Power Plant Energy Predictions.

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**Author’s Note**

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Abstract.

Since the Twentieth Century, Electric Power has been the source of advancement of Human Technology. It has been a basic need for the past 100 years. The Power Plants of today are significantly more efficient than ever, like the Combined Cycle Power Plants which take advantage of the heat exhaust generated by their predecessor designs and reuse it to generate even more electricity. The level of efficiency is so high that we can now measure the effects of the environment on the productivity of the plant. Measuring the variance in the output of an electric plant is essential not only for the workers of the facility, but to the investors, the end users, and to the Economy. This paper explores how linear regression, and other models can be used to predict the output of a power plant based off ambient temperature, atmospheric pressure, and other environment variables automatically.

*Keywords*:Artificial Intelligence, electric power, linear regression, profitability

**Introduction.**

In the Era of Information is quite hard to imagine our lives without computer, without 24/7 access to the Internet, without a fridge and a microwave in our kitchens, or even without LED light bulbs that remove darkness from our nights. None of the prior modern necessities can be resolved without a key element: electric power. Without it, there’s no modern technology, no research, no economy. Electric Power is critical on our daily lives. Just like Hollywood visual FX, when electricity works fine is almost invisible and easy to forget it’s there, but the moment there’s a power outage we surely notice. Predicting its output could be beneficial for multiple purposes; think of Energy Demand Forecasting, Financial Planning, Carbon Emission Management, Energy Trading, Integration with Renewable Energy, and many more that exceed our imagination. This paper is about how a predictive model can work to accurately predict the output of a Combined Cycle Power Plant based off ambient temperature, atmospheric pressure, and other environmental variables that directly affect the productivity of a CCPP.

## Definition of a Combined Cycle Power Plant (CCPP).

Our work is based on the data and research performed by Tüfecki (2014).

# Data Cleaning/Preparation.

Darin - We confirmed there are no nulls, duplicates. We also analyzed and removed outliers (how the data was binned and outliers identified and removed) and confirmed the linear regression assumptions. We also defined the separation of the data to build the testing and training data frames.

# Exploratory Data Analysis.

Darin - In this section we’ll talk about multicollinearity, VIF, and the relationship between the variables, as well as removing the variables that have strong correlations between them.

# Model Selection.

Mani - Here we’ll talk about the models we tried with the assumptions defined in previous steps, and end up describing WHY we chose the models we chose.

# Model Analysis.

Mani - Here we understand the behavior and results for the various models we tested with.

# Conclusion and Recommendations.

Israel - Conclusion about the models: Linear Regression is good and cheap, Random Forest Regressor is more expensive and accurate. Also include future research and areas of opportunity for this project, as well as other applications of the project.

**References.**

Tüfekci, P. (2014). Prediction of full load electrical power output of a base load operated combined cycle power plant using machine learning methods. *International Journal of Electrical Power & Energy Systems*, *60*, 126–140. https://doi.org/10.1016/J.IJEPES.2014.02.027