

EV Power - Lab 4 Project Report

Example Solution 1

Part 0: libraries

Part 1: Defining Research Question

Chosen Question: Do states with cheaper energy have higher renewable energy usages? Do these states have higher ev registrations? Does energy cost correlate more with renewable energy usage or non renewable? Which states have the fastest growing renewable energy usage?

Part 2: Data Preparation and Cleaning

Turns csv files into tibbles. Standardizes column names and converts all states to upper case abbreviations. Cleans strings with excess characters (≈, \$, etc.) Converts strings to numeric where applicable.

Part 3: Joining / Pivoting Datasets for Analysis

I chose to join the cost of energy with both the usage of renewable and non renewable energy sources for each year. Using these tables, one could easily plot energy costs vs the usage of any kind of energy, and see if they are correlated.

I also chose to join the ev registration table with the energy cost table to easily see the number of ev registrations compared to the cost of power, by state.

I also joined all three total use tables and selected the renewable energy totals to see the difference in renewable energy use by state over time.

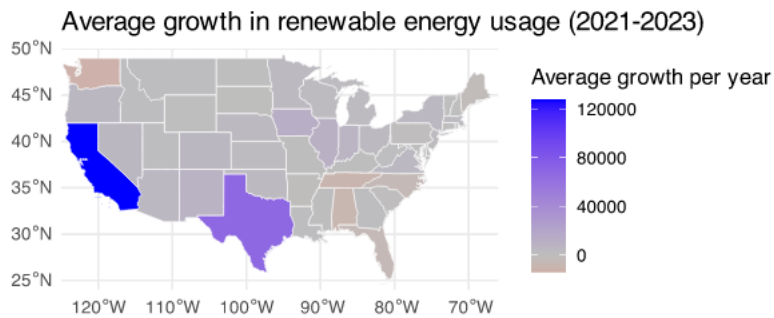
```
# A tibble: 51 × 12
  state energy_cost coal natural_gas petroleum nuclear renewable biomass
  <chr> <chr>      <int>      <int>      <int>      <int>      <int> <chr>
1 AK    20.03      18694      395590      261094         0       9597 3153
2 AL    17.85     309791      739891      583042     480115     239817 198543
3 AR    18.42     216123      360545      328271     141372      89714 72939
4 AZ    25.07     160299      484962      606862     329868      99266 35287
5 CA    28.44      28244     2172757     2959389     171842     810020 462829
6 CO    20.64     252442      509970      497788         0     103955 36334
7 CT    25.85       2880      305184      284788     179551      49306 42781
8 DC    25.67         0       28336       18439         0        2487 1897
9 DE    21.83       4542       82708      113641         0        7150 5995
10 FL   22.53     200193     1591864     1748346     307811     297291 221885
# i 41 more rows
# i 4 more variables: geothermal <chr>, hydropower <chr>, solar <chr>,
# wind <chr>
```

```
# A tibble: 51 × 5
  state `2021` `2022` `2023` count
  <chr> <chr> <chr> <chr> <chr>
1 AK    20.03  27.33  23.84  2697
2 AL    17.85  23.37  21.11 13047
3 AR    18.42  23.84  21.76  7108
4 AZ    25.07  31.72  30.28 89798
5 CA    28.44  37.35  35.72 1256646
6 CO    20.64  25.85  23.85  90083
7 CT    25.85  33.15  32.32  31557
8 DC    25.67  30.84  32.28  8066
9 DE    21.83  27.74  26.70  8435
10 FL   22.53  29.35  28.12 254878
# i 41 more rows
```

```
# A tibble: 51 × 4
  state `2021` `2022` `2023`
  <chr> <int> <int> <int>
1 AK      9597  10410  10087
2 AL   239817 232035 222189
3 AR    89714  90825  87277
4 AZ    99266 101215 108445
5 CA   810020 880995 1065179
6 CO   103955 114917 115061
7 CT    49306  49084  48981
8 DC     2487   2622   2795
9 DE     7150   7402   8041
10 FL   297291 304605 286306
# i 41 more rows
```

Part 4: Mapping Visualization

Creates a map that displays the average difference in renewable energy usage. Uses a diverging scale to visualize states with increasing renewable energy usage versus decreasing.



Analysis

This map shows that California had by far the highest average growth in renewable energy usage per year. Most states did not have a significant increase in renewable energy usage. Washington, Tennessee, Alabama, Florida, and North Carolina showed the largest decrease in renewable energy usage.