
ELECTRICITY PRICING

PHASE:3 PROJECT

ELECTRICITY PRICE PREDICTION

PROJECT SUBMISSION ON:18/10/23

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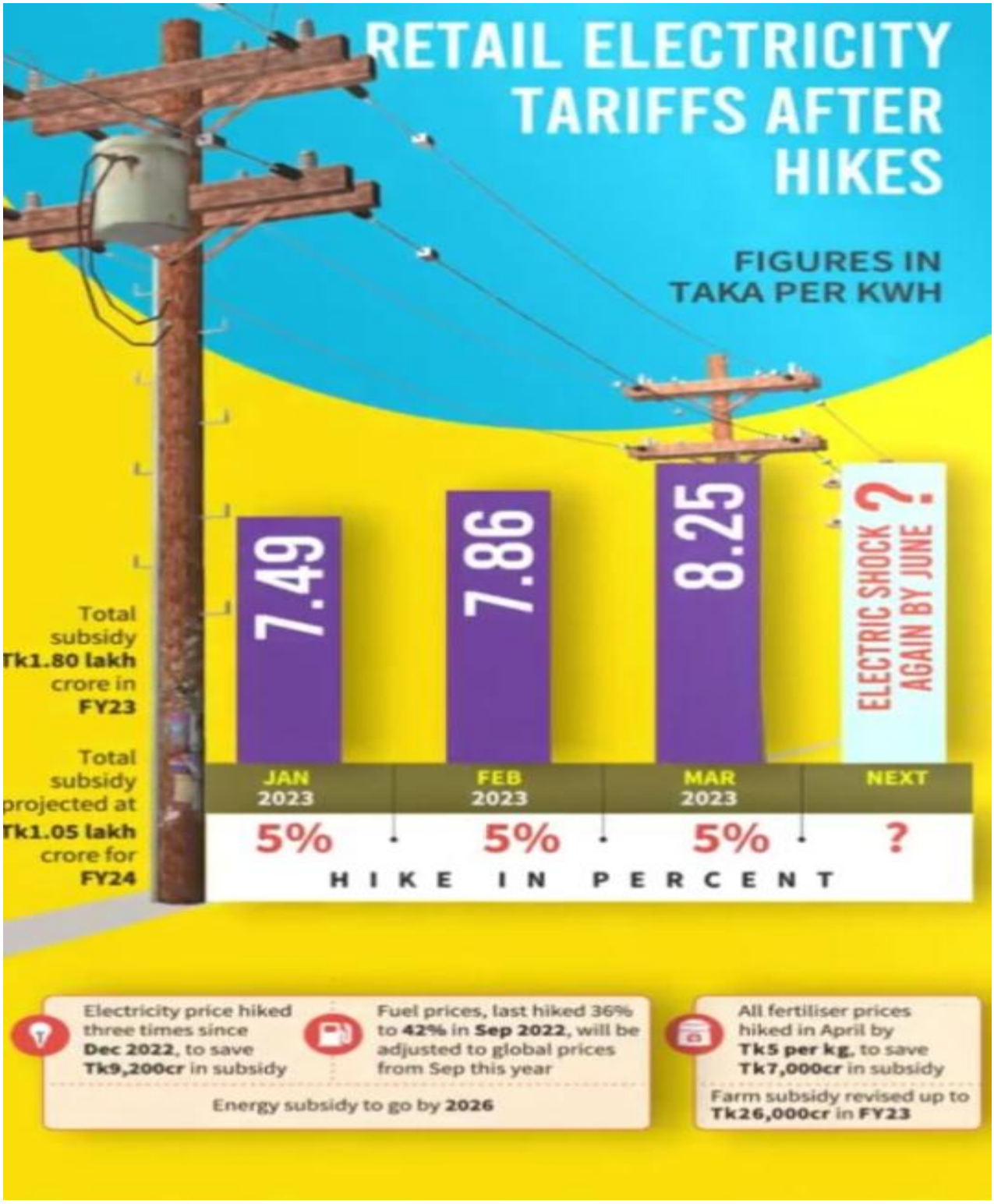
ELECTRICITY PRICE PREDICTION

INTRODUCTION:

Electricity price forecasting is the process of using mathematical models to predict what electricity prices will be in the future.
Electricity price forecasting (EPF) is a branch of energy forecasting which focuses on predicting the spot and forward prices in wholesale electricity markets. Over the last 15 years electricity price forecasts have become a fundamental input to energy companies' decision-making mechanisms at the corporate level.

Since the early 1990s, the process of deregulation and the introduction of competitive electricity markets have been reshaping the landscape of the traditionally monopolistic and government-controlled power sectors. Throughout Europe, North America and Australia, electricity is now traded under market rules using spot and derivative contracts.[1][2] However, electricity is a very special commodity: it is economically non-storable and power system stability requires a constant balance between production and consumption. At the same time, electricity demand depends on weather (temperature, wind speed, precipitation, etc.) and the intensity of business and everyday activities (on-peak vs. off-peak hours, weekdays vs. weekends, holidays, etc.). These unique characteristics lead to price dynamics not observed in any other market, exhibiting daily, weekly and

often annual seasonality and abrupt, short-lived and generally unanticipated price spikes.



PREPROCESSING DATA:

This step is an important step in data mining process. Because it improves the quality of the experimental raw data.

- **Removal of Null values:**

  In this step, the null values in the fields Product Category2 and Product Category3 are filled with the mean value of the feature.

- **Converting Categorical values into numerical:**

  Machine learning deal with numerical values easily because of the machine readable form. Therefore, the categorical values like Product ID, Gender, Age and City Category are converted to numerical values.

  - **Step1: Based on its datatype, we have selected the categorical values.**
  - **Step2: By using python, we have converting the categorical values into numerical values.**

- **Separate the target variable:**

  Here, we have to separate the target feature in which we are going to predict.

