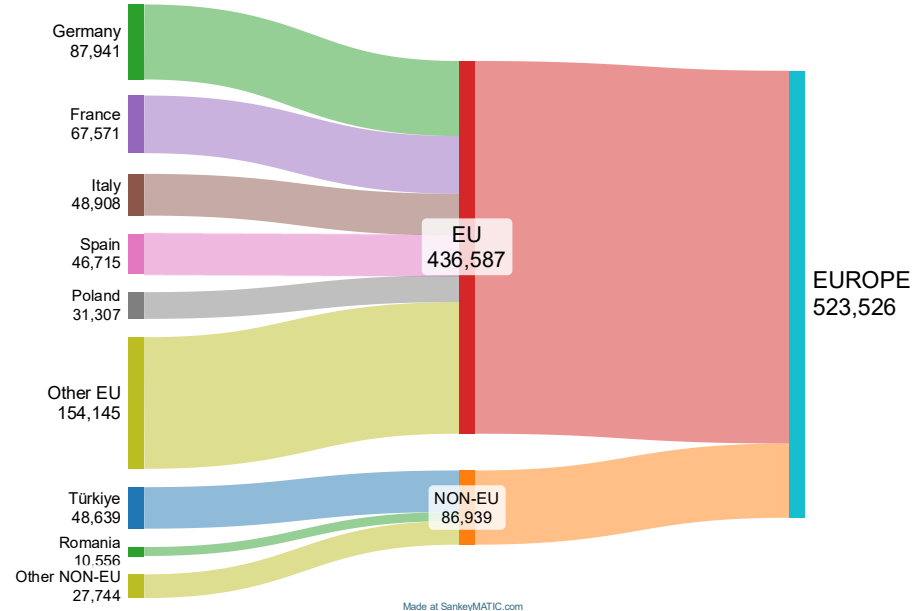


Data Visualization Pitch

Student Individual Assignment



Oil and petroleum products
consumption in 2023
(thousand tonnes)

Consumption of Oil and Petroleum Products in the European Union: A Long-Term Trend Analysis

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Research questions

To better understand **long-term trends** and cross-country differences in oil and petroleum product consumption within the European Union, this study addresses the following research questions.

How has **oil** and **petroleum** product **consumption** evolved in the **EU over time** (1990–2023)?

- Are there **significant differences** in consumption patterns **among EU** member states?
- Are we **witnessing** a **structural decline** in oil and petroleum products consumption in the European Union, in line with **EU** climate and energy policies?
- **To what extent** does **oil** remain a **dominant** energy source compared to the broader **energy transition narrative**?

About Data

Dataset: **EUROSTAT** "[Supply, transformation and consumption of oil and petroleum products](#)"

License: The dataset is shared under the Creative Commons Attribution (**CC BY-NC-SA 4.0**) license. This license is compatible with academic use.

This Eurostat dataset is based on the **Eurostat energy balance dataset on oil and petroleum products** (*nrg_cb_oil*), which provides harmonised and comparable statistics on the supply, transformation, and consumption of oil-related energy products across European Union member states.

The dataset covers the period **1990-2024** and reports values in **thousand tonnes**, allowing for **long-term** time-series analysis as well as cross-country comparisons. Data are collected and disseminated by Eurostat, the official statistical office of the European Union. For the purposes of this study, the analysis focuses primarily on **final consumption of oil and petroleum products**, as this indicator best reflects end-use demand and is directly relevant to understanding consumption trends, cross-country differences, and potential structural changes over time.

Unfortunately we don't have data for some countries in certain years. A prime example is UK, Eurostat doesn't have official data about UK since Brexit, therefore we do not have any UK data given from 2020 onwards.

The dataset given is already very comprehensible and well structured. Minimal cleaning was required.

- Filtering only EU countries and relevant indicators
- Handling missing values
- Renaming variables for clarity
- Aggregating data at EU level when needed

Methodology

- **Data Collection:** I used a classic manual download approach, even though **KNIME** has a very user-friendly API system that could have been used.
- **Data Processing & Cleaning:** I used KNIME, an open-source data analytics, reporting, and integration platform, only for a data Processing & Cleaning goal. Datawrapper and SankeyMATIC have been used to produce the graphs.
- **Use of AI Tools:** I used ChatGPT to obtain contextual background information on the material underlying my project, particularly to deepen the thematic context and support the data analysis and interpretation phase. I then double-checked the given context with other sources of information. (Commission Europa, Consilium Europa, Consob...)
- **Analytical Techniques:** Descriptive Statistics, Ranking and Top-N Analysis, Time-Series Trend Analysis, Comparative Analysis Across Time, Aggregation. These techniques were selected to summarize consumption levels, compare countries, and identify long-term trends and structural changes in oil and petroleum product use across the European Union.
- **Reproducibility:** Yes. The Eurostat dataset used is available to everyone, as well as the tools used for the project. I will also share the github link at the end of the presentation with the Knime workflow.

