

**PROJECT TITLE – OPTIMIZING ENERGY DEMAND
AND CONSUMPTION THROUGH DATA-DRIVEN
STRATEGIES**

COLLEGE CODE: 8203

**COLLEGE NAME: A.V.C COLLEGE OF ENGINEERING,
MANNAMPANDAL.**

TECHNOLOGY: DATA ANALYTICS

TEAM NAME: Tech Titans

TOTAL NO. OF STUDENTS IN A GROUP: 5

TEAM MEMBERS:

- 1) B. AZRINA (REG NO: 820322205013)
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SUBMITTED BY,

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PROJECT DESCRIPTION:

1. Introduction

This project aims to enhance energy efficiency and reduce operational costs by implementing data-driven strategies to optimize energy demand and consumption across residential, commercial, and industrial sectors.

2. Objectives

Data Collection: Gather and integrate data from smart meters, IoT sensors, weather forecasts, and historical usage.

Consumption Analysis: Identify inefficiencies and anomalies in current energy use through advanced analytics.

Predictive Modeling: Forecast future energy demand using machine learning techniques.

Optimization Strategies: Develop algorithms to minimize energy use during peak hours and reduce costs.

Real-Time Monitoring: Implement systems for real-time tracking and automated control of energy usage.

User Engagement: Provide stakeholders with actionable insights via user-friendly interfaces and dashboards.

Sustainability: Align strategies with environmental goals and regulatory requirements.

3. Methodology

Data Acquisition: Deploy IoT sensors and integrate external data sources.

Data Processing: Use cloud-based platforms for data storage and processing.

Analytical Framework: Apply statistical and machine learning techniques to analyze data.

Model Development: Build and validate predictive models for energy demand forecasting.

Optimization Implementation: Design and implement energy optimization algorithms.

Visualization: Create interactive dashboards and regular performance reports.

4. Expected Outcomes

Energy Savings: Reduced energy consumption and costs.

Efficiency Gains: Improved energy usage efficiency.

Sustainability: Better alignment with environmental goals.

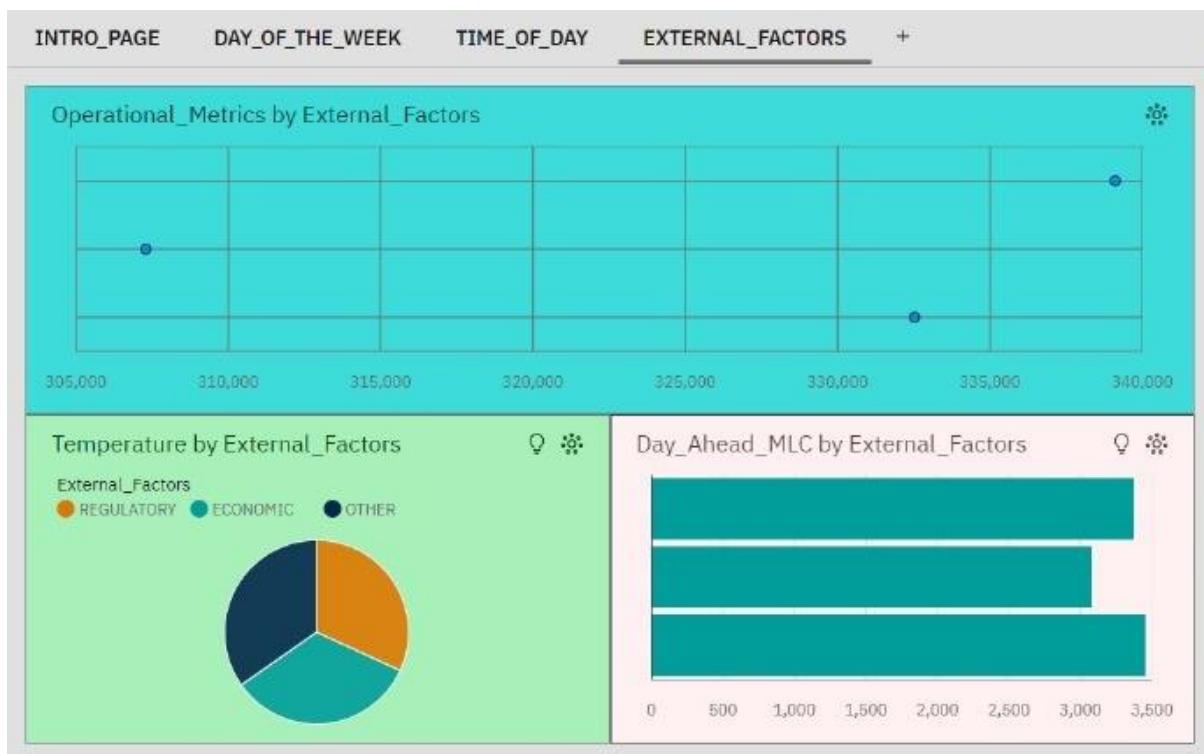
User Empowerment: Increased user awareness and engagement.

