Library Preparation

```
library(dplyr)
library(ggplot2)
library(tidyr)
library(scales)
library(readr)
library(readxl)
library(ggthemes)
library(forcats)
library(jsonlite)
```

Data Source

1)my_data2

2)my_data3

3)my_data4

4)my_data8

GLOBAL EV SALES DATA (my_data2)

This data is used for detecting global electric vehicle sales by country and across the world.

To download this data, the following codes are used.

```
# The following code is used to download the data from excel. Necessary
# adaptions must be made according to your local computer.

# my_data2 <- read_csv("C:/files/my_data2.csv")

head(my_data2, 10)
```

```
# A tibble: 10 x 8
   region    category   parameter      mode  powertrain  year unit         value
   <chr>     <chr>      <chr>          <chr> <chr>      <dbl> <chr>        <dbl>
 1 Australia Historical EV stock share Cars  EV          2011 percent    3.90e-4
 2 Australia Historical EV sales share Cars  EV          2011 percent    6.50e-3
 3 Australia Historical EV sales       Cars  BEV         2011 Vehicles   4.9 e+1
 4 Australia Historical EV stock       Cars  BEV         2011 Vehicles   4.9 e+1
 5 Australia Historical EV stock       Cars  BEV         2012 Vehicles   2.2 e+2
 6 Australia Historical EV sales       Cars  BEV         2012 Vehicles   1.7 e+2
 7 Australia Historical EV sales share Cars  EV          2012 percent    3.00e-2
 8 Australia Historical EV stock share Cars  EV          2012 percent    2.40e-3
 9 Australia Historical EV stock       Cars  PHEV        2012 Vehicles   8   e+1
10 Australia Historical EV sales       Cars  PHEV        2012 Vehicles   8   e+1
```

CO2 EMISSION FROM TRANSPORT DATA (my_data3)

This data is used to determine vehicle-related CO2 emissions globally and by country.

To download this data, the following codes are used.

```
# Fetch the data
my_data3 <- read.csv("https://ourworldindata.org/grapher/co2-emissions-transport.csv?v=1&csvTy

# Fetch the metadata
metadata <- fromJSON("https://ourworldindata.org/grapher/co2-emissions-transport.metadata.json

head(my_data3, 10)
```

```
        Entity Code Year transport_co2_emissions
1  Afghanistan  AFG 1990                 970000
2  Afghanistan  AFG 1991                 930000
3  Afghanistan  AFG 1992                 740000
4  Afghanistan  AFG 1993                 740000
5  Afghanistan  AFG 1994                 730000
6  Afghanistan  AFG 1995                 730000
7  Afghanistan  AFG 1996                 700000
8  Afghanistan  AFG 1997                 670000
9  Afghanistan  AFG 1998                 670000
10 Afghanistan  AFG 1999                 490000
```

TURKIYE'S VEHICLE DATA (my_data4)

This data is used to analyse Turkiye's status about EVs.

To download this data, the following codes are used.

```
# The following code is used to download the data from excel. Necessary
# adaptions must be made according to your local computer.

# my_data4 <- read_excel("C:/files/my_data4.xls",sheet = 1)

head(my_data4, 10)
```

```
# A tibble: 10 x 15
   Yıl   Toplam  ...3    Benzin ...5  Dizel ...7  LPG   ...9  `Hibrit (2)` ...11
   <chr> <chr>   <chr>   <chr>  <chr> <chr> <chr> <chr> <chr> <chr>        <chr>
 1 Year  Total   (%)     Gasol~ (%)   Dies~ (%)   LPG   (%)   Hybrid (2)   (%)
 2 2004  5400440 100     40624~ 75.2~ 2526~ 4.67~ 7930~ 14.6~ -            -
 3 2005  5772745 100.00~ 38831~ 67.2~ 3946~ 6.83~ 1259~ 21.8~ -            -
 4 2006  6140992 100     38385~ 62.5~ 5837~ 9.50~ 1522~ 24.7~ -            -
 5 2007  6472156 100     37149~ 57.3~ 7639~ 11.8~ 1826~ 28.2~ -            -
 6 2008  6796624 99.999~ 35317~ 51.9~ 9477~ 13.9~ 2214~ 32.5~ -            -
 7 2009  7093964 100.00~ 33738~ 47.5~ 1111~ 15.6~ 2525~ 35.5~ -            -
 8 2010  7544862 99.999~ 31919~ 42.3~ 1381~ 18.3~ 2900~ 38.4~ -            -
 9 2011  8113111 100     30361~ 37.4~ 1756~ 21.6~ 3259~ 40.1~ 23           0.00~
10 2012  8648875 100     29292~ 33.8~ 2101~ 24.2~ 3569~ 41.2~ 53           0.00~
```

```
# i 4 more variables: Elektrik <chr>, ...13 <chr>, `Bilinmeyen (3)` <chr>,
#   ...15 <chr>
```

POPULATION DATA (my_data8)

This data is used to determine transportation CO2 emissions per person for each country.

To download this data, the following codes are used.

```
# The following code is used to download the data from excel. Necessary
# adaptions must be made according to your local computer.

# my_data8 <- read_csv("C:/files/my_data8.csv")

head(my_data8, 10)
```

```
        Entity Year Population...Sex..all...Age..all...Variant..estimates
1  Afghanistan 1950                                                7776182
2  Afghanistan 1951                                                7879343
3  Afghanistan 1952                                                7987783
4  Afghanistan 1953                                                8096703
5  Afghanistan 1954                                                8207953
6  Afghanistan 1955                                                8326981
7  Afghanistan 1956                                                8454302
8  Afghanistan 1957                                                8588340
9  Afghanistan 1958                                                8723412
10 Afghanistan 1959                                                8869271
```

RENAMING AND FILTERING THE DATA SETS

Before starting the analysis, let's make the columns more understandable. Note that the time frame between 2011 and 2021 will be used in the analysis.

my_data2

```
my_data2 <- my_data2 |>
  filter(year %in% 2011:2021)

head(my_data2, 10)
```

```
# A tibble: 10 x 8
   region    category   parameter      mode  powertrain  year unit         value
   <chr>     <chr>      <chr>          <chr> <chr>      <dbl> <chr>        <dbl>
 1 Australia Historical EV stock share Cars  EV          2011 percent    3.90e-4
 2 Australia Historical EV sales share Cars  EV          2011 percent    6.50e-3
 3 Australia Historical EV sales       Cars  BEV         2011 Vehicles   4.9 e+1
 4 Australia Historical EV stock       Cars  BEV         2011 Vehicles   4.9 e+1
 5 Australia Historical EV stock       Cars  BEV         2012 Vehicles   2.2 e+2
```

```
 6 Australia Historical EV sales       Cars  BEV         2012 Vehicles   1.7 e+2
 7 Australia Historical EV sales share Cars  EV          2012 percent    3.00e-2
 8 Australia Historical EV stock share Cars  EV          2012 percent    2.40e-3
 9 Australia Historical EV stock       Cars  PHEV        2012 Vehicles   8   e+1
10 Australia Historical EV sales       Cars  PHEV        2012 Vehicles   8   e+1
```

There was no need to rename the columns of **my_data2.**

my_data3

```
my_data3 <- my_data3 |>
  rename(entity = Entity,
         code = Code,
         year = Year
  ) |>
  filter(year %in% 2011:2021)

head(my_data3, 10)
```

```
        entity code year transport_co2_emissions
1  Afghanistan  AFG 2011                 6710000
2  Afghanistan  AFG 2012                 5850000
3  Afghanistan  AFG 2013                 4330000
4  Afghanistan  AFG 2014                 3530000
5  Afghanistan  AFG 2015                 4300000
6  Afghanistan  AFG 2016                 3310000
7  Afghanistan  AFG 2017                 3940000
8  Afghanistan  AFG 2018                 4410000
9  Afghanistan  AFG 2019                 4550000
10 Afghanistan  AFG 2020                 5070000
```

my_data4

```
my_data4 <- my_data4 |>
  rename(year = Yıl,
         total = Toplam,
         gas = Benzin,
         diesel = Dizel,
         lpg = LPG,
         hybrid = `Hibrit (2)`,
         electric = Elektrik,
         unknown = `Bilinmeyen (3)`
  ) |>
  rename(percentage_total = ...3,
         percentage_gas = ...5,
         percentage_diesel = ...7,
         percentage_lpg = ...9,
         percentage_hybrid = ...11,
         percentage_electric = ...13,
```

```
        percentage_unknown = ...15
  ) |>
  filter(year %in% 2011:2021)

head(my_data4, 10)
```

```
# A tibble: 10 x 15
   year  total    percentage_total gas   percentage_gas diesel percentage_diesel
   <chr> <chr>    <chr>            <chr> <chr>          <chr>  <chr>
 1 2011  8113111  100              3036~ 37.4225004440~ 17560~ 21.6443975683310~
 2 2012  8648875  100              2929~ 33.8681736063~ 21012~ 24.2945585408506~
 3 2013  9283923  100.00000000000~ 2888~ 31.1141098434~ 24972~ 26.8982088714005~
 4 2014  9857915  100.00000000000~ 2855~ 28.9622907075~ 28828~ 29.2443686114152~
 5 2015  10589337 100              2927~ 27.6478121340~ 33459~ 31.5973606279599~
 6 2016  11317998 100.00000000000~ 3031~ 26.7869282182~ 38037~ 33.6081699254585~
 7 2017  12035978 100              3120~ 25.9256622104~ 42563~ 35.3631836149916~
 8 2018  12398190 100              3089~ 24.9199762223~ 45686~ 36.8494514118593~
 9 2019  12503049 99.999999999999~ 3020~ 24.1542442967~ 47697~ 38.1484068406034~
10 2020  13099041 100.00000000000~ 3201~ 24.4437283614~ 50143~ 38.2803290714182~
# i 8 more variables: lpg <chr>, percentage_lpg <chr>, hybrid <chr>,
#   percentage_hybrid <chr>, electric <chr>, percentage_electric <chr>,
#   unknown <chr>, percentage_unknown <chr>
```

my_data8

```
my_data8 <- my_data8 |>
  rename(entity = Entity,
         year = Year,
         population = Population...Sex..all...Age..all...Variant..estimates
         ) |>
  filter(year %in% 2011:2021)

head(my_data8, 10)
```

```
       entity year population
1  Afghanistan 2011   29347709
2  Afghanistan 2012   30560036
3  Afghanistan 2013   31622708
4  Afghanistan 2014   32792527
5  Afghanistan 2015   33831765
6  Afghanistan 2016   34700614
7  Afghanistan 2017   35688942
8  Afghanistan 2018   36743040
9  Afghanistan 2019   37856126
10 Afghanistan 2020   39068978
```