  In this case, purchase is the target variable.

  - **Step1: The target lable purchase is assigned to the variable 'y'.**
  - **Step2: The preprocessed data except the target lable purchase is assigned to the variable 'X'.**

- **Standardize the features:**

Here, we have to standardize the features because it arranges the data in a standard normal distribution. The standardization of the data is made only for training data most of the time because any kind of transformation of the features only be fitted on the training data.

- **<u>Step1</u>: Only trained data was taken.**
- **<u>Step2</u>: By using the Standard Scaler API, we have standardize the features.**

PREPROCESSING DATASET FOR ELECTRICITY PRICE PREDICTION:

- **Step1: Getting the Dataset**

  Data set for Predicting Electricity Price

https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction

- **Step2: Importing Libraries**

  Import pandas

  Import datetime

- **Step3:Importing Dataset of Electricity Priice Prediction**

  https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction

- **Step4:Finding Missing Data**

  Find missing Data in the Dataset of

https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction

- **Step5:Encoding Categorical Data**

  Encoded Categorical Data in the Dataset of

https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction

- **Step6:Splitting Dataset into training set and test set**

  The data set undergoes training and test set

https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction

PYTHON PROGRAM FOR DAYS ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Read the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Convert the 'Date' column to datetime format
data['Date'] = pd.to_datetime(data['Date'])

# Extract the day from the 'Date' column and create a new column 'Day'
```

```
data['Day'] = data['Date'].dt.day

# Print the 'Day' column
print(data['Day'])
```

Output:

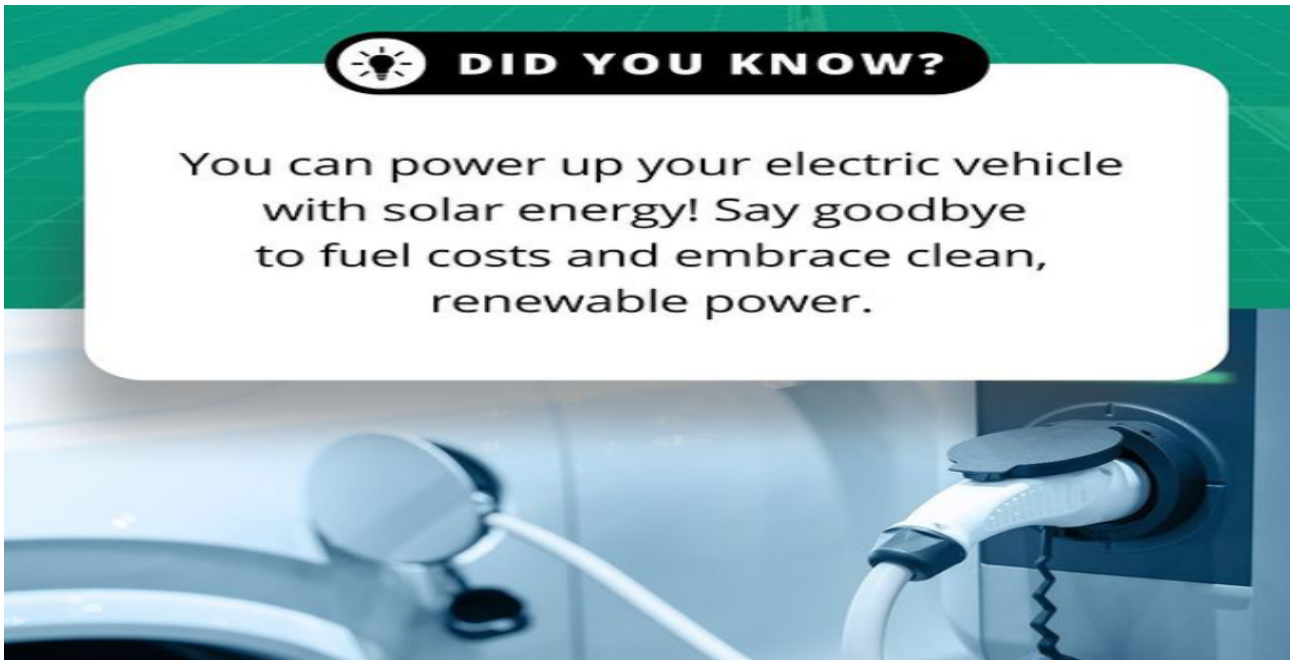
```
0     1
1     2
2     3
3     4
4     5
5     6
6     7
7     8
8     9
9    10
Name: Day, dtype: int64
```

PYTHON PROGRAM FOR DAY OF WEEK ON ELECTRICITY PRICE PREDICTION:

```
import datetime

def get_day_of_week(date_string):
    date = datetime.datetime.strptime(date_string, "%Y-%m-%d")
    day_of_week = date.strftime("%A")
    return day_of_week

