Final Report Data Visualization

Traffic within Europe

Famke van den Boom s2394669
Julia van der Geest s2403250
Bart Blom s2377004
Martijn van Ooijen s2255898
Sam Hengeveld s2175355
Simon van Roozendaal s2174197

Subtopic 1: The correlation between different fuel type car's and the GDP of countries

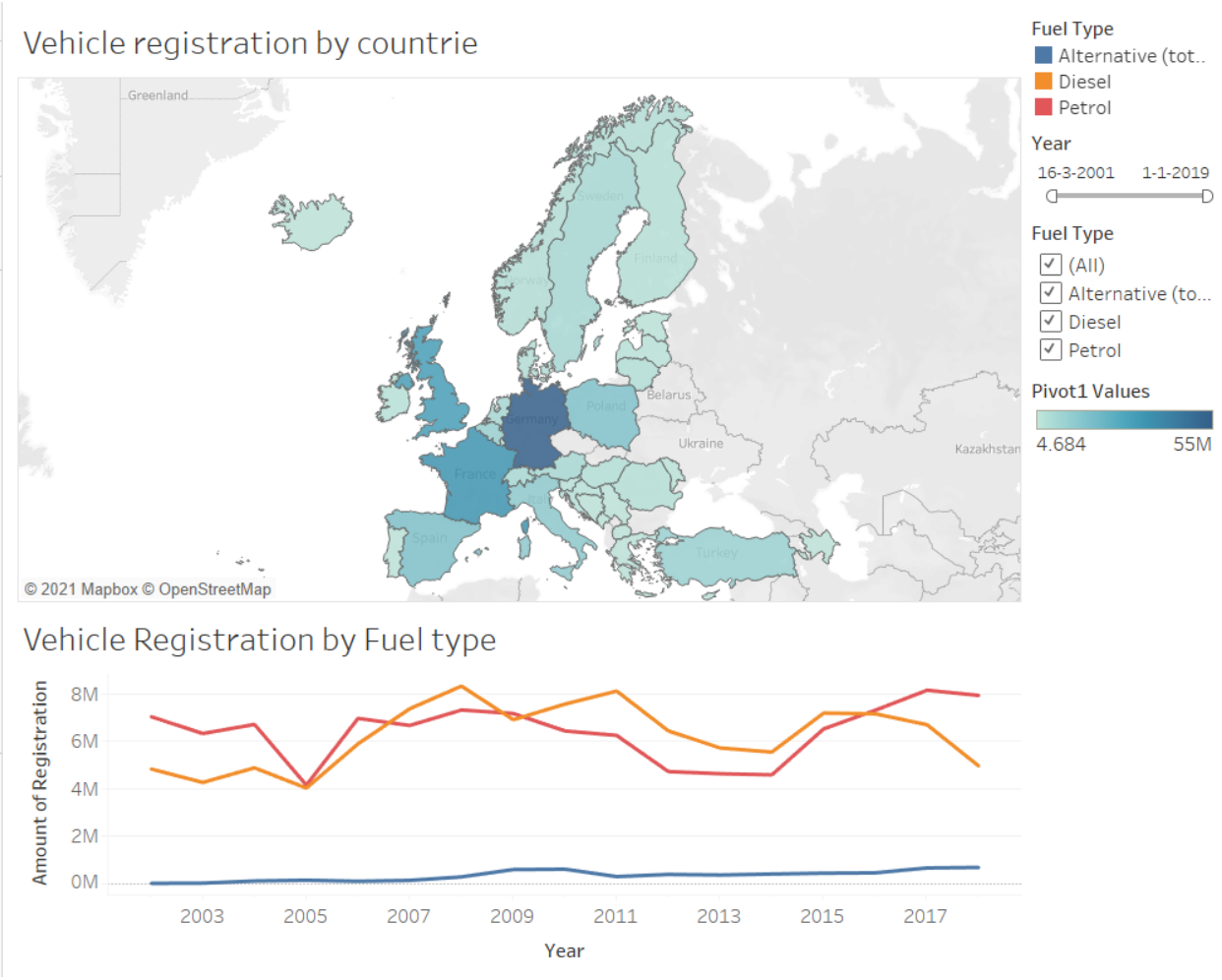

Figure 1: an interactive map featuring the vehicle registration by country of each fuel type (diesel, petrol and alternative fuel)

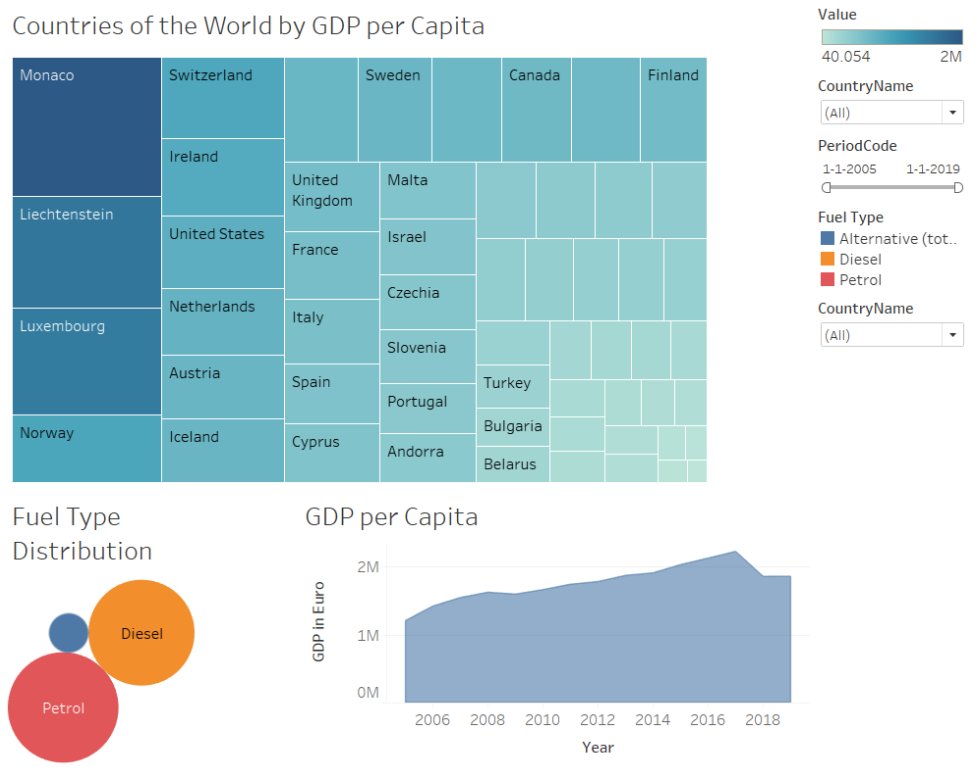

Figure 2: the correlation of GDP per Capita and the fuel type distribution of cars in each country

Both figure 1 and 2 are interactive maps with an overarching theme: the number of registered cars per country that have a certain fuel type. Figure 1 is a clickable map showing the number of vehicles of the selected fuel type, where a country, a fuel type of a timeframe can be selected. When the top map is filtered differently, the bottom graph (which is displaying the vehicle registration by fuel type) changes accordingly.

