EV Power - Lab 4 Project Report

Part 0: libraries

import stringr, tidyr, dplyr, sf, rnaturalearth, and ggplot2

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
```

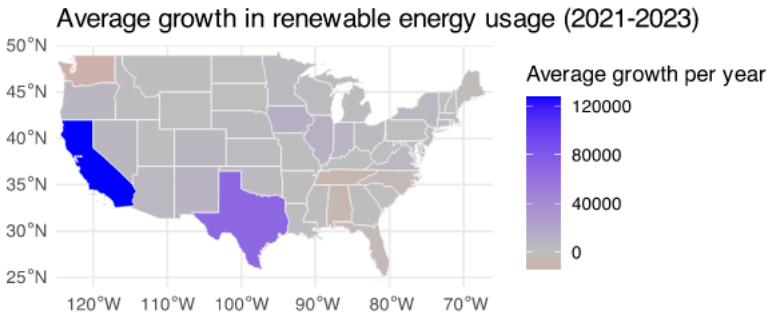
```
# ℹ 4 more variables: geothermal <chr>, hydropower <chr>, solar <chr>,
#   wind <chr>
```

```
# 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.