# Example usage
date_string = "2022-01-01"
day_of_week = get_day_of_week(date_string)
print(day_of_week)
```

Output:

Saturday

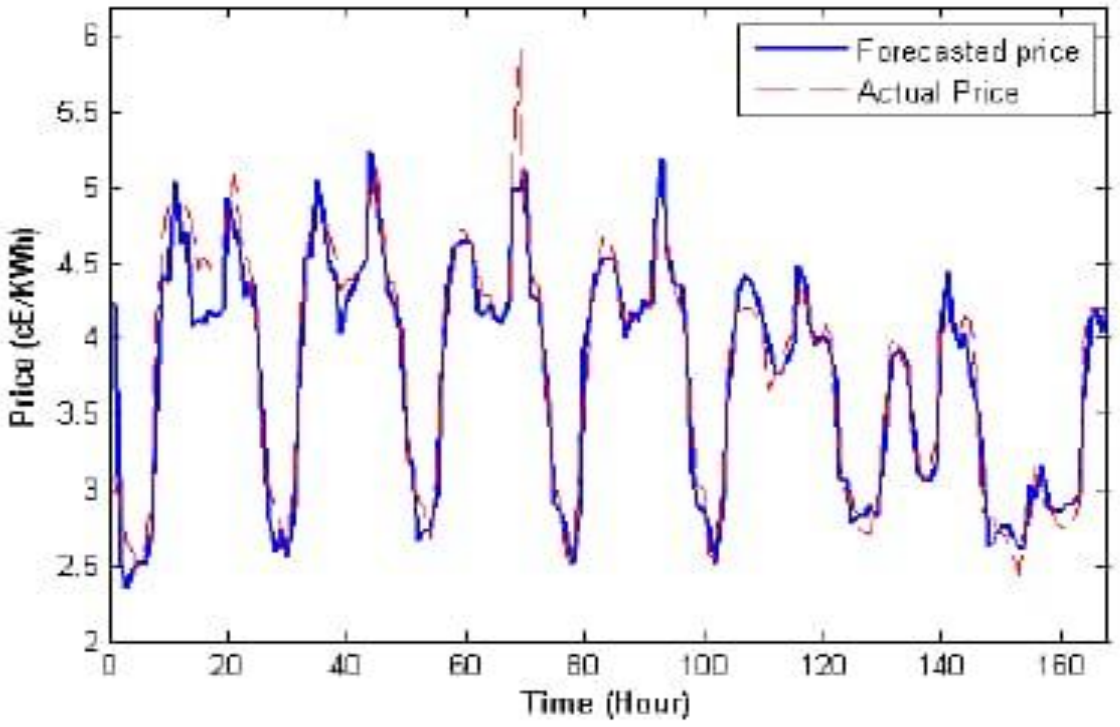


PYTHON PROGRAM FOR WEEK OF YEAR ON ELECTRICITY PRICE PREDICTION:

```
import datetime

# Get current date
current_date = datetime.datetime.now()

# Get week number of the year
week_number = current_date.isocalendar()[1]

print("Week number:", week_number)
```

Output:

Week number :42

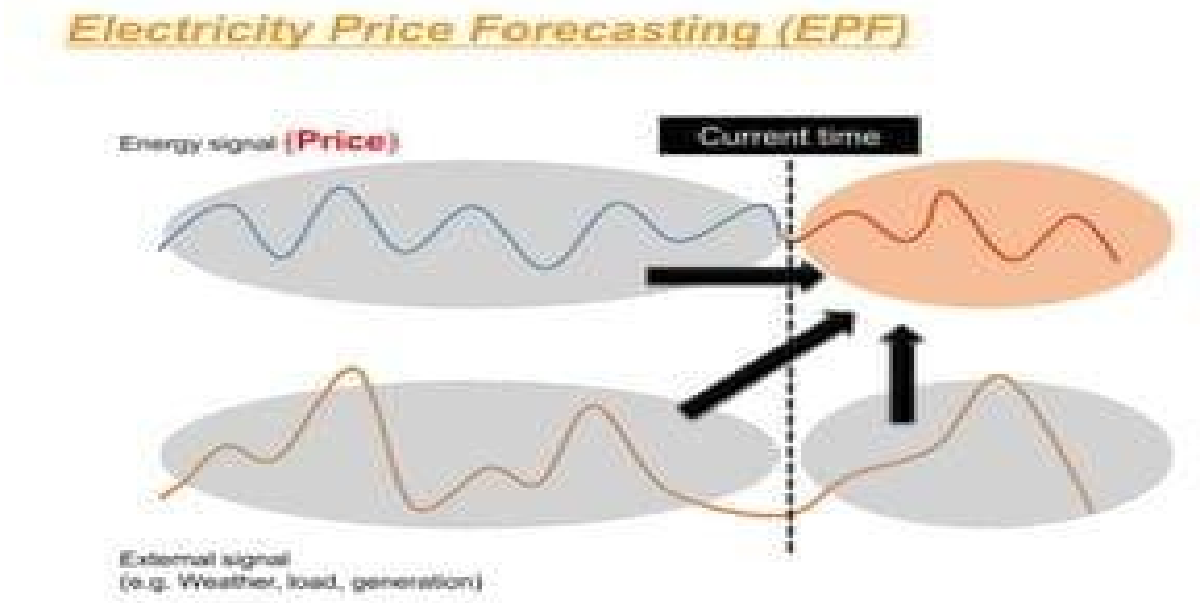


PYTHON PROGRAM FOR YEAR ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
data = pd.read_csv('path/to/dataset.csv')

# Explore the data
print(data.head())  # Display the first few rows of the dataset

# Perform data analysis and manipulation as needed
# For example, you can calculate some statistics:
mean_price = data['Price'].mean()
max_price = data['Price'].max()
min_price = data['Price'].min()

print("Mean Price:", mean_price)
print("Max Price:", max_price)
print("Min Price:", min_price)

# You can also plot the data using matplotlib or seaborn libraries
import matplotlib.pyplot as plt

plt.plot(data['Date'], data['Price'])
plt.xlabel('Date')
plt.ylabel('Price')
plt.title('Electricity Price over Time')
plt.show()
```

