
European Electricity Usage

— An analysis of affecting factors —

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The Dataset

Main Dataset:

- Electricity usage by country in Europe per hour
- Date range: 01.01.2019 - 30.06.2020

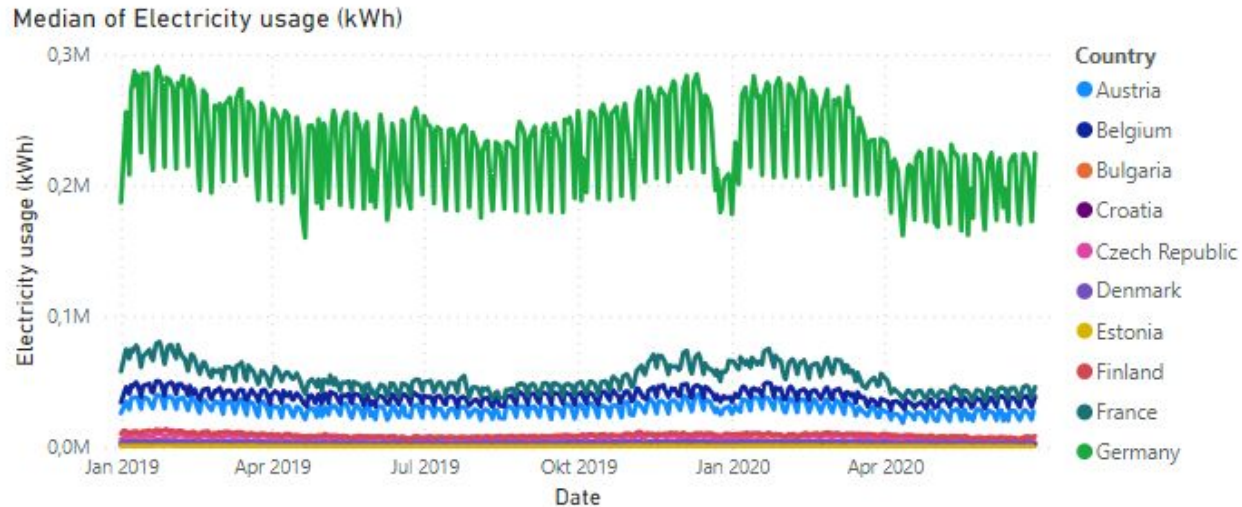
Additional info sourced by country:

- Population
- Geographical location
- CPI
- HDI
- Electricity Unit Price

	A	B	C	D	E	F	G	H
1	year	month	day	areaname	mapcode	timehourly	totalloadvalue_hourly	
2	2019	1	1	Austria	AT	01.01.2019 00:00	23410	
3	2019	1	1	Austria	AT	01.01.2019 01:00	22476,801	
4	2019	1	1	Austria	AT	01.01.2019 02:00	21295,6	
5	2019	1	1	Austria	AT	01.01.2019 03:00	21093,199	
6	2019	1	1	Austria	AT	01.01.2019 04:00	21756	
7	2019	1	1	Austria	AT	01.01.2019 05:00	22066,4	
8	2019	1	1	Austria	AT	01.01.2019 06:00	23791,6	
9	2019	1	1	Austria	AT	01.01.2019 07:00	24814,801	
10	2019	1	1	Austria	AT	01.01.2019 08:00	26176,801	
11	2019	1	1	Austria	AT	01.01.2019 09:00	27536,801	
12	2019	1	1	Austria	AT	01.01.2019 10:00	28255,199	
13	2019	1	1	Austria	AT	01.01.2019 11:00	28246,4	
14	2019	1	1	Austria	AT	01.01.2019 12:00	28162,801	
15	2019	1	1	Austria	AT	01.01.2019 13:00	27751,199	
16	2019	1	1	Austria	AT	01.01.2019 14:00	27904,801	
17	2019	1	1	Austria	AT	01.01.2019 15:00	29028,801	

Electricity Load: First analysis

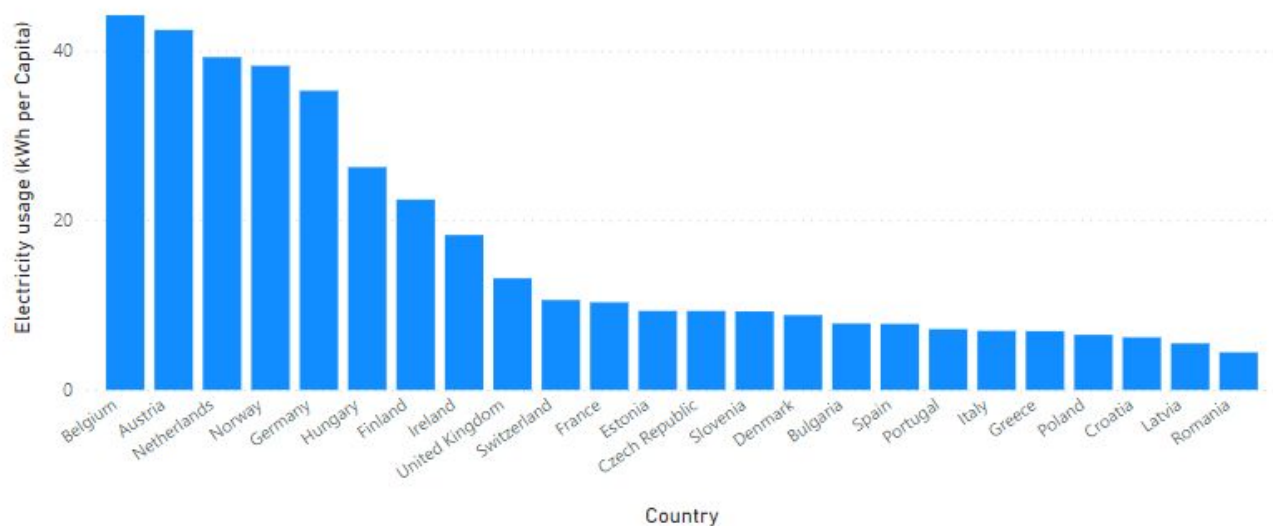
- Weekly oscillations (workdays vs. weekends)
- Germany's electricity usage dominates, thus harder to gain meaningful insight from our diagram



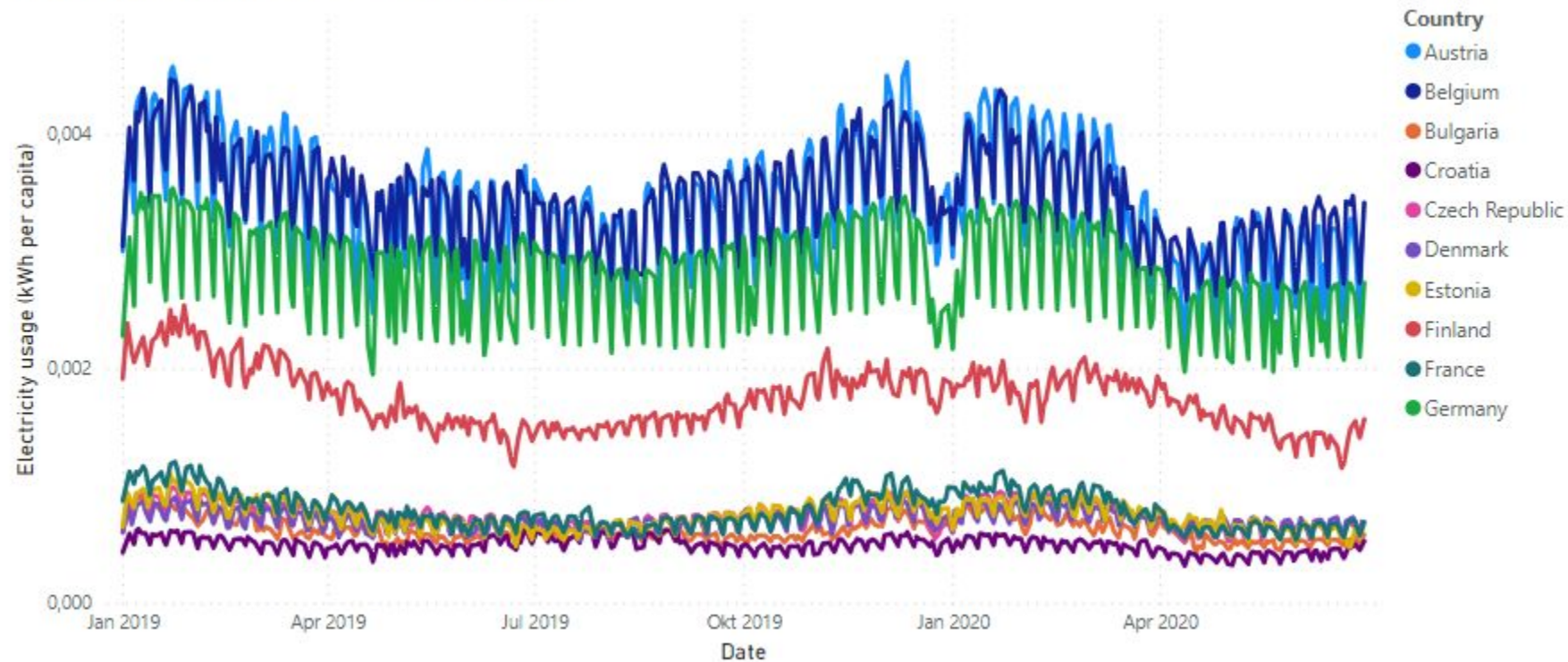
Electricity Load: Adjusted for Population

