EV Power - Lab 4 Project Report

Part 0: libraries

```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0
──
✔ dplyr     1.1.4     ✔ readr     2.1.5
✔ forcats   1.0.1     ✔ stringr   1.5.2
✔ ggplot2   4.0.0     ✔ tibble    3.3.0
✔ lubridate 1.9.4     ✔ tidyr     1.3.1
✔ purrr     1.1.0
── 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
Linking to GEOS 3.13.1, GDAL 3.11.0, PROJ 9.6.0; sf_use_s2() is TRUE


Attaching package: 'maps'


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

    map
```

Part 1: Defining Research Question

Chosen Question: Which regions have shown the fastest growth in renewable energy between 2021 and 2023? What is their EV registration growth in comparison?

Part 2: Data Preparation and Cleaning

Part 3: Joining / Pivoting Datasets for Analysis

Heads of Cleaned, Pivoted & Combined (Final!) Tables

```
# A tibble: 6 × 2
  state ev_registrations
  <chr>            <dbl>
1 AL               13047
2 AK                2697
```

```
3 AZ               89798
4 AR                7108
5 CA             1256646
6 CO               90083
```

```
# A tibble: 6 × 5
  Energy_Source state energy_use_2021 energy_use_2022 energy_use_2023
  <chr>         <chr>           <int>           <int>           <int>
1 Coal          AK              18694           18615           18414
2 Coal          AL             309791          297654          224926
3 Coal          AR             216123          211724          180262
4 Coal          AZ             160299          154007          137885
5 Coal          CA              28244           30049           28746
6 Coal          CO             252442          233256          204826
```

```
# A tibble: 6 × 4
  state total_2021 total_2022 total_2023
  <chr>      <int>      <int>      <int>
1 AK        684975     730276     746979
2 AL       2352656    2337513    2265008
3 AR       1136025    1178115    1151062
4 AZ       1681257    1651857    1712667
5 CA       6142252    6244174    6429818
6 CO       1364155    1411476    1359507
```

```
# A tibble: 6 × 5
  state per_2021 per_2022 per_2023 change_absolute
  <chr>    <dbl>    <dbl>    <dbl>           <dbl>
1 AK      0.0140   0.0143   0.0135       -0.000507
2 AL      0.102    0.0993   0.0981       -0.00384
3 AR      0.0790   0.0771   0.0758       -0.00315
4 AZ      0.0590   0.0613   0.0633        0.00428
5 CA      0.132    0.141    0.166         0.0338
6 CO      0.0762   0.0814   0.0846        0.00843
```

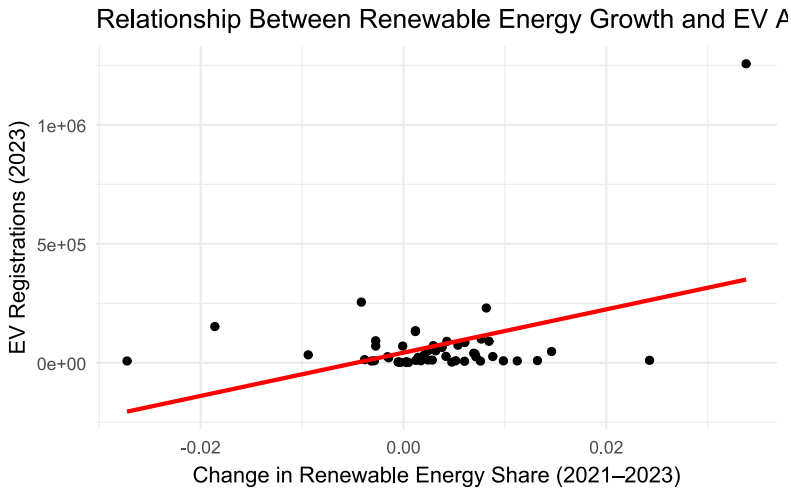
```
# A tibble: 6 × 3
  state change_absolute ev_registrations
  <chr>           <dbl>            <dbl>
1 AK          -0.000507             2697
2 AL          -0.00384             13047
3 AR          -0.00315              7108
4 AZ           0.00428             89798
5 CA           0.0338            1256646
6 CO           0.00843             90083
```

Relationship between Variables (Change in Renewable Energy % 2021-2023 and EV Registrations in 2023

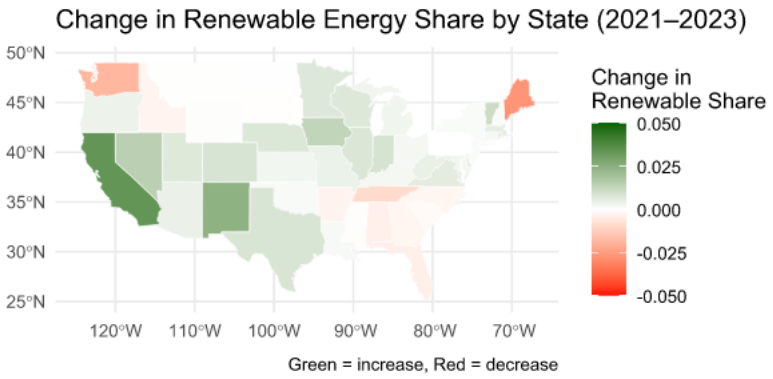
```
`geom_smooth()` using formula = 'y ~ x'
```

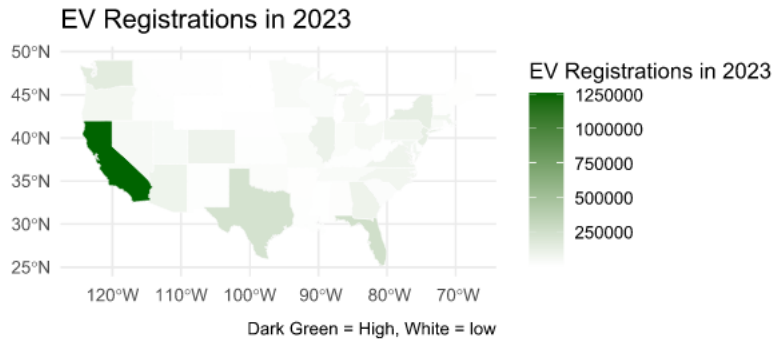
```
Warning: Removed 1 row containing non-finite outside the scale range
(`stat_smooth()`).
```

```
Warning: Removed 1 row containing missing values or values outside the scale
range
(`geom_point()`).
```



Part 4: Mapping Visualization





ANALYSIS

The first map visualizes how the share of renewable energy changed from states 2021-2023. States like California, Colorado grew in renewable energy, while states in the South and Midwest exhibit minimal change. However, if we compare this to the EV adoption map (Map #2), we see that these aren't necessarily aligned. The lack of alignment in these spatial patterns suggests that EV adoption doesn't necessarily have a strong relationship with change in renewable energy percentage change.