Figure 2 is focussed more on the GDP per capita of the countries. The squares in the top visualization change its size and color shade according to the level of GDP per capita. The bottom visualizations show the percentual fuel type distribution of registered cars and the GDP per capita of different years of the selected countries. Here too, the entire dashboard can be filtered simultaneously by year, fuel type and country name.

Subtopic 2: Electric vehicles in Europe

Even though the majority of vehicles still run on fossil fuels, more and more people switch over to electric cars. In this subtopic we will take a look at the different types of electric cars and their popularity within different countries of Europe.

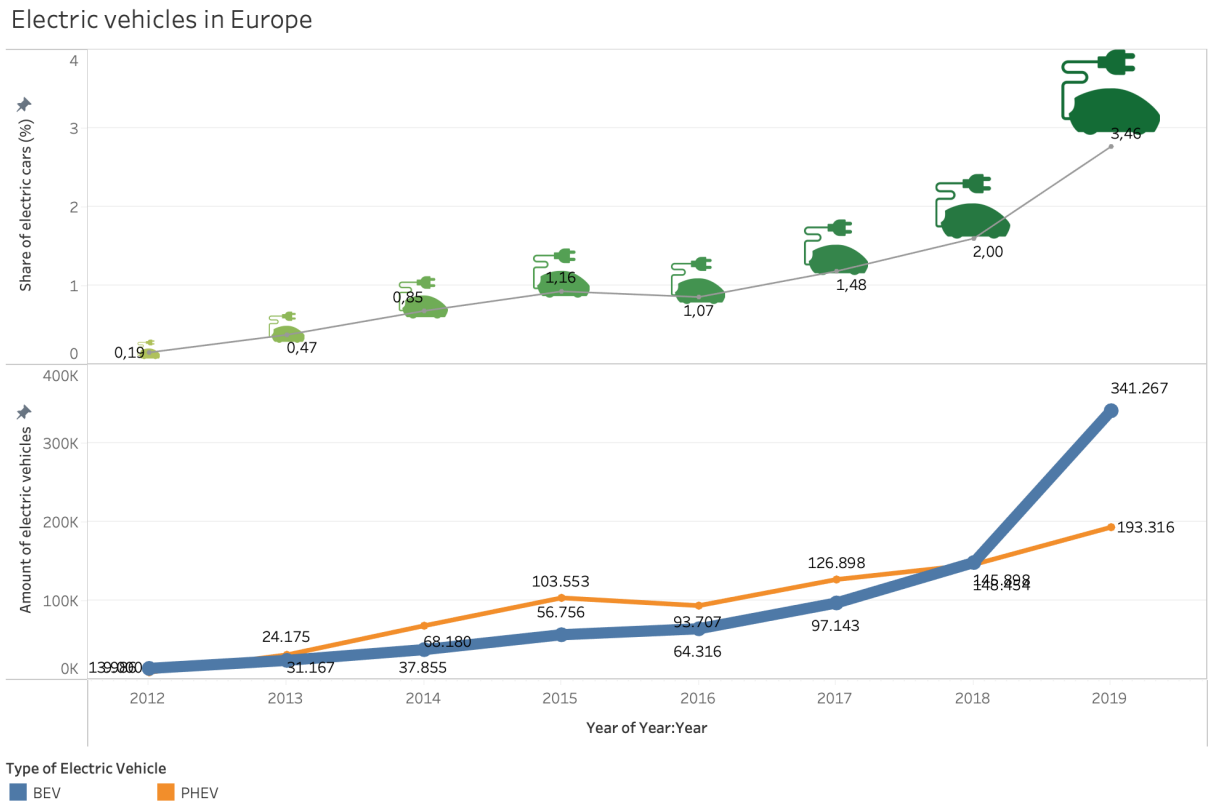

Figure 3: The share of electric vehicles in Europe and the type of electric vehicle

Electric cars are getting more popular day by day and in the last decade they've managed to increase their share of the total number of registered cars in Europe from around 0.2% to almost 3.5%. But, not all electric cars are the same and below the graph the division in absolute values between electric cars can be seen. BEV stands for Battery Electric Vehicle and is only powered by a battery. PHEV stands for Plugin Hybrid Electric Vehicle and also contains a traditional combustion engine.

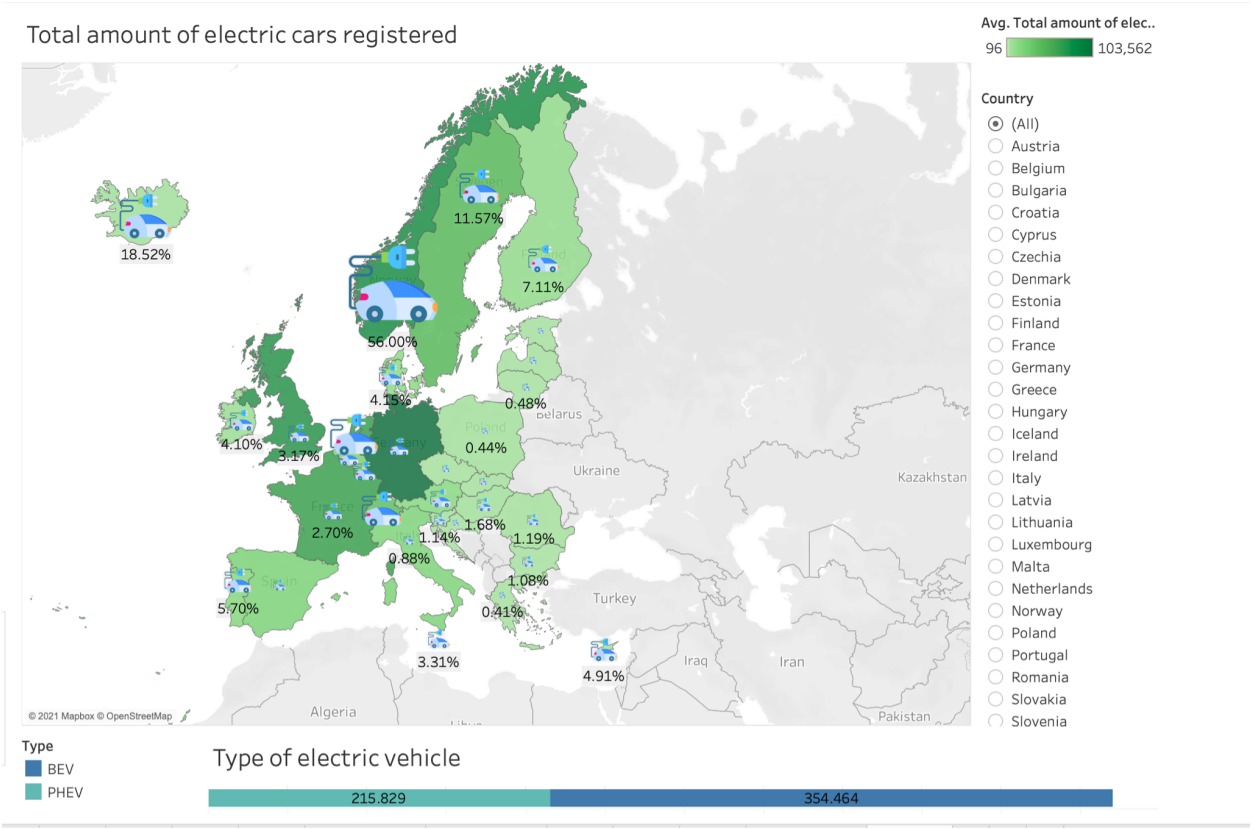

Figure 4: Total amount of electric cars registered per country and their type (in 2019)

With the rise of the electric vehicle the question arises what the division is per country regarding their electric vehicle registration. In figure 4 you can see multiple values that differ between the countries in Europe in 2019. First the green color intensity, this represents the absolute amount of electric cars that are registered in that year. Secondly, the size and number of the car (icon) represent the percentage of electric cars of the total number of cars registered. Lastly, the bottom bar graph shows the ratio between BEV's and PHEV's.

Although some countries, like Germany, register a lot of electric cars in that year, the percentage of the total number of registered cars can be quite low.

Subtopic 3: Energy consumption in road transport

But, ofcourse, we have more vehicles on the road than just electric cars. So now we will focus on the final energy consumption in road transport by type of fuel in Europe. These forms of transportation fall under road transport: cars, buses, trucks, ambulances, passenger and freight transport, domestic and international transport, etc.

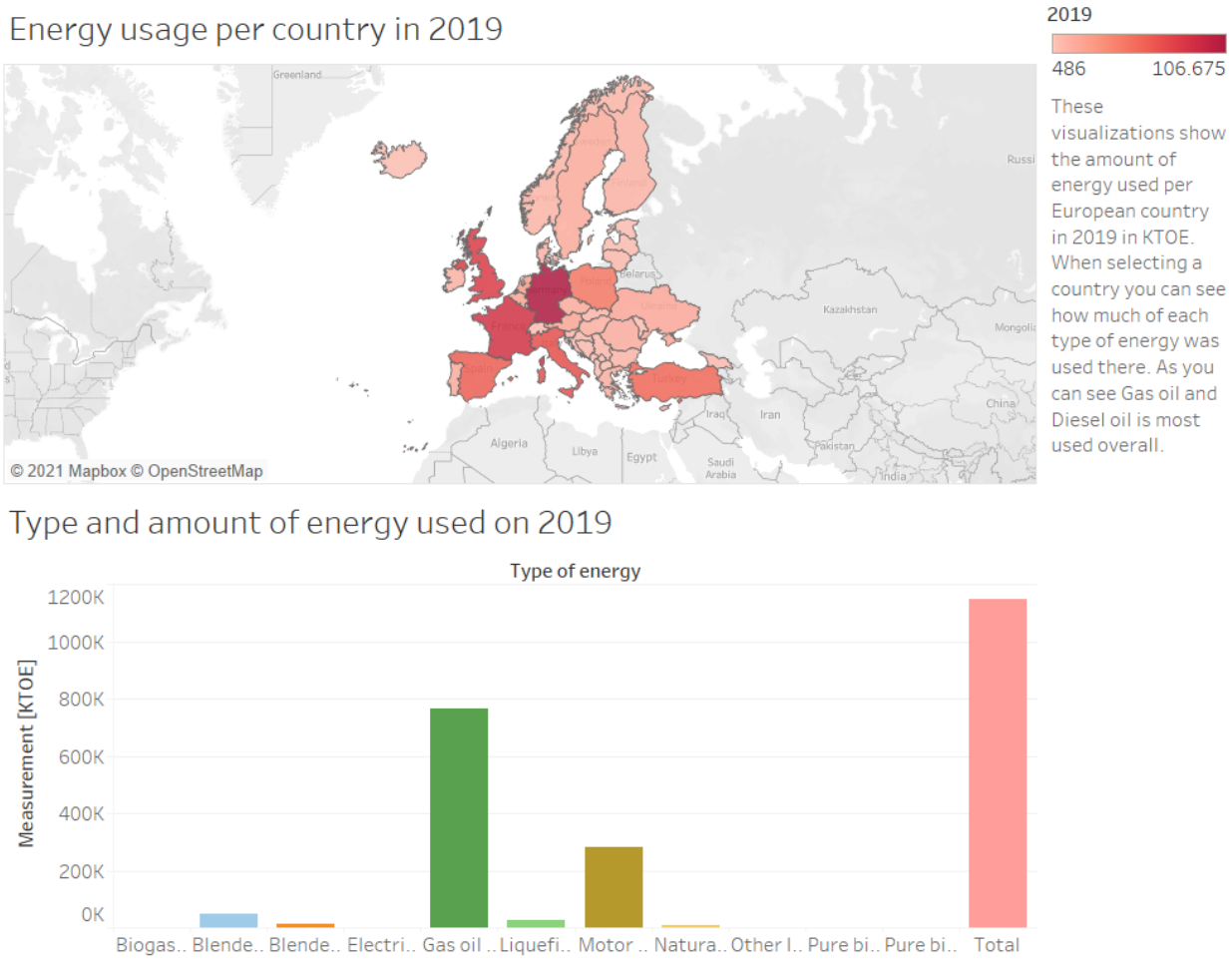

Figure 10: THe amount of energy used per country and per type in 2019.

In figure 10, one can select a country in the map displayed in the top part of the visualization. When doing so the bottom part will display per type of energy the amount used by that country. As you see the largest consumption of energy is Gas oil and Diesel oil for almost every country. Whereas biogasses and natural gas are both rarely used.

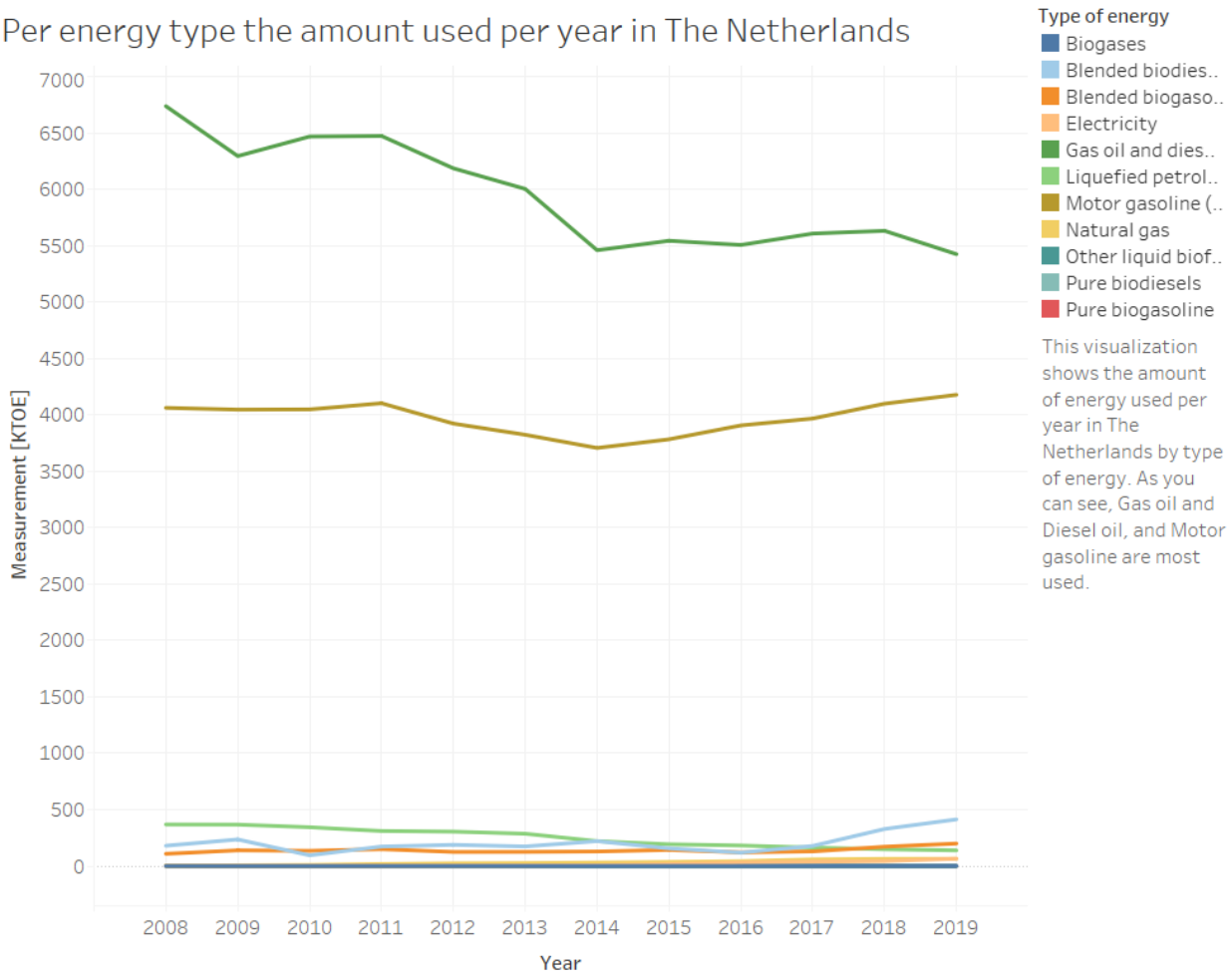

Figure 11: Amount of energy used per year and type in The Netherlands.

Figure 11, displays how much of each type of energy is used in The Netherlands. This measurement is displayed over a time period of 12 years. As you can see, also in The Netherlands Gas oil and Diesel oil is the largest form of energy used. However, Motor gasoline is not far off. However, the use of Gas oil and Diesel oil is decreasing whereas the use of Motor gasoline is increasing.

Subtopic 4: CO2 emissions per country and sector and driven kilometers per country in Europe

Fuel consumption and pollution go hand in hand. So the following visualizations will focus on the CO2 emissions in Europe and the different categories these emissions can be divided into so we can see how big a part transportation actually plays in pollution. The second part of these visualizations will look into driven kilometers by different vehicles throughout Europe.

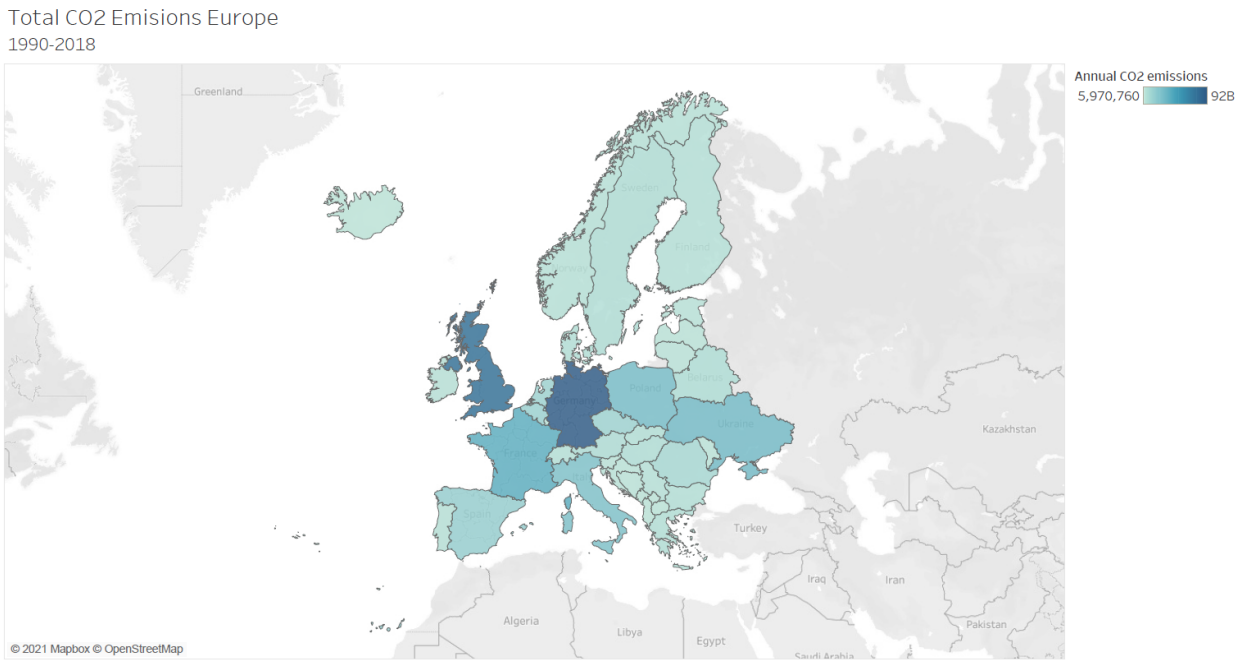

Figure 5: The total amount of CO2 emissions in ton from 1990-2018 in Europe

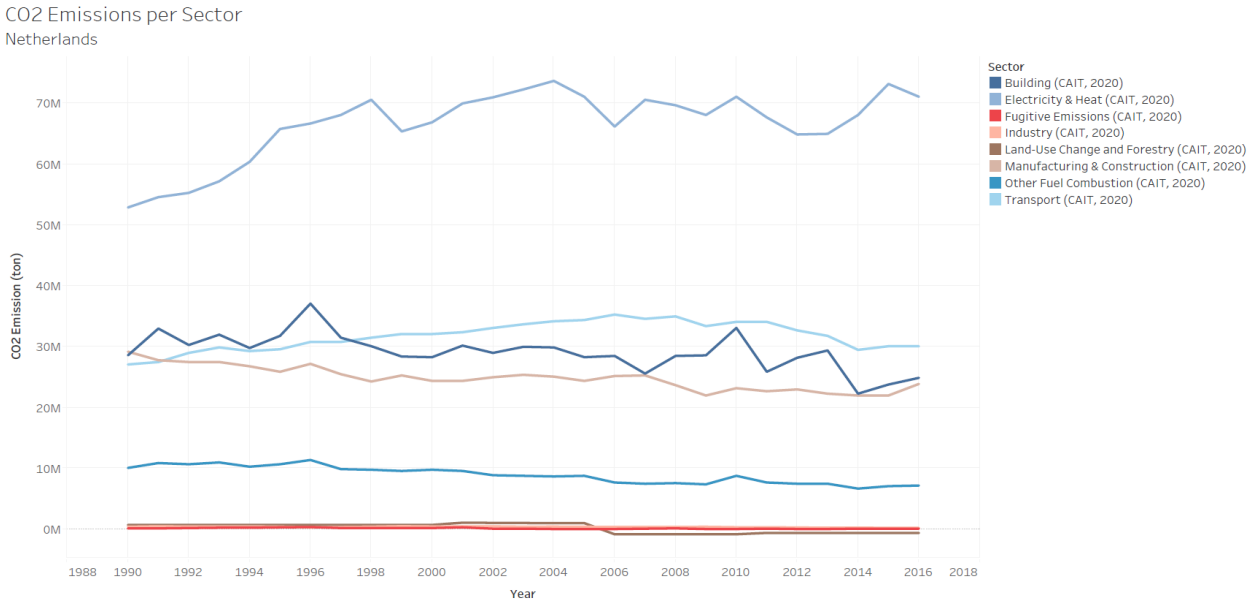

Figure 6: The amount of CO2 emissions per sector in the Netherlands

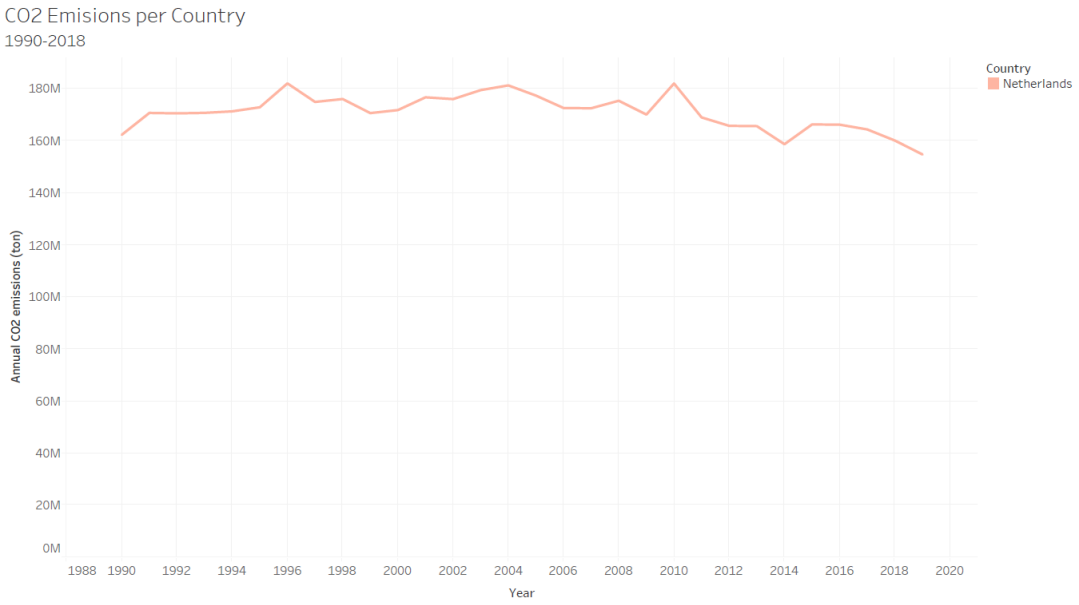

Figure 7: The CO2 Emissions from the Netherlands 1990-2018

Carbon Dioxide (CO2) is the main cause for global warming and from the greenhouse gasses the one that is most emitted. In figure 5 it can be seen which countries in Europe are the biggest contributor to global warming in the time period from 1990 to 2018. In the interactive visualization one of the countries can be picked and figures 6 and 7 will change accordingly to the country. Figure 6 displays the CO2 emission per sector in The Netherlands and figure 7 the total amount of CO2 emission in The Netherlands. It can be seen that in the Netherlands, traffic is about 20% of the CO2 emission. In figure 8 the CO2 traffic emission of Europe is divided into 6 subcategories.

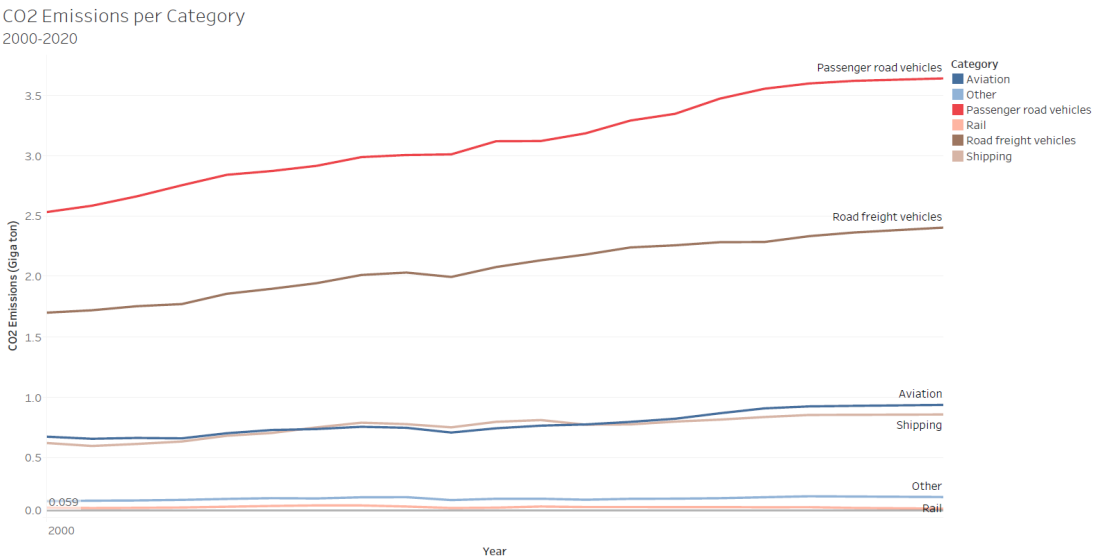

Figure 8: CO2 emission from transport divided in subcategories in Europe

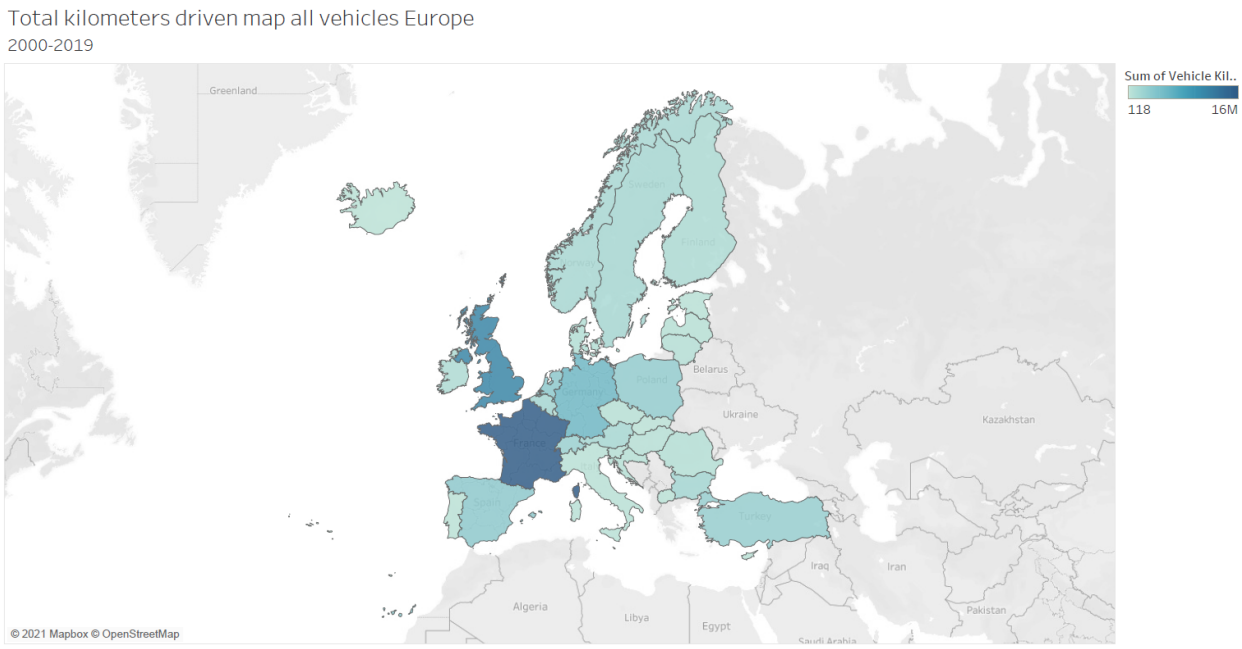

Figure 9: Total kilometers driven by all vehicles in Europe per country (M km) (2000-2019)

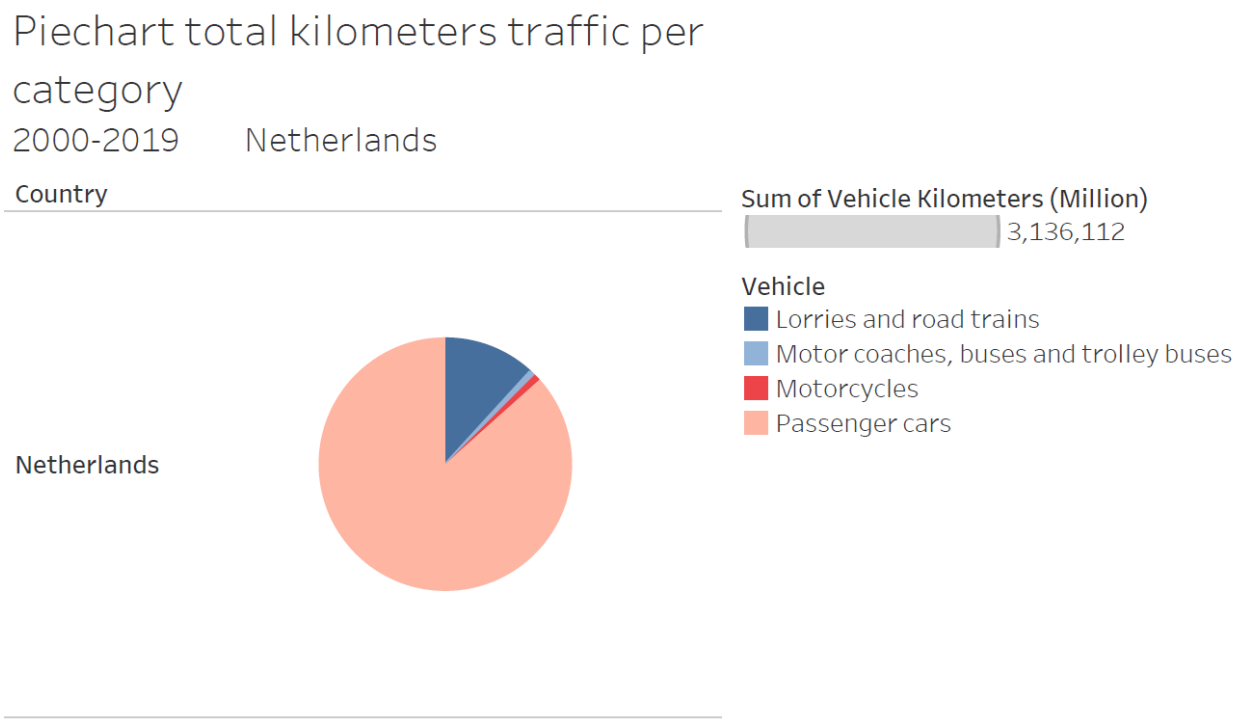

Figure 10: Piechart of kilometers driven divided by vehicles in the Netherlands from (2000-2019)

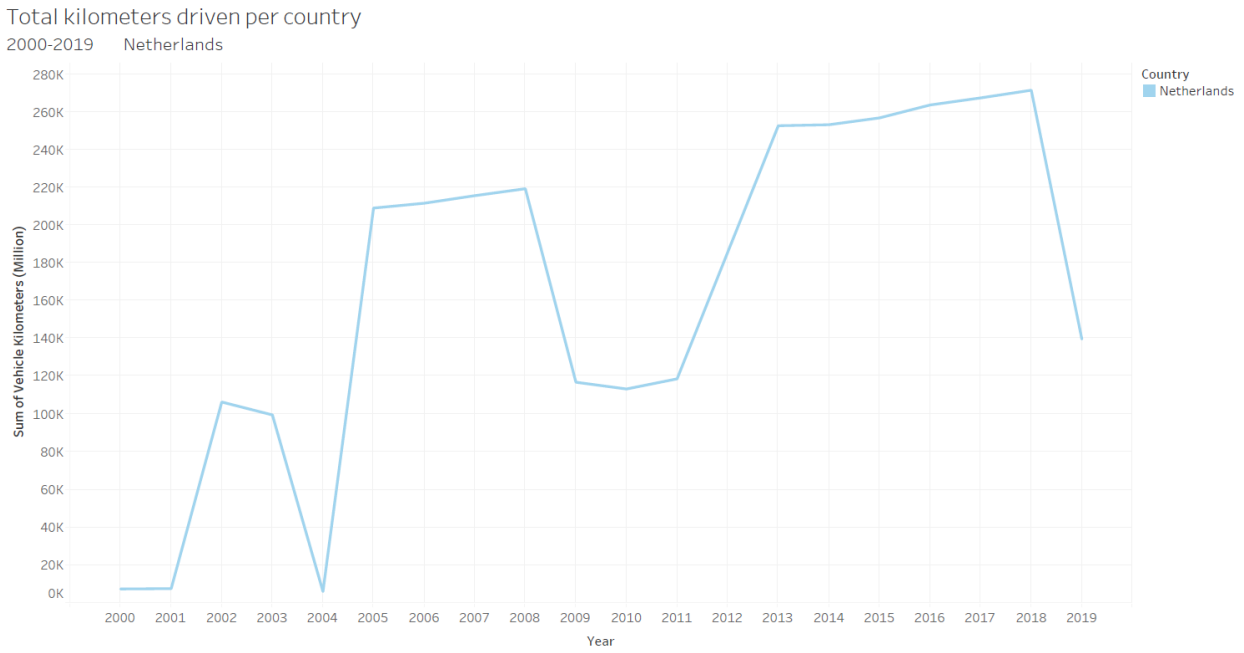

Figure 11: Total amount of driven kilometers in the Netherlands (2000-2019)

As can be seen in figure 8, most traffic CO2 emissions are caused by passenger road vehicles and road freight vehicles. In figure 9 is the amount of kilometers driven of road traffic mapped in Europe. When figure 9 is compared to figure 5, in which the CO2 emissions are mapped through Europe, it is interesting to note that having the highest amount of driven kilometers does not mean you have the highest CO2 emission as a country. Although, it does contribute to the total amount of CO2 emission, as the countries with higher CO2 emission also have the most drive kilometers. France has the most driven kilometers and Germany the highest CO2 emission. In both cases comes the United Kingdom on a solid second place.
In the interactive visualization one of the countries can be picked from figure 9 and figures 10 and 11 will change accordingly to the country. Figure 10 displays the total kilometers driven in a country displayed in a piechart divided by different kinds of vehicles in The Netherlands and figure11 displays the total amount of driven kilometers in The Netherlands displayed in a chart in the time period from 1990 to 2019.