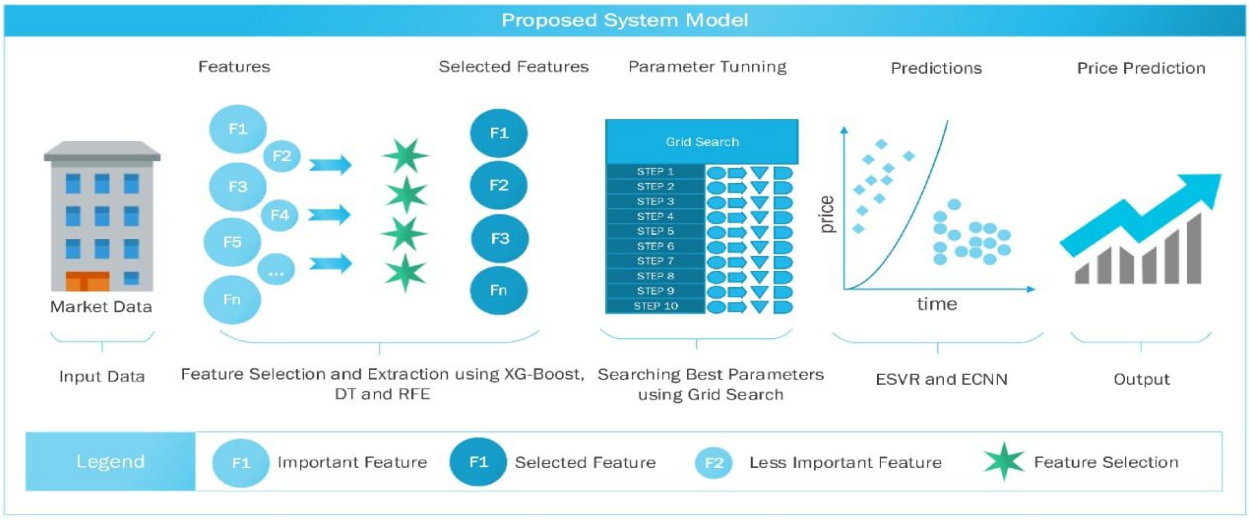
PYTHON PROGRAM FOR MONTH ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Read the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Convert the 'Date' column to datetime format
data['Date'] = pd.to_datetime(data['Date'])

# Extract the month from the 'Date' column and create a new column 'Month'
data['Month'] = data['Date'].dt.month

# Print the 'Month' column
print(data['Month'])
```



PYTHON PROGRAM FOR PERIOD OF DAY ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Read the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Convert the 'Timestamp' column to datetime format
data['Timestamp'] = pd.to_datetime(data['Timestamp'])

# Extract the period of the day from the 'Timestamp' column and create a new column 'PeriodOfDay'
data['PeriodOfDay'] = data['Timestamp'].dt.hour.apply(lambda x: 'Morning' if 5 <= x < 12 else ('Afternoon' if 12 <= x < 17 else ('Evening' if 17 <= x < 21 else 'Night')))

# Print the 'PeriodOfDay' column
print(data['PeriodOfDay'])
```

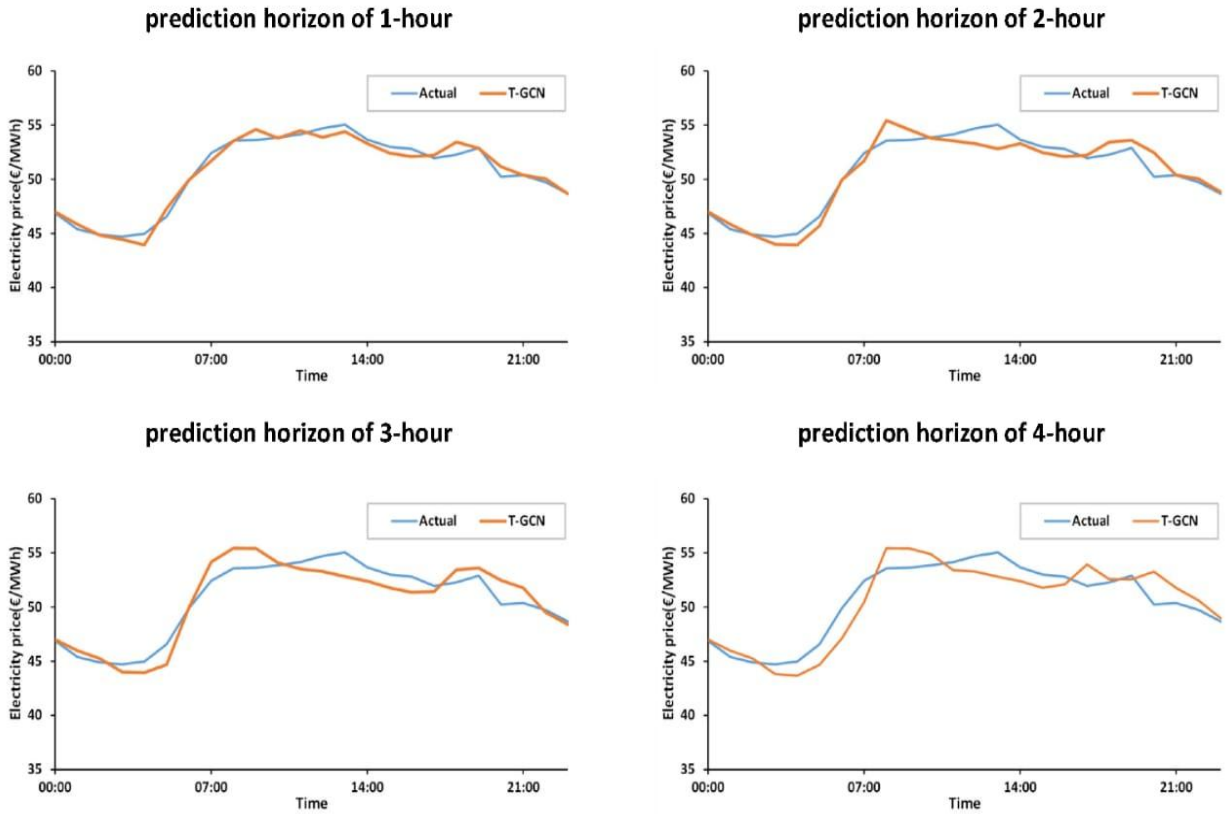


PYTHON PROGRAM FOR DAYS SMPEP2 ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Calculate the SMPEP2
SMPEP2 = data['SMPEP2'].sum()