Insights from the Data

- **Long-term decline in EU oil consumption:**
The dataset shows a clear **downward** trend in oil and petroleum product consumption in the European Union over the period 1990–2023. While consumption peaked in the mid-2000s, levels observed in 2023 remain significantly below those peaks, suggesting a long-term structural decline rather than a temporary fluctuation.
(time-series trend analysis)
- **High concentration of consumption among a few countries:**
Oil consumption in the EU is **highly concentrated**. In 2023, a **small group** of large economies—most notably Germany, France, Italy, Spain, and Türkiye.
(descriptive statistics and ranking (top-N analysis))
- **Persistent dominance of Germany with declining levels:**
Germany **consistently** appears as the **largest oil consumer** throughout the **entire time period**. However, despite maintaining its leading position, Germany's consumption shows a gradual decline over time, reflecting both its economic scale and its ongoing energy transition.
(comparative analysis and time-series analysis)
- **Diverging national trajectories:**
While most **Western** European countries exhibit **declining** or **stabilizing consumption patterns**, some countries show a relative **growth** or delayed peaks, mostly Central and Eastern European (CEE) states.
(comparative analysis across countries)
- **Presence of structural breaks:**
Significant **discontinuities** are visible around major events, notably the **2008 financial crisis** and **2020 Covid-19** pandemic, where consumption drops sharply across nearly all countries. Post-crisis recoveries do not fully return to pre-shock levels, reinforcing the hypothesis of a structural shift.
(time-series inspection and visual trend analysis)

Trends in consumption of oil and petroleum products

1990-2000: Growth and Consolidation Phase

During the 1990s, oil and petroleum products shows a **steady and widespread increase**. This period is characterized by economic expansion, growing mobility, and strong reliance on oil, particularly in the transport and industrial sectors. Most countries display upward or stable trajectories.

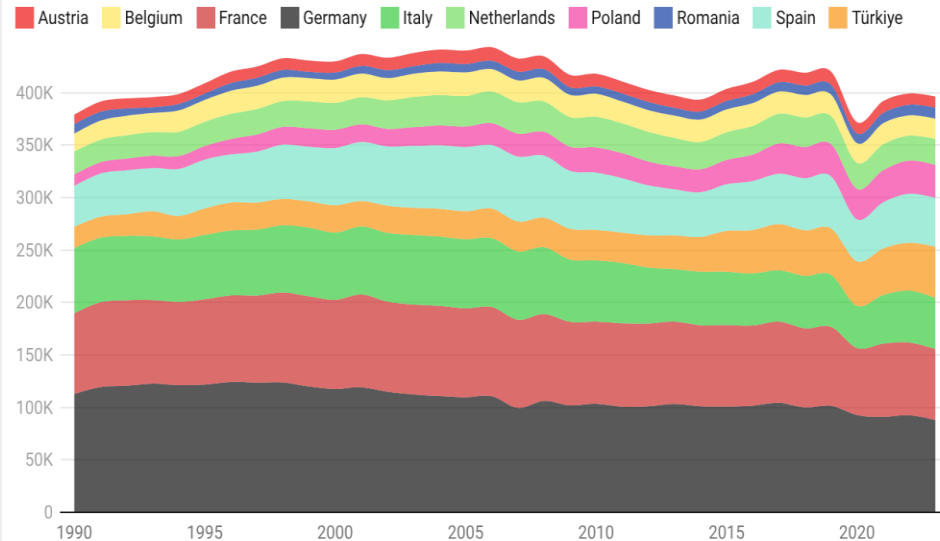
2000-2010: Peak and Turning Point

Consumption levels reach the apex in the mid 2000s, right before the start of a slow downwards trend. This shift coincides with increasing energy efficiency measures, early climate policy initiatives, and structural changes in EU economies. The downward trend intensifies after the **2008 financial crisis**. The beginning of a structural decline.