Subtopic 5: Fatal Road Accidents in Europe

Traffic can cause more damage than just pollution, road accidents happen every day, and a large portion of them end up to be fatal. The following visualizations will look into what countries within Europe are the most dangerous when it comes to travel.

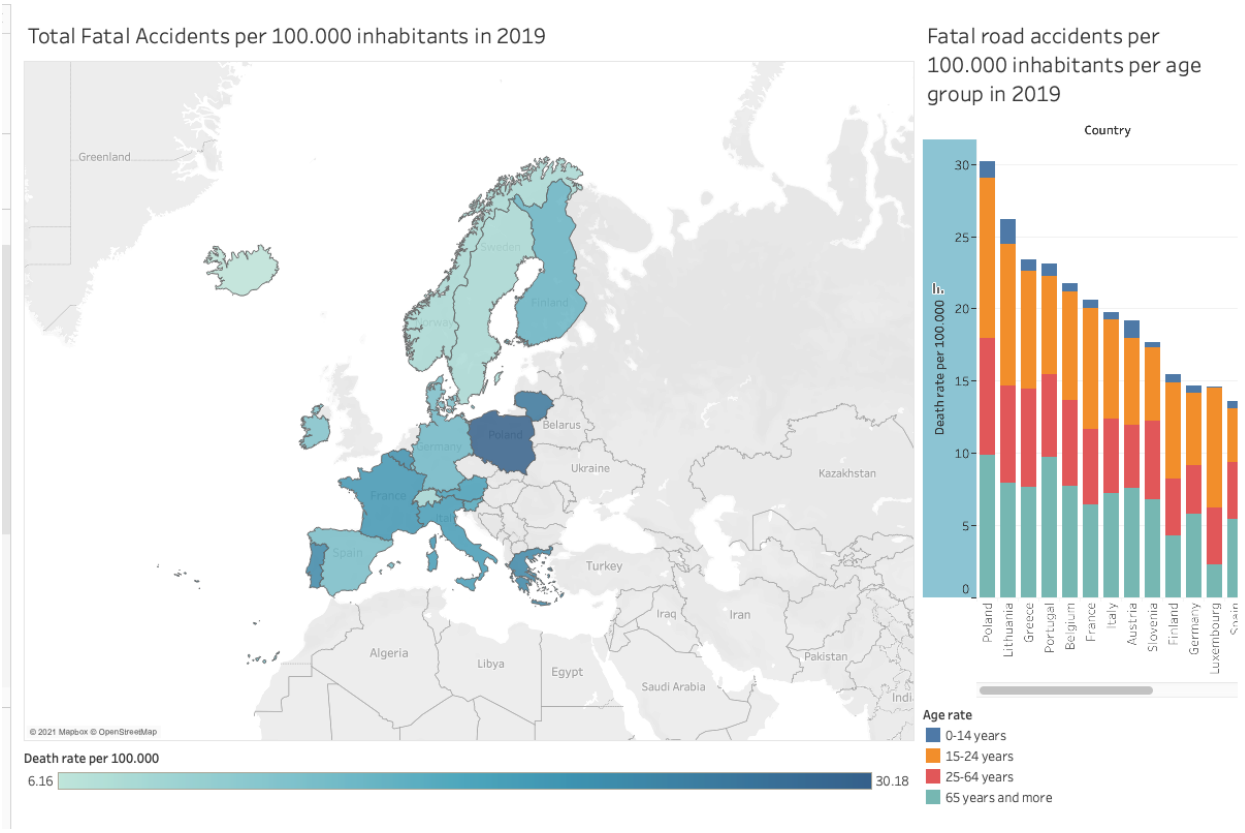

Figure 12: Total amount of fatal road accidents per 100.00 inhabitants per age group and per european country in 2019