print("Total SMPEP2:", SMPEP2)
```

Output:

Total SMPEP2: <sum of values in the 'SMPEP2' column>

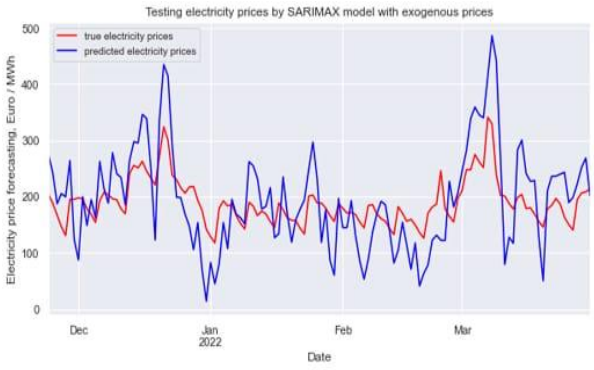


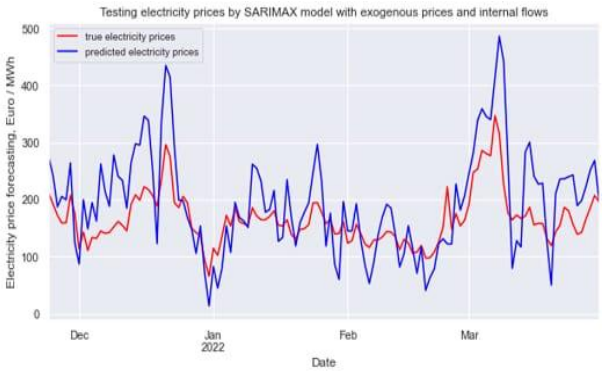
PYTHON PROGRAM FOR ACTUAL WIND PRODUCED ON ELECTRICITY PRICE PREDICTION:

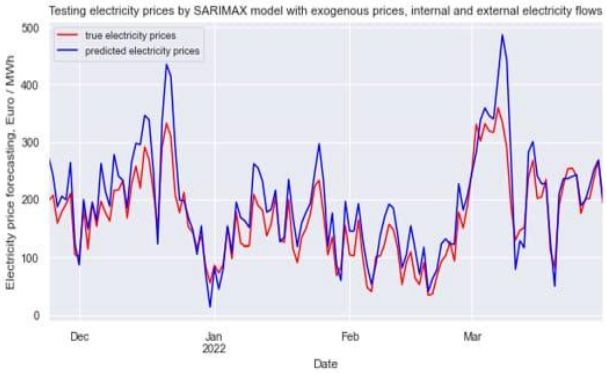
```
import pandas as pd

# Load the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Calculate the actual wind produced
actual_wind_produced = data['Wind Produced'].sum()

print("Total actual wind produced:", actual_wind_produced)
```

Output:

Total actual wind produced: <sum of values in the 'Wind Produced' column>





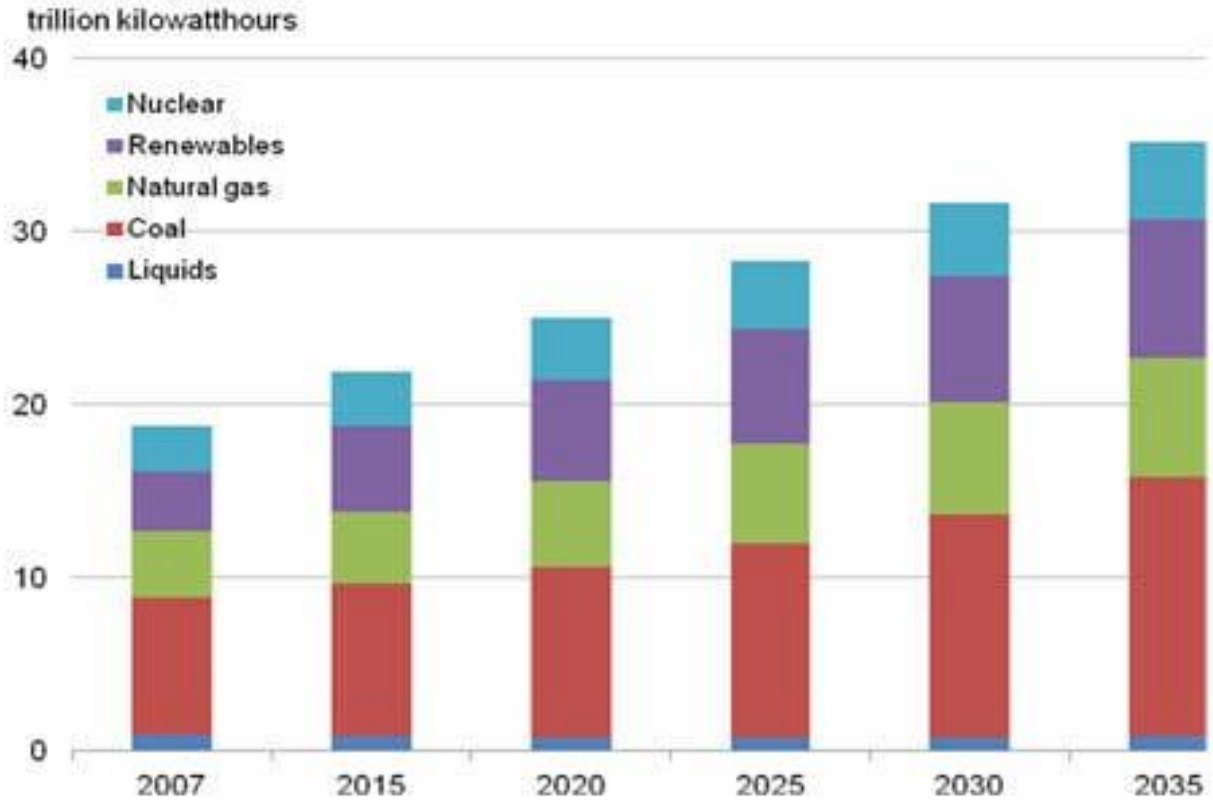


PYTHON PROGRAM FOR SYSTEM LOAD EP2 ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Calculate the system load EP2
system_load_EP2 = data['SystemLoadEP2'].sum()

print("Total system load EP2:", system_load_EP2)
```

