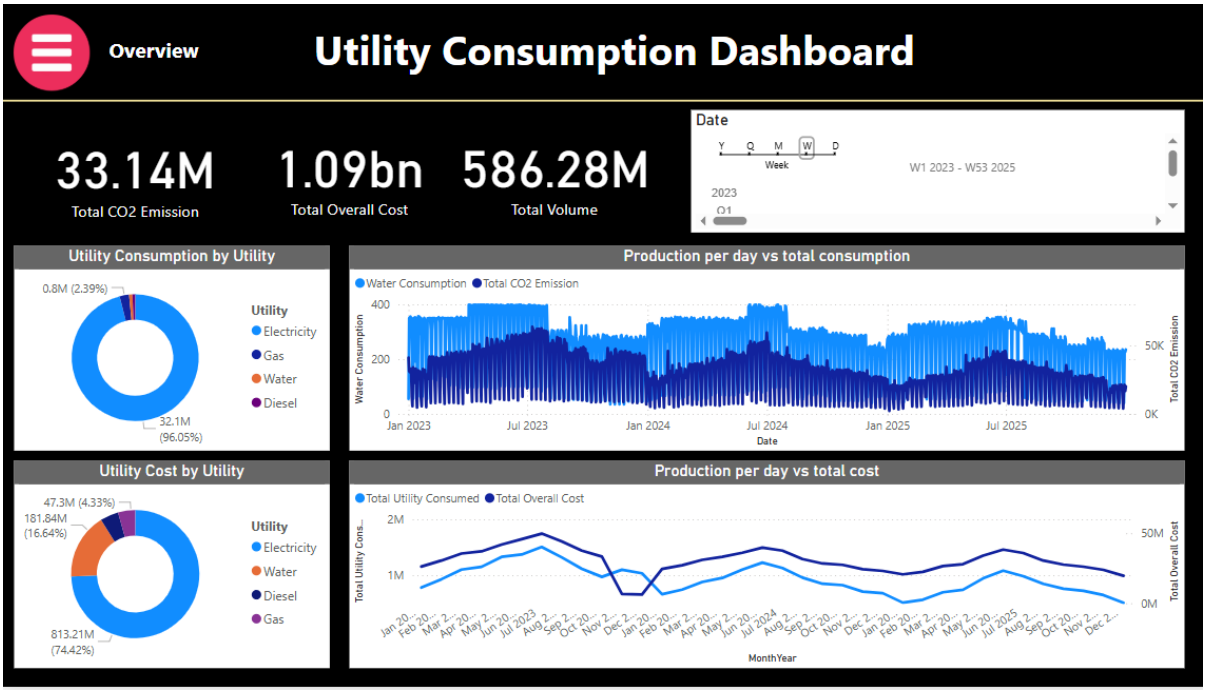
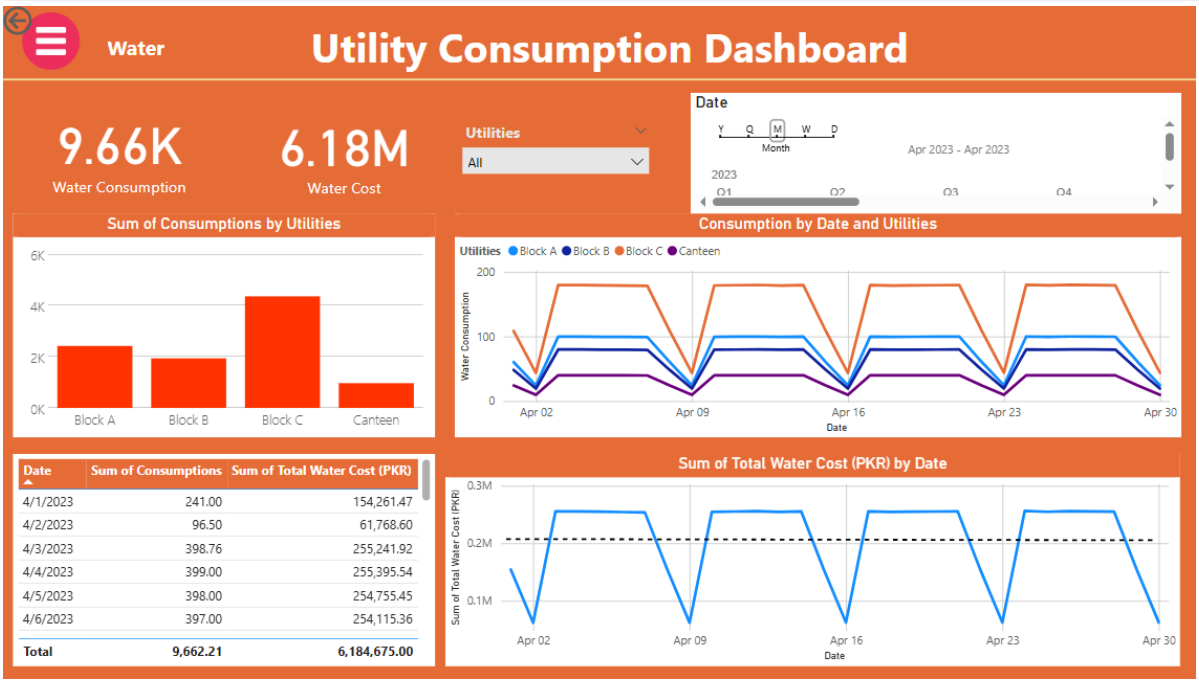
Final Year Project Showcase Batch 2021
Year 2025

Department: Industrial & Manufacturing Engineering Programme: Industrial & Manufacturing Engineering	
1	**Project Title** Design & Development of Smart-Factory Utilities Dashboard to Monitor Consumptions and Predict Outliers
2	**Project Idea** The project focuses on developing a smart, centralized dashboard that monitors the real-time consumption of critical industrial utilities—water, gas, diesel, and electricity. The goal is to identify inefficiencies and provide actionable recommendations for cost reduction and sustainable operation. The system leverages Power BI for data visualization and integrates predictive analytics aligned with Industry 4.0 practices.
3	**Process** We followed the **PDCA Cycle** (Plan-Do-Check-Act): • **Plan**: Data sourcing from meters, logs, and SCADA systems. • **Do**: Data cleaning, transformation, and Power BI dashboard development. • **Check**: Stakeholder validation and KPI performance testing. • **Act**: Final optimization recommendations and integration roadmap. We used Power BI for visualization, Excel/SQL for backend data management, and regression-based forecasting models for prediction.
4	**Outcome** • Fully functional dashboard that integrates 3 years of utility data. • Real-time monitoring of utility consumption. • Detection of outliers and inefficiencies. • Recommendations for cost-saving and energy optimization. • Forecasting of future consumption for better budgeting. • Alignment with SDG 9 (Industry, Innovation) and SDG 12 (Responsible Consumption).
5	**Evidence (Theoretical Basis)** The project is backed by: • **Big Data Analytics**: 5Vs framework, descriptive/predictive analytics. • **Industry 4.0**: Real-time monitoring, IoT integration, KPI management. • **Power BI**: Used for visualization and interactive dashboards. • **Sustainability Goals**: Reduction in energy waste and operational inefficiencies.
6	**Impact on Sustainability of Urban Regions or SDG-11 "Sustainable Cities and Communities"** Our system contributes to SDG-11 by: • Promoting sustainable energy management in urban manufacturing sectors. • Reducing unnecessary utility wastage.