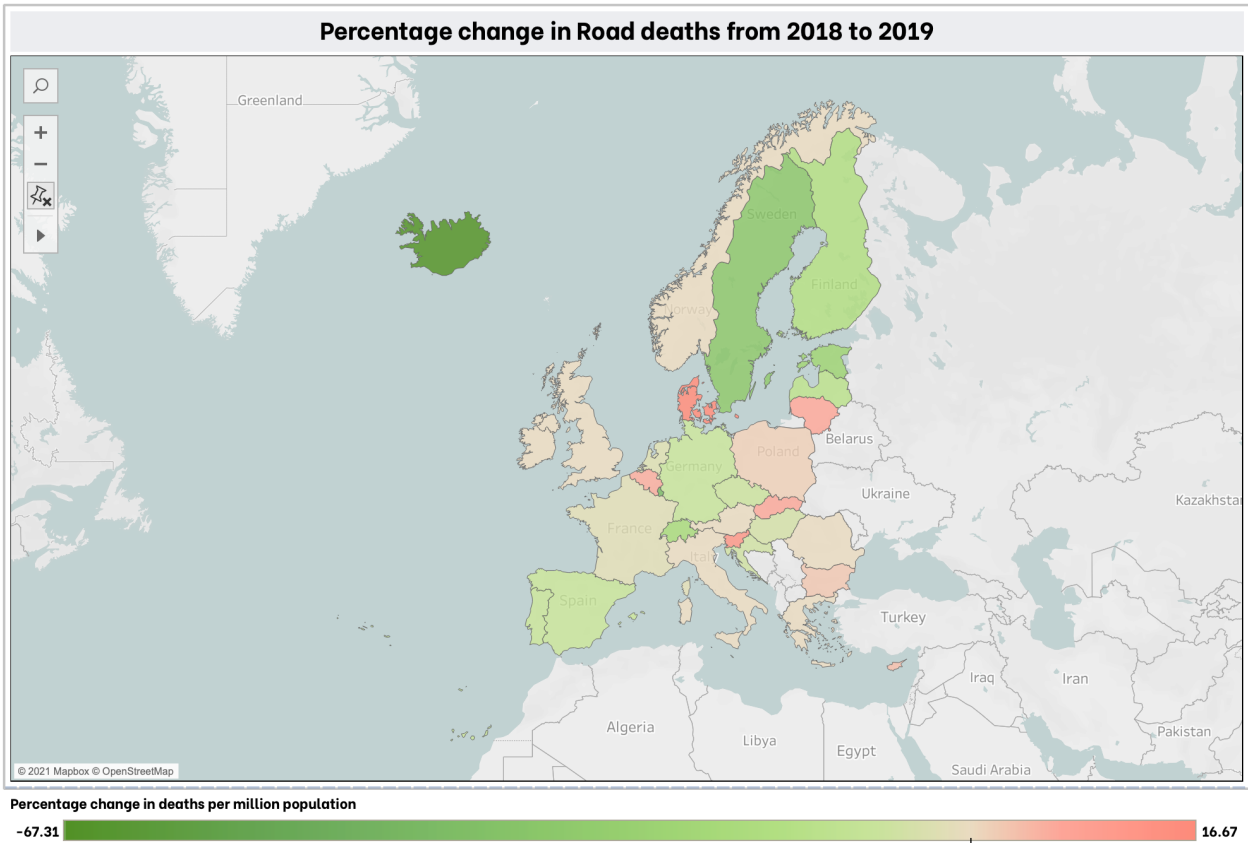

Figure 13: Percentage change in Road deaths within Europe from 2018 to 2019

The visualization for the total number of road accidents can be found in figure 12. In the visualization, one can select an european country in the top part of the dashboard and in the bottom part of the dashboard the according pie chart will be presented. In the pie chart, one can see the fatal road accident per age group. From this visualization the user is able to retrieve multiple forms of information. For example, the user can see that Poland has the highest number of fatal accidents with 30.18 accidents per 100.000 inhabitants, while Iceland has the least number of fatal accidents, with only 6.16 accidents per 100.000 inhabitants. When looking at the pie charts, the user can see that Switzerland has a relatively high amount of fatal accidents within the age group 65+. The opposite is happening in Luxembourg, where they have a relatively high amount of fatal accidents within the age group 15-24 year. In figure 13, one can see the visualization of the percentage change of road deaths from 2018 to 2019 in Europe. From this visualization, the user can see that Iceland had the largest decrease in road death with a percentage of -67.31%, while Denmark has the largest increase with a percentage of +16.67%

Subtopic 6: Air Traffic in the Netherlands

Up to now we have only looked at road traffic, but we travel through the air too. The flight sector is one of the sectors that were hit the hardest with the pandemic, since international flights were mainly canceled. In this chapter we will see how much difference the pandemic actually made in the numbers.

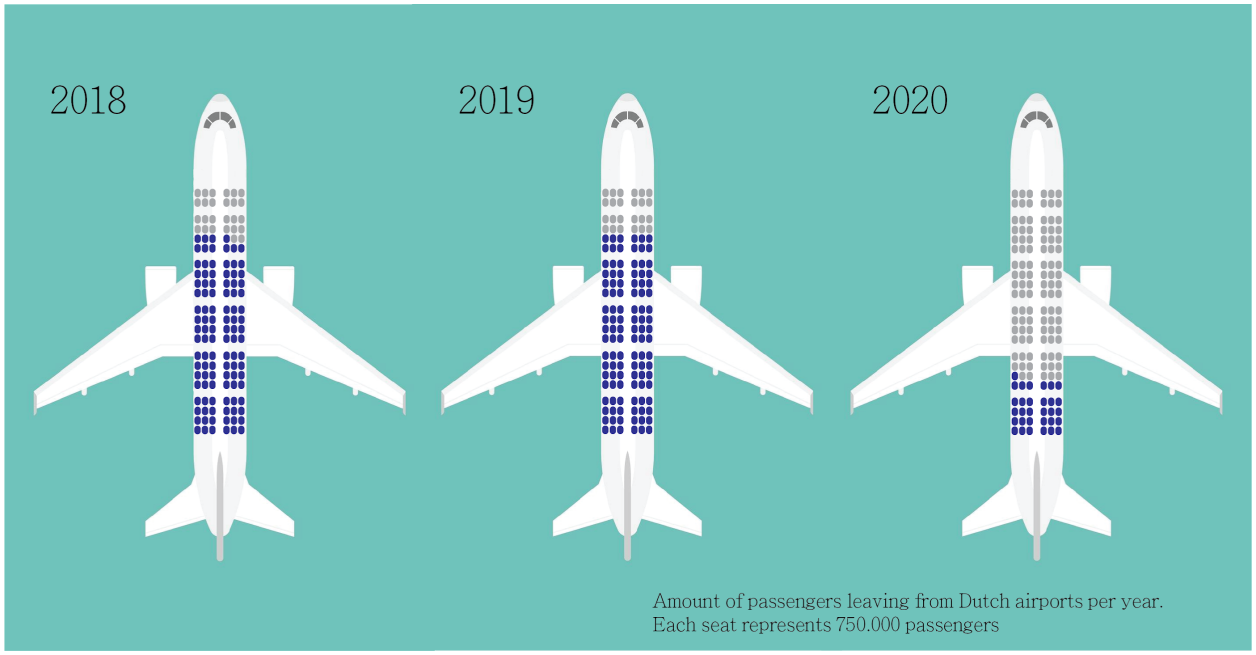

Figure 14: Amount of passengers leaving from Dutch airports per year. Each seat represents 750.000 passengers.

The Dutch airports were used to sending off around 80 million passengers every year. The impact of covid on air travel was very heavy, as can be seen in figure 14, only just over 20 million passengers left from dutch airports in 2020. This is just over a quarter of a year before. Even though passenger flights dropped heavily when covid hit, freight flights increased heavily. However, the amount of tons moved in these flights stayed the same. This resulted in a less efficient tons per movement ever since covid hit in march 2020, this can be clearly seen in figure 15.

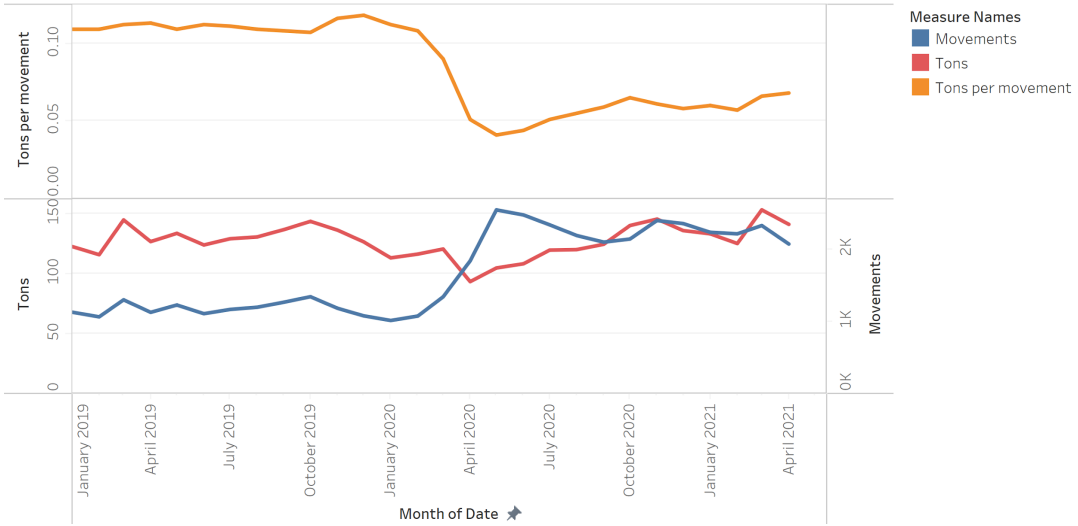

Figure 15: The amount of freight flight movements, moved tons and tons per movement graphed.

Sources

Subtopic 1:

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9. https://www.iea.org/data-and-statistics/charts/transport-sector-co2-emissions-by-mode-in-the-sustainable-development-scenario-2000-2030

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