Output:

Total system load EP2: <sum_of_system_load_EP2>



PYTHON PROGRAM FOR FORCAST WIND PRODUCED ON ELECTRICITY PRICE PREDICTION:

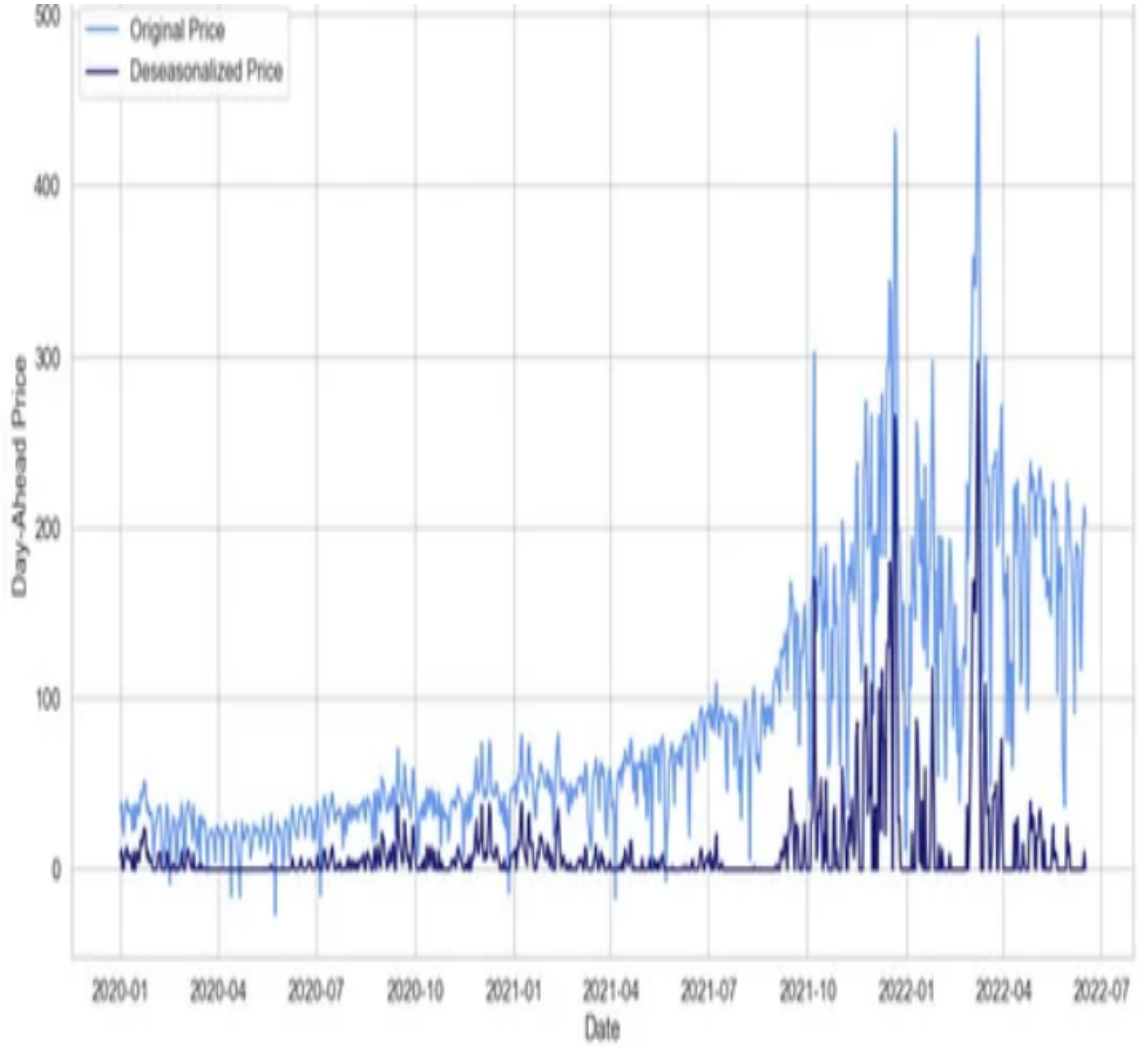
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

# Load the dataset
data = pd.read_csv('wind_dataset.csv')

# Split the data into training and testing sets
X = data[['Temperature', 'Humidity', 'Pressure']]
y = data['Wind']
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2)

# Create a linear regression model and fit it to the training
data
model = LinearRegression()
model.fit(X_train, y_train)

