Examining the Relationship between the Economy and Energy in the European Union Using Multivariate Statistical Methods

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Abstract

Economic growth, which is the focus of nations' central objectives, is causing significant environmental costs and damage (Chou et al., 2023). Fossil energy use contributes to economic growth but is also a major source of carbon emissions and accelerating rates of climate change, requiring governments to balance spending on economic growth with sustainable energy management (Bhuiyan et al., 2022).

This research aims to examine and evaluate the links between economic performance and energy management. This will be achieved through a multivariate statistical analysis of relevant EU data (GDP, energy production and consumption, energy exports and imports, GHG emissions) for 27 Member States in 2022. The results of the correlation analysis will partly provide insights into the relationships between the variables, while the results of the principal component analysis will allow for identification of background variables. The cluster analysis shows a high degree of homogeneity among members, but several outliers can be identified.

Keywords

Economic growth, sustainable energy, energy use, renewable energy, GHG emissions

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INTRODUCTION

While the use of energy resources is an essential element of the functioning of society and the economy (Zohuri and Mcdaniel, 2019), CO_2 and other greenhouse gas emissions as a by-product of fossil fuel consumption represent a source of many environmental problems (Irfan et al., 2021), including the driving force behind the threat of global warming to humanity (Hacimamoglu and Sungur, 2024).

According to the Kuznets hypothesis (EKC), environmental pressures and pollution are higher in the early stages of economic growth, but at higher stages of development, negative environmental impacts are reduced as a result of the need to increase production efficiency, technological progress, and innovation.

Although Kuznets was optimistic about the temporary nature of the negative effects of economic growth; he assumed that the environmental problems associated with economic growth would be solved by a combination of capital and innovation (as higher GDP increases the willingness and capacity to invest in environmental protection, Grossmann and Krueger, 1995; Bhattacharya et al., 2016; IRENA, 2024), the evidence today provides little proof that the problem can be remedied by further economic growth (Dinda, 2004). Meadows and his co-authors in The Limits to Growth see voluntary control of growth with societal-scale self-discipline and a high degree of creativity as the only way to avoid collapse, but this is incompatible with the rate of population growth, the level of resource exploitation, or the rate and trend of environmental pollution that characterises the Earth. However, if the right balance is struck between population and capital, and resource use is minimised, development can be understood as a trend towards technological progress – includeing through the use of material and energy-saving solutions, more efficient technologies, or renewable energy systems (Meadows et al., 2013).

