Energy Consumption Dashboard in Power BI

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1 Project Overview

This Power BI dashboard was created in collaboration with Aston University's Environment and Sustainability team. The goal of this project is to visualise the university's energy consumption data, making it easier to identify trends, monitor usage, and make informed decisions for better energy management.

Due to data confidentiality, the actual dataset has been removed from the shared Power BI (.pbix) file. However, the dashboard structure, DAX measures, and data model remain intact, showcasing the technical implementation and insights without exposing sensitive data.

2 Technologies Used

This project leverages a combination of tools and languages to deliver powerful data visualisations:

- **Power BI**: For creating interactive visualisations and building the dashboard.

- **DAX (Data Analysis Expressions)**: For calculated measures and dynamic data analysis.

3 Dashboard Highlights

3.1 Time Series Forecasting

The dashboard visualises historical energy consumption trends and forecasts future usage based on existing patterns. It provides monthly and yearly consumption projections, helping the university plan for energy needs.

3.2 Building-Level Energy Breakdown

This section shows how much energy each building consumes. By highlighting high-consumption buildings, the team can target energy-saving initiatives more effectively.

3.3 Energy Source Distribution

The dashboard displays the proportion of different energy sources, like the Grid and DHEN, showing their contribution to total energy consumption. This helps in understanding energy dependencies and optimizing supply strategies.

4 DAX Measures

Here are some key DAX measures used to drive the insights in the dashboard:

```
TotalConsumption = SUM('energy_data'[Consumption_kWh])

MonthlyConsumption =
CALCULATE(
```

```
SUM('energy_data'[Consumption_kWh]),
VALUES('energy_data'[Month])
)

YearlyForecast =
CALCULATE(
[TotalConsumption],
FILTER('energy_data', 'energy_data'[Year] = YEAR(TODAY()) + 1)
)

PercentageContribution =
DIVIDE(
[TotalConsumption],
CALCULATE(SUM('energy_data'[Consumption_kWh]), ALL('energy_data')),
0
)
```

5 Data Model

The Power BI data model connects various tables to facilitate comprehensive analysis:

- **Tables**: Energy Data, Buildings, Energy Sources
- **Relationships**: Building ID and Energy Source ID as primary keys
- **Calculated Columns**: Derived for time-based analysis and energy grouping

6 Dashboard Visuals

While the actual data is removed, screenshots of the dashboard layout and visual elements illustrate the structure and interactivity of the report.
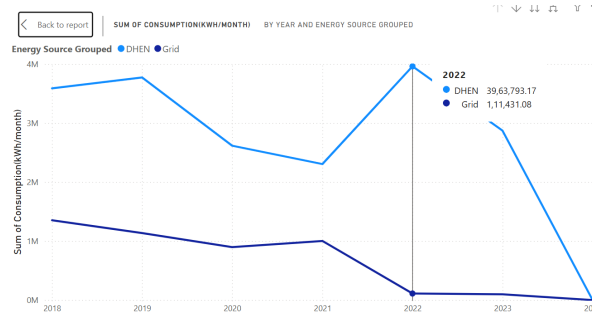

Figure 1: Time Series

7 Next Steps

Future enhancements to the dashboard could include:

- Real-time data integration for live monitoring
- Advanced forecasting models incorporating external factors like weather data
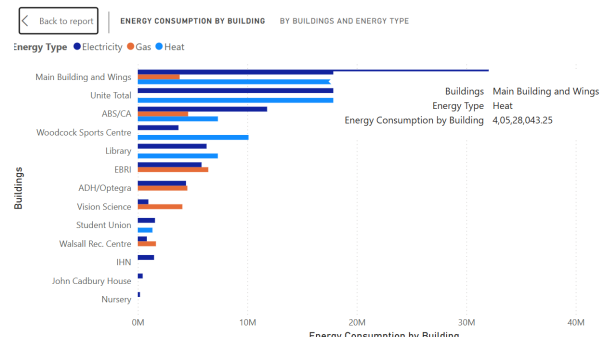- Sub-metering for room-level or equipment-level analysis
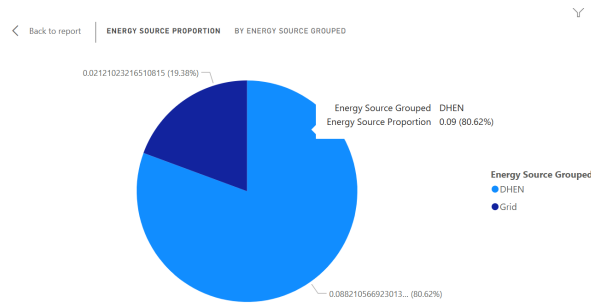
Figure 2: Energy by Building

Figure 3: Energy Source Distribution

8   Repository

The technical implementation of this dashboard, including the Power BI file and DAX scripts, can be found on GitHub: GitHub Repository

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Buildings, Energy Type, Energy Source Grouped, Date

- ☐ ▣ ABS/CA
- ☐ ☐ ADH/Optegra
- ☐ ☐ EBRI
- ☐ ☐ IHN
- ☐ ☐ John Cadbury House
- ☐ ☐ Library
- ☐ ☐ Main Building and Wings
- ☐ ☐ Nursery
- ☐ ☐ Student Union
- ☐ ☐ Unite Total
- ☐ ☐ Vision Science
- ☐ ☐ Walsall Rec. Centre
- ☐ ☐ Woodcock Sports Centre

Figure 4: Slicers