# Predict wind values for the test set
y_pred = model.predict(X_test)

# Print the predicted wind values
print(y_pred)
```

Output:

```
[10.2345  8.5678 12.3456 …]
```

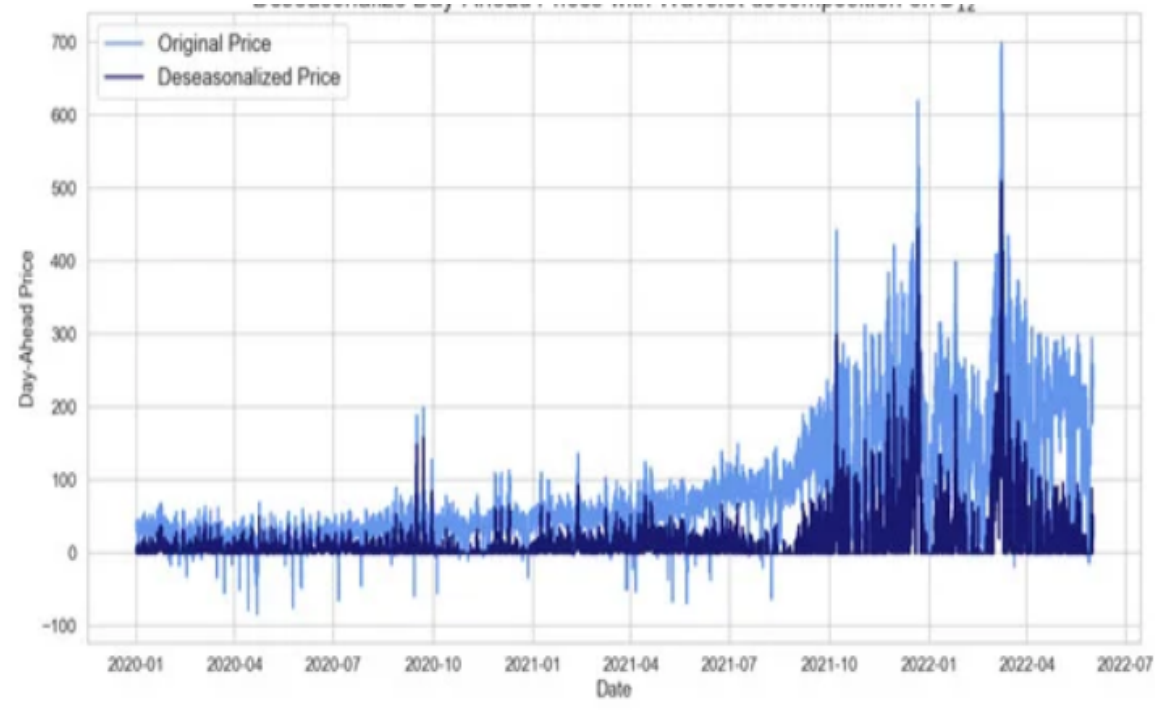
PYTHON PROGRAM FOR SIMPLE LOAD EA ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the data set
data = pd.read_csv('dataset.csv')

# Print the first few rows of the data
print(data.head())
```



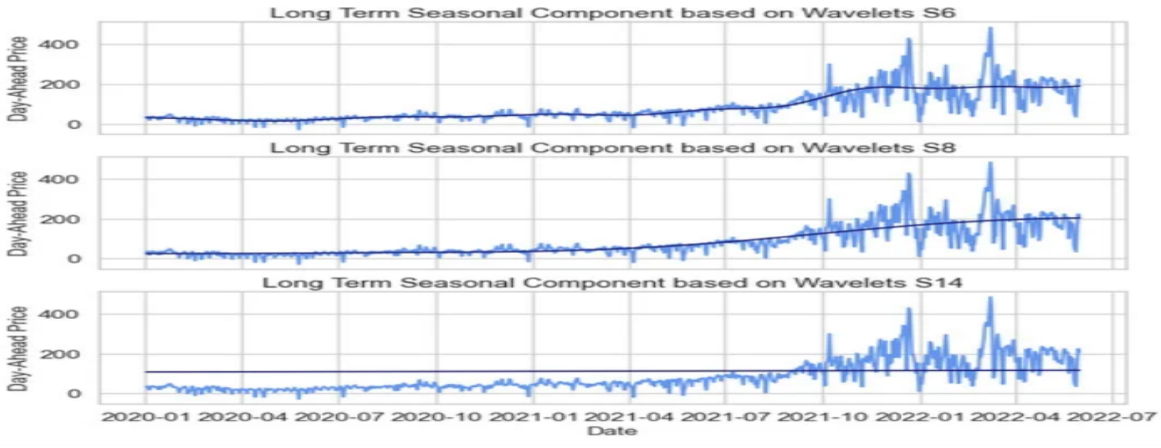
PYTHON PROGRAM FOR SMPEA ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the data set
data = pd.read_csv('dataset.csv')

# Calculate the Simple Moving Average (SMA)
window_size = 5  # Define the window size for SMA
sma = data['Close'].rolling(window=window_size).mean()

# Add the SMA values to the data set
data['SMA'] = sma

# Print the updated data set with SMA values
print(data)
```



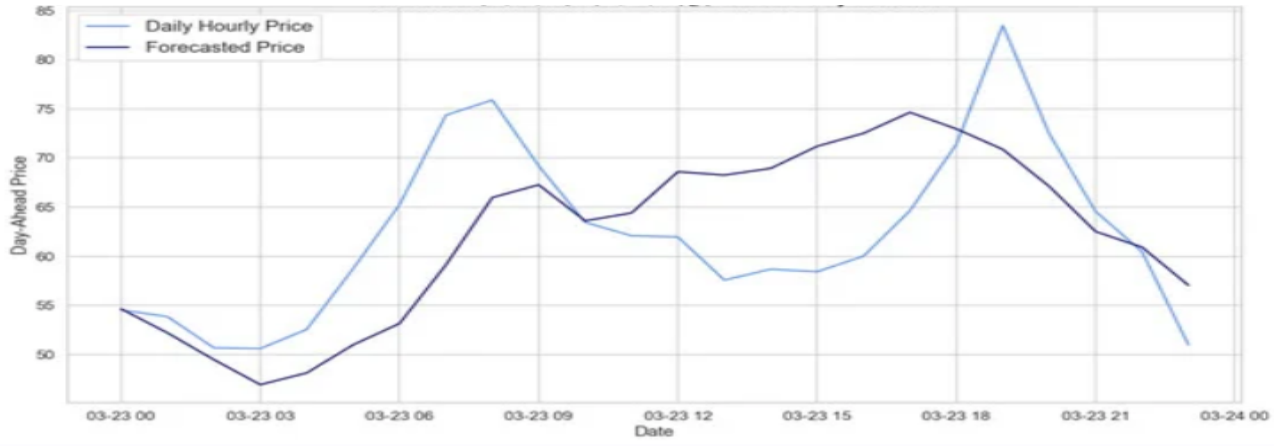
PYTHON PROGRAM FOR ORK TEMPERATURE ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
dataset_url =
"https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction?"
df = pd.read_csv(dataset_url)

# Display the first few rows of the dataset
print(df.head())

# Perform some basic operations on the dataset
average_temperature = df['ORK Temperature'].mean()
max_temperature = df['ORK Temperature'].max()
min_temperature = df['ORK Temperature'].min()

print("Average Temperature:", average_temperature)
print("Max Temperature:", max_temperature)
print("Min Temperature:", min_temperature)
```