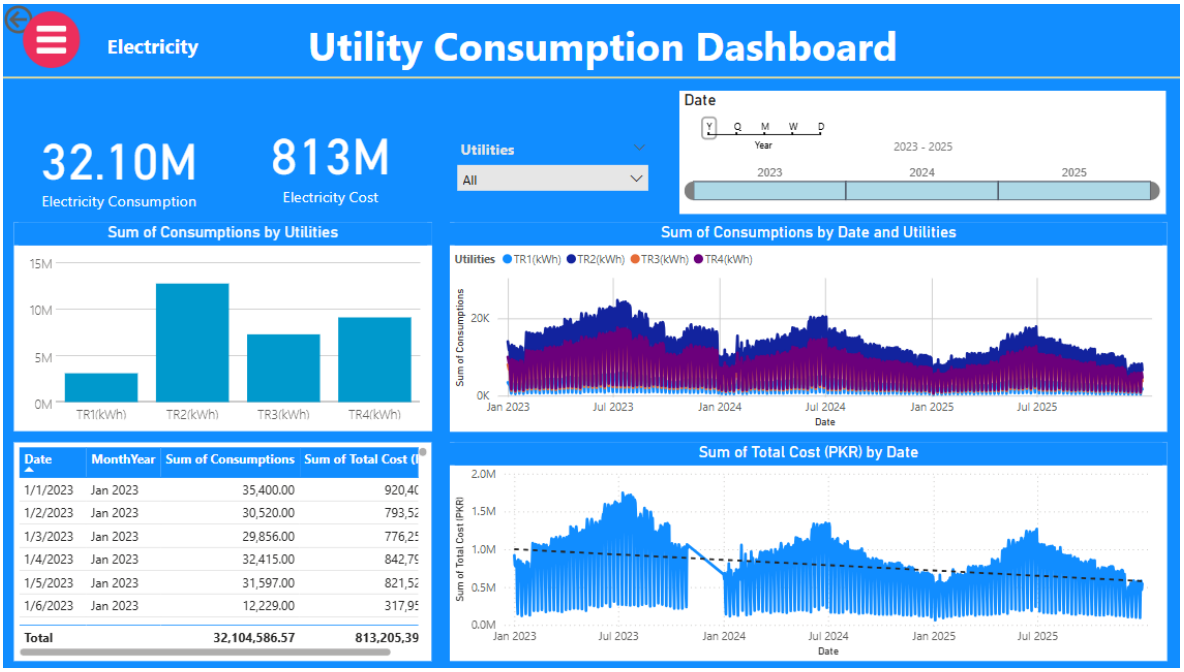
	• Enabling smart resource monitoring in factories that are part of urban industrial zones. • Helping industries transition toward low-emission, data-driven, and cost-efficient operations.	
7	**Competitive Advantage or Unique Selling Proposition** (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence	
a	**Attainment of any SDG** • Aligns with **SDG 9** (Industry, Innovation) by integrating smart technology. • Addresses **SDG 12** through efficient resource consumption and waste reduction.	
b	**Environmental Aspect** • Reduces carbon footprint by identifying energy leaks and excess utility usage. • Promotes eco-friendly manufacturing by improving resource efficiency.	
c	**Cost Reduction of Existing Product** • Identifies peak consumption hours and recommends operational shifts. • Predictive analytics help avoid unplanned maintenance and repairs.	
d	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** • Replaces manual utility tracking with automated real-time systems. • Integrates fragmented utility systems into one unified platform, improving decision-making speed and accuracy.	
8	**Target Market** • **Industries and Manufacturing Units**: Especially in pharmaceuticals, textiles, and chemical sectors. • **Facility Managers & Utility Engineers**: Need real-time monitoring tools. • **Smart City Developers**: Seeking scalable utility monitoring solutions. • **Environmental and Energy Auditors**: For cost-efficiency and carbon reduction insights.	
