**Improving Renewable Energy Adoption by Analyzing Household Usage Patterns and Preferences**

A renewable energy provider wants to increase the adoption of solar panels and wind energy systems among residential customers. Despite growing awareness of clean energy, adoption rates are inconsistent across regions. The objective is to create a Power BI report that identifies household usage patterns, demographic influences, and regional trends to develop targeted strategies for increasing renewable energy adoption.

**Step-by-Step Process for Power BI Report:**

**1. Problem Statement**

Address the challenge of low renewable energy adoption by:

* Understanding household energy consumption patterns.
* Identifying regions with high potential for clean energy adoption.
* Analyzing customer preferences for renewable energy systems.
* Evaluating the impact of government subsidies and incentives.

**2. Data Requirements**

Key data points include:

* Household demographics (Income Level, Family Size, Location, Property Type).
* Energy consumption data (Electricity Usage, Monthly Bills, Peak Usage Hours).
* Renewable energy adoption data (System Type, Installation Date, Cost).
* Government incentives (Subsidy Amount, Eligibility, Usage Rates).
* Feedback data (Customer Reviews, Sentiments on renewable energy systems).

**3. Data Collection**

* **Energy Providers**: Household energy usage data.
* **Renewable Energy Installers**: Adoption rates and system details.
* **Government Portals**: Subsidy usage and regional incentive data.
* **Customer Surveys**: Preferences and barriers to adoption.
* **Regional Demographics**: Census data for segmentation.

**4. Data Validation**

* Cross-check energy consumption data against reported bills.
* Verify installation data aligns with customer locations.
* Ensure subsidy usage data matches eligible households.
* Standardize formats for household demographics and addresses.

**5. Data Cleaning**

* Handle missing income levels or preferences using median values or “Not Specified.”
* Remove outliers in electricity usage data (e.g., extreme anomalies).
* Standardize property types (e.g., “Apartment” vs. “Flat”).
* Aggregate regional data for visual consistency.

**6. Tools**

* **Power BI**: For creating dashboards with dynamic filtering.
* **SQL**: For querying energy and adoption data.
* **Excel**: For initial data merging and validation.
* **Python**: For advanced data preprocessing or sentiment analysis.

**7. Dashboard Development in Power BI**

**Dashboard Components:**

* **Adoption Overview**: KPI cards for total households, renewable adoption rates, and subsidy utilization.
* **Consumption Analysis**: A bar chart showing energy usage by household type.
* **Regional Trends**: A heatmap highlighting areas with high or low adoption.
* **Demographics**: A pie chart displaying household segments by income and property type.
* **Feedback Sentiments**: A word cloud or sentiment trend line based on reviews.
* **Subsidy Impact**: A table comparing adoption rates with and without subsidies.

**8. Storytelling**

1. **Set the Context**:
   * Present the issue of slow renewable energy adoption and its implications for sustainability goals.
2. **Highlight Insights**:
   * Showcase energy consumption trends and regions with untapped potential.
   * Present demographic factors influencing adoption rates.
3. **Address Barriers**:
   * Highlight common issues, such as cost barriers or low awareness of incentives.
4. **Actionable Recommendations**:
   * Target high-energy-use regions with tailored campaigns.
   * Increase awareness of subsidies and incentives.
   * Provide financing options to lower upfront costs for households.