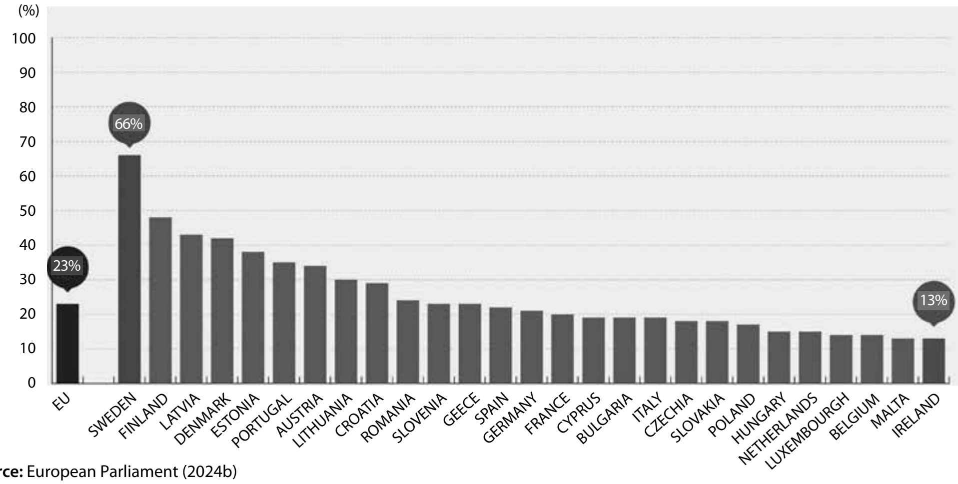
1 LITERATURE SURVEY

The use of renewable energy sources was initially seen as an alternative to fossil fuel depletion, but it is now clear that it goes beyond this goal and is also an optimal and long-term alternative to the implementation of sustainable energy systems (Cucchiella et al., 2017). Due to its nature of ensuring CO_2 emissions reduction (and avoiding the use of fossil resources), one of the main goals of energy policies worldwide is to include more renewable energy in the energy mix. (Dong et al., 2018) In line with this, the European Union's energy policy also strongly encourages an increasing share of renewables in meeting energy consumption needs; while in 2022, renewable energy consumption accounted for an average of 23% of the EU's gross energy consumption (with significant variation, as shown in Figure 1. While the target of 32% by 2030 was raised to 42.5% by the European Parliament and Council Directive 2023/2413, with EU Member States aiming to exceed this target by 45% (European Parliament, 2024a).

Although the European Union's 2020 targets of meeting 20% of total energy demand from renewable energy sources have been met, as illustrated in Figure 1, there is a significant variation in performance between Member States, but nevertheless, according to the EEA experts, there is a clear structural shift away from fossil energy use towards clean, renewable energy use at the EU level (EEA, 2021).

Given the cardinal importance of renewable energy in sustainable development, this study examines the link between economic performance and sustainable energy management by exploring the effects of economic performance on energy transition and the effects of renewable energy production on energy dependence, energy consumption and emissions. The research covers the member states of the European Union and aims to answer the research questions through a multivariate statistical analysis of empirical data frm 2022 (as the most recent year for which complete data are available).

Figure 1 Overall share of energy from renewable sources in 2022



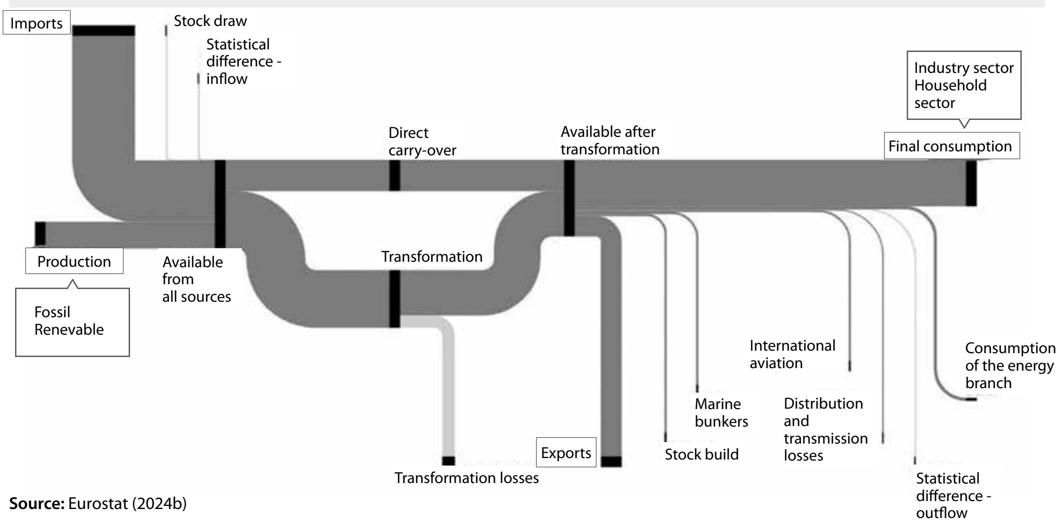
Source: European Parliament (2024b)

This research aims to explore the relationships between GDP as an indicator of economic performance and relevant energy production-use indicators and GHG emissions, based on the theoretical and empirical inputs presented in the introduction, and going beyond the factors mentioned in the introduction. To achieve this, specific indicators on energy flows will be used in addition to GDP and GHG emissions data. The analysis includes relevant production (input) and consumption (output) data related to energy flows, such as:

– Input: energy production (including fossil and renewable energy production), energy imports;
– Output: final consumption (including industrial sector consumption and household sector consumption of energy for heating purposes) and energy exports.

Figure 2 aims to illustrate the place and role of these variables in the energy flow, making the function of each variable more transparent, as well as their relationship with other dimensions.

Figure 2 Energy flow – Sankey diagram



Source: Eurostat (2024b)

The research questions formulated for this research seek to answer the following questions:

1. What is the relationship between GDP and the energy indicators and GHG emissions considered?
2. How can the relationship between energy production and consumption variables be characterised on the basis of the data for the year under review, with particular reference to renewable energy sources?
3. What is the relationship between renewable energy production and GHG emissions?

In addition to answering these hypotheses and research questions, the aim is to investigate to what extent the seven variables included in the analysis can be reduced without any significant loss of information and what phenomena can explain this. Finally, the analysis will also seek to answer the question of how the variables under analysis can be grouped for each Member State of the European Union.

The remaining chapters of the thesis first present the data sources used for the research and the multivariate statistical methods used for their analysis. This is followed by an outline of the results of the multicollinearity analysis and the results of the correlation analysis (testing the hypotheses and answering the research questions), the conclusions of the principal component analysis and, finally, the results of the cluster analysis. The paper concludes with a summary of results of the statistical analyses carried out in the study.

2 MATERIAL AND METHOD

The analysis was based on a multivariate data analysis extended to the European Union countries (27 Member States for the year 2022), which included the population data, GDP, GHG emissions and relevant categories of energy flows relevant to this research. The inputs for the analysis are taken from the Eurostat data collection and are presented in Table F1 in the Appendix. The analyses were carried out in 2024, during which time the most recent data available for all variables under analysis was 2022. The methods to achieve the research objectives were applied using the SPSS 27 software package.

The methods used to answer the research questions:

- What is the linear relationship between the dimensions examined in the research questions? (Correlation and multicollinearity analysis);
- To what extent can the number of variables included in the analysis be reduced? (Principal components analysis);
- How can the EU countries be grouped according to the data included in the study? (Cluster analysis).

Before exploring the correlation relationships, the collinearity between the variables is investigated. The inverse of the correlation matrix and its diagonal are used for the analysis.

The correlation was tested using Pearson's correlation coefficients. The dimensions used in the study have been abbreviated to simplify the presentation of the results (Table 1) the short names of each variable are used to present the results of the analyses.

The amount of energy used for heating by households was climate corrected according to the methodology recommended by Szép et al. (2022). The reference value for the climate correction was the EU27 average heating day degree in 2022 (Eurostat, 2025).

To ensure the feasibility of the principal component analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlet test were performed to verify the adequacy of the sample and model, and the principal component analysis was carried out using the non-rotational and rotational (varimax) methods.

In the cluster analysis, hierarchical cluster analysis was performed by choosing Between-groups linkage method, for which the data series included in the analysis were normalized.

Table 1 Quantitative units and abbreviated names of variables included in the survey

Variable name*	Unit of measurement	Short name
Energy flow – input (production, purchase) data		
Primer energy production	TJ/1 000 people	PEP
Renewable energy production	TJ/1 000 people	REP
Net energy import	TJ/1 000 people	NIMP
Energy flow – output (consumption, sales) data		
Industrial energy consumption	TJ/1 000 people	IEC
Household heating energy consumption (climate-corrected data)	TJ/1 000 people	HHEC
Variable related to economic performance		
GDP	m EUR/1 000 people	GDP
Variable indicating the environmental impact		
GHG-emission	kt/1 000 people	GHG

Note: * the calculation of each variable is shown in the row "Source (based on Table A1)" in the Appendix.
Source: Own editing

3 RESULTS AND DISCUSSION

The original dataset included 270 data items for 10 variables from 27 EU countries in 2022, but by removing redundant data, the actual dataset analysed was reduced to 216 items – with total energy consumption and household energy consumption data omitted. Given that the data values from the referenced data collection showed a significant variation in magnitude (in particular for population numbers, GDP), specific data per thousand inhabitants were calculated (these are shown in Table A2 in the Appendix) to avoid outliers distorting the results of the analytical methods used.

3.1 Multicollinearity test

An important first step in exploring correlations is to examine the collinearity between variables. For the analysis we use the inverse of the correlation matrix and its diagonal. The diagonal of the inverse of the correlation matrix is the variance inflation factor (VIF).

In the VIF analysis, a threshold value is specified for which the individual variables can be expressed as a function of the other variables as a linear function. The higher this value, the higher the R-squared value of the variable as a function of the other variables. A value of 5 or 10 is usually given as a threshold value (Vörösmarty és Dobos, 2020). In our analysis, we use a value of 10, as recommended by O'Brien (2007). The results are shown in Table 2.

Table 2 Diagonal values of the inverse correlation matrix (VIF values)

Variable	VIF
PEP	3.975
REP	4.844
NIMP	2.415
IEC	3.516
HHEC	5.335
GDP	2.156
GHG	1.947

Source: Own calculation using SPSS 27 software

The results of Table 2 show that the VIF of all variables is below 10, so there is no multicollinearity for the variables under study.

3.2 Correlation analysis

Correlation analysis was used to examine the relationship between the factors in the hypotheses formulated (Table 1). It can be concluded that there is both a positive and a negative relationship between the results – these results can be explained by the context of the variables involved. There is a non-random correlation between several dimensions, i.e. the correlation can be considered significant: 13 of the 32 cases examined had a correlation level below 5% (the correlation level was defined as .054, according to the mathematical rounding rule, to be below 5%).

Table 3 Results of Pearson correlation analysis

		REP	NIMP	IEC	HHEC	GDP	GHG
PEP	Pearson correlation	**.782****	**–0.452***	**–0.564****	**0.762***	**–0.058**	–0.025
	Sig. (2-tailed)	<0.001	0.018	0.002	<0.001	0.774	0.903
	N	27	27	27	27	27	27
REP	Pearson correlation		–0.297	**0.675****	**0.807****	0.092	–0.12
	Sig. (2-tailed)		0.132	<0.001	<0.001	0.647	0.55
	N		27	27	27	27	27
NIMP	Pearson correlation			0.176	–0.15	**0.532****	0.324
	Sig. (2-tailed)			0.38	0.456	0.004	0.099
	N			27	27	27	27
IEC	Pearson correlation				**0.755****	0.375	0.146
	Sig. (2-tailed)				<0.001	0.054	0.468
	N				27	27	27
HHEC	Pearson correlation					0.232	0.204
	Sig. (2-tailed)					0.242	0.308
	N					27	27
GDP	Pearson correlation						**0.551****
	Sig. (2-tailed)						0.003
	N						27

Source: Own calculation using SPSS 27 software

The results of the correlation analysis are presented according to the research questions formulated in advance.

No relationship between GDP and the energy use indicators included in the survey (energy use in the industrial sector, heating energy use in households) can be found in the year under review that would allow meaningful conclusions to be drawn on the relationship between the variables. GDP showed weak and non-significant results with both energy use indicators.

The situation is similar for GDP and renewable energy production, where although it would be logical to assume that higher GDP allows for higher investment in renewable energy production, the correlation between the two variables is not significant and negligible.

While neither energy production nor energy use shows a co-movement with GDP, there is a moderately strong (0.551) and significant relationship between GDP and GHG emissions. This may be explained by a medium strong (0.532) and significant correlation between GDP and net energy imports, which is consistent with the characteristics of the energy crisis in 2022.

Primary energy production and renewable energy production show a significant and strong (0.782) correlation. The strong co-movement of the two variables corresponds to community and government expectations and measures taken to increase the share of renewable resources.

The results show a moderately strong and significant relationship between primary energy production and industrial (0.564) and household heating (0.762) energy consumption, which is a logical result, since both energy consumption variables represent a significant consumer group: industrial energy consumption accounted for 40.2% of the EU's primary energy production in 2022, while household heating energy consumption 27% of it.

It is particularly favourable that the renewable energy production and energy consumption (industrial energy consumption 0.675, household heating energy consumption 0.807) indicate a medium or strong, in both cases significant correlation, which shows a definite manifestation of the intention of the two sectors to use renewable energy sources.

The relationship between renewable energy production and greenhouse gas emissions is negative, but not significant and negligible, so no meaningful conclusions can be drawn from the study regarding these two variables for 2022.

