Result:

5.1 Results Overview

The results obtained through Power BI dashboards provide comprehensive insights into energy usage across both household and industrial sectors.
For the household dataset, the analysis revealed that heating and appliances are the top contributors to energy consumption. A significant peak was observed in the year 2024, particularly during winter months in colder regions.

In the industrial sector, energy usage is dominated by the Metals and Construction sectors. These industries operate heavy machinery and often run round-the-clock, contributing to high energy consumption. Furthermore, the data indicates underutilization of modern, energy-efficient technologies. Sectors with legacy systems show significantly higher consumption compared to those using CNC machines or IoT-based automation.

5.2 Dataset Source

The analysis was conducted using the following datasets:
- Household_energy_data.xls: Includes attributes like HouseType, HeatingEnergy, Appliances, Lighting, etc.
- Industrial_energy_data.xls: Contains fields such as IndustryID, Sector, EnergyConsumption, and TechnologyUsed.

5.3 Performance Metrics

- Total household energy analyzed: 6.10K units across various house types and regions.
- Industrial energy analyzed: 519.51K units over a one-year period.
- Regional comparison: Clear differentiation seen between high-consumption zones (e.g., North for heating, West for industrial load).
- Sectoral breakdown: Provided visual distribution by sector and technology, enabling benchmarking.
- Dashboards allow aggregation at monthly, quarterly, and annual levels.

5.4 Model Evaluation

The developed dashboards were evaluated based on usability, accuracy, responsiveness, and interactivity:
- Dynamic filters and slicers work as intended, enabling users to perform effective slice-and-dice operations.
- KPI indicators accurately reflect real-time values for total, average, max, and min energy consumption.
- Visual components (e.g., line graphs, pie charts, bar charts) adjust dynamically based on user selections.
- Stakeholders can easily compare energy usage between different timeframes, regions, and categories.

- Performance across visual filters was responsive with no lag, even when complex combinations were selected.

These evaluations confirm the dashboard’s effectiveness in delivering actionable insights to both technical and non-technical users.