**Business Insight Report**

Client: EcoSmart Solutions (for a large REIT)

Project: Smart Energy Dilemma – Race for Energy Efficiency

**Executive Summary**

* Hog and Fox sites have the highest total energy consumption across the REIT.
* Education buildings contribute the most to overall energy usage, far ahead of other building types.
* Wide variation in energy use across sites and building types, with significant outliers.
* Immediate focus should be on high-consuming sites and education-use buildings to meet the 20% reduction target.

**Objective**

Identify areas of major energy inefficiency across the company's 1600+ buildings to reduce total energy consumption by 20% in two years.

**Data Overview**

* Daily and hourly energy meter readings across North America and Europe (2016–2017).
* Building metadata includes site, primary usage type (e.g., education, office, public), and energy readings.
* Missing values and inconsistencies were cleaned during preprocessing.
* Rolling averages (24-hour) and group summaries were generated for better trend visualization.

**Key Findings**

*Site-Level Insights*

* Hog is the site with the highest total energy usage (~450M+), followed by Fox and Rat.
* Moose site has very few buildings but the highest average energy use per building (an outlier).
* Rat has the largest number of buildings but relatively lower average energy use per building.

*Usage-Type Insights*

* Education buildings dominate energy usage, accounting for the largest share by a wide margin.
* Office buildings are also high consumers but spread across many buildings.

*Energy Efficiency Observations*

* Some buildings show consistent high usage throughout the years without obvious seasonal reductions.
* Significant outliers detected (seen in boxplots) — some buildings consume 5–10x the typical median energy for their site/usage type.
* Certain sites (e.g., Eagle, Bear) have more stable and lower variance in energy use compared to others.

**Business Implications**

* High Energy Usage Concentration: A small number of sites (Hog, Fox, Rat) and building types (education, office) account for a majority of energy consumption.
* Opportunity: Focusing energy-saving measures on just the top-consuming buildings can deliver disproportionate impact toward the 20% reduction goal.
* Risk: Outliers may skew averages; some sites/buildings may need individualized strategies (not one-size-fits-all).

**Recommendations**

* Prioritize top sites: Audit and optimize energy usage at Hog, Fox, and Rat sites first.
* Target education buildings: Focus on energy retrofits and operational changes in education facilities.
* Investigate outliers: Buildings far above median usage (seen in boxplots) should be immediately flagged for deep dive analysis.
* Implement real-time monitoring: Introduce IoT-based smart meters on top sites to identify ongoing waste dynamically.
* Seasonal tuning: Adjust building heating/cooling systems proactively based on seasonal usage patterns observed.

**Graphs**

Mean Energy Use Over Time for Major Buildings

A graph of energy use per building by site

AI-generated content may be incorrect.

Total Energy by Site

A graph of energy by site

AI-generated content may be incorrect.

Total Energy by Primary Use

A graph of energy by primary use

AI-generated content may be incorrect.

Boxplots showing Energy Use Variations

A comparison of a graph

AI-generated content may be incorrect.

Mean Energy Use Per Building Analysis

A graph with blue lines

AI-generated content may be incorrect.

A graph showing a blue line

AI-generated content may be incorrect.

A graph showing a wave of energy

AI-generated content may be incorrect.

A graph showing a number of energy

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Mean Energy Use – Rat Office

A graph of energy and time

AI-generated content may be incorrect.

Mean Energy Use – Hog\_Public\_Kevin

A graph of a graph

AI-generated content may be incorrect.

Mean Energy Use – Hog\_Public\_Brad

A graph of energy and time

AI-generated content may be incorrect.

Mean Energy Use – Hog\_education\_Janell

A graph of energy and time

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Mean Energy Use – Hog\_assembly\_Maribel

A graph of a graph

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Mean Energy Use – Hog\_assembly\_Letha A graph of a graph

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Mean Energy Use – Fox\_Education\_Wills A graph of a graph

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Mean Energy Use – Eagle\_Education\_Peter

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Mean Energy Use – Bear\_Education\_Wilton

A graph of a graph

AI-generated content may be incorrect.