

# Project Report

## *Forecasting Electricity Consumption By A Model Of Transfer Function In Time Series Analysis*

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## Abstract

The study aimed at modeling and predicting electricity consumption in the city of Sanabria in Spain using transfer function Model in time series analysis. Forecasting procedures performed by several stages, namely: identification, pre-whitening, the cross-correlation calculation, weighting impulse response, determining the value of  $(b, m, l)$  and noise, parameter estimation, diagnostic checking and forecasting. Using a secondary data of over 100 months data of electricity consumption and temperature, a transfer model is estimated using time series analysis.

## 1 Introduction

Transfer function is a model describing the future prediction value of a time series(output series) based on the past values from one or more interconnected time series(input series). The scope of analyzing transfer model includes but not limited to identification, estimation, diagnostic checking of the model and forecasting. Forecasting electricity demand and consumption accurately is critical to the optimal and cost-effective operation system, providing a competitive advantage to companies. Of paramount importance in energy planning, management and sustainability is the ability to make accurate power forecasting for electrical consumption. The variation in electricity demand depends upon various parameters, such as the effect of the temperature, social activities, holidays, the working environment, and so on. The selection of improper forecasting methods and data can lead to huge variations and mislead the power system operators. This project presents a study of electricity consumption and its relation to the temperature by examining through a time series transfer model the case of a consumer distribution center in Puebla de Sanabria, small town located in the north-western part of the province of Zamora in Spain.

## 2 The Data

The data set contains 10 years(1997–2006) of electricity consumption(in Kwh) and temperature(in degrees celsius) for the city of Sanabria in Spain. The data is available at Kaggle where electricity consumption was retrieved from Entsoe a public for transmission Service operator(TSO) data and temperature from Open Weather API. The data set has 114 observations.