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Kosovo's Electricity Sector Challenges and Opportunities

Republic of Kosovo

Gabriel Di Bella and Selim Thaci

SIP/2023/025

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Kosovo's Electricity Sector Challenges and Opportunities
Prepared by **Gabriel Di Bella and Selim Thaci**

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ABSTRACT: Since the start of the war in Ukraine, electricity prices in Europe have increased and become more volatile. This coupled with unreliable domestic electricity supply has led to significant stress for Kosovo's energy sector and budget. This paper presents several scenarios characterized by alternative assumptions for European electricity prices and domestic electricity production in 2023 in order to gauge their potential impact on the budget and the economy. It also discusses the medium-term benefits, including in terms of increased energy security and reduced emissions and pollution, of diversifying domestic electricity generation away from lignite.

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REPUBLIC OF KOSOVO

SELECTED ISSUES

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Approved By
European Department

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CONTENTS

KOSOVO'S ELECTRICITY SECTOR: CHALLENGES AND OPPORTUNITIES	2
A. Context: Higher Energy Prices Shock Kosovo's Current Account	2
B. Kosovo's Electricity Supply Chain and Load: Coal-Based Supply and Highly Seasonal Demand	3
C. The ESC's Financial Flows: Choke Points, Load Shedding and Fiscal Costs	4
D. The Short-Term Outlook: Stress Likely to Continue	5
E. Medium Term Challenges: Greening the Electricity Generation Matrix	6
F. Policy Options: Stylized Suggestions	7
REFERENCES	
References	9

KOSOVO'S ELECTRICITY SECTOR: CHALLENGES AND OPPORTUNITIES¹

A. Context: Higher Energy Prices Shock Kosovo's Current Account

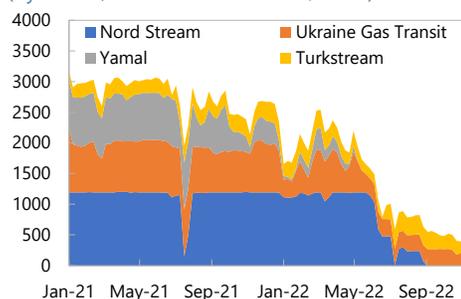
1. Energy prices, including of electricity, have increased sharply across Europe, and become more volatile since the start of the war in Ukraine.

Russia's energy exports to Europe have decreased quite significantly; for natural gas, Russia's exports through October 2022 were 85 percent below their level in 2021. Sharply higher natural gas-based electricity generation costs (which frequently constitute the marginal supply technology) led to record high European electricity prices last August as the region scrambled to fill natural gas storage facilities ahead of the winter. Substitution in electricity generation also drove coal prices higher across all energy content varieties. Above-average temperatures in the fall, imports of gas from non-Russian suppliers, and filling of natural gas storage facilities in Europe have led to lower natural gas and electricity prices in October and November 2022, but as the temperature begins to cool, energy prices are likely to increase once more during the winter season.

2. Energy market pressures in Europe are likely to continue throughout 2023.

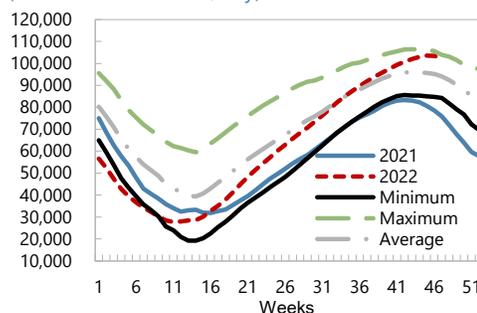
While there is significant uncertainty about global natural gas supply and demand forces going forward, a continuation of Russian exports to the European Union (EU) at their current level would result in a supply loss of about 100 billion cubic meters/year (25 percent of 2022 EU's demand) that will need to be replaced by more expensive liquefied natural gas (LNG) imports. Future LNG prices are also uncertain, but they will likely increase as infrastructure bottlenecks constrain the extent to which Russia can redirect exports to other