- Scaling usage by population size makes the data easier to read

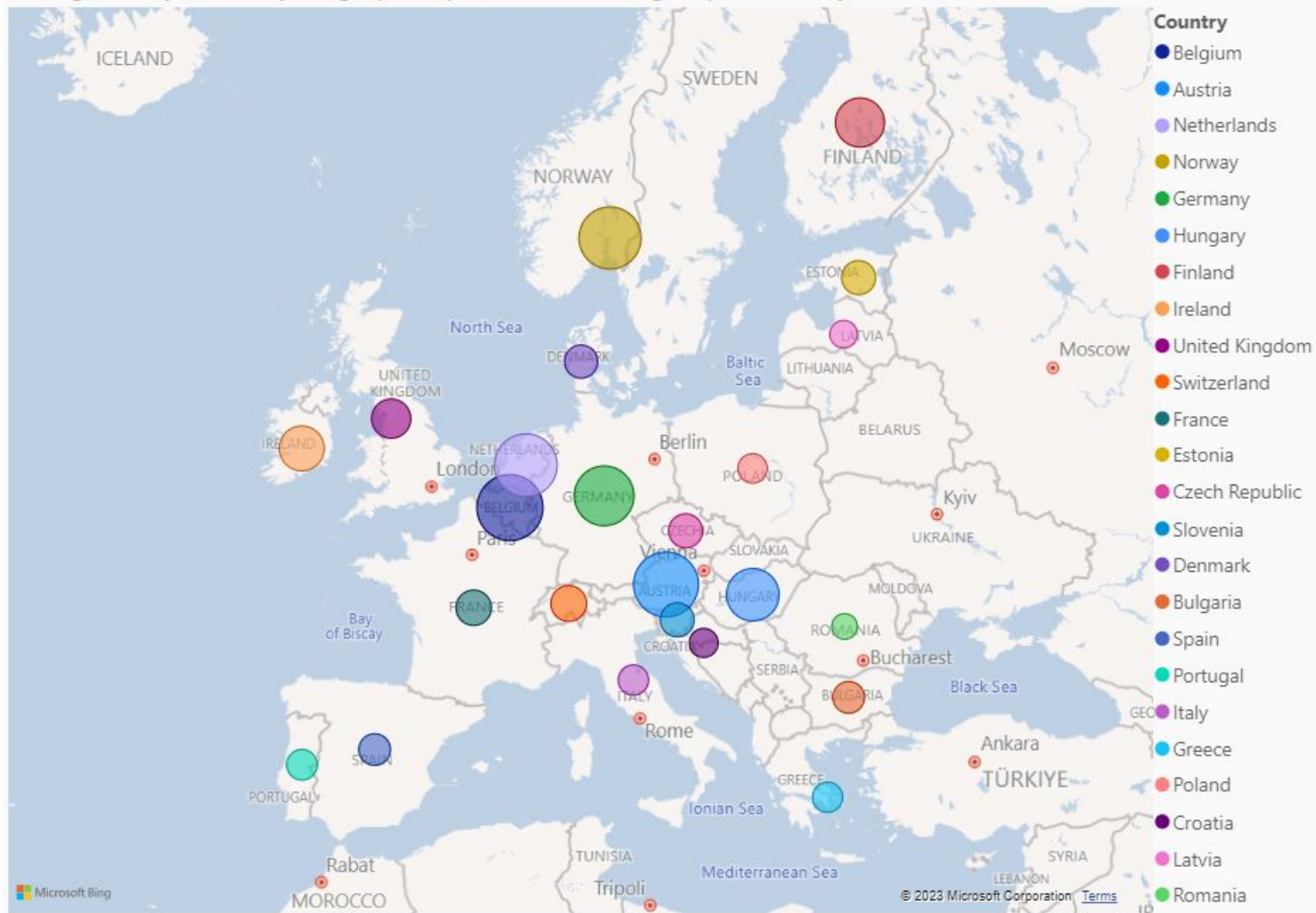
Median of Electricity usage concerning population



Median of Electricity usage concerning population



Average Hourly Electricity Usage (per Capita) - Relative usage represented by bubble size



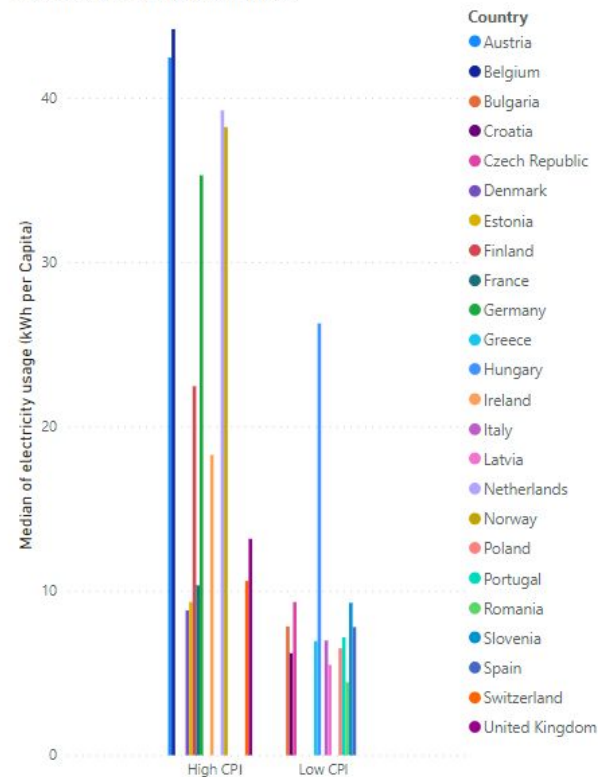
Clustering Countries: Low CPI vs. High CPI

CPI = Consumer Price Index

Measures a country's cost of goods and services: "cost of living"

- High CPI: Austria, Germany, Belgium, ...
- Low CPI: Croatia, Bulgaria, Greece, ...
- Countries with high CPI use almost 4 times as much electricity than countries with low CPI
- Higher CPI => higher urbanisation, wealthier countries => higher electricity usage

Electricity usage grouped by CPI



Clustering Countries: Low HDI vs. High HDI

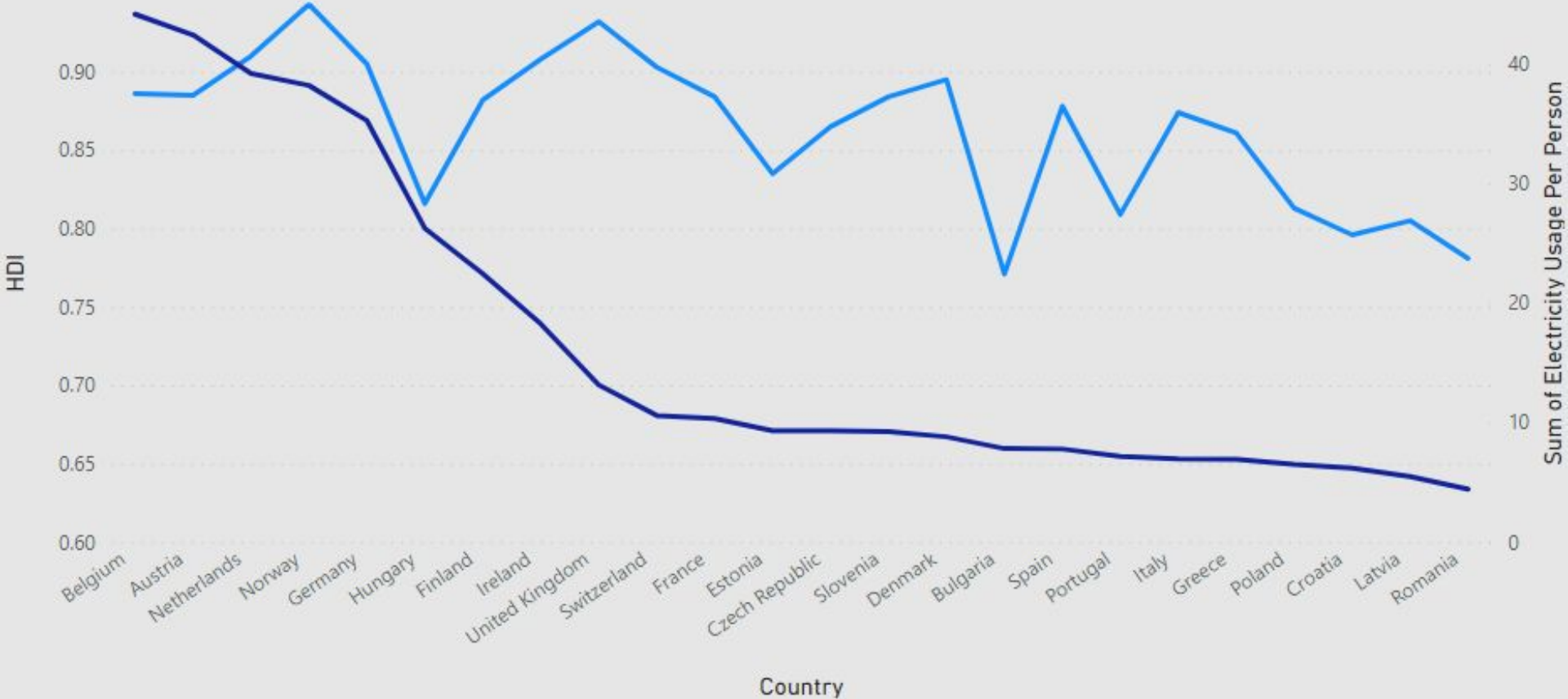
HDI = Human Development Index

Measures a country's overall human development: "health & wealth"

- High HDI: Norway, Germany, the Netherlands, ...
- Low HDI: Croatia, Bulgaria, Greece, ...
- Countries with high HDI **don't necessarily** have higher levels of energy usage