The main reason for carrying out the correlation analysis was to reveal the relationship between the investigated factors. The answers to the research questions formulated in this regard can be expressed as follows:

- Among the other variables, GDP only shows a correlation with net energy import and GHG emissions, in both cases the co-movement is significant and of medium strength. Based on the 2022 data, no relationship can be demonstrated with other variables.
- A strong and significant relationship can be seen between the two variables related to energy production, and there is also a correlation between production and consumption. Primary energy production and renewable energy production both show a moderate correlation with industrial energy consumption and a strong relationship with household energy consumption for heating purposes.
- Regarding the relationship between renewable energy production and GHG emissions, no conclusions can be drawn based on the 2022 data. Based on this, the increase in the share of renewable energy sources (with a strong significant relationship to primary energy production) and its favourable impact on emissions is not reflected in the GHG emissions data.

3.3 Results of Principal Components Analysis

A strong correlation between several dimensions can be identified, which justifies the implementation of principal component analysis to simplify the dimensions and filter out latent variables. The analysis aimed to identify background variables based on the relationships between each variable. The KMO metric that allowed the analysis to be performed is 0.712, which supports the analysis, as does the result of the Bartlett test showing significance. For ease of reference, the results are presented using a rotation (Varimax) procedure and sorted by size (Table 4).

Table 4 Results of Principal Component Analysis after Varimax Rotation

Rotated component matrix		
	Component	
	1	2
HHEC	**0.933**	0.133
REP	**0.921**	–0.128
PEP	**0.887**	0.246
IEC	**0.809**	0.352
GDP	0.175	**0.865**
NIMP	–0.267	**0.796**
GHG	0,063	0.732

Source: Own calculation using SPSS 27 software

As can be seen in Table 4, the values of the communalities range from 0.732 to 0.933, so the principal components explain most of the variance, with the first three principal components explaining 77.166% f the variance in this analysis.

The results show that the first principal component includes data on energy production as well as energy use; of these, household energy use for heating and renewable energy use for heating are the main components. The second principal component is correlated with GDP and greenhouse gas emissions with almost equal (high) significance, while the third principal component, energy imports, is more strongly correlated, while the effect of energy use in the energy sector is medium.

The variables of the first principal component are concentrated in the area of energy production and consumption, so that the level of energy production and consumption can be identified as a factor influencing the evolution of each variable.

The second component includes net energy imports and two non-energy variables, GDP, which describes the output of the national economy, and greenhouse gas emissions. The relationship between the two latter indicators, while 'common' because of their different nature, can be described as the interaction between economic growth and its environmental effects, in short: the evolution and state of economic development provide a common starting point. Economic conditions (economic development, price and market conditions, etc.) also play a decisive role in the background factors of net energy imports, but also political (energy policy, international relations), natural and environmental (fossil fuel supply, availability of renewable energy sources) and technological (infrastructure, innovation, etc.) factors.

3.4 Results of cluster analysis

To answer the question of how the EU member states can be grouped according to the dimensions included in the study, a hierarchical cluster analysis was carried out. The different scales for each dimension were standardized to a range of 0–1, with 5 clusters being defined as the number of clusters. A slight separation was achieved at lower cluster numbers (3 and 4) due to the high degree of homogeneity between the countries under study. However, at 5 clusters the degree of separation was significantly higher, allowing better identification of outlier countries.

The results of the analysis using the between-groups linkage method are summarized in Table 5. This shows that the cluster analysis has placed 22 out of the 27 EU Member States in the same cluster, due to the outlier values of the 5 countries concerned.

The outliers are also clearly confirmed by looking at the specific data included in the analysis.

Table 5 Results of the cluster analysis based on the original population (N = 27)

Cluster number	Number of cluster members	Cluster members
1	22	BE, BG, CZ, DK, DE, EE, GR, ES, FR, HR, IT, CY, LV, LT, HU, NL, AT, PL, PT, RO, SI, SK
2	2	IE, LU
3	1	MT
4	1	FI
5	1	SE

Source: Own editing using SPSS 27 software

Together, Ireland and Luxembourg form Cluster 2, which can be identified by their high GDP and GHG emissions compared to the other countries, and the lowest primary energy production.

Cluster 3 includes Malta, which is characterised in part by extremely low primary and renewable energy production and GHG emissions compared to the EU average, but also by the above average net energy imports.

Finland (cluster 4) and Sweden (cluster 5) both stand out from the rest with their exceptionally high renewable energy production and energy use, but the difference between them, which is also the reason for their inclusion in a separate cluster, is that Finland has above average GHG emissions, while Sweden has the lowest per capita emissions among the 27 Member States.