Scalability: A scalable solution adaptable to various settings and technologies.

5. Conclusion

The project seeks to create a more efficient, sustainable, and cost-effective energy management system through the use of advanced analytics, predictive modeling, and real-time optimization.

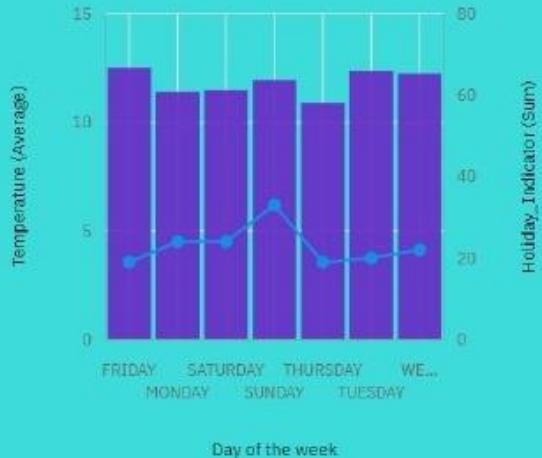
DASHBOARD COMPLETION SCREENSHOTS & ANALYSIS:



Holiday_Indicator and Temperature by Day of the week

Column
● Temperature (Average)

Line
● Holiday_Indicator (Sum)



IoT_Sensor_Data by Day of the week

Day of the week

● FRIDAY ● TUESDAY ● SUNDAY
● WEDNESDAY ● SATURDAY ● MONDAY



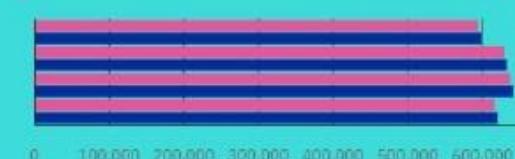
Day_Ahead_LMP by Day of the week

FRIDAY MONDAY SATURDAY SUNDAY THURSDAY TUESDAY WEDNESDAY

Electricity_Load and Previous_Load by Time_of_Day

Measures

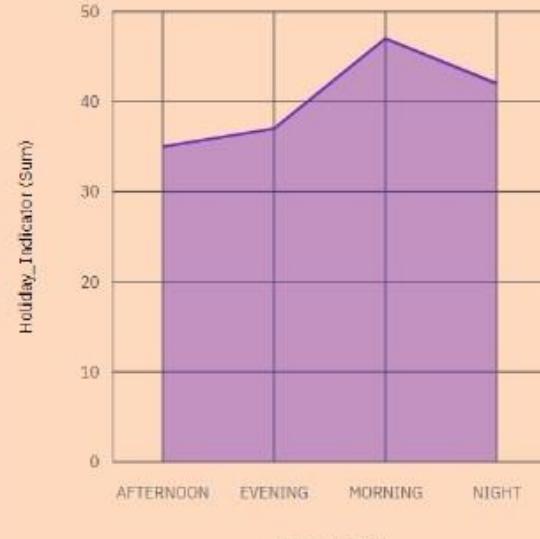
● Electricity_Load ● Previous_Load



Day_Ahead_Demand by Time_of_Day



Holiday_Indicator by Time_of_Day



ANALYSIS:

- Day_of_Week 1 has the lowest total IoT_Sensor_Data at 233.63, followed by 4 at 236.71.
- Add insight to favorites
- Day_of_Week 3 has the highest total IoT_Sensor_Data at 247.27, followed by 0 at 246.94.
- Add insight to favorites
- Based on the current forecasting, IoT_Sensor_Data may reach 236.6 by Day_of_Week 8.
- The overall number of results for IoT_Sensor_Data is almost 3500.

LINK:

INTRO_PAGE:

https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FMY&action=view&mode=dashboard&subView=model0000018f8ce421ce_00000000

DAY_OF_THE_WEEK:

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TIME_OF_DAY:

https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FMY&action=view&mode=dashboard&subView=model0000018f8f788389_00000000

EXTERNAL_FACTORS:

https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FMY&action=view&mode=dashboard&subView=model0000018f8fb2319b_00000000

REPORT COMPLETION SCREENSHOT & ANALYSIS:

The screenshot shows a web browser window with the title 'MY REPORT'. The interface includes a sidebar with three sections labeled 1, 2, and 3, each containing a small preview image. The main content area displays a table with the following data:

Day_of_Week	Time_of_Day	Regulation_Capacity	System_Load	Transportation_Data
5	AFTERNOON	7,711	75,791	3,424
	MORNING	10,143	100,024	4,169
5 - Total			348,951	
5 - Average				3,597
6	AFTERNOON	8,559	84,588	3,106
	EVENING	9,092	87,635	3,796
	MORNING	9,406	96,312	3,533
	NIGHT	8,218	82,807	3,190
6 - Total			351,342	
6 - Average				3,406.25
Overall - Total			2,476,093	
Overall - Average				3,478.39285714

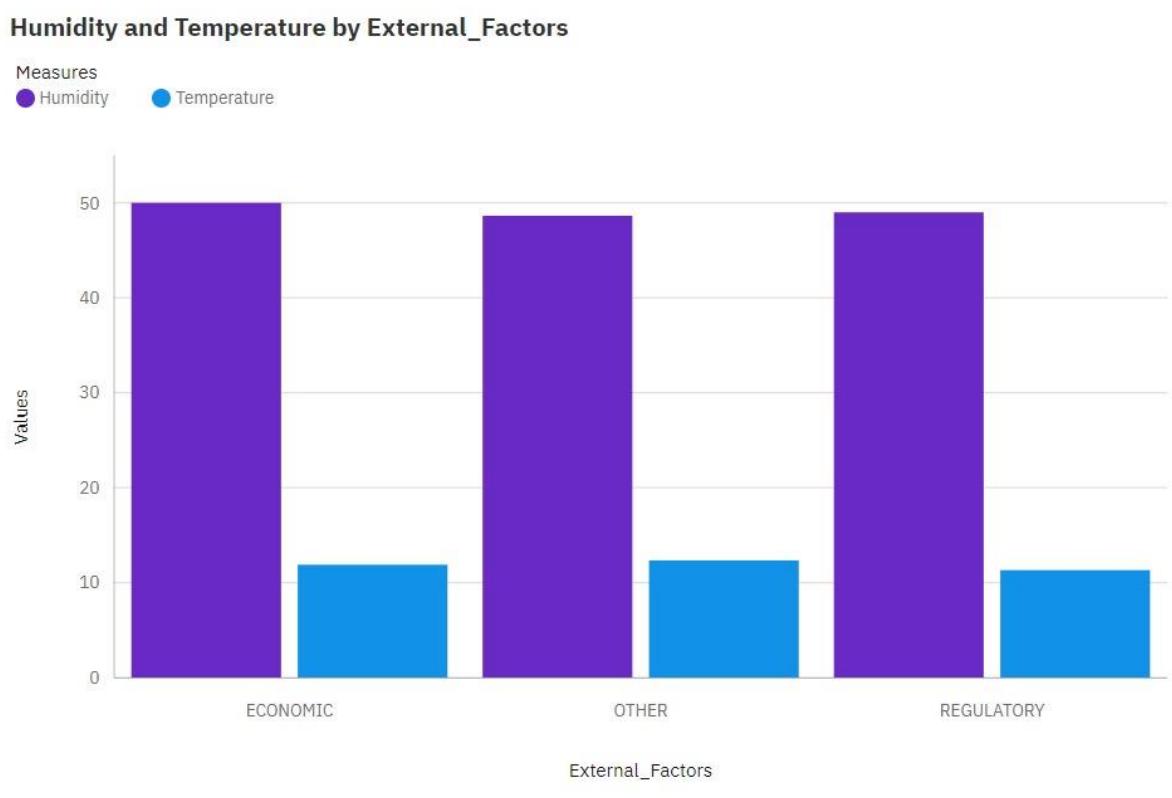
The screenshot shows a web browser window with the title 'ENERGY DEMAND AND CONSUMPTION REPORT'. The interface includes a sidebar with three sections labeled 1, 2, and 3, each containing a small preview image. The main content area displays a table with the following data:

Day_of_Week	Time_of_Day	Regulation_Capacity	System_Load	Transportation_Data
0	AFTERNOON	9,357	93,553	3,455
	EVENING	8,985	88,246	3,274
	MORNING	9,460	93,528	3,404
	NIGHT	8,106	81,616	3,181
0 - Total			356,943	
0 - Average				3,328.5
1	NIGHT	10,555	101,448	4,166
	MORNING	8,803	88,672	3,597
	EVENING	8,551	86,744	3,411
	AFTERNOON	7,404	77,092	3,135
1 - Total			353,956	
1 - Average				3,577.25
2	NIGHT	8,389	87,271	3,589
	EVENING	9,342	91,405	3,706
	AFTERNOON	8,793	87,112	3,192
	MORNING	9,020	86,581	3,419
2 - Total			352,369	
2 - Average				3,476.5
3	NIGHT	8,569	86,124	3,447
	AFTERNOON	8,487	86,034	3,410

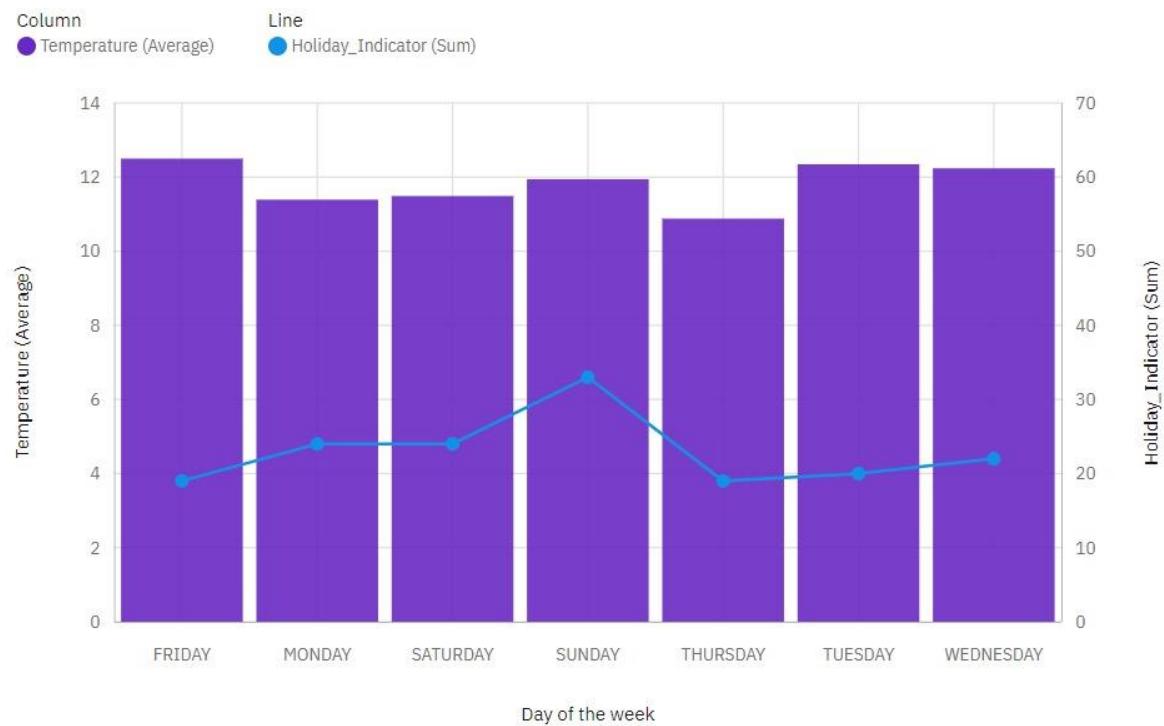
LINK:

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EXPLORATION COMPLETION SCREENSHOT & ANALYSIS:

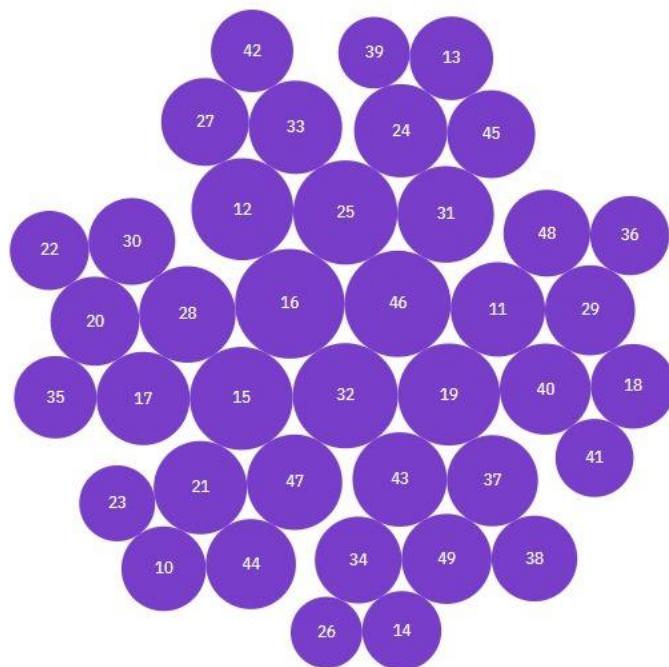


Holiday_Indicator and Temperature by Day of the week



Transportation_Data sized by Day_Ahead_CC

Day_Ahead_CC (C...
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ANALYSIS:

- IoT_Sensor_Data ranges from 229.8, when Day of the week is FRIDAY, to 251.8, when Day of the week is THURSDAY.
- The total number of results for IoT_Sensor_Data, across all day of the weeks, is almost 3500.
- Over all day of the weeks, the average of IoT_Sensor_Data is 0.5097.
- MONDAY (14.3 %) and SUNDAY (14.3 %) are the most frequently occurring categories of Day of the week with a combined count of 950 items with IoT_Sensor_Data values (28.6 % of the total).

LINK:

1. https://us1.ca.analytics.ibm.com/bi/?perspective=explore&pathRef=.my_folders%2FMY%2BDATA%2BVISUALIZATION&subView=model0000018f8d0e0aa4_00000000
2. https://us1.ca.analytics.ibm.com/bi/?perspective=explore&pathRef=.my_folders%2FMY%2BDATA%2BVISUALIZATION&subView=model0000018f8d0407b2_00000000
3. https://us1.ca.analytics.ibm.com/bi/?perspective=explore&pathRef=.my_folders%2FMY%2BDATA%2BVISUALIZATION&subView=model0000018f8d070215_00000000
4. https://us1.ca.analytics.ibm.com/bi/?perspective=explore&pathRef=.my_folders%2FMY%2BDATA%2BVISUALIZATION&subView=model0000018f8d15ada3_00000000

SAMPLE SCREENSHOTS OF WEB PAGE TO BE BUILT:

