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Professional paper

THE ROLE OF COAL IN THE KOSOVO BASIN IN THE IMPLEMENTATION OF GREEN TRANSITION AGENDA

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Abstract

The era we live in is characterized by high and often inefficient energy consumption, driven by the intensification of human activities, which frequently leads to the irrational and unsustainable exploitation of energy resources. The sharp increase in energy consumption is a direct consequence of the rapid advancement of science and technology, which has enabled the expansion of industry—one of the most energy-intensive sectors of the modern economy. This growing demand for energy has significantly contributed to environmental pollution and has disrupted natural ecological balances. Consequently, this situation has raised awareness within the international community and national organizations regarding the urgent need for a more sustainable and rational approach to energy use, guided by the principle that *'no form of energy is more expensive than its absence.'*
From a practical standpoint, human survival is closely tied to the ability to harness energy from natural resources. However, today we find ourselves in a paradoxical situation: while technological progress has been significant, it has not yet reached the level necessary to fully address the environmental consequences of uncontrolled industrial growth. It is worth emphasizing that energy and time share a common trait—they can only be used once and cannot be recycled.
Many scientists argue that, although sufficient energy resources exist, the real challenge lies in the lack of knowledge and technology required to utilize them efficiently and sustainably. In this context, the European Union has taken concrete steps to promote the **Green Transition Agenda**, which calls for a comprehensive review of energy generation technologies based on fossil fuels, under the guiding principle of **decarbonization**. This implies a commitment from all member states and candidate countries to declare their intention to phase out coal-fired power generation, in response to the environmental impacts of emissions—particularly the well-known *'greenhouse effect.'*
This transition has been framed to culminate by the year 2050, with the closure and decommissioning of coal-based thermal power plants. The Republic of Kosovo has responded to this agenda through its **Energy Strategy 2022–2031**, which clearly outlines its commitment to implementing the process of decarbonization and fulfilling the objectives of the Green Transition Agenda by 2050

Keywords: Coal as an energy source, environmental pollution, green transformation.

1. Introduction

As a result of globalization trends, in recent years the energy sector has undergone a major transition toward the production of “clean energy”, accompanied by the accelerated development of new technologies for generating electricity from renewable sources, which are becoming increasingly available on the market.
With the adoption of the Integrated Pollution Prevention and Control Directive (IPPC Directive – 96/61/EC), the European Union set an ambitious objective to raise the overall level of environmental protection and introduced the concept of sustainable development across a wide range of polluting industrial activities, including mining, metallurgy, energy, and several other sectors.
In light of the obligations arising from this directive, it is essential to acknowledge that coal utilization will face significant challenges in the coming period.

This development was further reinforced by the Western Balkans Leaders' Declaration during the Sofia Summit, which brought together the region's highest state representatives to sign the "Green Agenda". Through this agenda, Western Balkan countries committed to implementing measures addressing environmental changes and pollution prevention, the development of sustainable energy, mobility, and the circular economy, as well as the advancement of biodiversity, sustainable agriculture, and food production.
Initial concrete steps include:

- the promotion of a carbon dioxide (CO_2) emissions tax,
- the development of market models for the use of renewable energy sources,
- and the gradual phase-out of coal subsidies.

Some of the key measures to be implemented are:

- alignment with EU legislation, with the goal of achieving climate neutrality by 2050,
- setting energy and environmental targets for 2030 in line with the EU Energy Community legal framework,
- and developing and implementing national energy and climate plans with clear actions for reducing greenhouse gas (GHG) emissions.

The implementation of the "Green Agenda" also includes:

- cooperation on preparing a socio-economic impact assessment of decarbonization at both national and regional levels,
- ensuring a just transition,
- enhancing energy efficiency across all sectors,
- increasing the share of renewable energy sources in the energy mix,
- and creating the necessary conditions for investment.

According to many researchers, from both a technical and economic standpoint, there is no long-term alternative to a 100% renewable energy system.
In this context, it is worth emphasizing that the scenarios developed in the national strategies of many countries, including Kosovo, foresee a diversified energy mix generated from sources such as: wind, biomass, natural gas, hydro, geothermal energy, and solar panels (photovoltaic systems).

2. Coal Reserves

According to research conducted by the Anatolia Agency and BP, global coal reserves in 2016 were estimated to reach 1,141 billion and 791 million tons, of which approximately 411 billion tons are attributed to hard coal reserves.
Coal, recognized as one of the largest sources of energy production, is found in almost every part of the world. These reserves are distributed across many countries, with 75% of the currently known coal reserves located within the territories of just five countries.
It is projected that, at the current rate of coal consumption, global reserves could meet energy demands for approximately the next 120 years.

Table 1. Global Coal Reserves According to 2016 Publication

	Country	Coal Reserves 10^6(t)	%
1	USA	254197	22.07
2	Russia	176771	15.35
3	Australia	159634	13.86
4	China	149818	13.01
5	India	107726	9.35
6	Germany	39802	3.46
7	Ukraine	37892	3.29

8	South Africa	35053	3.04
9	Poland	28451	2.47
10	Kazakhstan	28225	2.45
11	Indonesia	24910	2.16
12	Kosovo	13910	1.21
12	Turkey	12514	1.09
		1141791	100

Lignite is the most important energy resource in Kosovo, accounting for approximately **95% of total electricity production**. The first coal explorations in Kosovo began in the early 20th century, when it was confirmed that the country possesses significant reserves of this resource. Underground coal exploitation started in **1922**, in the locality of **Hade**, followed later by operations in **Babush, Lipjan**. Systematic geological investigations of coal in the Kosovo basin were conducted during the period **1952–1957**.
The most important coal basins in Kosovo are:

- the **Kosovo Basin**,
- the **Dukagjini Basin**,
- and the **Drenica Basin**,

which together contain an estimated **14 billion tonnes** of lignite-type coal.

Kosovo Coal Basin

The Kosovo Coal Basin is located in the central part of the country. Geomorphologically and geographically, it represents a typical lowland area with a longitudinal axis stretching in a **northwest-southeast direction**, from **Mitrovica in the north to Kaçanik in the south**. The basin extends approximately **85 km in length** and has an average width of about **10 km**. It covers a total area of around **850 km²**, while the productive coal-bearing area spans roughly **300 km²**.