European Union: Russian Natural Gas Imports
(By Route, million cubic meters/week)



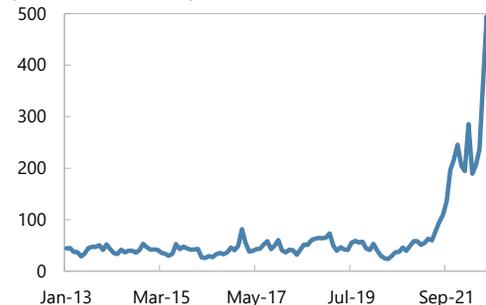
Sources: Bruegel and IMF staff calculations.

European Union: Natural Gas Storage
(Million cubic meters/day)



Sources: Bruegel and IMF staff calculations.

Electricity Prices
(Euro/MWh, HUPX)



Sources: Kosovo authorities and IMF staff calculations.

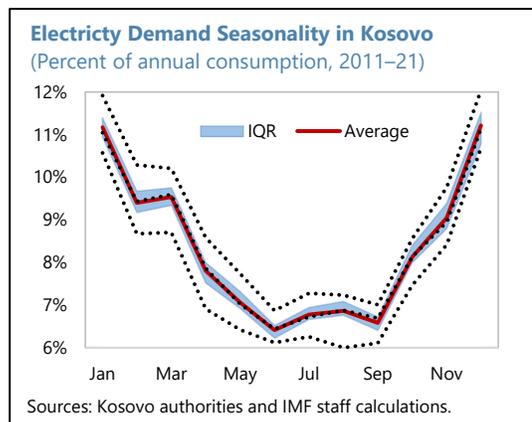
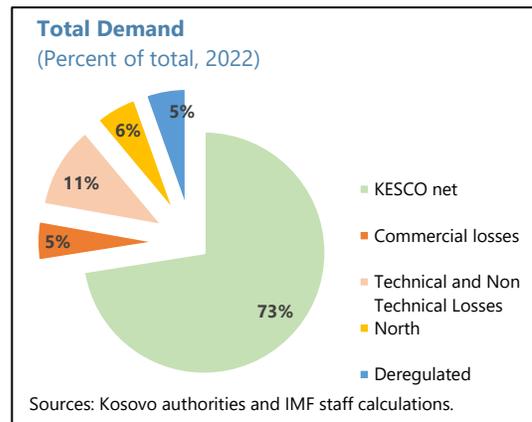
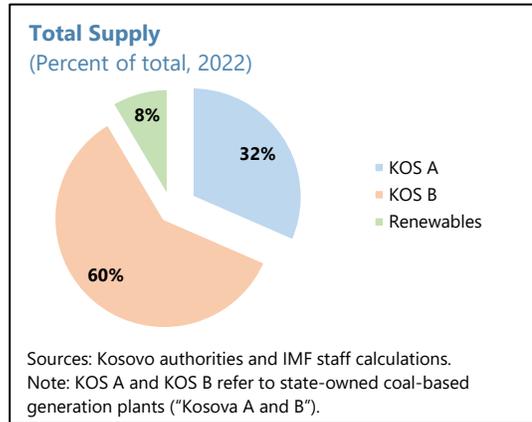
¹ This note was written by Selim Thaci and Gabriel Di Bella. Sabiha Mohona provided research assistance.

markets, notably China. In any event, natural gas market developments will spill over into both electricity and coal markets.

3. Higher energy prices represent a heavy blow for Kosovo’s current account. Despite having the 5th largest global reserves of lignite coal, lignite’s low-energy content and Kosovo’s inadequate infrastructure have prevented exports at a meaningful scale, along with actions by other countries to reduce carbon emissions and move away from coal use. However, lignite is used to generate more than 90 percent of Kosovo’s electricity, with the rest produced by wind farms, hydro-generation and to a small extent, solar farms. Natural gas use is virtually inexistent, with no distribution network for residential or commercial consumers. Although interconnection with gas pipelines reaching Serbia and North Macedonia is possible, there is currently none. There are also no local oil refining facilities; thus, petroleum-related imports are mostly of refined products. Kosovo’s net energy imports are projected to have reached 12.5 percent of GDP in 2022, up 3.5 percentage points (pp) with respect to 2021, despite a 35 percent decrease in electricity imports and 5 percent decrease in fuel imports.