9	**Team Members**	• M. Abdullah Khan – pc19402.mabdullah@gmail.com • Humna Siddiqui – humna@gmail.com • Sajal Ayaz – sajalayaz2008@gmail.com • Sufyan Feroze – sufyanferoze41@gmail.com
10	**Supervisor Name** (along with email address)	M Danish Saleem – mdanishsaleem@cloud.neduet.edu.pk
11	**Video (If any)**	https://youtu.be/u0KaqDRrqik?si=qEdLFhS6P3DQNWNk

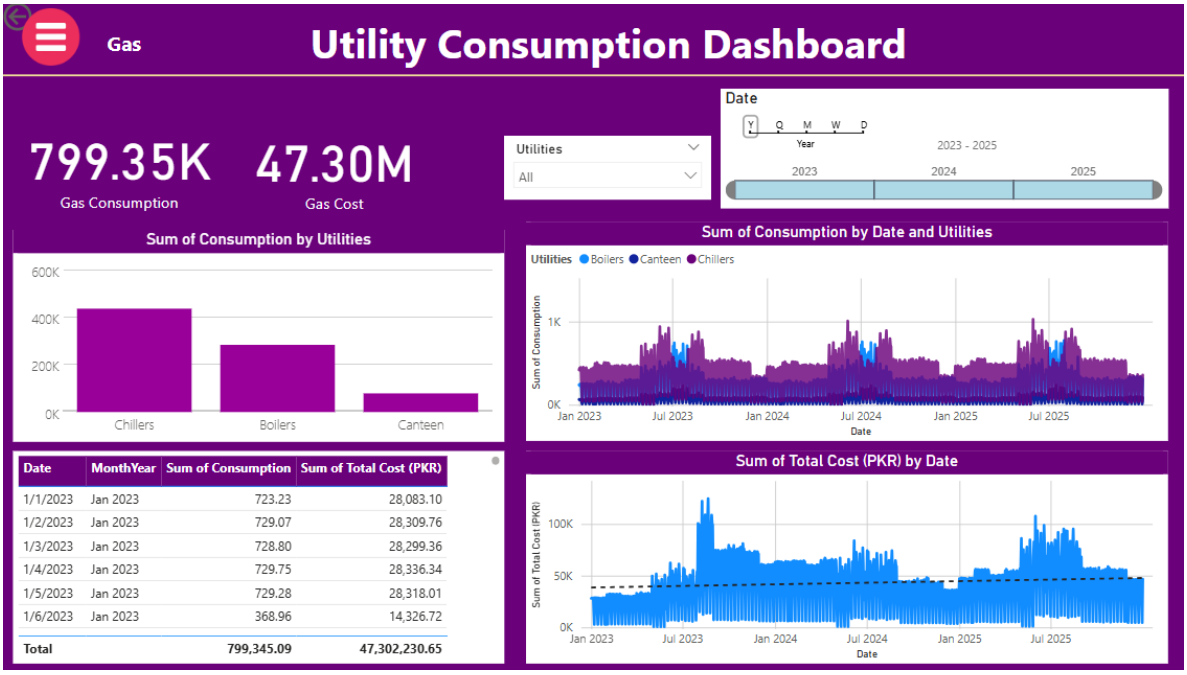
Pictures

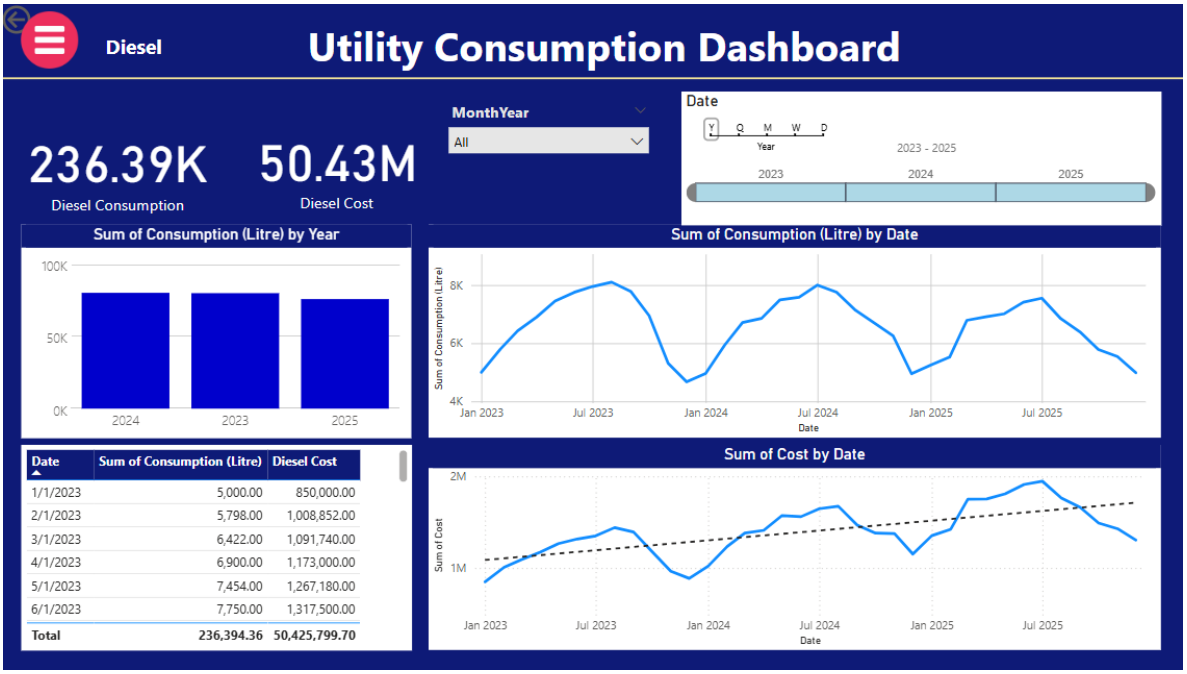


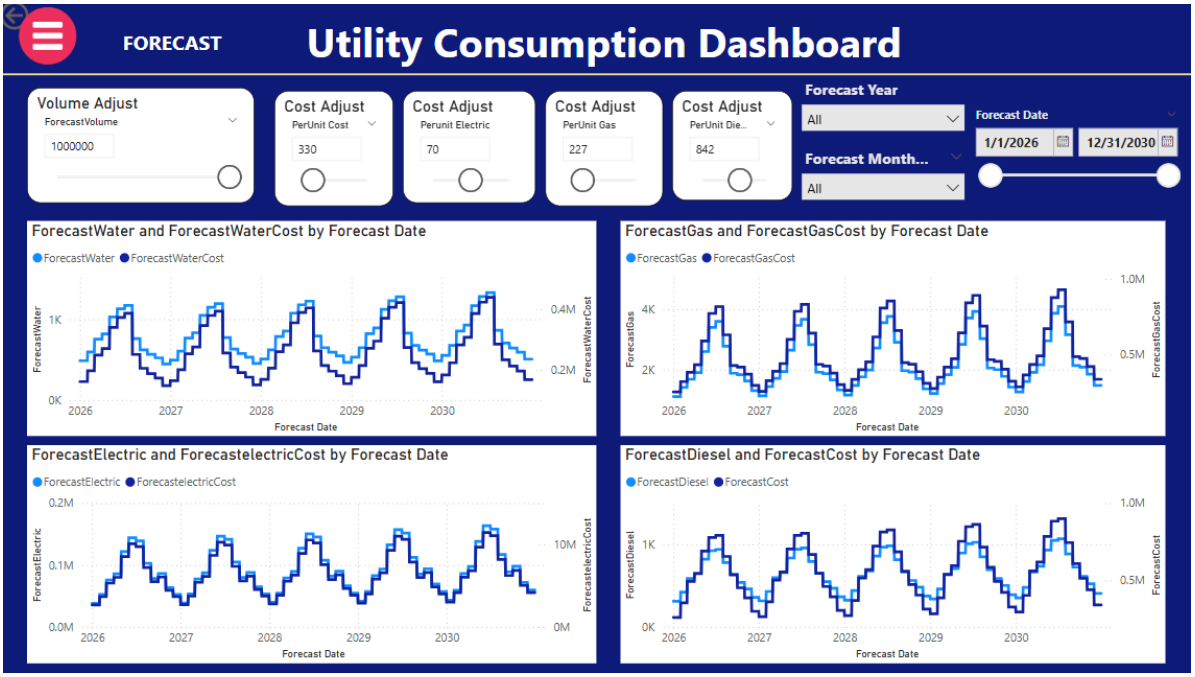


Date	Sum of Consumptions	Sum of Total Water Cost (PKR)
4/1/2023	241.00	154,261.47
4/2/2023	96.50	61,768.60
4/3/2023	398.76	255,241.92
4/4/2023	399.00	255,395.54
4/5/2023	398.00	254,755.45
4/6/2023	397.00	254,115.36
Total	**9,662.21**	**6,184,675.00**


Electricity
Utility Consumption Dashboard
32.10M
Electricity Consumption
813M
Electricity Cost
Utilities
All
Date
Year
2023 - 2025
2023
2024
2025
Sum of Consumptions by Utilities
15M
10M
5M
0M
TR1(kWh)
TR2(kWh)
TR3(kWh)
TR4(kWh)
Sum of Consumptions by Date and Utilities
Utilities TR1(kWh) TR2(kWh) TR3(kWh) TR4(kWh)
Sum of Consumptions
20K
0K
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date
Date MonthYear Sum of Consumptions Sum of Total Cost (
1/1/2023 Jan 2023 35,400.00 920,4
1/2/2023 Jan 2023 30,520.00 793,5
