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

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1 Exploratory data analysis of the electrical energy demand in the time 2 domain in Greece

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

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

23 1. Introduction

24 1.1 Electrical energy demand forecasting

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

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