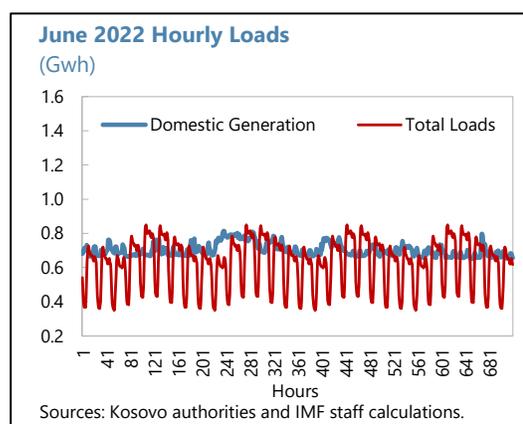
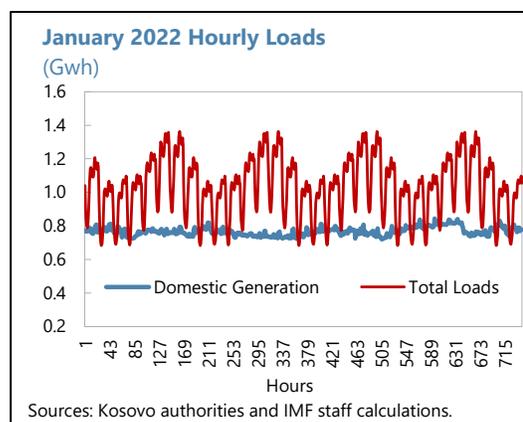
B. Kosovo’s Electricity Supply Chain and Load: Coal-Based Supply and Highly Seasonal Demand

4. Kosovo’s electricity supply chain (ESC) includes both public and private firms. Electricity production is dominated by a publicly owned enterprise (POE), Kosovo Energy Corporation (KEK), which owns two coal-based power plants (Kosova A and B), and the lignite mines that fuel both plants. Another POE (Ibër-Lepenc JSC) owns and operates the only reservoir-based hydro-electricity power plant. A few private firms also produce electricity (wind-based, run-of-the-river hydro-electric, and solar). Transmission and operation are performed by Kosovo’s Transmission System and Market Operator (KOSTT, a POE), a member of ENTSO-E (the European Network of Transmission System Operators for Electricity). KOSTT, as the system’s transmission and system operator (TSO), balances electricity generation and loads. Electricity Distribution Services in Kosovo (KEDS, a privately-owned firm) oversees distribution.



The same firm owns KESCO (Kosovo Electricity Supply Company), in charge of retail supply, metering, and collection.²

5. More than 20 percent of Kosovo’s electricity consumption is either not billed or billed but not collected. Demand in the “regulated” market accounts for about 90 percent of the load, while the “deregulated” market, composed by a few large firms that procure their electricity mostly through imports, accounts for another 5 percent; the remaining 5 percent is from “unregulated” consumers from four northern municipalities mostly inhabited by ethnic Serbs, from whom Kosovo has been unable to collect fees since the early 2000s. Moreover, around 11–12 pp of the regulated market are technical and non-technical losses of distribution, and another 5 pp are commercial losses. Electricity demand is highly seasonal, given its use for household and district heating in Pristina, resulting in winter hourly loads that are about twice as large as those in the summer.³ Despite supply volatility on account of reliability issues of both Kosova A and B, this load pattern results in electricity imports in the winter and exports in the summer. Household consumption constitutes around 60 percent of demand, followed by commercial consumption (38 percent) and public lighting (2 percent).