2010-Present: Structural Decline and Acceleration

From 2010 onwards, oil and petroleum product consumption exhibits a **persistent downward trajectory**. This phase is marked by the expansion of renewable energy sources, improvements in energy efficiency, and the strengthening of EU climate and energy policies. The sharp drop observed in **2020** represents a major external shock linked to the COVID-19 pandemic.

Oil and petroleum use in the top 10 countries by consumption (EU)



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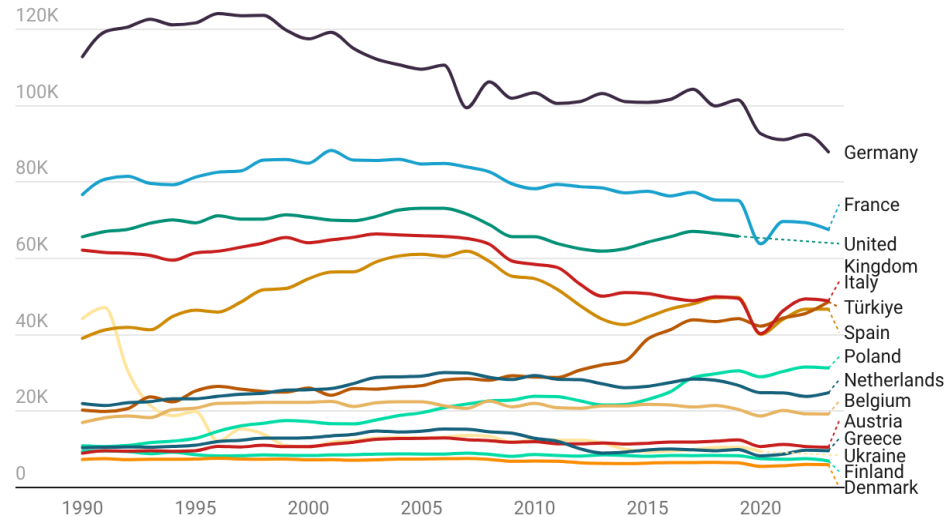
A steady, western, decline

This chart compares oil and petroleum product consumption across the top consuming countries in the European Union in **1990** all the way to **2023**, highlighting both continuity and structural change over time.

In 1990, consumption is strongly concentrated in large Western European economies. **Germany** clearly dominates, followed by **France** and **UK**, reflecting their industrial scale, population size, and transport demand. Most countries display relatively high consumption levels, consistent with an energy system heavily reliant on oil during this period.

By 2023, a **different pattern emerges**. While Germany remains the largest consumer, its consumption declines markedly, indicating a substantial absolute reduction over the period. A similar downward trend is observed in France and Italy, confirming that traditional major consumers have significantly reduced their oil use over time. These reductions suggest long-term structural changes rather than short-term fluctuations.

All countries in 1990 vs 2023



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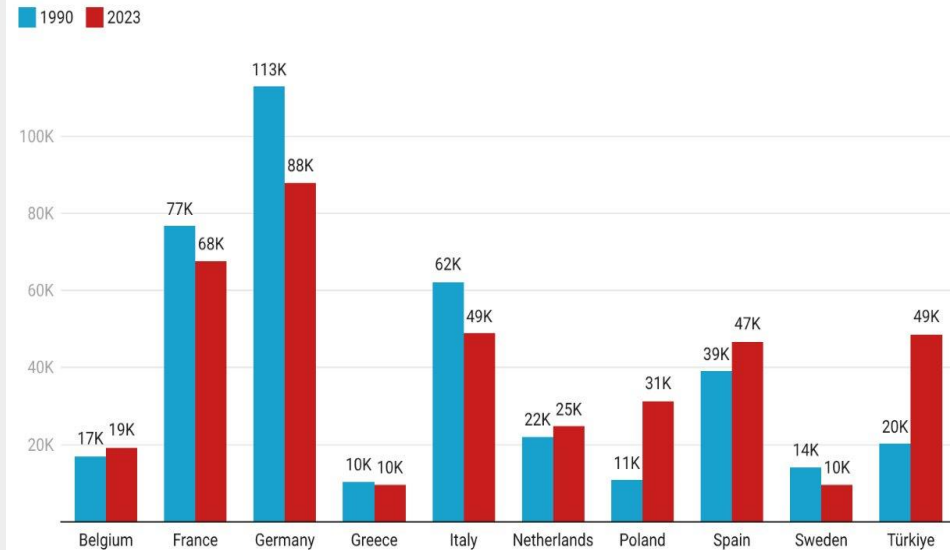
A steady, western, decline

At the same time, some countries exhibit **stable** or increasing consumption. Poland and Türkiye, in particular, show notable growth between 1990 and 2023, reflecting economic expansion, increased mobility, and later stages of energy transition compared to Western European countries. Spain also shows a moderate increase, while smaller countries such as Belgium and the Netherlands display relatively limited changes.

