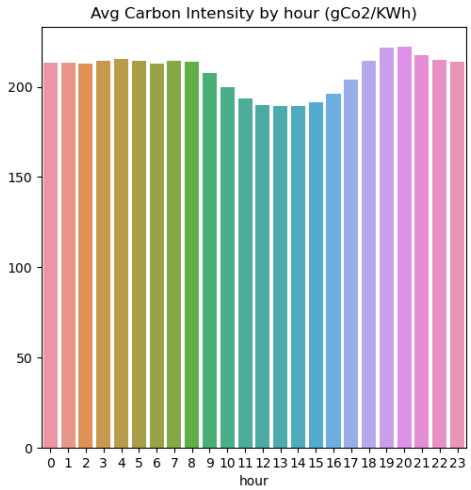
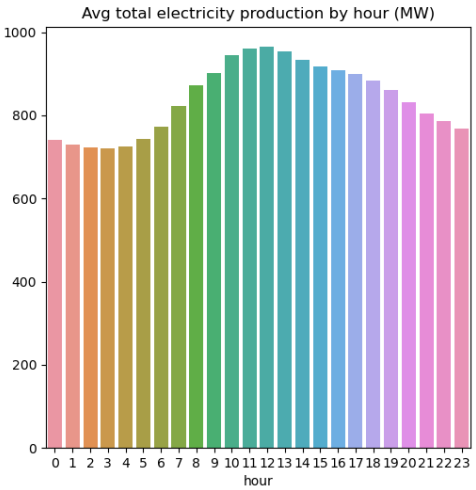
Using electricityMap for “Green Charging”

Transition from petrol-based cars to electric vehicles has a huge environmental impact due to the reduction of emissions from oil. However, not all electricity is produced in a “green” way, and some type of the produced electricity might be as harmful to our planet as the usage of the petrol. Therefore, by using electricityMap, you can understand and be a part of responsible usage of the electricity that Denmark produces.

First of all, it is important to note that there are two electrical sectors in Denmark, DK1 and DK2. While DK1 has many interconnections between countries (imports, exports and so on), DK2 has more wind penetration, which is one of the least carbon intensive types of electricity production. We will focus on the DK2 zone, which is East Denmark.

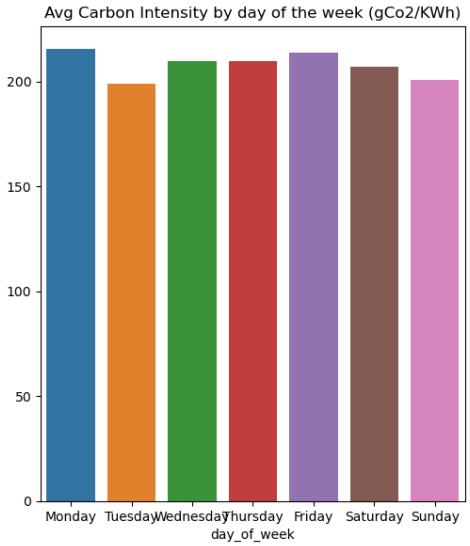
So, for responsible and green charging it should be noted that the carbon footprint of electricity production is not the same throughout the day, and even month or year. But, how are we supposed to know when is the best time to charge EVs? This is when electricityMap comes in hand. Let’s dive deep into the statistics of electricity production and its carbon footprint for last year.