1/3/2023 Jan 2023 29,856.00 776,2
1/4/2023 Jan 2023 32,415.00 842,7
1/5/2023 Jan 2023 31,597.00 821,5
1/6/2023 Jan 2023 12,229.00 317,9
Total 32,104,586.57 813,205,39
Sum of Total Cost (PKR) by Date
Sum of Total Cost (PKR)
2.0M
1.5M
1.0M
0.5M
0.0M
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date


Gas
Utility Consumption Dashboard
799.35K
Gas Consumption
47.30M
Gas Cost
Utilities
All
Date
Year
2023 - 2025
2023
2024
2025
Sum of Consumption by Utilities
600K
400K
200K
0K
Chillers
Boilers
Canteen
Sum of Consumption by Date and Utilities
Utilities Boilers Canteen Chillers
Sum of Consumption
1K
0K
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date
Date MonthYear Sum of Consumption Sum of Total Cost (PKR)
1/1/2023 Jan 2023 723.23 28,083.10
1/2/2023 Jan 2023 729.07 28,309.76
1/3/2023 Jan 2023 728.80 28,299.36
1/4/2023 Jan 2023 729.75 28,336.34
1/5/2023 Jan 2023 729.28 28,318.01
1/6/2023 Jan 2023 368.96 14,326.72
Total 799,345.09 47,302,230.65
Sum of Total Cost (PKR) by Date
Sum of Total Cost (PKR)
100K
50K
0K
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date


Diesel
Utility Consumption Dashboard
236.39K
Diesel Consumption
50.43M
Diesel Cost
MonthYear
All
Date
Year
2023 - 2025
2023
2024
2025
Sum of Consumption (Litre) by Year
100K
50K
0K
2024
2023
