**Project Summary – Household Energy Consumption Analysis**

**Objective:**

The project analyse household energy usage data to:

1. Identify **high-energy-consuming households**.
2. Understand consumption patterns based on **family size, appliance count, and income level**.
3. Suggest **energy-saving recommendations** for policy planning.

**Dataset Overview**

* **Household\_ID** → Unique identifier for each household
* **Family\_Size** → Number of family members
* **Monthly\_Income** → Household monthly income (₹)
* **Electricity\_Usage (kWh)** → Electricity consumption
* **Gas\_Usage** → Gas consumption
* **Appliances\_Count** → Total appliances owned
* **Month** → Month of data collection

**Added Calculations:**

* **Total Energy** = Electricity + Gas
* **Per Capita Energy** = Total Energy ÷ Family Size
* **Score (0–3)** = Based on Large Family, High Appliance, High Income

**Key Findings**

**1. Monthly Patterns**

* Peak consumption observed in **Jul, Sep, and Oct** (likely due to seasonal cooling/heating).
* Lowest usage recorded in **Apr** (moderate climate, reduced appliance use).

**2. Household Categories**

* **Large Families (≥6 members)** → Consumed significantly more energy per capita.
* **High Appliance Count (≥10)** → Biggest driver of excess consumption.
* **High Income (≥₹80,000)** → Linked with more appliances and higher usage.

**3. Score Analysis**

* Households scoring **2 or 3** (Large Family + High Appliance + High Income) = **highest energy consumption group**.
* Normal households (Score 0) contributed much less to overall consumption.

**4. Top Consumers**

* Top 10 households account for a disproportionately high share of energy usage.
* These households have **large families + many appliances + higher income**.

**Recommendations**

**For Large Families**

* Subsidies for **LED bulbs & efficient fans/ACs**.
* Awareness campaigns on **shared appliance usage**.

**For High Appliance Users**

* Appliance replacement scheme (**BEE 5-star rated appliances**).
* **Smart plugs** to reduce standby power.
* Promote **solar water heaters** instead of electric geysers.

**For High-Income Households**

* **Tiered electricity tariffs** to discourage wasteful use.
* Incentives for **rooftop solar** adoption.
* Encourage **inverter ACs, energy-efficient refrigerators**.

**For Seasonal Peaks (Jul–Oct)**

* Awareness on **AC temperature settings (24–26°C)**.
* Promote **natural ventilation & insulation** to cut cooling load.

**Deliverables**

* **Excel workbook** with:
  + Pivot Tables & Charts (monthly, score-based, household-type).
  + Top 10 consumers table.
  + Energy-saving recommendations.
* **Dashboard** with slicers for interactive analysis.
* **Summary Report** (this document).

**Conclusion:**  
The analysis highlights that **appliance-heavy and high-income households** are the main contributors to high energy consumption. Targeted policies (appliance efficiency, solar incentives, tariff structures) will help the city reduce overall consumption while supporting low-income families.