

# IBM Hack Challenge

## Problem Statement

Predicting the energy output of the wind turbine based on weather condition

# 1. Introduction:

## 1.1 Overview

Wind power generation is increasing rapidly and the availability of wind energy depends on wind speed, which is a random variable. This highly depends on the weather conditions at that place. We will carry out this problem on publicly available weather and energy data sets correlating and considering different features in our project.

## 1.1 Purpose

In our project, we propose an intelligent technique for forecasting wind speed and power output of a wind turbine from several hours up to 72 hours ahead. This will enable us to cut down on production costs and collaborate on different energy sources more efficiently.

# 2. Data Collection:

[https://data.open-power-system-data.org/time\\_series/](https://data.open-power-system-data.org/time_series/)

<https://www.elia.be/en/grid-data/power-generation>

[https://data.open-power-system-data.org/weather\\_data/](https://data.open-power-system-data.org/weather_data/)

# 3. Data Preprocessing :

When we talk about data, we usually think of some large datasets with a huge number of rows and columns. While that is a likely scenario, it is not always the case — data could be in so many different forms: Structured Tables, Images, Audio files, Videos, etc..

# 4. Functional Requirements:

The functional requirements of the project are:

1. A model to predict the power output of the turbine for the future
2. A database to store and update the values in real-time
3. A UI to display the results to the user.

# 5. Software Requirements:

The softwares required are

1. Python 3
2. IBM ML services
3. IBM Cloud

4. Deep learning model(RNN)
5. Django
6. User Interface
7. Plotly with Dash
8. MDBootstrap.
9. Cloudant

## **6. Project Deliverables:**

We are going to deliver a time series model to predict the power output of a wind farm based on the weather conditions in the site (1Hr prediction to 72Hrs. prediction). We are going to build an application with the help of Django to recommend the Power Grid to suggest the best time to utilize the energy from the wind farms.

## **7. Project Team:**

Our team consists of four members:

1. Aditya Mahajan
2. Noel Jaymon
3. Tarun Agarwal
4. R Benjamin Franklin

## **8. Technical and Software Requirements**

Plotly with Dash, Django, Deep learning model(RNN), IBM ML services, IBM Bluemix, IBM Cloudant, Python 3, MDBootstrap.

## **9. Conclusion:**

Thus, we have developed a time series model to predict the future power output values from the turbine and present it beautifully in the form of UI with a real-time database and prediction of values every 72 hours.

## **10. Future Scope**

The future scope of the project is:

It can be scaled to predict the power output more accurately in a lesser time frame.