Dukagjini Coal Basin

The Dukagjini Basin, in a broader sense, represents a distinct morpho-tectonic unit formed on top of older, more complex geological structures. The basin's axis extends in a **northeast-southwest direction**. The total surface area of the basin is approximately **1,700 km²**, with the **White Drin River** flowing through its center.
The Dukagjini Basin benefits from good transportation connections. The **Fushë Kosovë – Pejë railway line** passes through its southern part, with a branch line leading to **Prizren**. The entire basin is intersected by several asphalt roads, including **Pejë – Gjurakovc – Mitrovicë**, **Pejë – Klinë – Prishtinë**, as well as **Gjurakovc – Istog** and **Gjurakovc – Klinë**. Given this well-developed road and railway network, any future coal exploitation must consider appropriate solutions for relocating infrastructure objects that lie within the exploitation zones.

Drenica Coal Basin

The Drenica Basin lies between the **Kosovo Basin** to the east and the **Dukagjini Basin** to the west. It consists of two sub-fields:

- the **Skenderaj Field** in the north, with an area of approximately **3.97 km²**, and
- the **Gllabar-Drenas Field** in the south, covering **1.5–2.0 km²**.

The basin stretches in a **north-south (meridional) direction**, with a slight westward deviation. It has a total length of about **30 km** and a maximum width of approximately **10 km**. Traffic and transport connections to nearby urban centers are favorable. The coal

deposit is accessible via the **Skenderaj–Drenas asphalt road**, connected further through **Prishtinë – Pejë** and **Mitrovicë – Podgoricë**, and **Drenas** is linked by the **Prishtinë – Pejë railway line**.
In terms of hydrography, all surface waters from the northern part of the Drenica Basin drain into the **Klinë River**, which subsequently flows into the **Drin River**.

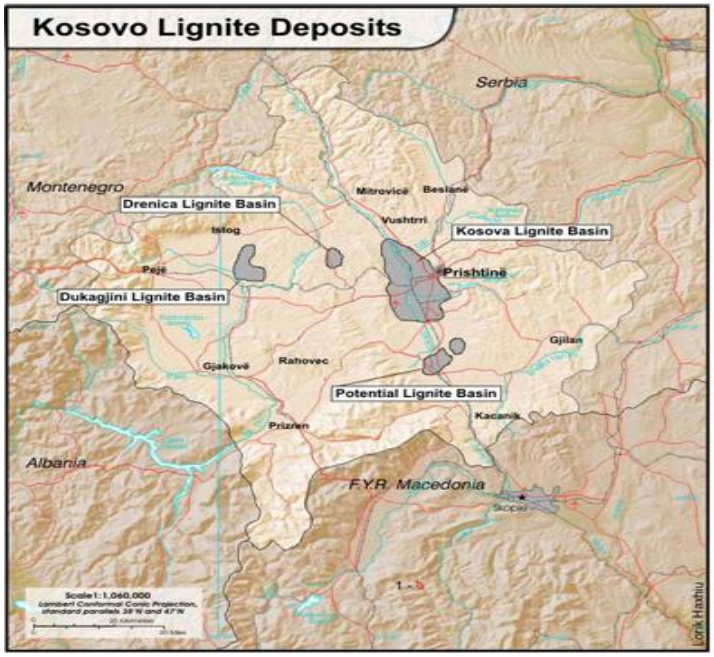

Figure 1. Kosovo Coal Basin

3. Global Trend in Coal Utilization

According to the International Energy Agency (IEA), global coal usage is expected to reach a record high in 2024. This projection comes during a year that is likely to become the hottest ever recorded. Despite growing calls to phase out the most polluting fossil fuel—coal, which is a major driver of climate change—the IEA anticipates that global coal demand will hit an all-time high for the third consecutive year.
Scientists have consistently warned that greenhouse gas (GHG) emissions must be drastically reduced to prevent global warming and avoid catastrophic impacts on both the planet and humanity. The year 2024 is already marked by severe droughts in Italy and South America, fatal floods in Nepal, Sudan, and Europe, intense heatwaves in Mexico, Mali, and Saudi Arabia, and deadly cyclones in the U.S. and the Philippines that have claimed thousands of lives.
The IEA's newly released "Coal 2024" report forecasts that global coal use will peak by 2027, following a new record high of 8.77 billion tonnes surpassed this year. However, this trajectory depends heavily on China, which over the past 25 years has consumed 30% more coal than all other countries combined. The primary driver of this consumption has been the increasing electricity demand in China, with more than one-third of global coal combustion occurring in Chinese thermal power plants.
While China has made significant efforts to diversify its energy mix—including a massive expansion of solar and wind capacity—the IEA estimates that China's coal demand will hit a record 4.9 billion tonnes in 2024. This growing demand from China, India, and Indonesia has offset declines in coal consumption seen in developed economies.
In the European Union and the United States, coal consumption is expected to fall by 12% and 5% respectively in 2024, compared to 23% and 17% declines observed in 2023.

However, the rate of decline has slowed, raising concerns among experts—particularly in light of a potential shift in U.S. leadership—that climate commitments by the world's largest economy may be weakened.
Coal production has also reached an all-time high, surpassing nine billion tonnes for the first time, with major producers China, India, and Indonesia setting new production records.

