Power BI Project Report

Generator, Fuel, Grid, and Battery Behavior Analysis

Executive Summary

This report analyzes system data from a power generation and backup setup, focusing on fuel levels, generator activity, grid supply, and battery voltage. The findings highlight system behaviors, anomalies, and vulnerabilities during a critical timeline window, and provide targeted recommendations for operational improvement.

1. Introduction

A detailed Power BI analysis was conducted to monitor key performance indicators, detect anomalies, and recommend corrective actions for enhanced facility resilience. The primary variables examined include:

- **Fuel Percentage (%)**
- **Generator R Phase Voltage (GSET R Ph Volt)**
- **Grid R Phase Voltage (GRID R Ph VOLT)**
- **Battery Voltage (BAT Volt)**

2. Data Insights

2.1 Fuel Percentage Behavior

- **Starts at 0%**, then rises sharply.
- **Sudden fuel drop detected at the 53K mark**, without matching generator activity.
    - Possible causes: *leakage, theft, or sensor error*.

2.2 Generator Activity (GSET R Ph Volt)

- Largely **inactive throughout the monitoring period**.
- Brief voltage spikes observed near **55K** and just before **70K** (possible test runs).
- **No strong correlation** between generator activity and fuel drops.

2.3 Grid Supply (GRID R Ph VOLT)

- **Stable grid voltage** maintained until approximately **65K**.
- **After 65K**, grid supply **drops to zero**, suggesting a power outage.
    - This event coincides with battery and fuel anomalies.

2.4 Battery Voltage (BAT Volt)

- **Stable early in the timeline**.
- **Fluctuations and drops** post-65K, probably due to grid outage and non-active generator.
- Indicates *possible battery undersizing*, unable to provide sustained backup.

3. Timeline Correlation (65K–75K)

During this interval, the following issues were observed:

- **Loss of grid power**
- **Unexplained fuel drop**
- **Battery voltage fluctuations**
- **Intermittent generator spikes**

These combined factors suggest a *critical event window*, likely involving a grid failure where backup systems failed to adequately respond.

4. Recommendations

- **Investigate Fuel Drop:**
  Review tank sensors and logs at the 53K mark to rule out fuel theft, leakage, or sensor error.
- **Audit Generator Logic:**
  Examine generator auto-start settings, controller programming, and maintenance records to ensure proper response to grid outages.
- **Check Battery Health:**
  Assess battery backup for aging, insufficient capacity, or missed maintenance. Consider upgrading for longer autonomy during outages.
- **Enhance Grid Monitoring:**
  Implement automated alerts for grid interruptions and critical system instabilities for faster incident response.

5. Conclusion

The analysis reveals vulnerabilities in the backup power infrastructure, notably during grid outages. Immediate investigation and maintenance actions should be taken to secure fuel, confirm generator readiness, and improve battery backup, minimizing risk of power loss to critical systems.