# Long term load forecasting in power system

What is long-term load forecasting?
Long-term load forecasting focuses on system planning and optimization,helping utilities to make decisions about where to invest in new power generation capacity and how to balance different sources of energy,such as renewable energy and traditional fossil fuels. Load forecasting methods begin with historical load data collection.

Should we implement long-term load forecasting for future power generation?
It is strongly recommendedto implement effective long-term load forecasting for future power generation in the new architecture of the smart grid and buildings.

What is long-term load forecast (LTLF)?
Long-term load forecast (LTLF): The time-period of LTLF is few years (>1 year) to 10-20 years ahead. LTLF aims at system expansion planning, i.e. generation, transmission and distribution. In some cases, it also affects the purchase of new generating units.

What are the challenges of long-term electricity load forecasting?
(Chandramowli and Felder 2014) structures the challenges of long-term electricity load forecasting in three dimensions: 1) the scope (which technological and economic factors to include), 2) the spatial and temporal scale (which scale to choose), and 3) the uncertainties (which extent to account for long-term and short-term uncertainties).

How do you forecast the long-term electricity load?
Methodologies for forecasting the long-term electricity load are generally based on extrapolating today's load profileas seen in the EEX,Nasdaq or other power market exchange,see e.g. (50Hertz et al.,2014; Bøhnsdalen et al.,2016; Pillai et al.,2014; Västermark et al.,2015).

What is electric load forecasting?
According to (Hernandez et al., 2014), electric load forecasting can be classified according to the period of time to be predicted. Unlike short-term load forecasting, long-term load forecasting must take long-term trends into account in addition to short-term variabilities - a complex task.

Load forecasting can be classified as short-term (intraday and day-ahead), medium-term (one week to several months ahead), or long-term (one or more years). This report highlights best practices (summarized in . Table ES 1) for enhanced load modeling and forecasting for long-term power sector planning. The best practices touch on stakeholder ...

1 INTRODUCTION. The efficacy of a power management system relies heavily on accurate long-term load

forecasts, which are crucial for devising operational strategies, ensuring system stability, and achieving a harmonious equilibrium between power generation and ...

The main and pivot part of electric companies is the load forecasting. Decision-makers and think tank of power sectors should forecast the future need of electr ... Load Forecasting Techniques for Power System: Research Challenges and Survey Abstract: The main and pivot part of electric companies is the load forecasting. Decision-makers and ...

o Long-term load forecast is an important factor in: -Determining region"s resource adequacy requirements for future years -Evaluating reliability and economic performance of electric power system under various conditions -Planning needed transmission improvements

Long-term models covering the power sector must take better account of the interaction between the power sector and other parts of the energy system, such as the building and transport sector, to enable more accurate load forecasting.

Power load is affected by many factors, so accurate forecasting is more difficult, and the current methods are mostly aimed at short-term power load forecasting problems. There is no good method for long-term power load forecasting problems.

The growing success of smart grids (SGs) is driving increased interest in load forecasting (LF) as accurate predictions of energy demand are crucial for ensuring the reliability, stability, and efficiency of SGs. LF techniques aid SGs in making decisions related to power operation and planning upgrades, and can help provide efficient and reliable power services at ...

The accurate forecasting of short-term load plays a significant role in power systems operation and planning. This paper suggests a short-term load forecasting model combining Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM). The developed CNN-LSTM aims to capture both spatial and temporal dependencies within the load data, leveraging the strengths ...

The estimation of load in advance is commonly known as load forecasting. Power system expansion planning starts with a forecast of anticipated future load requirement. The estimation of both demand and energy requirement is crucial to an effective system planning. ... Long term load forecasting is done for one to five years in advance in order ...

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In power system planning, long-term load forecasting (more than a year ahead) is used (Khator and Leung Citation 1997). Rest of the paper is arranged as: Section 2 presents the materials and methods. Results are

discussed in section 3 and discussion is made in section 4. Conclusions are discussed in section 5.

Energy forecasting covers a wide range of prediction problems in the utility industry, such as forecasting demand, generation, price, and power load over time horizons and different power levels. Short-term load forecasting allows the system operator to make important decisions during network management and planning, which represents an ...

Accurate load forecasting can provide important information support for intelligent operation of power systems, it can assist the power grid to deploy production plans in advance to uphold the equilibrium between the supply and demand for electrical power, or plan investment strategies based on the results of the forecast. Nonlinear Spiking Neural P (NSNP) system [1] ...

Artificial Neural Network and Adaptive Neuro-Fuzzy Inference System models were used to analyse data collection obtained from the Metrological Department of Malaysia for long-term load forecasting and showed that the results for ANFIS produced much more accurate results compared to ANN. Load forecasting is very important for planning and operation in ...

Load forecasting has always been an important part in the planning and operation of electric utilities, i.e. both transmission and distribution companies. With technological advancement, change in economic condition and many other factors (to be discussed in this work), load forecasting is becoming more important. The forecast affects as well as gets ...

However, due to its stochastic and uncertainty characteristics, it has been one challenging problem for electrical utilities to accurately forecast future load demand. This study aims at reviewing the different load forecasting techniques developed for the mid- and long-term horizons of electrical power systems.

Electrical load forecasting plays a crucial role in planning and operating power plants for utility factories, as well as for policymakers seeking to devise reliable and efficient energy infrastructure. Load forecasting can be categorized into three types: long-term, mid-term, and short-term. Various models, including artificial intelligence and conventional and mixed ...

The purpose of power system short-term load forecasting is to predict the load demand in the sector divided by region or transmission lines for up to 1 week in the future. ... Long term electric load forecasting based on particle swarm optimization. Appl Energy 2010;87:320-6. 10.1016/j.apenergy.2009.04.024. Google Scholar [11]

The forecasting processes may be classified into four categories: very short-term load forecasting (VSTLF), short-term load forecasting (STLF) (Saez-Gallego and Morales 2017), medium-term load forecasting (MTLF), and long-term load forecasting (LTLF) (Hong and Fan 2016). In this classification, VSTLF addresses a period up to 1 day, STLF is a ...

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The traditional load forecasting method based on "similar days" only applies to the power systems with stable load levels and fails to show adequate accuracy. Therefore, a novel load forecasting approach based on long short-term memory (LSTM) was proposed in this paper. The structure of LSTM and the procedure are introduced firstly.

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Although the Transformer model performs well in long-term prediction, its accuracy in short-term prediction is less than 50% of the LSTM-Informer performance. If a model is needed for power load forecasting, the LSTM-Informer model has the best performance. It is optimal in both STLF and LTLF. 4.6.2. Results Analysis

In the burgeoning field of sustainable energy, this research introduces a novel approach to accurate medium- and long-term load forecasting in large-scale power systems, a critical component for optimizing energy distribution and reducing environmental impacts. This study breaks new ground by integrating Causal Convolutional Neural Networks (Causal CNN) ...

Long-term load forecasting (LTLF) is exploitable in power system planning. Until recently, the system operator was responsible for providing the official predictions for the national system level. However, due to the deregulation and increase of competition of modern-day power markets, the strategic actions of various entities such as ...

Forecasting the electrical load is essential in power system design and growth. It is critical from both a technical and a financial standpoint as it improves the power system performance, reliability, safety, and stability as well as lowers operating costs. The main aim of this paper is to make forecasting models to accurately estimate the electrical load based on ...

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