Table 2. The Largest Coal Producers

1.1.1 Annual coal production 10^6 [t]								
Country	**2023**	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**
1.1.12 China	4362	4153	4126	3902	3846	3698	3523	3411	3747
1.1.13 India	969	863	767	720	730	715	671	653	632
1.1.14 Indonesia	781	693	614	564	616	558	461	434	392
1.1.15 USA	524	539	524	486	641	686	702	661	813
1.1.16 Russia	480	461	435	401	437	442	411	385	373
1.1.17 Australia	443	464	467	500	512	502	481	493	485
1.1.18 South Africa	238	244	236	247	258	250	252	251	252
1.1.19 Kazakhstan	118	115	84	96	98	101	101	103	107
1.1.20 Germany	102	131	126	107	131	169	175	176	183
1.1.21 Poland	89	108	107	100	112	122	127	131	136
1.1.22 Turkey	79	84	86	75	87	84	100	71	58
1.1.23 Serbia	33	35	36	40	39	38	40	38	38
1.1.24 Greeece	11	14	12	14	27	37	38	33	48

1.1.25	Kosovo	7	9	9	8	8	9	8	10	9
1.1.26	Brazili	7	6	7	6	5	6	7	8	8
1.1.27	Global level	**8695**	**8360**	**8065**	**7687**	**8059**	**7923**	**7629**	**7419**	**7900**

4. International Coal Market

The largest coal producers in 2022 were China and India, followed by Indonesia and the United States. Australia and the European Union were also among the top seven producers, with the EU being the world's largest lignite producer, by a significant margin. Germany is also included among the top ten coal-producing countries, and collectively, these ten countries accounted for 93% of global coal production.

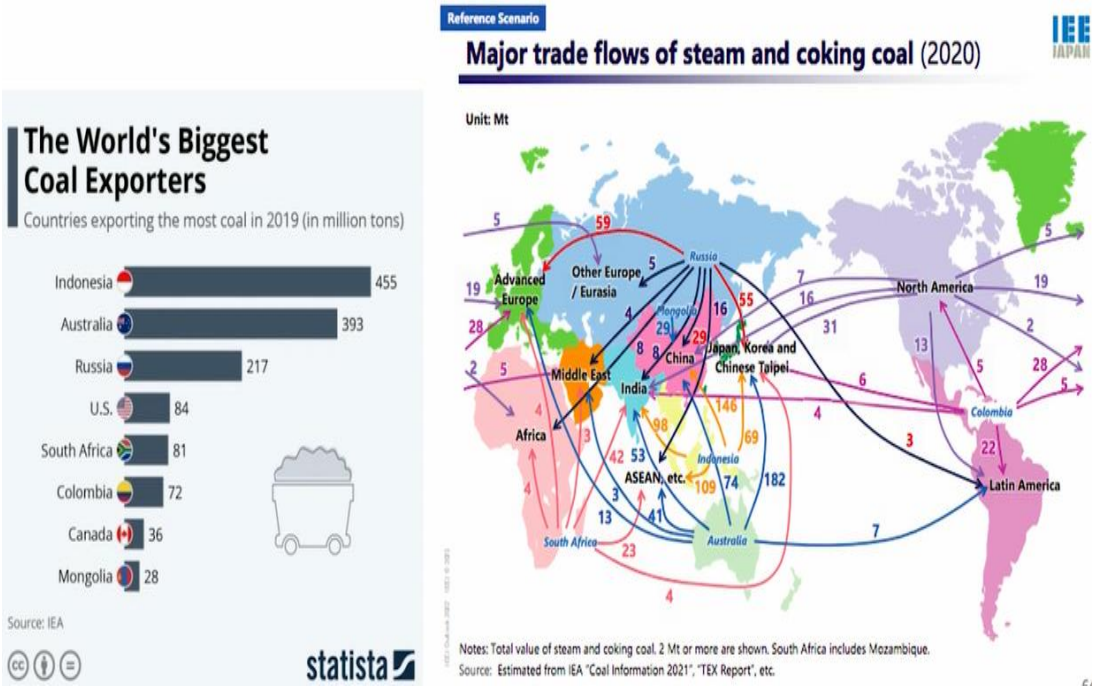

Table 3. Largest Coal Exporters, 2022 *(Source: IEA 2023, No. 1)*

	Country	Steam and coking coal (Mt)	Lignite (Mt)	Total (Mt)
1	China	4,495.80	0	4,495.80
2	India	868.1	47.6	915.7
3	Indonesia	684.5	0	684.5
4	USA	496.8	43.1	539.9
5	Australia	444.9	46.6	491.5
6	Russia	348.6	77.6	426.2
7	EU-27	54.6	294.3	348.9
8	South Africa	229.6	0	229.6

9	Kazakhstan	90.5	5.3	95.7
10	Turkey	1.5	87.3	88.8
	Total	256.9	110.8	367.8
	Global level	7,971.80	712.7	8,684.40

He main coal-importing countries are **China**, **India**, **Japan**, **South Korea**, **Taiwan**, and **Turkey**, which together accounted for **61% of total global coal trade in 2022**. Within the **European Union**, **Germany** and **Poland** were the largest coal importers in 2022, followed by **Italy**, **Spain**, **the Netherlands**, and **France**.

Table 4. Largest Coal Importers, 2022 *(Source: IEA, June 2023)*

	Country	**Coking coal** (Mt)	**Steam coal** (Mt)	**Total** (Mt)
1	China	63.8	233.2	297
2	India	64.7	167	231.7
3	Japan	64.2	116.6	180.8
4	EU-27	38.3	88.5	126.8
5	Korea	22.3	102.8	125.1
6	Taiwan	11.1	57	68.1
7	Turkey	5	30.5	35.6
8	Malaysia	0	34.5	34.5
9	Philippines	0	31.5	31.5
10	Vietnam	9	20.6	29.6
	Total	24	137.5	161.5
	Global level	302.4	1,019.80	1,322.20

5. Coal Consumption in Europe

Demand for coal in Europe has increased due to a greater shift from gas to coal, driven by high gas prices and reduced Russian gas flows. However, European coal demand is expected to fall below 2022 levels by 2025, according to the report. Global coal-fired power generation is projected to reach a new record of around 10.3 terawatt-hours this year, while coal production will increase by 5.4 percent to approximately 8.3 billion tonnes, also an all-time high. The three largest coal producers — China, India, and Indonesia — are set to achieve record production this year. Despite high prices and healthy margins for coal producers, there are no signs of increased investment in export-led coal projects. This indicates investor and mining company caution regarding the medium- and long-term outlook for coal, the report states.