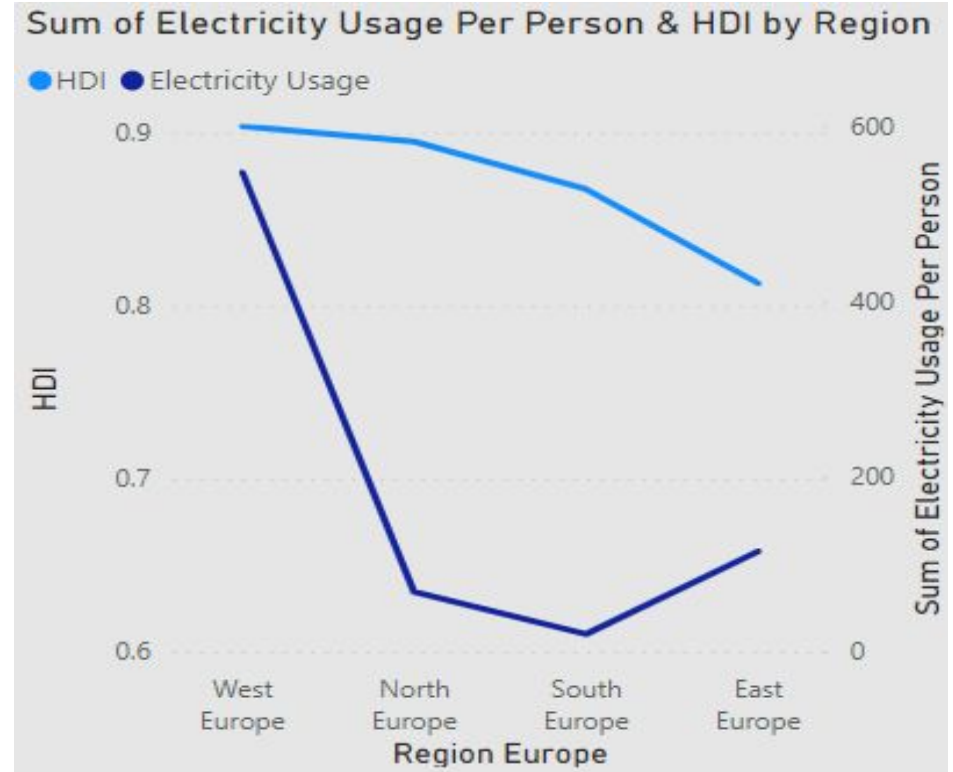
Sum of Electricity Usage Per Person & HDI by Country

● HDI ● Electricity Usage



Clustering by Region: Low HDI vs. High HDI

- Northern and Western Europe have higher HDI levels
- Western Europe has a higher electricity usage than Northern Europe
- West: Possibly due to differences in sustainability policies
- East: Possibly attributed to its higher proportion of heavy industries