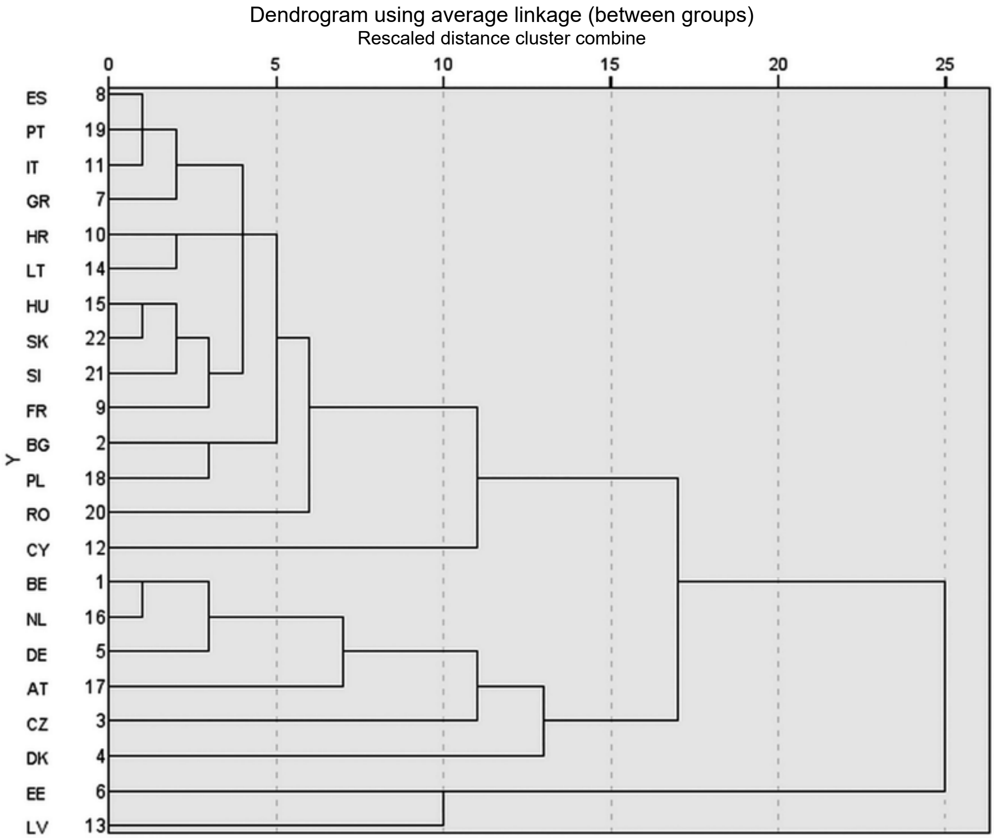
Given that the cluster analysis shows poorly diversified data due to the sensitivity of the cluster analysis to outliers, countries belonging to clusters 2–5 of the previous experiment have been excluded from the cluster analysis below.

The cluster analysis with a population of 22 countries by requesting a classification into 3 clusters yielded the following result. The countries in the sample are grouped into clusters as follows:

- Cluster 1: BE, CZ, DK, DE, NL, AT,
- Cluster 2: BG, GR, ES, FR, HR, IT, CY, LT, HU, PL, PT, RO, SI, SK,
- Cluster 3: EE, LV.

Estonia and Lithuania, which form a separate cluster (Cluster 3), differ from the other Member States in terms of their high above-average renewable energy production per population and their very low net energy imports, while the Cluster 1 Member States (Belgium, Czech Republic, Denmark, Germany, the Netherlands and Austria) share above-average industrial energy consumption, GDP and GHG emissions. Cluster 2, which comprises the largest number of Member States after outlier management, includes Member States with data closest to the average.

Figure 3 The dendrogram of the hierarchical cluster analysis with 22 countries



Source: Own editing using SPSS 27 software

CONCLUSIONS

Based on the test results, the answers to the research questions can be summarized as follows.