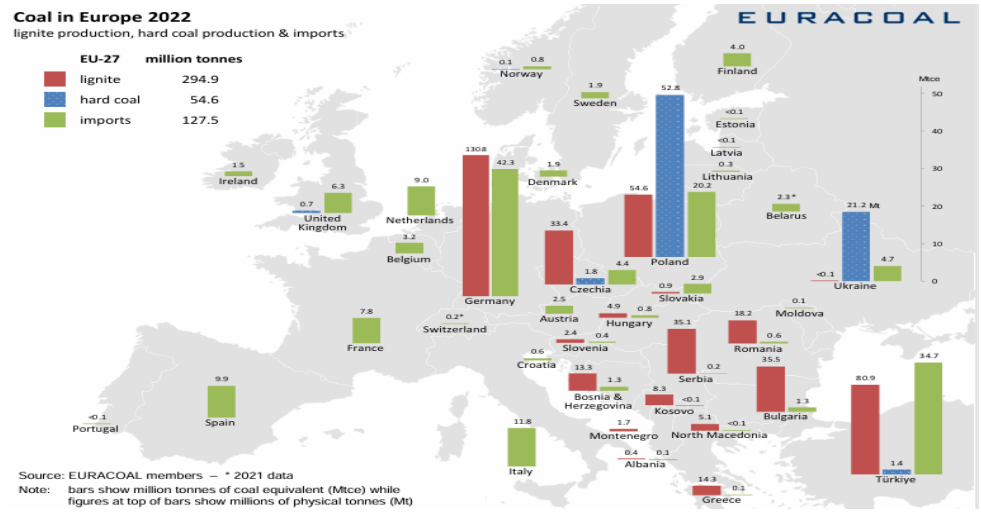

Figure 3. Coal Consumption in Europe for the Year 2022

6. Electricity Production and Consumption

The total electricity production in the Western Balkans region reached 69.5 TWh in 2022, with coal-fired power plants contributing 43.8 TWh (63%). The largest share of coal-fired power plants in the electricity generation mix is in Kosovo (92%), followed by North Macedonia (72%) and Serbia (70%). Albania does not have any coal-fired power plants in its generation portfolio.

In the Western Balkans region, 36 coal-fired power units were operational in 2022, with a total installed capacity of 8,255 MW. Approximately 46,000 workers were directly employed in coal-fired power plants and associated coal mines. Additionally, between 80,000 and 100,000 workers were indirectly employed in 2022 in related sectors, such as hard coal production, which produced 23.5 TWh (34%).

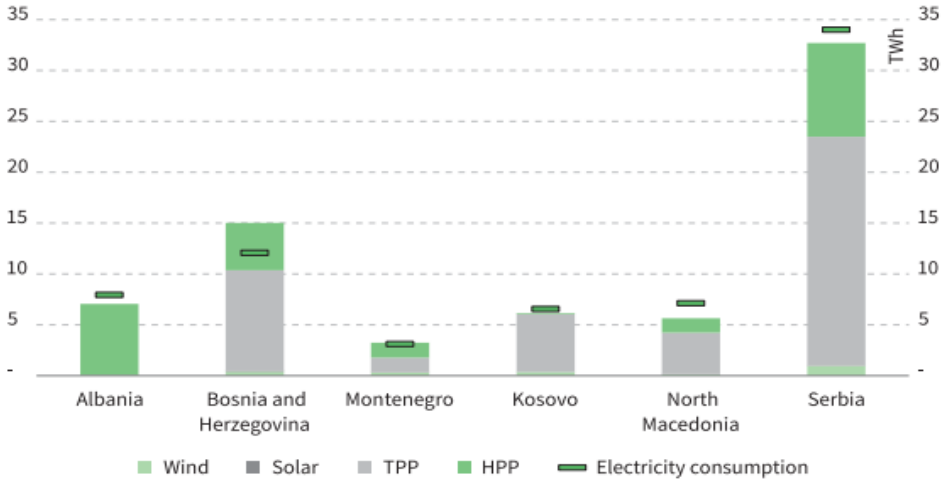

Figure 4. Electricity Production and Consumption in Western Balkan Countries in 2022

A comparison was made with Germany (as the largest economy in Europe). The main parameter guiding this study is the high percentage of electricity production generated from coal in these countries (for the period 2011–2022). The following figure presents the basic characteristics related to electricity in these countries. As can be seen, there are significant

deviations regarding the values of gross domestic product (GDP) per capita and total gross electricity production — the ratios clearly favor Germany.

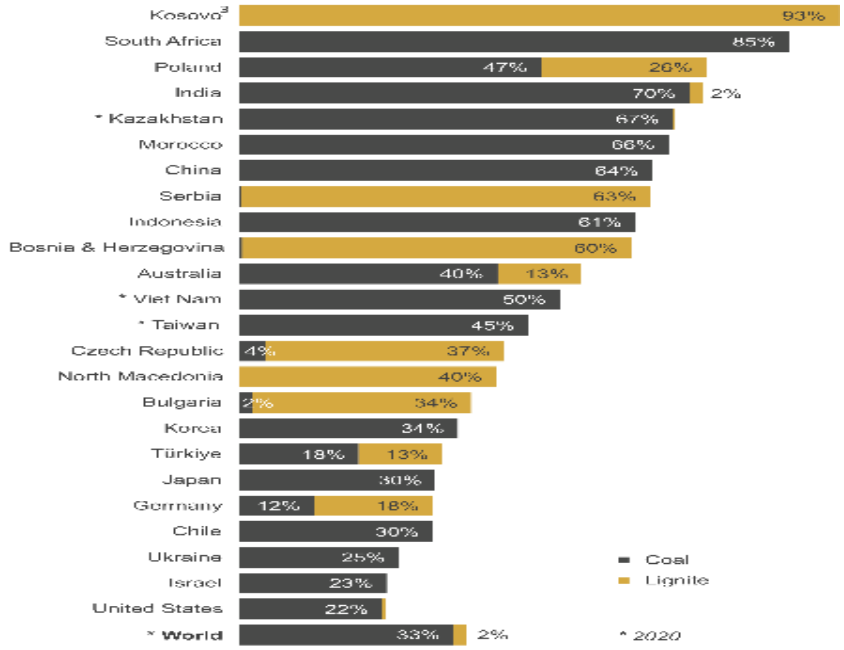

Figure 5. Shares of coal and lignite in global gross electricity production, 2021 (Source: IEA databases – including coal gases and coal products)

In order for the development level of a country like Poland, which is already at a higher level, to advance further, energy development must be faster and more market-oriented than it is today, primarily to meet economic parameters without diminishing the importance of environmental protection. The figure above illustrates the relationship between the following parameters: total gross electricity production per capita [TWh/person] and installed capacity per capita [kW/person].