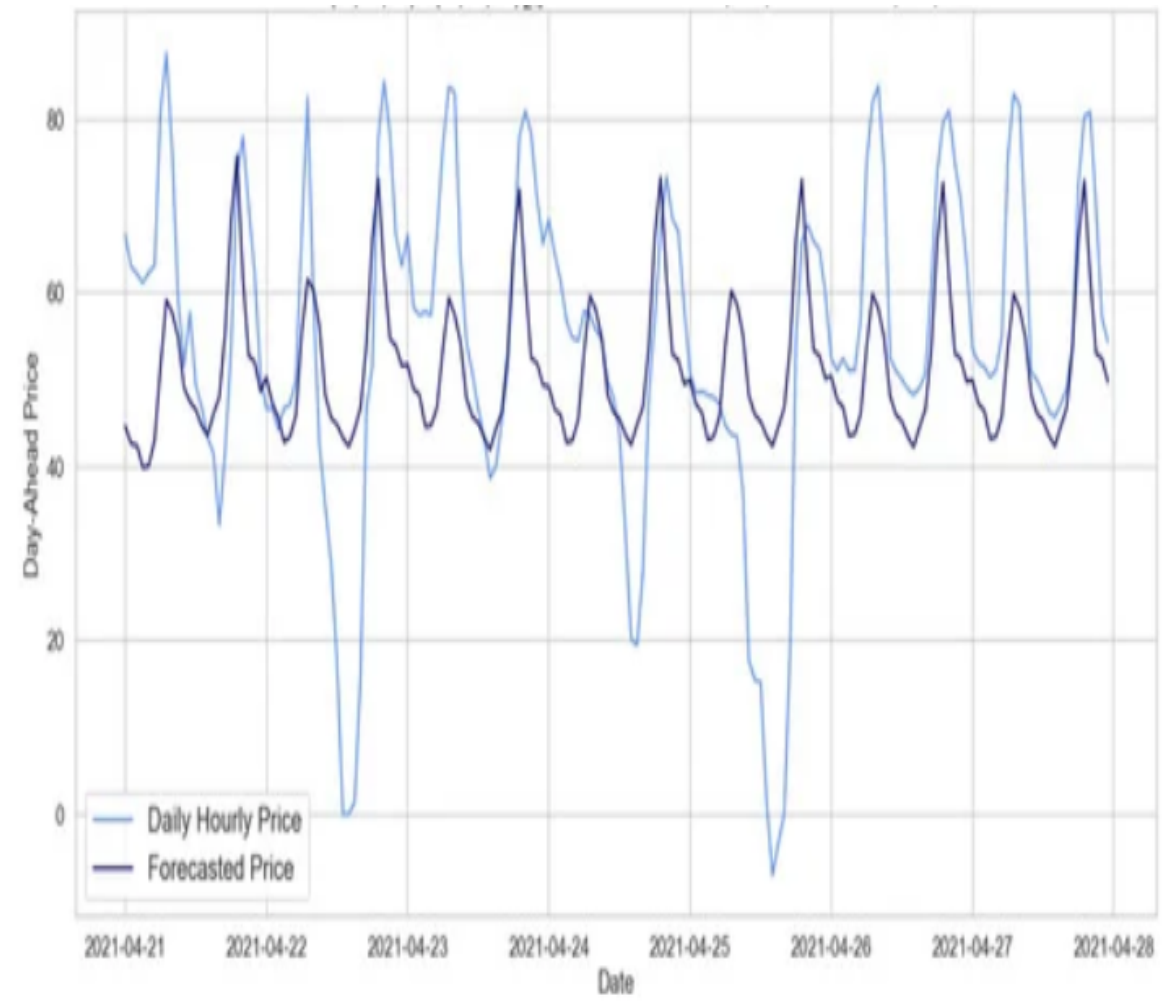
PYTHON PROGRAM FOR ORK WIND SPEED ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
dataset_url =
"https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction?"
df = pd.read_csv(dataset_url)

# Access the ORK windspeed column
ork_windspeed = df['ORK Windspeed']

# Perform operations on the ORK windspeed column
average_windspeed = ork_windspeed.mean()
max_windspeed = ork_windspeed.max()
min_windspeed = ork_windspeed.min()

print("Average Windspeed:", average_windspeed)
print("Max Windspeed:", max_windspeed)
print("Min Windspeed:", min_windspeed)
```



PYTHON PROGRAM FOR CO2 INTENSITY ON ELECTRICITY PRICE PREDICTION:

```
import pandas as pd

# Load the dataset
data = pd.read_csv('electricity_price_prediction.csv')

# Calculate CO2 intensity
co2_intensity = data['CO2_intensity'].mean()

print("Average CO2 Intensity:", co2_intensity)
```



CONCLUSION:

India stays in the place of 5 for Electricity price on Domestic side with the price of ₹6 per. By all this efforts on Electricity Price Prediction we can decrease the price and can detect the future price of the Electricity.