C. The ESC’s Financial Flows: Choke Points, Load Shedding and Fiscal Costs

6. The tariff setting framework is broadly sound, but the increase in European electricity prices has led to challenges. Tariffs are set once per year by the Energy Regulatory Office (ERO) taking into consideration domestic generation prices, expected load and generation, generation composition, import volumes and prices, projected technical, non-technical and commercial losses, and a value added of distribution that provides room for improvements and investment in the distribution network and a regulated profit.⁴ Tariffs were last adjusted in February 2022 (up by about 10 percent for households consuming more than 800 KWh/month, while keeping other tariffs

² KEDS and KESCO are owned by the Limak-Çalik consortium, a Turkish company. Other suppliers are licensed but they are currently mostly inactive.

³ Net electricity imports cover about 10 percent of demand; however, gross electricity imports are equivalent to about 20 percent of demand, and gross electricity exports represent around 10 percent of domestic supply.

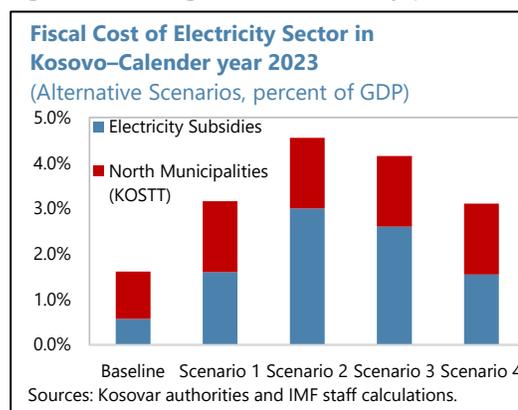
⁴ The ERO is an independent agency that regulates electricity, district heating, and gas markets in Kosovo. It was established in 2004, after the promulgation of the Laws on Energy, on Electricity, and on the Energy Regulator. The ERO helps to ensure that Kosovo’s regulatory framework is in line with the EU ‘acquis’ on energy.

for households and firms constant) to account for higher import prices of electricity, and government subsidies.⁵ Though the tariff setting allows for revisions when tariff parameters deviate from actuals, the ERO has not authorized further tariff increases in 2022, arguing that government subsidies to the sector (of about 2 percent of GDP) were sufficient to finance the difference between import electricity prices and those recognized in tariffs.

7. Higher European electricity prices have stressed the sector's flows, creating liquidity choke points. Before 2021, relatively low European electricity prices allowed the system to operate without significant fiscal costs.⁶ Technical, non-technical, and commercial losses were covered by electricity tariffs, electricity price volatility was lower, and the electricity consumption of the north was paid through a budget transfer to KOSTT.⁷ The increase in natural gas and electricity prices since 2021 stressed this model, first in the winter of 2021–22 and again in the late summer of 2022, as record high electricity prices created a liquidity choke point in KEDS, the distribution company, that led to load-shedding. While budgetary support for the sector increased substantially, KEK electricity exports in the summer also increased to record levels (€150 million, about 1.5 percent of GDP).

D. The Short-Term Outlook: Stress Likely to Continue

8. The war in Ukraine will keep uncertainty high, and energy prices volatile in the short term. A full Russian gas shutoff would likely lead to both higher natural gas and electricity prices; a less temperate winter would also weigh on electricity prices. Even if replenished natural gas stocks allow Europe to avoid shortages in the winter of 2022–23, the spring will find the region trying to refill inventories but with very modest (or totally absent) Russian supply, which may result in the market retesting in 2023 the record high natural gas and electricity prices of 2022 (Di Bella et al, 2022; IMF, 2022). In any event, it is likely that Europe will end up facing higher energy prices than before the war in the medium term.⁸



⁵ Electricity tariffs are set at 7€cts/KWh (6.1€cts/KWh for households and 8.4€cts/KWh for non-households), reflecting a coal-based generation price of 2.95 €cts/KWh, a renewable generation price of 9€cts/KWh, and a price for electricity imports of 18.6€cts/KWh. Lignite prices for domestic generation are only 3€/Ton, mainly reflecting a royalty, which allows for domestic coal-based electricity prices to be significantly lower than in the EU.