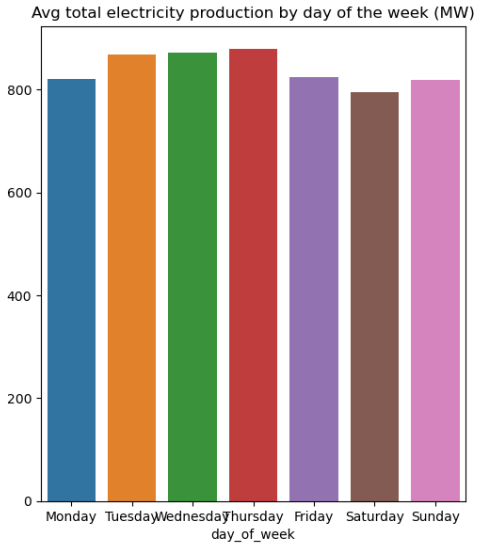


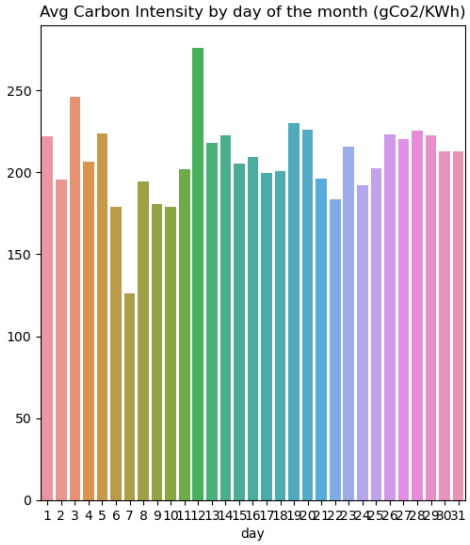


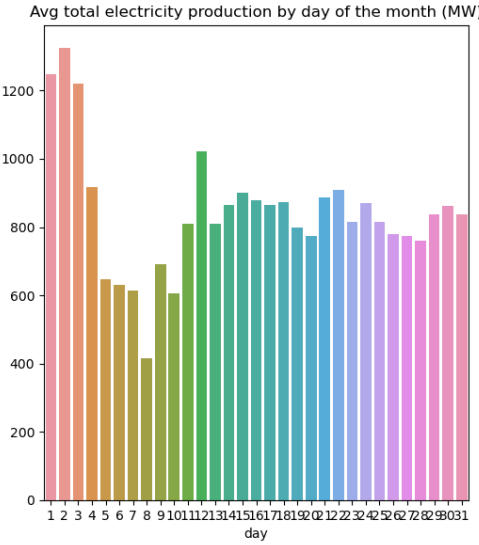
This graph represents a comparison of average hourly Carbon Intensity (grams of carbon for each KW per hour) and total electricity in MW produced for 2020. We can see clearly that from 08:00 to 17:00 the Carbon Intensity is significantly less (~178 from ~205 rest of the day) despite the fact that at those hours there was more electricity produced (~950 from ~800 rest of the day), which indicates that most of the electricity produced at those hour is the greenest. For example, to charge 50 EVs to travel for 100 miles (approximate values 30KWh per 100 miles, source: internet), it takes ~1500 KWh and by charging at the green time, you can reduce carbon emission by ~40.5 kg for the required amount of charged electricity.

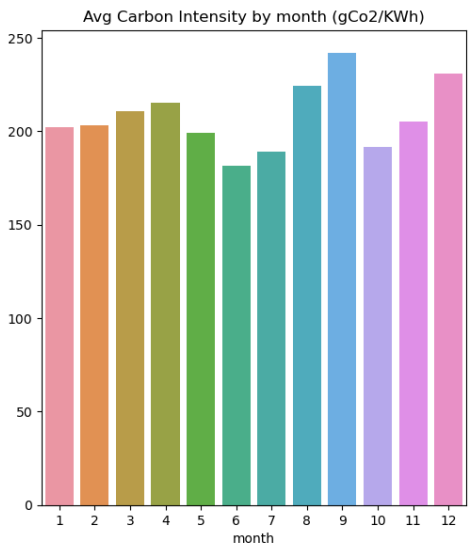
There are a lot of factors that affect the carbon intensity of the electricity produced, such as day of the week/month, month of the year.

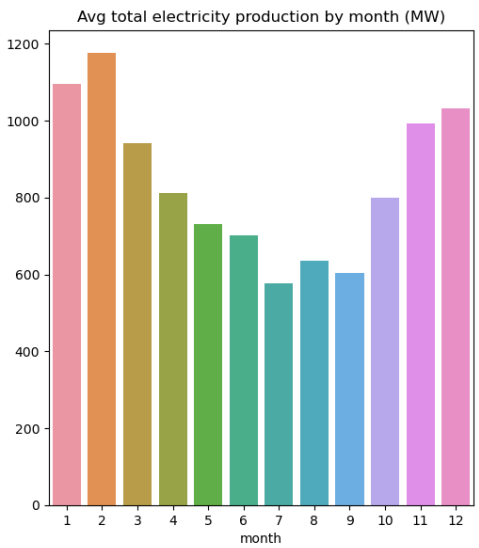

Avg Carbon Intensity by day of the week (gCo2/KWh)
0
50
100
150
200
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
day_of_week


Avg total electricity production by day of the week (MW)
0
200
400
600
800
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
day_of_week


Avg Carbon Intensity by day of the month (gCo2/KWh)
0
50
100
150
200
250
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
day


Avg total electricity production by day of the month (MW)
0
200
400
600
800
1000
1200
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
day





This is only average results, and numbers fluctuate even more depending on multiple factors. It is hard to monitor all these factors, trends or seasonal aspects. Therefore, electricityMap produced a convenient and easy to understand application with electricity related data that was derived from multiple sources and complex algorithms. Also electricityMap has an advanced machine learning model that forecasts carbon intensity, electricity production and prices in the next 24 hours to help your users schedule their charging time accordingly. This way we can be more responsible for the usage of electricity to charge our EVs and take steps forward for the greener planet.