1. Demonstrate that all the relations in the relational schema are normalized to Boyce–Codd normal form (BCNF).

   For the first relation between Municipality and Solar Installation, for a specified Municipality_Name, County_Name, and Year, there will be only one result.

   For the second relation between Municipality and Electric Vehicle Ownership, for a specified Municipality_Name, County_Name, and Year there would be only one result from the Electric Vehicle data set. For example if were use Municipality_Name = Aberdeen township, County_Name = Monmouth, and Year = 2015 we would get back the following;
   Municipality_Name = Aberdeen township, County_Name = Monmouth, Year = 2015, Total_Vehicles = 12240, Num_of_EVs = 7, and %_EVs = 0.06%

   For the third relation between Municipality and Utility Energy, the composite key of Muncipality_Name, County_Name, and year returns a single result.

   For the fourth relation between Municipality and Lifetime Residential Energy Efficiency Program Participation, only Municipality_Name and County_Name are needed to return a single result

   For the fifth relation between Municipality and Lifetime Commercial Energy Efficiency Program Participation, only Municipality_Name and County_Name are needed to return a single result

2. Define the different views (virtual tables) required. For each view list the data and transaction requirements. Give a few examples of queries, in English, to illustrate.

   1. Solar Installation and Utility Energy:
      a. Municipality, County, Year, Installation Number, Electricity Total, Electricity Type
   2. Electric Vehicle Ownership and Utility Energy:
      a. Municipality, County, EV_percentage, Year, Natural_Gas_ Total , Electricity_Total

3. Lifetime Residential Energy Efficiency Programs and Lifetime Commercial Energy Efficiency Programs
    a. Municipality, County, Completed_Projects, Lifetime_Rate_Percent
4. Utility Energy and Lifetime Residential Energy Efficiency Program Participation:
    a. Municipality, County, Electricity Total, Electricity Type, Completed projects, Lifetime Rate Percentage
5. Utility Energy and Lifetime Commercial Energy Efficiency Program Participation:
    a. Municipality, County, Electricity Total, Electricity Type, Completed projects, Lifetime Rate Percentage

Examples of VIEW queries:

1. CREATE VIEW EVs_v_Utility AS(
   SELECT e.Municipality, e.County, e.Year, e.EV_Percentage, u.Electricity_Total, u.Natural_Gas_Total FROM Electic_Vehicle_Ownership e
   LEFT JOIN
   POP u
   ON
   e.Municipality = u. Municipality
   WHERE
   e.Year = u.Year
   );
2. CREATE VIEW Solar_v_Utility AS(
   SELECT s.Municipality, s.County, s.Year, s.Installation_Num, u.Electricity_Total, u.Electricity_Type FROM Solar_Installation s
   LEFT JOIN
   POP u
   ON
   s.Municipality = u. Municipality
   WHERE
   s.Year = u.Year
   );

3. Design a complete set of SQL queries to satisfy the transaction requirements identified in the previous stages, using the relational schema and views defined in tasks 2 and 3 above.

1. SELECT s.Solar_Instalations, e.Utility_Energy

FROM Municipality
JOIN Utility_Energy ON s.Municipality = e.Municipality, s.County = e.County, s.Year = e.Year
WHERE s.Municipality = “”,s. County = “”,s. Year = “”;

2. SELECT ev.Electric_Vehicle_Owenership, e.Utility_Energy
   FROM Electric_Vehicle_Owenershipewwe
3. SELECT Municipality, County, Electricity_Total, Installation_Num COUNT(*)
   FROM Solar_v_Utility
   Group by Municipality, County
   Order By COUNT(*) DESC
   LIMIT 20
4. SELECT Municipality, County, Electricity_Total, Ev_Percentage COUNT(*)
   FROM EVs_v_Utility
   Group by Municipality, County
   Order By COUNT(*) DESC
   LIMIT 20