⁶ The budget includes a subsidy for vulnerable households to cover electricity consumption of €4.5 million.

⁷ In winter of 2017–18 the consumption of Kosovo's north municipalities was not balanced (i.e., a source of energy generation was not nominated to equal such demand), which decreased the electricity's frequency of continental Europe as a whole. As KOSTT joined ENTSO-E in 2020, it committed to balance this consumption. In parallel, a more permanent solution is being seek between Serbia and Kosovo with the 2013 Brussels' agreement framework.

⁸ The EU agreed on a natural gas price cap in mid-December 2022, though its impact on gas supply remains uncertain.

9. Higher European electricity prices and lower domestic electricity supply may result in significant stress for Kosovo's energy sector and budget.

To estimate this stress, a baseline scenario is constructed that assumes that foreign electricity prices in 2023 remain, on average, at the same level of 2022; that KEK's electricity supply remains unchanged; and that electricity demand also remains unchanged at 2022 levels. The baseline fiscal cost of keeping electricity tariffs constant and avoiding load shedding in the winter would be about 1 percent of GDP (0.5 percent

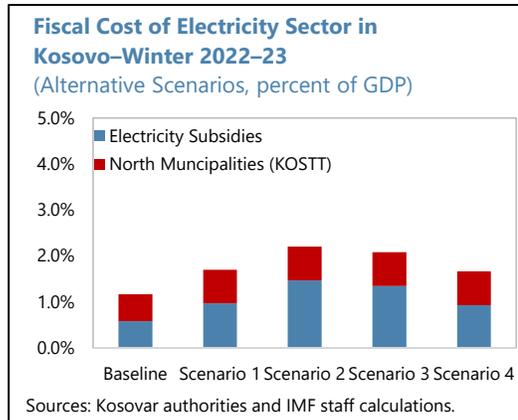
of GDP for subsidies to the regulated electricity sector, and the other 0.5 percent of GDP to finance the electricity consumption of the northern municipalities), and about 1.5 percent of GDP for 2023. In addition, the following scenarios are considered:

- Scenario 1 assumes a 50 percent increase in the external price of electricity in 2023.
- Scenario 2 assumes in addition a 10 percent decrease in KEK electricity production.

If downside risks materialize, the costs for the sector and the budget would be significant. In scenario 2, the fiscal cost over the winter would reach more than 2 percent of GDP and around 4.5 percent of GDP for 2023. In this case, it is unlikely that the higher cost of electricity imports will be covered completely by additional subsidies, but rather by a combination of subsidies and demand compression. While the latter can be induced through different actions, higher foreign electricity prices will likely lead once again to liquidity choke points and to load shedding.

E. Medium Term Challenges: Greening the Electricity Generation Matrix

10. Coal-based electricity generation is the largest source of greenhouse gas (GHG) emissions in Kosovo. Kosovo's carbon intensity, as measured by CO₂ emissions per unit of output, is the highest in the western Balkans and about four times the average of the EU. The burning of fossil fuel for heating is the main cause for the high concentration of harmful PM_{2.5}, one of the leading causes of illness and death associated with respiratory, pulmonary and heart diseases. The ambient concentrations of PM_{2.5} in Kosovo exceed the World Health Organization air quality guideline value of 10 µg/m³ and the EU limit value of 25 µg/m³.⁹ Moreover, the EU's carbon border adjustment mechanism (CBAM) will require EU importers, as of 2026, to purchase carbon certificates equivalent to the weekly EU carbon price. The CBAM would initially apply to imports of cement, iron and steel, aluminum, fertilizers, and electricity. In this regard, Kosovo's current electricity generation



