EV Power - Lab 4 Project Report

Part 0: libraries

Part 1: Defining Research Question

Chosen Question: What is the relationship between the average energy prices in each state and the number of registered electric vehicles in 2023?

Part 2: Data Preparation and Cleaning

```
price_2023_clean:
```

```
# A tibble: 10 × 2
   state energy_price_2023
   <chr>            <dbl>
 1 State             2023
 2 AK                23.8
 3 AL                21.1
 4 AR                21.8
 5 AZ                30.3
 6 CA                35.7
 7 CO                23.8
 8 CT                32.3
 9 DC                32.3
10 DE                26.7
```

```
ev_2023_clean:
```

```
# A tibble: 10 × 2
   state ev_count
   <chr>    <dbl>
 1 AL       13047
 2 AK        2697
 3 AZ       89798
 4 AR        7108
 5 CA     1256646
 6 CO       90083
 7 CT       31557
```

```
 8 DE         8435
 9 DC         8066
10 FL       254878
```

```
# A tibble: 51 × 3
   state energy_price_2023 ev_count
   <chr>             <dbl>    <dbl>
 1 AK                 23.8     2697
 2 AL                 21.1    13047
 3 AR                 21.8     7108
 4 AZ                 30.3    89798
 5 CA                 35.7  1256646
 6 CO                 23.8    90083
 7 CT                 32.3    31557
 8 DC                 32.3     8066
 9 DE                 26.7     8435
10 FL                 28.1   254878
# i 41 more rows
```

Part 3: Joining / Pivoting Datasets for Analysis

```
# A tibble: 51 × 8
   state energy_price_2023 ev_count  year renew total_use renew_share
   <chr>             <dbl>    <dbl> <dbl> <dbl>     <dbl>       <dbl>
 1 AK                 23.8     2697  2023     0    746979           0
 2 AL                 21.1    13047  2023     0   2265008           0
 3 AR                 21.8     7108  2023     0   1151062           0
 4 AZ                 30.3    89798  2023     0   1712667           0
 5 CA                 35.7  1256646  2023     0   6429818           0
 6 CO                 23.8    90083  2023     0   1359507           0
 7 CT                 32.3    31557  2023     0    789642           0
 8 DC                 32.3     8066  2023     0     46323           0
 9 DE                 26.7     8435  2023     0    203487           0
10 FL                 28.1   254878  2023     0   4237858           0
# i 41 more rows
# i 1 more variable: ev_per_total_use <dbl>
```
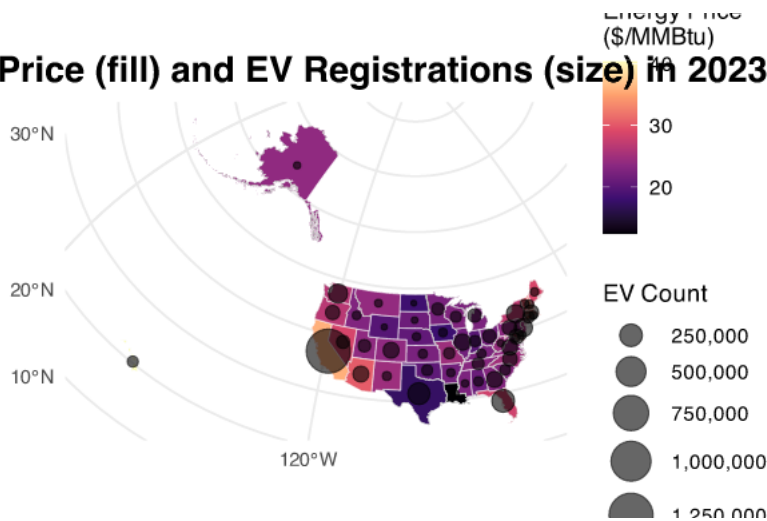
Part 4: Mapping Visualization

newable Energy Share by State (2023)
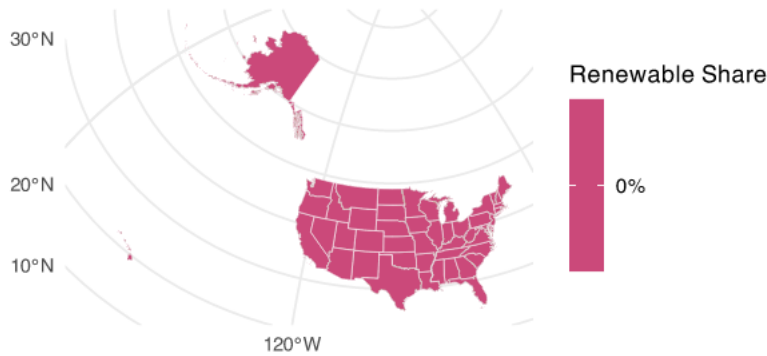
Price (fill) and EV Registrations (size) in 2023

Part 5: Analysis

From the first map, we can see that the distribution of renewable energy proportions in the continental United States is not balanced. Some states in the west and northeast have relatively higher proportions of renewable energy. From the second map, we can observe that those states with high energy prices and a large number of electric vehicles are mainly concentrated in the west coast regions, such as California, Washington, and Oregon, as well as some parts of the northeast. This indicates that those states with more powerful clean energy or climate policies may simultaneously face higher energy prices and a faster rate of electric vehicle adoption. However, some states have high energy prices but few electric vehicles, which might be related to factors such as income levels, urbanization process, or charging networks. Thus, the price factor alone cannot explain the popularity of electric vehicles - the proportion of renewable energy and the policy background of each state are also equally important.