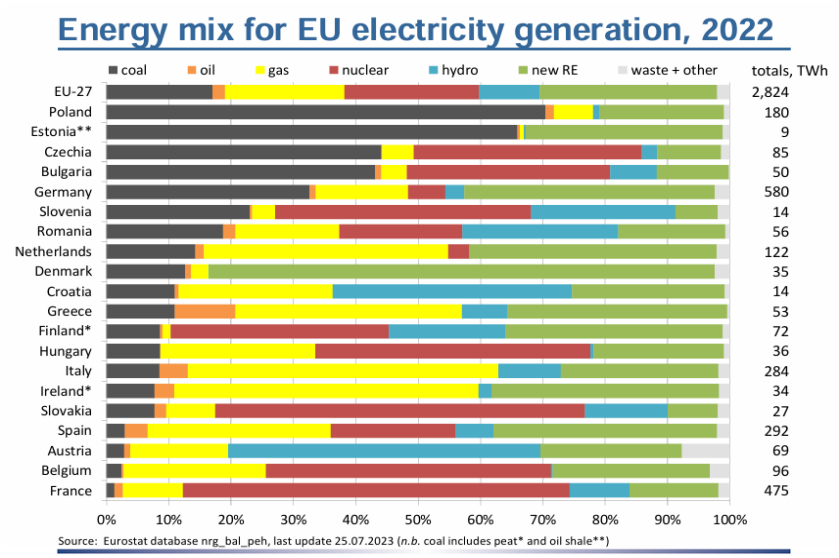

Figure 6. Electricity generation mix in the EU for 2022, according to Eurostat 2023

For the period from 2011 to 2020, the average electricity production per capita in Kosovo was approximately 3.75 MWh/person, in Poland 4.33 MWh/person, and in Germany 7.68

MWh/person — clearly showing a significant difference in favor of Germany. This relationship gives Kosovo reason to better utilize its energy potential, which it certainly has, especially coal (as it is currently being exploited).

Table 6. EURACOAL Sources According to Eurostat, 2022

Structure of energy production in the EU-27									
	Total gross power gen.(TWh)	EU share (%)	**Coal & coal products** (%)	**Oil** (%)	**Fossil gas** (%)	**Nuclear energy** (%)	**Hydro** (%)	**New renewables** (%)	**Waste & other** (%)
Austria	69.2	2.5	**2.8**	1	15.7	0	50.1	22.7	7.6
Belgium	95.9	3.4	2.4	0.3	22.9	45.7	0.3	25.2	3.2
Bulgaria	50.5	1.8	43.1	1	4.1	32.6	7.5	11.6	0.1
Croatia	14.2	0.5	11	0.6	24.7	0	38.4	24.6	0.8
Cyprus	5.3	0.2	0	83.2	0	0	0	16.8	0
Czech Rep.	84.8	3	44.1	0.1	5.1	36.6	2.5	10.2	1.4
Denmark	35.1	1.2	12.6	0.9	2.9	0	0	81.1	2.4
Estonia	8.9	0.3	66	0.4	0.6	0	0.3	31.7	1.1
Finlanda	72.2	2.6	8.6	0.3	1.3	35.1	18.7	34.9	1.1
France	474.8	16.8	1.3	1.3	9.6	62.1	9.6	14.3	1.8
Germany	580.3	20.5	32.7	0.9	14.8	6	3	40.2	2.3
Greece	52.7	1.9	10.9	9.7	36.3	0	7.3	35.3	0.4
Hungary	35.8	1.3	8.6	0.2	24.7	44.2	0.5	20.9	0.9
Ireland	33.9	1.2	7.7	3.2	48.8	0	2.1	36.5	1.7
Italy	284	10.1	8.5	4.5	49.8	0	10	25.4	1.8
Latvia	5	0.2	0	0.1	24.2	0	55	20.7	0
Lithuania	4.8	0.2	0	7.9	10.8	0	9.7	53.6	18.1
Luxembourg	2.2	0.1	0	0	4.4	0	2.9	42.3	50.4
Malta	2.3	0.1	0	2.5	84.5	0	0	12.9	0
Netherlands	121.8	4.3	14.3	1.3	39.2	3.4	0	39.6	2.1
Poland	179.7	6.4	70.5	1.3	6.3	0	1.1	19.9	0.9
Portugal	48.8	1.7	0	2.6	35.6	0	13.4	43.2	5.2
Romania	56	2	18.7	2	16.7	19.8	25	17.2	0.7
Slovakia	26.8	1	7.7	1.9	7.8	59.3	13.3	8	1.9
Slovenia	13.6	0.5	23	0.4	3.6	41.2	23.1	6.8	1.9
Spain	292.5	10.4	3	3.6	29.4	20	6	36	1.9
Sweden	173.2	6.1	0.4	0.3	0.1	30	40.4	27.9	1
EU-27	**2,824.30**	**100**	**17.1**	**2**	**19.2**	**21.6**	**9.8**	**28.5**	**2**

It has long been known that the future of energy does not lie in coal. The reasons for this are not only policies aimed at combating climate change and air pollution but also the significant decline in the cost of electricity generated from renewable sources, which are now competitively

priced against fossil fuels. The global trend of abandoning coal and imposing carbon emissions taxes will undoubtedly continue. If Kosovo does not seriously approach a plan to transform its energy system, it risks becoming a black hole—initially on the map of Europe, and eventually on the global stage.

Our coal-fired power plants are among the largest polluters in Europe, and according to data from the World Health Organization, air pollution causes thousands of premature deaths annually in Kosovo. Because of all these factors, many countries worldwide are actively working to phase out this energy source.

According to calculations published by the scientific online publication "Our World in Data" from Oxford, the average resident of our country consumes about four times more electricity generated from coal compared to the European average. In 2020, 3,557 kilowatt-hours (kWh) per capita were produced in our country from coal-fired power plants. This is roughly three times more “dirty” kilowatt-hours than the average global citizen consumes (1,121 kWh) and an astounding 444 times more than the average Belgian resident (8 kWh).