Overall, the comparison highlights a **divergence** in national trajectories: established Western European economies show clear declines, whereas some Eastern and non-EU countries experience growth or delayed peaks. This contrast supports the interpretation of an uneven but ongoing energy transition within Europe, where oil consumption declines are advanced in some regions while still unfolding in others.

Even though its not part of the dataset, we can clearly see that the main eastern countries (China,Russia,India,Philippines,Bangladesh) are using more and more oil and petroleum rather than investing in renewable energy sources.

Top 10 countries per oil and petroleum consumption of 1990 vs 2023



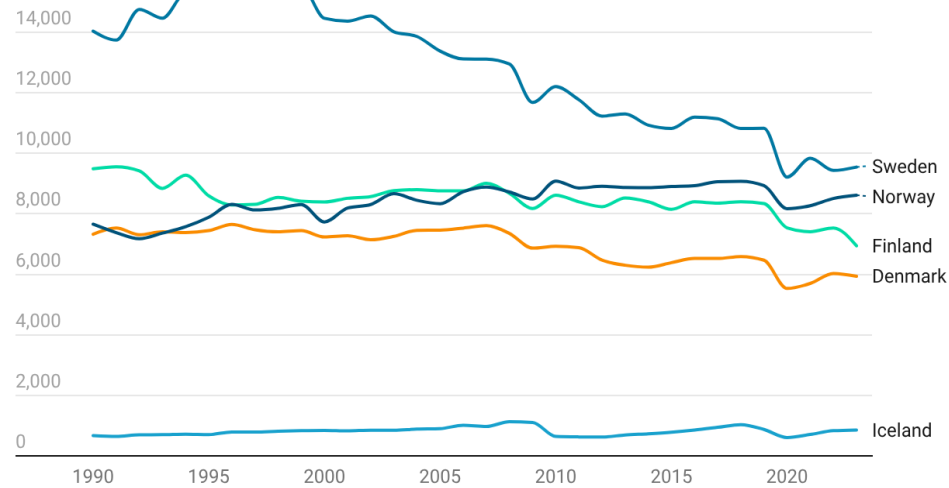
Created with Datawrapper

From Oil Dependence to Energy Transition

The Nordic countries represent a clear **example** of an early and sustained transition away from oil dependence. From 1990 to 2023, oil and petroleum product consumption shows a consistent downward trend across Sweden, Finland, and Denmark, indicating a structural decline rather than short-term fluctuations.

Sweden exhibits the **most pronounced reduction**, with consumption steadily decreasing after the mid-1990s. Finland and Denmark follow similar trajectories, particularly after 2000, reflecting increased energy efficiency, reduced use of oil in heating, and the expansion of renewable energy sources. Norway presents a more stable pattern, but without significant growth over time, suggesting a decoupling of oil consumption from economic activity. Iceland maintains very low consumption levels throughout the period due to its long-standing reliance on renewable energy.

Nordic countries consumption 1990 vs 2023



Created with Datawrapper

From Oil Dependence to Energy Transition

Despite a long-term decline in consumption, oil remains a **dominant energy source** in the European Union in absolute terms. Throughout the period analyzed, oil and petroleum products continue to account for a substantial share of final energy consumption, particularly in sectors such as transport, aviation, and petrochemicals, where alternatives are either limited or still in the process of scaling up.

However, the data also show that oil's dominance is **gradually weakening**. Consumption levels have declined structurally since the mid-2000s and have not returned to historical peaks, even during periods of economic recovery. This trend aligns with the broader energy transition narrative, which emphasizes decarbonisation, energy efficiency, and the expansion of renewable energy sources.

The coexistence of declining oil consumption and continued reliance on oil-intensive sectors suggests that the energy transition is **incremental rather than abrupt**. Oil remains central to the current energy system, but its role is increasingly challenged by policy-driven structural changes, technological innovation, and shifts in energy demand. Overall, the evidence supports the view that oil is transitioning from a dominant to a gradually diminishing role within the EU energy mix, consistent with—but not yet fully replaced by—the broader energy transition.

LICENCE

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Github link:

<https://github.com/FilippoAvon>