building of a model for the short-, medium- and long-term EED forecasting, something not highlighted in the literature.

Keywords: electrical energy demand; energy forecasting; exploratory data analysis; Greece; Gross Domestic Product; temperature

1. Introduction

1.1 Electrical energy demand forecasting

Electrical Energy Demand (EED) forecasting regards the prediction of hourly, daily, weekly, monthly, and annual values of the system demand and peak demand [1]. EED forecasts are classified into three categories, according to the horizon of the forecast. Short-term forecasts usually range from one hour to one week, medium-term forecasts usually range from one week to one year, and long-term forecasts are usually applied to time intervals longer than a year [2], albeit in the absence of a standard the time intervals may differ [3]. The short-term variation of the EED seems to depend mostly on