# EV Power - Lab 4 Project Report

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## Part 0: libraries

```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0
──
✔ dplyr     1.1.4     ✔ readr     2.1.5
✔ forcats   1.0.0     ✔ stringr   1.5.1
✔ ggplot2   3.5.1     ✔ tibble    3.2.1
✔ lubridate 1.9.4     ✔ tidyr     1.3.1
✔ purrr     1.0.2
── Conflicts ────────────────────────────────────────── tidyverse_conflicts()
──
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all
conflicts to become errors

Attaching package: 'maps'


The following object is masked from 'package:purrr':

    map
```

## Part 1: Defining Research Question

Chosen Question: *Is there a pattern in the dominant energy source in the top 10 electric vehicle registration states?*

Overview: This research question investigates the relationship between the top 10 state's primary energy source and electric vehicle registration. The findings will contribute to the main research question which asks if the electricity used to power EVs is from clean sources because it'll investigate what the main energy source is in the top ten states of EV registrations.

## Part 2: Data Preparation and Cleaning

```
        Full Abbreviation
1    Alabama           AL
2     Alaska           AK
3    Arizona           AZ
4   Arkansas           AR
```

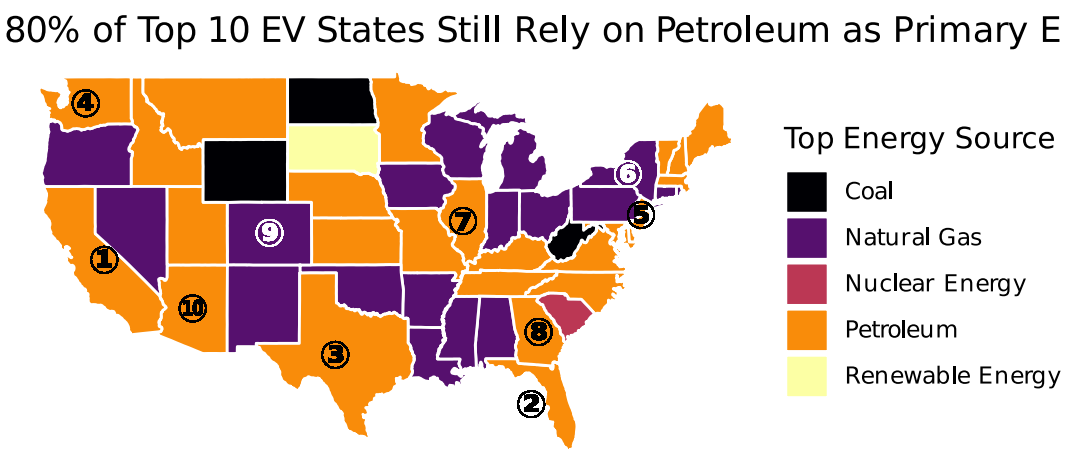
```
5 California          CA
6   Colorado          CO
```

## Part 3: Joining / Pivoting Datasets for Analysis

```
# A tibble: 6 × 4
# Groups:   State [6]
  State      Energy_Source   Total_Use_2023 Energy_Prop_in_State_2023
  <chr>      <chr>                    <int>                     <dbl>
1 Alabama    naturalgas              775747                     0.342
2 Alaska     naturalgas              448087                     0.600
3 Arizona    petroleum (btu)         599712                     0.350
4 Arkansas   naturalgas              399566                     0.347
5 California petroleum (btu)        2996168                     0.466
6 Colorado   naturalgas              525446                     0.386
```

## Part 4: Mapping Visualization

```
# A tibble: 49 × 3
# Groups:   State [49]
   State      Prop_EV prop_again
   <chr>        <dbl>      <dbl>
 1 California  0.353      0.353
 2 Florida     0.0717     0.0717
 3 Texas       0.0647     0.0647
 4 Washington  0.0428     0.0428
 5 New Jersey  0.0379     0.0379
 6 New York    0.0369     0.0369
 7 Illinois    0.0280     0.0280
 8 Georgia     0.0260     0.0260
 9 Colorado    0.0253     0.0253
10 Arizona     0.0253     0.0253
# ℹ 39 more rows
```




**Analysis**

From the map, we see that 80% of the top ten EV registration states still rely on petroleum as their primary energy source. While this is an observable pattern from the map, it is reasonable to assume there are other factors contributing to the states' use and/or reliance on petroleum. Factors could be these states have higher populations, so there's more demand for energy which is more reliably provided from petroleum sources.

The 6th and 9th highest EV registration states having their primary energy source be natural gas provide alternative cases to investigate the scenario of how other states can rely on another energy source than petroleum. While this investigation did not include the annual price for different energy sources, perhaps the states with the higher EV registration counts generally have more money which can influence the primary energy source. But as this map shows, the primary energy source in the states with the higher EV registration still tends to be unclean, petroleum. There is some indication that the energy that provides the electricity for EVs is not clean in the states with the highest EV registration counts, but there is no direct relationship claimed here.