1. GDP and energy correlations

The data indicates only a moderate correlation between GDP and net energy imports, as well as GHG emissions. There is no significant link between GDP and variables related to energy production or consumption – energy production and consumption indicators do not align with GDP. This suggests that a higher GDP does not lead to lower energy import dependency or GHG emissions; rather, both tend to increase.

The 2022 data suggests that while economic growth could provide the financial resources needed to make energy production more sustainable and reduce import dependency and emissions, its direct impact on achieving these goals is not evident.

2. Renewable energy and consumption trends

The strong correlation between primary energy production and renewable energy production is encouraging, as it suggests a shift toward renewable energy sources. Similarly, the moderate to strong relationship between renewable energy production and both industrial and household heating energy consumption indicates that renewables are playing an increasing role in meeting energy demands across these sectors.

3. Renewable energy and GHG emission

The absence of a correlation between renewable energy production and GHG emissions may suggest that the share of renewables remains too low. While renewable energy plays a crucial role in reducing emissions, its overall contribution is not yet significant enough to influence emission trends.

The results of the principal component analysis show that the variation in the seven examined variables can be attributed to two underlying factors. The first principal component is primarily driven by energy production and consumption levels, while the second principal component is mainly influenced by economic development.

The results of the cluster analysis show that in several cases there are outliers between the relevant indicators of the countries included in the analysis, which leads the analysis to place most countries in the same cluster.

After managing outliers, the cluster analysis results still distinguish only a few member countries from the rest of the sample. Even after the second cluster analysis, 14 countries remain in the same cluster. This suggests that further clustering of these countries could provide a more detailed insight into the characteristics of individual country groups. In addition, the data included in the analysis also shows that a significant number of EU countries show similar behaviour and results, probably due to the Community energy policy and the EU environment and climate policy, which are pushing Member States in the same direction. On this basis, it may be useful to carry out further studies to identify the impact and extent of these policies.

Finally, it is important to emphasize that the results of the 2022 cross-sectional analysis may have been significantly influenced by the energy crisis during the period under review. Therefore, analysing the impact of these external factors could be valuable. Similarly, further research could explore the role of renewable energy not only in production but also in imports, exports, and various consumption activities. Additionally, incorporating GDP – or other economic indicators – into forecasting models could be a promising research direction.

Further studies might also examine the evolution of household energy use for cooling, with appropriate climate adjustments.

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APPENDIX

Table A1 Data for EU countries in 2022, the baseline for our analysis

	Primer energy production (TJ)	Renewable energy production (TJ)	Energy import (TJ)	Energy export (TJ)	Industrial energy consumption (TJ)	Household energy use for heating (TJ)	GHG-emission (kt)	Population (1 000 people)	GDP (mEUR)
	(a)	*(b)*	*(c)*	*(d)*	*(e)*	*(f)*	*(g)*	*(h)*	*(i)*
BE	664 848	179 020	3 438 341	1 582 923	401 119	217 667	108 464	11 618	554 214
BG	550 871	117 255	538 978	233 912	113 073	41 206	49 543	6 839	85 801
CZ	1 058 474	232 574	1 005 308	272 753	276 913	210 343	121 878	10 517	276 266
DK	416 376	211 897	733 634	425 112	99 147	96 700	43 862	5 873	380 618
DE	4 074 315	2 066 790	9 758 105	1 613 969	2 237 818	1 585 298	781 762	83 237	3 876 810
EE	196 451	80 249	113 452	100 137	15 005	29 385	14 464	1 332	36 011
IE	131 268	71 044	558 442	68 230	89 534	66 316	67 633	5 060	506 282
GR	219 977	150 532	1 574 360	782 037	107 414	102 577	76 852	10 460	206 620
ES	1 505 507	842 297	5 311 990	1 323 924	751 387	235 990	261 869	47 433	1 346 377
FR	4 513 388	1 188 439	6 104 142	1 300 328	1 059 350	1 047 493	391 233	67 872	2 639 092
HR	155 025	101 .385	369 763	154 479	47 247	64 621	21 391	3 862	68 370
IT	1 453 232	1 095 951	6 374 437	1 385 132	1 031 067	845 849	398 268	59 030	1 962 846
CY	10 763	10 281	110 905	753	10 497	5 566	9 273	905	27 777
LV	122 430	121 916	161 193	87 983	37 932	29 968	15 513	1 876	38 386
LT	85 725	76 693	596 201	375 226	39 937	44 363	12 893	2 806	67 437
LU	13 633	11 897	153 420	7 083	22 726	15 175	9 497	645	77 529
HU	445 208	144 942	850 712	157 693	180 386	175 240	53 529	9 689	168 550
MT	2 038	2 038	127 560	1 504	3 098	1 024	2 648	521	17 432
NL	1 015 897	364 275	7 845 558	5 199 944	513 287	217 389	168 060	17 591	958 549
AT	508 030	434 666	1 184 383	173 533	319 026	191 056	70 352	8 979	447 218
PL	2 484 953	563 092	2 692 013	669 822	631 124	545 382	347 790	36 890	656 153
PT	282 315	276 169	909 200	214 227	188 261	39 980	54 656	10 352	242 341
RO	930 865	239 930	701 613	271 668	240 312	203 233	63 526	19 042	284 174
SI	126 080	40 326	273 804	129 905	49 441	26 871	15 507	2 107	57 038
SK	282 548	91 012	684 231	199 764	132 636	78 839	29 958	5 435	109 762
FI	820 796	532 426	929 954	367 966	408 277	155 193	51 785	5 548	267 687
SE	1 494 692	941 180	1 347 022	809 391	466 820	166 051	5 857	10 452	561 785