2025
Sum of Consumption (Litre) by Date
Sum of Consumption (Litre)
8K
6K
4K
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date
Date | Sum of Consumption (Litre) | Diesel Cost
1/1/2023 | 5,000.00 | 850,000.00
2/1/2023 | 5,798.00 | 1,008,852.00
3/1/2023 | 6,422.00 | 1,091,740.00
4/1/2023 | 6,900.00 | 1,173,000.00
5/1/2023 | 7,454.00 | 1,267,180.00
6/1/2023 | 7,750.00 | 1,317,500.00
Total | 236,394.36 | 50,425,799.70
Sum of Cost by Date
Sum of Cost
2M
1M
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
Date


FORECAST
Utility Consumption Dashboard
Volume Adjust
ForecastVolume
1000000
Cost Adjust
PerUnit Cost
330
Cost Adjust
Perunit Electric
70
Cost Adjust
PerUnit Gas
227
Cost Adjust
PerUnit Die...
842
Forecast Year
All
Forecast Month...
All
Forecast Date
1/1/2026
12/31/2030
ForecastWater and ForecastWaterCost by Forecast Date
ForecastWater
ForecastWaterCost
1K
0K
0.4M
0.2M
2026
2027
2028
2029
2030
Forecast Date
ForecastGas and ForecastGasCost by Forecast Date
ForecastGas
ForecastGasCost
4K
2K
1.0M
0.5M
Forecast Date
ForecastElectric and ForecastelectricCost by Forecast Date
ForecastElectric
ForecastelectricCost
0.2M
0.1M
0.0M
10M
0M
Forecast Date
ForecastDiesel and ForecastCost by Forecast Date
ForecastDiesel
ForecastCost
1K
0K
1.0M
0.5M
Forecast Date