⁹ Kosovo is a member of the Energy Community (2006), and a signatory of the EU-SAA (2016) and the Sofia Declaration (2020). Under the Energy Community, Kosovo has commitments with respect to national GHG emissions monitoring and reporting systems, and about the National Energy and Climate Plans (NECPs). Under the SAA, Kosovo is part of the SAA Energy and Environment Committee, which commits the country to develop national plans for the reduction of GHG emissions. Kosovo's participation in the Sofia Declaration on the Green Agenda, commits the country to a path of carbon neutrality by 2050.

profile will clearly be a drawback for its efforts to attract EU FDI, and it may constrain Kosovo's electricity exports during the summer.

11. In addition, unreliable domestic supply makes the system vulnerable to short-term price fluctuations. Frequent unplanned outages of Kosovo's old coal-based plants have been a main reason preventing the sector to engage in long-term electricity supply contracts, rendering the system dependent on the volatile day-ahead and intraday markets. Moreover, absent a solution within the Brussels' agreement framework, the northern municipalities' consumption will continue to represent a heavy burden for the budget. High non-technical and commercial electricity losses have also led to fiscal costs and rendered the electricity system more vulnerable.

F. Policy Options: Stylized Suggestions

12. In the short-term, more efficient use of electricity should reduce demand and contribute to balance the system in 2023. A partial pass-through of external prices to tariffs, including differential increases for peak-hour consumption for non-vulnerable clients would contribute to a more efficient use of electricity, and reduce the fiscal cost of subsidies. This is illustrated by Scenario 3, which considers a 20 percent of the increase in the external price of electricity assumed in Scenario 1 is passed through domestic tariffs. While prices should reflect to the extent possible market signals, vulnerable households should preferably be protected through direct transfers. While the tariff-setting mechanism allows for up to three annual adjustments if tariff parameters are no longer realistic, the de facto implementation of this mechanism (accounting for planned instead of effectively paid subsidies) creates liquidity choke points that have resulted in load shedding. Increased frequency of tariff adjustments (from once to at least twice per year) and of the payment of subsidies should reduce liquidity choke points and reduce the need for load shedding, which always should be the last resort. If load shedding is needed, it should be allocated smartly to preserve economic activity.

13. In the medium term, boosting energy efficiency and diversification away from lignite is priority. To that end, creating a fund for the renewal and expansion of domestic electricity generation capacity in green technologies could be explored. KEK's extraordinary export revenues could be earmarked for this. In this regard, Scenario 4 shows, for illustrative purposes, the added energy security and reduced fiscal costs if 150 MW of wind-based electricity would have been in place, under the assumption of the higher international prices and lower supply assumed in Scenario 2.¹⁰ Further regional integration, especially with Albania, would allow for more efficient balancing of generation and loads.¹¹ Moreover, existing transmission and generation capacity should be properly maintained to increase reliability, efficiency and reduce pollution. Tackling air pollution is a key priority. In this regard, the focus should be on enforcing regulation for emissions and investing to install filters in Kosova B. In the residential sector, a feebate mechanism could be used to encourage

¹⁰ Scenario 4 assumes an effective capacity for wind of 28 percent, in line with Kosovo's average.

¹¹ In late 2019, ERO signed cooperation agreements with the Energy Regulatory Entities of Albania and North Macedonia, to strengthen the cooperation for harmonizing the regulatory frameworks and to promote the development and integration of energy markets.

reductions in pollution by rewarding heating efficiency of buildings and the adoption of clean efficient stoves, while green investment funds could be deployed to expand district heating. Reducing non-technical losses through stronger penalization of theft is essential, while continue to seek options to implement the Brussels' agreement energy protocols is key to lower fiscal exposures. In addition, ERO will need to continue working with KESCO–KEDS to ensure that planned improvements in the distribution network result in the target decreases in electricity theft. Starting to explore carbon pricing would strengthen price signals and result in more efficient demand and less carbon intensity.

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