SDG 7: Affordable and Clean Energy

Problem Definition:

Problem Statement: Improving access to affordable clean energy in rural areas. Many rural areas struggle with high energy costs and limited access to clean energy sources. This project aims to analyze energy costs and identify strategies to increase access to affordable clean energy in these regions.

Entity-Relationship Diagram (ERD):

Some of the Entities:

Households: Represents individual households.

Regions: Represents geographic regions.

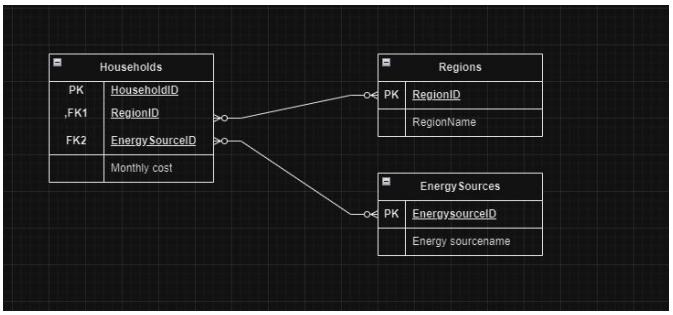
Energy Sources: Represents types of energy used (e.g., solar, wind).

Costs: Represents monthly energy costs for each household.

Relationships:

Each Household belongs to one Region and uses one Energy Source.

Costs are associated with each Household.



Database Schema:

SQL SCRIPTS

CREATE TABLE Regions (

```
    RegionID INT PRIMARY KEY,
    RegionName VARCHAR(255)
);

CREATE TABLE EnergySources (
    EnergySourceID INT PRIMARY KEY,
    EnergySourceName VARCHAR(255)
);

CREATE TABLE Household (
    HouseholdID INT PRIMARY KEY,
    RegionID INT,
    EnergySourceID INT,
    MonthlyCost DECIMAL(10,2),
    FOREIGN KEY (RegionID) REFERENCES Regions(RegionID),
    FOREIGN KEY (EnergySourceID) REFERENCES
EnergySources(EnergySourceID)
);
```

Sample Data:

SQL Statements for Data Insertion:

```
INSERT INTO Regions (RegionID, RegionName) VALUES
(1, 'North Region'),
(2, 'South Region'),
(3, 'East Region'),
(4, 'West Region');
```

```
INSERT INTO EnergySources (EnergySourceID, EnergySourceName) VALUES
(1, 'Solar'),
(2, 'Wind'),
(3, 'Fossil Fuels'),
(4, 'Hydro');

INSERT INTO Household (HouseholdID, RegionID, EnergySourceID,
MonthlyCost) VALUES
(1, 1, 1, 50.00),
(2, 1, 3, 120.00),
(3, 2, 2, 80.00),
(4, 2, 1, 60.00),
(5, 3, 4, 45.00),
(6, 4, 3, 110.00);
```

Data Retrieval:

Average Energy Cost by Region:

```
SELECT r.RegionName, AVG(h.MonthlyCost) AS AverageCost
FROM Households h
JOIN Regions r ON h.RegionID = r.RegionID
GROUP BY r.RegionName;
```

Number of Households Using Each Energy Source:

```
SELECT e.EnergySourceName, COUNT(h.HouseholdID) AS
NumberOfHouseholds
FROM Households h
```

```
JOIN EnergySources e ON h.EnergySourceID = e.EnergySourceID
GROUP BY e.EnergySourceName;
```

Data Analysis:

Identify regions with highest and lowest average costs:

```
SELECT r.RegionName, AVG(h.MonthlyCost) AS AverageCost
FROM Households h
JOIN Regions r ON h.RegionID = r.RegionID
GROUP BY r.RegionName
ORDER BY AverageCost DESC;
```

Find EnergySources with highest number of users:

```
SELECT e.EnergySourceName, COUNT(h.HouseholdID) AS
NumberOfHouseholds
FROM Households h
JOIN EnergySources e ON h.EnergySourceID = e.EnergySourceID
GROUP BY e.EnergySourceName
ORDER BY NumberOfHouseholds DESC;
```

Data Retrieval:

Query 1: Find the average energy cost by region.

Query 2: Count the number of households using each type of energy source.

Data Analysis:

Analysis 1: Identify regions with the highest and lowest average energy costs.

Analysis 2: Determine which energy sources have the highest number of users.

Integration and Testing

Integration:

Data was exported from SQL queries as CSV files and imported into Google Sheets. The data was validated to ensure consistency with the original SQL query results.

Testing:

The dashboard was tested by applying filters and updating data to ensure the charts responded correctly to changes.