Source: Own editing based on Eurostat database (2024b–2024f, 2025)

Table A2 Variables derived from the basic data in Table A1

	Primer energy production (TJ/ 1 000 people)	Renewable energy production (TJ/ 1 000 people)	Net energy import (TJ/ 1 000 people)	Industrial energy consumption (TJ/ 1 000 people)	Climate-corrected energy use for heating in household (TJ/ 1 000 people)	GDP (mEUR/ 1 000 people)	GHG-emission (kt/ 1 000 people)
Source (based on Table A1)	*(a/h)*	*(b/h)*	*(c-d)/h)*	*(e/h)*	*(f/h)*	*(i/h)*	*(g/h)*
BE	57.2	15.4	159.7	34.5	16.8	47.7	9.3
BG	80.5	17.1	44.6	16.5	5.2	12.5	7.2
CZ	100.6	22.1	69.7	26.3	23.2	26.3	11.6
DK	70.9	36.1	52.5	16.9	18.7	64.8	7.5
DE	48.9	24.8	97.8	26.9	19.6	46.6	9.4
EE	147.5	60.3	10.0	11.3	34.2	27.0	10.9
IE	25.9	14.0	96.9	17.7	12.6	100.1	13.4
GR	21.0	14.4	75.7	10.3	5.7	19.8	7.3
ES	31.7	17.8	84.1	15.8	2.8	28.4	5.5
FR	66.5	17.5	70.8	15.6	11.8	38.9	5.8
HR	40.1	26.2	55.7	12.2	13.3	17.7	5.5
IT	24.6	18.6	84.5	17.5	9.3	33.3	6.7
CY	11.9	11.4	121.8	11.6	1.6	30.7	10.3
LV	65.3	65.0	39.0	20.2	24.2	20.5	8.3
LT	30.6	27.3	78.8	14.2	22.4	24.0	4.6
LU	21.1	18.4	226.7	35.2	23.6	120.1	14.7
HU	45.9	15.0	71.5	18.6	17.3	17.4	5.5
MT	3.9	3.9	242.0	5.9	0.4	33.5	5.1
NL	57.8	20.7	150.4	29.2	11.1	54.5	9.6
AT	56.6	48.4	112.6	35.5	25.8	49.8	7.8
PL	67.4	15.3	54.8	17.1	17.8	17.8	9.4
PT	27.3	26.7	67.1	18.2	1.4	23.4	5.3
RO	48.9	12.6	22.6	12.6	11.0	14.9	3.3
SI	59.8	19.1	68.3	23.5	12.7	27.1	7.4
SK	52.0	16.7	89.1	24.4	16.6	20.2	5.5
FI	147.9	96.0	101.3	73.6	55.5	48.2	9.3
SE	143.0	90.0	51.4	44.7	29.4	53.7	0.6

Source: Own calculation based on Eurostat database (2024b–2024f, 2025)