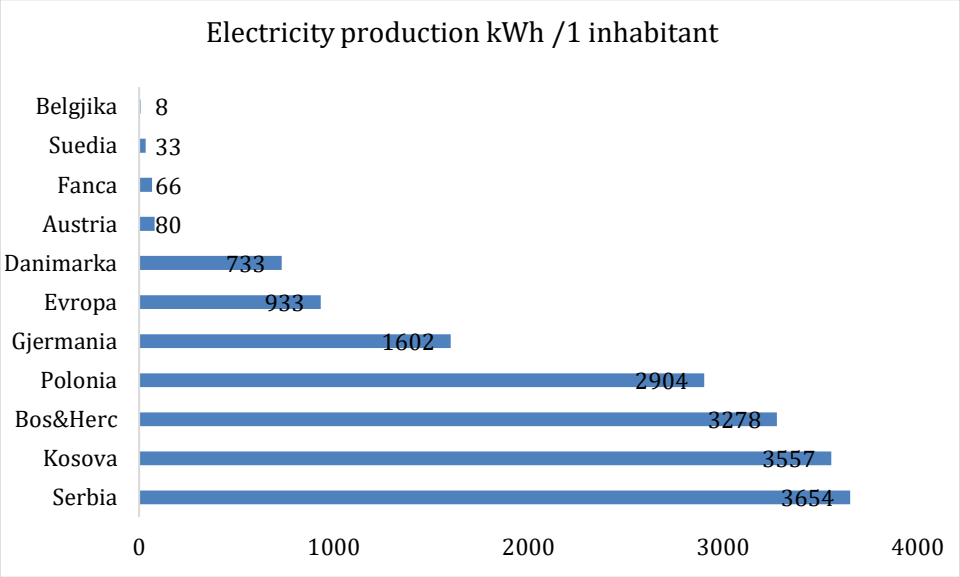

Figure 7. Electricity Generation from Coal per Capita in the European Union

The future of coal for electricity generation mainly depends on the following factors:

- Climate policies defined through EU guidelines for each individual country (CO2, NOx, SO2, and coal dust emissions),
- Electricity demand, which varies depending on the level of regional development and tends to increase,
- Prices of alternative energy sources, which may change over time and affect the competitive price per kWh of electricity generated from coal,
- Revitalization of old coal-fired power plants or potential construction of new, more modern coal power plants (both replacement capacities and new facilities).

According to the 2021 Implementation Report of the Energy Community, actual emission values in Kosovo compared to the limits were 197% for SOx, 223% for NOx, and 177% for dust. Some provisions of the Industrial Emissions Directive (2010/75/EU) have been applicable since January 1, 2017, for new plants in the contracting parties of the Energy Community. Existing plants are also expected to comply with the provisions of Chapter III and Annex V, especially in the case of renovation. Kosovo has prepared but has not yet approved the legal framework to comply with these provisions.

The use of wood or coal for household heating also contributes to air pollution problems. Monitoring stations in 2020 detected numerous instances where PM10 exceeded the

maximum allowed limit, and in some areas, the annual average concentration of PM2.5 was also higher than the standard, mainly during the autumn-winter season, as a consequence of burning fuels for heating purposes.
Although coal has been an irreplaceable energy source in recent years for electricity generation, especially during the COVID-19 pandemic, we will further present some parameters related to coal.

Table 7. Energy Production Structure in the EU-27 in 2022

	Power plant	**Country**	**CO_2 emission 10^3 [t]**	**Coal type**	**Installed capacity [MW]**	**Report [10^3t CO_2/MW]**	**Electricity Production [GW]**	**Report [10^3tCO_2/GW]**
1	Belchatow	Poland	25540	Lignite	5097	5.00	27400	0.93
2	Neurath	Germany	22100	Lignite	3800	5.80	31300	0.71
3	Nikola Tesla	Serbia	17464	Lignite	3036	5.70	17623	0.99
4	Niederaussem	Germany	16100	Lignite	3021	5.30	24500	0.66
5	Kozienice	Poland	15900	stone coal	3994	4.00	11000	1.45
6	Boxberg	Germany	15500	Lignite	2582	6.00	18000	0.86
7	Janschwalde	Germany	15200	Lignite	3210	4.70	20000	0.76
8	Weisweiler	Germany	14500	Lignite	1595	9.10	13400	1.08
9	Schwarze Pumpe	Germany	11800	Lignite	1600	7.40	10000	1.18
10	Lippendorf	Germany	11100	Lignite	1868	5.90	11000	1.01
11	Opole	Poland	10700	stone coal	3332	3.20	24000	0.45
12	Turow	Poland	10193	Lignite	1948	5.20	10060	1.01
13	Maritsa Iztok	Bulgaria	9600	Lignite	2510	3.80	10923	0.88
14	**Kosova A dhe B**	**Kosovo**	**6660**	**Lignite**	**1290**	**5.20**	**6350**	**1.05**
15	Polaniec	Poland	6029	stone coal	1674	3.60	6840	0.88
16	Pocerady	Czech Rep.	5389	Lignite	1000	5.40	4600	1.17
17	Javorzno 3	Poland	5369	stone coal	2255	2.40	6073	0.88
18	Kostolac	Serbia	5340	Lignite	1010	5.30	5717	0.93

19	Emshaven	Netherlands	5306	stone coal	1740	3.00	6952	0.76
20	Abono	Spain	5176	stone coal	916	5.70	3072	1.68

Energy production is responsible for the formation of the greenhouse effect, which causes climate change, primarily due to the burning of fossil fuels. Despite efforts to reduce these emissions, the global trajectory of CO2 emissions remains significantly higher than what is required to avoid the worst impacts of climate change.
Carbon dioxide (CO2) emissions from the energy sector in the European Union decreased by approximately 7.6% in 2023, reaching 2.5 billion metric tons (Gt CO2). EU CO2 emissions are now at their lowest level in the past 58 years.