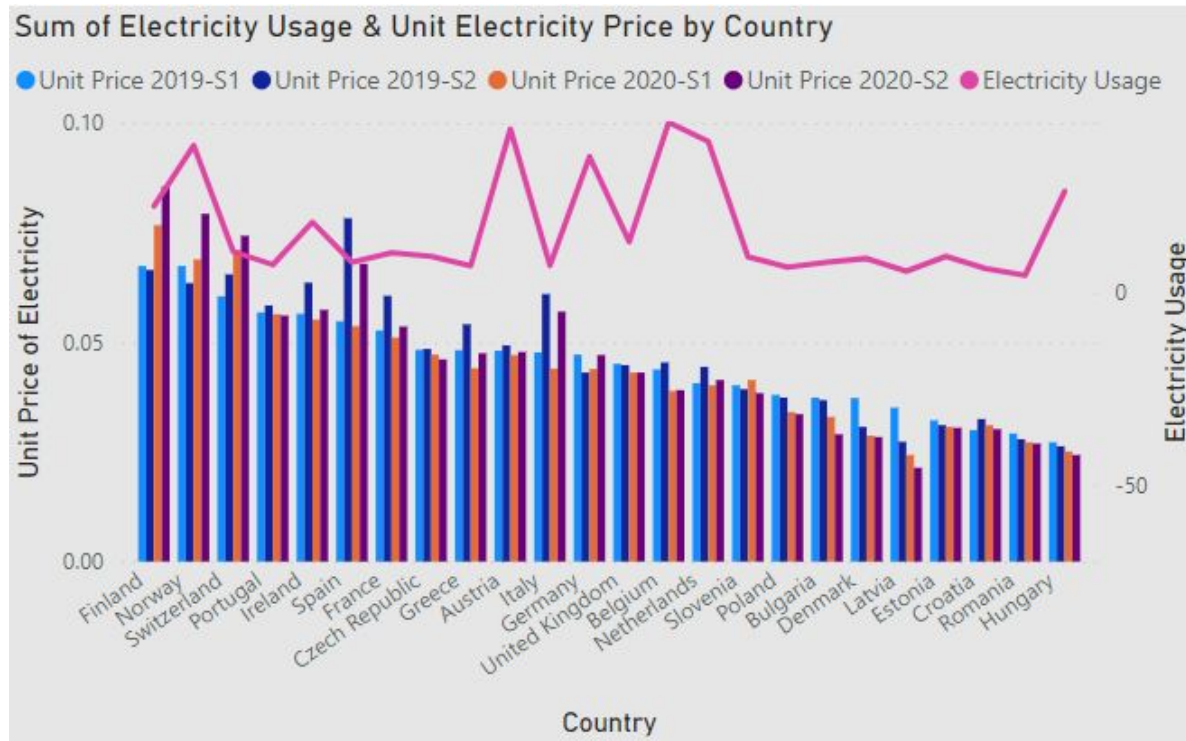


Clustering Countries: Electricity Unit Price

Line: electricity usage

Bars: electricity unit prices

- Higher electricity prices **don't** appear to influence electricity consumption
- Norway and Finland: possible climatic factor?

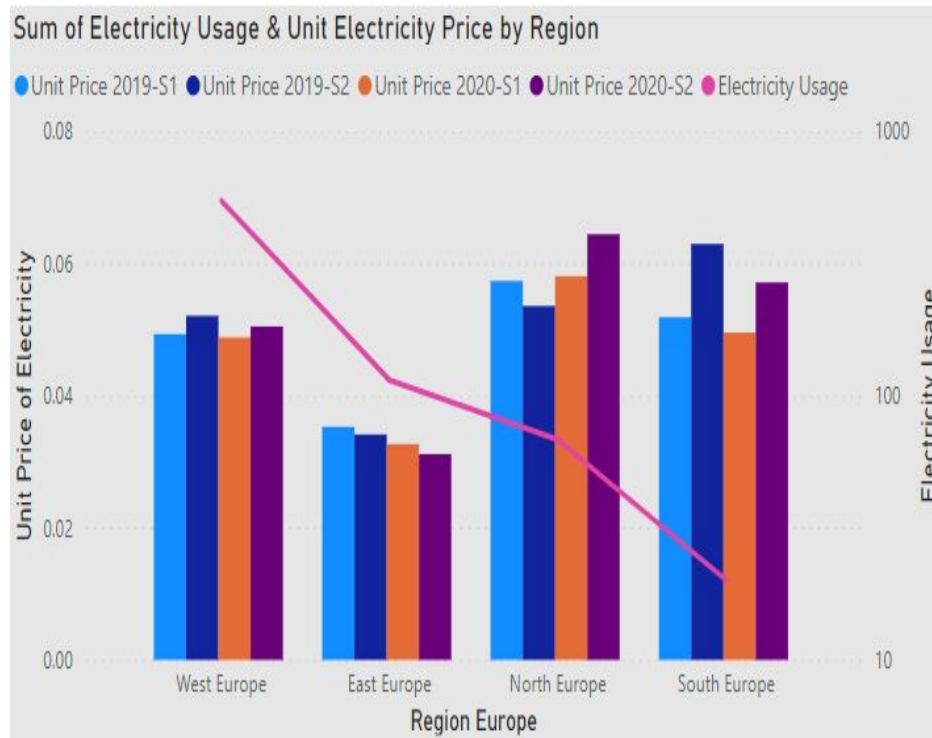


Clustering by Region: Electricity Unit Price

Line: electricity usage

Bars: electricity unit prices

- Northern and Southern Europe have the highest electricity unit prices, but lowest usage
- Western Europe exhibits more significant usage due to its more developed industrial sector



Key Conclusions

- While the electricity consumption habits of European countries are affected by a broad array of factors, none are dominant factors: each country has its individual idiosyncrasies
- Key influences include:
 - The **wealth & health** of a country (CPI, HDI)
 - The **geographic characteristics** (weather, urban density)
 - **Industrial activity** (industry composition, workday vs. weekend)
- Critical for the design of government energy policy & infrastructure investment decisions

Thank you