-- Create database

CREATE DATABASE EnergyConsumptionDB;

USE EnergyConsumptionDB;

-- Consumers table

CREATE TABLE Consumers (

ConsumerID INT PRIMARY KEY AUTO\_INCREMENT,

Name VARCHAR(255),

Location VARCHAR(255),

Sector ENUM('Residential', 'Commercial', 'Industrial')

);

-- EnergyUsage table

CREATE TABLE EnergyUsage (

UsageID INT PRIMARY KEY AUTO\_INCREMENT,

ConsumerID INT,

Date DATE,

EnergyConsumed DECIMAL(10,2), -- in kWh

PeakHours BOOLEAN,

FOREIGN KEY (ConsumerID) REFERENCES Consumers(ConsumerID)

);

-- EnergySources table

CREATE TABLE EnergySources (

SourceID INT PRIMARY KEY AUTO\_INCREMENT,

Type ENUM('Solar', 'Wind', 'Hydro', 'Coal', 'Gas'),

CarbonEmissionsPerUnit DECIMAL(10,2) -- CO2 emissions per kWh

);

-- SustainabilityMetrics table

CREATE TABLE SustainabilityMetrics (

MetricID INT PRIMARY KEY AUTO\_INCREMENT,

ConsumerID INT,

EnergySaved DECIMAL(10,2), -- in kWh

CO2Reduced DECIMAL(10,2), -- in kg

CostSavings DECIMAL(10,2), -- in $

FOREIGN KEY (ConsumerID) REFERENCES Consumers(ConsumerID)

);

-- Insert sample data

INSERT INTO Consumers (Name, Location, Sector) VALUES

('John Doe', 'New York', 'Residential'),

('ABC Corp', 'Los Angeles', 'Commercial'),

('XYZ Industries', 'Chicago', 'Industrial');

INSERT INTO EnergyUsage (ConsumerID, Date, EnergyConsumed, PeakHours) VALUES

(1, '2024-01-01', 50.5, TRUE),

(2, '2024-01-01', 200.0, FALSE),

(3, '2024-01-01', 500.0, TRUE);

INSERT INTO EnergySources (Type, CarbonEmissionsPerUnit) VALUES

('Solar', 0.0),

('Wind', 0.0),

('Hydro', 0.0),

('Coal', 2.5),

('Gas', 1.8);

INSERT INTO SustainabilityMetrics (ConsumerID, EnergySaved, CO2Reduced, CostSavings) VALUES

(1, 10.0, 5.0, 15.0),

(2, 50.0, 25.0, 100.0),

(3, 100.0, 75.0, 500.0);

-- SQL Queries for Energy Consumption Trends

-- 1. Total energy consumption per sector

SELECT Sector, SUM(EnergyConsumed) AS TotalEnergyConsumed

FROM Consumers C

JOIN EnergyUsage E ON C.ConsumerID = E.ConsumerID

GROUP BY Sector;

-- 2. Monthly energy consumption trends

SELECT DATE\_FORMAT(Date, '%Y-%m') AS Month, SUM(EnergyConsumed) AS TotalEnergyConsumed

FROM EnergyUsage

GROUP BY Month

ORDER BY Month;

-- 3. Peak hour energy consumption vs. non-peak

SELECT PeakHours, SUM(EnergyConsumed) AS TotalEnergyConsumed

FROM EnergyUsage

GROUP BY PeakHours;

-- 4. Top 5 highest energy-consuming consumers

SELECT C.Name, C.Location, SUM(E.EnergyConsumed) AS TotalEnergyConsumed

FROM Consumers C

JOIN EnergyUsage E ON C.ConsumerID = E.ConsumerID

GROUP BY C.Name, C.Location

ORDER BY TotalEnergyConsumed DESC

LIMIT 5;

-- 5. Energy consumption trends over time per consumer

SELECT C.Name, E.Date, SUM(E.EnergyConsumed) AS DailyEnergyConsumption

FROM Consumers C

JOIN EnergyUsage E ON C.ConsumerID = E.ConsumerID

GROUP BY C.Name, E.Date

ORDER BY E.Date;