Table 8. CO2 Emissions from Coal-Fired Power Plants in 2021

	CO_2 emission 10^6[t]	***Report [t CO_2/km^2]***	***Report [t CO_2/1 resident]***	***Report [kg CO_2/1 MWh]***
Kosovo	6.66	618	3.75	1049
Serbia	22.8	294	3.43	960
Polond	155	496	4.08	1120
Germany	184	515	2.21	1132
EU	688	162	1.54	248

7. Declarations of Countries on Ending Coal-Based Electricity Production

Below are the EU countries that have declared plans to phase out electricity production from coal:

- Germany: Currently uses (160-180) million tons/year of coal; plans to end coal use by 2038.
- Poland: Currently uses 60 million tons/year of coal; plans to end coal use by 2049.
- Czechia: Currently uses 40 million tons/year of coal; plans to end coal use by 2033.
- Bulgaria: Currently uses 30 million tons/year of coal; plans to end coal use by 2038.
- Romania: Currently uses 24 million tons/year of coal; plans to end coal use by 2032.
- Hungary: Currently uses 8 million tons/year of coal; plans to end coal use by 2025.
- Greece: Currently uses 50 million tons/year of coal; plans to end coal use by 2025.
- Kosovo: Currently uses (8-9) million tons/year of coal; plans to end coal use by 2033.
- Croatia: Currently uses 3 million tons/year of coal; plans to end coal use by 2033.
- Montenegro: 68% of energy comes from coal; plans to end coal use by 2038.
- North Macedonia: 82% of energy comes from coal; plans to end coal use by 2033.
- Serbia: Currently uses 38 million tons/year of coal; plans to end coal use by 2038.
- Albania and Slovakia: Do not have these issues and therefore have no such plans.

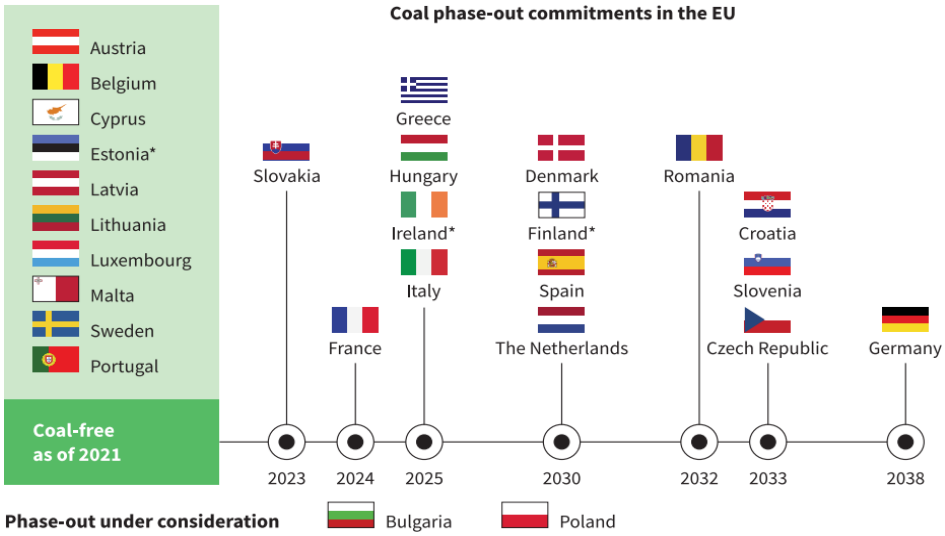

Figure 8. The phase-out of coal-based electricity production in the EU

8. Decarbonization and Promotion of Renewable Energy in Kosovo

The path towards reducing carbon dioxide (CO2) emissions in the energy sector, according to Kosovo's Energy Strategy (2022-2031), will be accompanied by the development of large renewable energy capacities (renewable energy sources), based on their technical and economic potential. The reduction of electricity generation based on lignite contributes to the decrease of pollution and greenhouse gas emissions; however, its effects on supply security and generation are compensated by increasing support for clean domestic energy sources.

Figure 9. Strategic Objectives According to Kosovo's Energy Strategy (2022-2031)

Moreover, considering that renewable energy technologies have reached costs comparable to traditional energy sources, their utilization will result in lower energy costs over a longer period. New renewable energy capacities, using existing and innovative technologies, will gradually replace coal usage, aiming to phase out coal use by no later than 2050.
This strategic objective is addressed through three specific goals:

- Gradual implementation of carbon pricing;
- Promotion of renewable energy in the electricity generation mix;
- Promotion of the use of renewable energy for heating.

The selection of capacity development scenarios is the final CORE-1A scenario, with the possibility to refurbish an additional unit of "Kosova A" (a total of two) if the situation demands. This implies that there is an option to shift from the CORE-1A scenario to the CORE-2A scenario. The two final capacity scenarios (summarized in Figure 10) reflect the following assumptions:

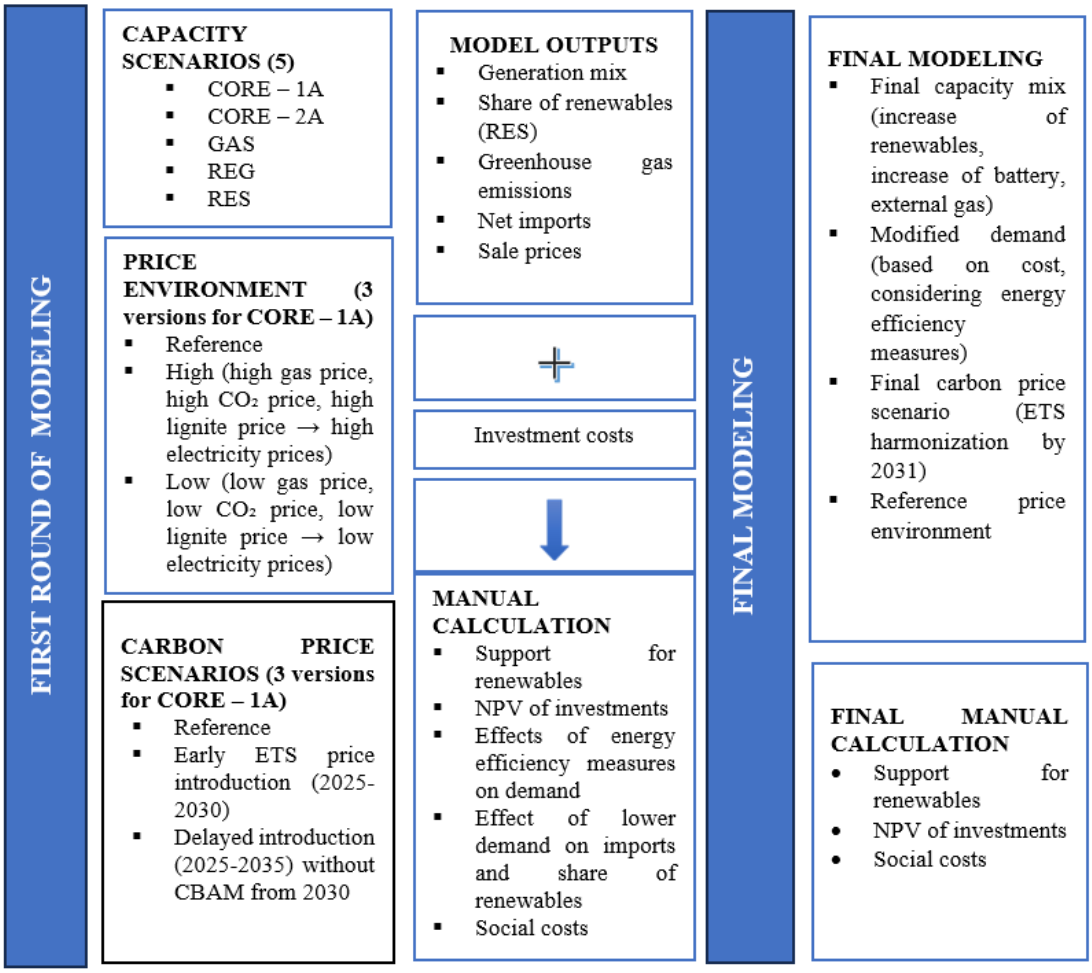

Figure 10. Implementation Scenarios of the Energy Strategy in Kosovo

"Assumed installed capacity in the two analyzed scenarios for the years 2026, 2028, and 2031."

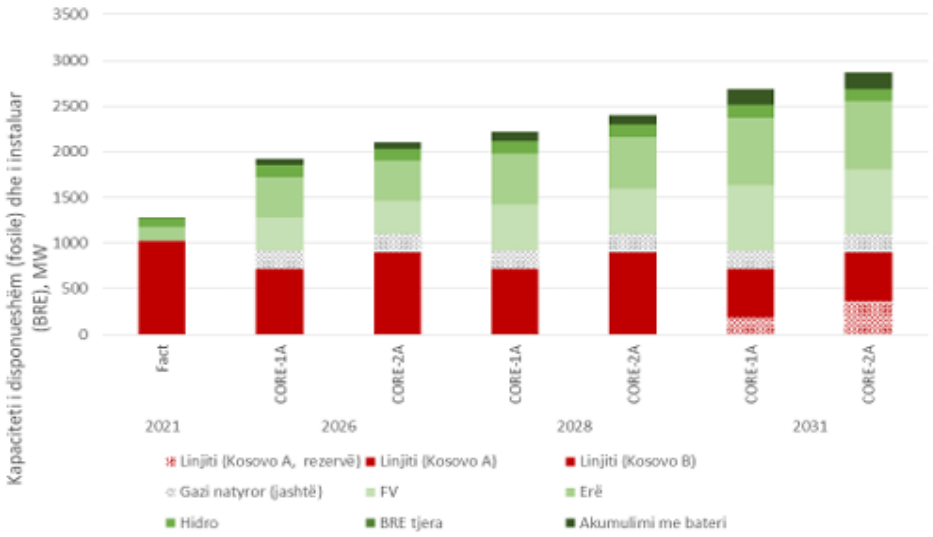

Figure 11: Mix of installed capacities in the two analyzed scenarios for the years 2026, 2028, and 2031."

9. Conclusion

Kosovo is a signatory of the Sofia Declaration and has thus joined the EU initiative "Green Agenda for the Western Balkans," under which the energy sector is committed to implementing the decarbonization process by 2050. This means a gradual phase-out of the so-called "dirty way of electricity production" from coal, lignite, peat, oil, etc., and a transformation towards investments in green projects for electricity generation from wind and solar energy. However, these remain largely dead letters on paper.

In the regional plan for the Western Balkans, the EU has allocated over €9 billion in grants and guarantees and €20 billion in new investments. Although Kosovo has committed to environmental protection and increasing the profitability of energy production by closing coal-fired power plants and mines, there has still been no substantive discussion on this issue. Kosovo has approved its Energy Strategy, pledging to use renewable energy sources and aiming to reach around 40% participation in total final energy consumption by 2031.

Moreover, Kosovo has committed to reducing SO2, NOx, and particulate emissions by 2028 compared to 2017 levels. Regarding CO2 emission reductions, the following targets have been set:

- Completion of all preparations for implementing a carbon pricing system by 2026,
- Reduction of greenhouse gas emissions in the energy sector by at least 32% by 2031,
- Coverage of at least 35% of electricity consumption from renewable energy sources (RES) by 2031,
- Development of new RES capacities (600 MW wind, 600 MW photovoltaic, 20 MW biomass, and at least 100 MW from prosumers) to reach a total installed RES capacity of 1600 MW by 2031.

Due to the current crisis, coal use is increasing significantly in some countries. Many experts consider this a worrying indicator, showing how far the world still is from achieving the goal of zero emissions, especially given the short but feasible deadline of 2050. As outlined in many analyses and studies of this nature, if the nationally approved plans for net-zero emissions by 2050 are implemented, the global cost of decarbonizing electricity production is projected to reach around $6 trillion.

Nevertheless, achieving the global zero-emission target by 2050 – which, according to current scientific forecasts, could prevent the average global temperature from rising by about 1.5°C – is crucial. This cost should also include an additional $9.5 billion to cover

the “human resources” involved, estimated to be around 8.4 million workers globally currently engaged in coal extraction, processing, transport, and use.

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