



NATURAL GAS AS AN OPTION FOR SUSTAINABLE ENERGY TRANSITION IN KOSOVO

Policy Paper

March 2022

www.indep.info

Natural Gas as an Option for Sustainable Energy Transition in Kosovo

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Program: **Sustainable Development**

Publication: **March, 2022**



Zhvillimi i Qëndrueshëm
Sustainable Development

Institute for Development Policy – INDEP

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Executive summary

Increasing the security of energy supply and diversifying energy resources is seen as one of the most important components of energy strategic objectives in Kosovo. Furthermore, this component goes in line with the future targets for decarbonization and market decentralization. Therefore, the potential development of the natural gas sector in Kosovo in line with the regional gas infrastructure developments is seen as a great opportunity to support this transition. In terms of the energy transition, gas seems to be the most viable transition fuel that offers the flexibility needed for the integration of renewables. Moreover, connecting to the regional natural gas supply lines is a significant opportunity for Kosovo and it will benefit the country both in terms of enhancing energy security of supply and diversification of energy sources, as well as in terms of the overall economic growth.

Currently, a number of critical gas infrastructure projects are being developed (supply pipelines and interconnectors in neighboring states) that could support diversity and security of energy supply in Kosovo. As such, gas supply options in the Western Balkans are expected to increase with the Trans-Adriatic Pipeline (TAP), Caspian supply alternatives, and LNG import from Greece or Croatia. The projected influx of competitive gas supplies in the region will bring price stability and supply redundancy that will support the development of Kosovo's natural gas industry. Considering, that these projects also align with the overall objectives of EC and promote cooperation and market integration; both prerequisite of EU integration.

Bearing in mind that currently there are no systems that are completely environmentally friendly, every system has its costs imposed to environment, either in pollution or some sort of contamination of natural resources. For example, solar panels are built using highly toxic materials. Wind turbines have recently caused the death of thousands of birds because its elevation and sound waves attract flying animals. Hydroelectric dams are rather clean, but have destroyed or modified the natural habitats of fishes and other aquatic life. Nuclear energy produces wastes that are very hazardous.

Considering this, then an opportunity exists also for natural gas to become increasingly significant in support of Kosovo' tackling the so-called Energy Trilemma: delivering decarbonization, maintaining security of supply, and ensuring that energy is affordable. Direct replacement of coal with natural gas for power generation has proven to reduce GHG emissions tremendously.¹ Natural gas has a bright medium-to-long-term future, as long as the gas industry embraces the energy transition and partners with renewables to produce carbon-free products, particularly hydrogen, while also embracing carbon capture, use, and storage (CCUS). Natural gas has several significant advantages. It is extremely versatile and can be used for heating, cooling, cooking, waste disposal, transportation, and as a feedstock for chemicals, fertilizers, and pharmaceutical products.

¹ Mac Kinnon, M et al. (2018). The role of natural gas and its infrastructure in mitigating greenhouse gas emissions, improving regional air quality, and renewable resource integration, Progress in Energy and Combustion Science.

Energy transition is concerned with envisioning and implementing change from one state to another or, more specifically, from an existing to a new and cleaner energy system. In the former post-communist states of Eastern and Central Europe, energy transition is rather understood as the shift from centrally planned and often highly carbon-intensive to market-based and more energy-efficient systems². Indeed, natural gas' ability to provide a relatively low carbon backup during peak energy usage times rather than the traditional role of round-the-clock baseload may prove to be its most significant contribution to the energy transition.³ Natural gas as an option in the sustainable energy transition in Kosovo is also a potential complement to renewable energy because it can compensate for the intermittent of power generated from renewables – that is, when the wind is not blowing or the sun is not shining.

To this moment, Kosovo has made a series of commitments on the international level, as such is the Sofia Declaration on the Green Agenda for the Western Balkans signed in November 2020, where Kosovo committed to becoming climate neutral country by 2050 with regards to energy, circular economy, depollution, agriculture and biodiversity. With this regard, Kosovo needs to focus on the following: synergy between all relevant developments strategies in Kosovo and develop a long term energy strategy with a clear path and set coal-phase out date as is clear that the outdated coal capacities are inefficient, expensive to run and causing havoc to the health of the citizens and the environment. They have run out of their lifespan and pose a direct threat to the energy stability in Kosovo, as recent events have shown.

The introduction of a carbon pricing mechanism has been shown to be a key incentive to phasing out of coal, leaving room for energy transition. Carbon pricing mechanisms (CPMs) that impose fees on emissions in the power and industrial sectors can be a powerful tool for influencing current production and consumption patterns. Western Balkan countries pledged to align their climate change mitigation efforts with EU targets and programs in Sofia Declaration⁴. Carbon pricing has been declared by policymakers to be one of the most important tools in the effort to make political promises a reality. As a result continuation of the alignment with the EU Emissions Trading Scheme, as well as work towards introducing other carbon pricing instruments to promote decarbonization in Kosovo is an obligation. However, the Western Balkan region has little experience with carbon pricing initiatives, with only Albania and Montenegro taking tentative steps so far.

Furthermore, building new capacities need to ensure production of electricity from natural gas and renewable energy sources to ensure gradual move away from the use of coal. These targets need to be ambitious enough for Kosovo to be on the path to climate neutrality by 2050. Thus, one of the options

² S. Bouzarovski (2009). East-Central Europe's changing energy landscapes: a place for geography Area, 41 pp. 452-463

³ UNECE (2019). How natural gas can support the uptake of renewable energy, available at: https://unece.org/DAM/energy/se/pdfs/CSE/PATHWAYS/publ/NG_RE.pdf

⁴ European Commission (2020). Action Plan for the Implementation of Sofia Declaration, available at: <https://www.rcc.int/docs/596/action-plan-for-the-implementation-of-the-sofia-declaration-on-the-green-agenda-for-the-western-balkans-2021-2030>

discussed in this paper is the investment in new gas fired CCGT plant with battery energy storage that can replace old lignite plants and reduce carbon emissions.

Not to forget the environmental benefits of natural gas compared to lignite knowing that the capital Pristina and other major cities of the Republic of Kosovo suffer from poor air quality, especially in the winter. To resolve the issue, authorities should intensify efforts to promote and develop the gasification of the entire country. Therefore, in the longer term, these gas infrastructure investments will provide the basis for the next step in environmental protection, as they will allow for the introduction of decarbonized gas once available and competitive, allowing further reductions in carbon dioxide and the impact of air pollution. Therefore, these investments will futureproof the countries' energy supply. According to the IEA⁵, since 2010, coal-to-gas switching has saved around 500 million tons of CO₂ - an effect equivalent to putting an extra 200 million electric vehicles (EVs) running on zero-carbon electricity on the road over the same period.

As it currently stands, in Kosovo there is little attention on issues of natural gas lock-in and expansion, either within the government or in commentaries from civil society. With this policy paper, we aim to contribute to addressing this gap. Thus, this paper focuses on the options of introducing natural gas in Kosovo, its central contribution lies in providing an overview of the key dynamics underpinning the options of the sustainable energy transition with the use of natural gas in Kosovo. Thus, this policy paper intends to contribute to a better understanding among the general public and public officials of the natural gas being a “bridge fuel” and an option for the energy transition in Kosovo as well as its benefits of developing gas infrastructure and integrating gas in Kosovo's energy mix.

This paper tries to answer where natural gas fits in Kosovo's sustainable energy transition and gives a description of the following:

- Understanding the current natural gas situation including infrastructure and legislative framework in Kosovo;
- Five (5) case studies (best practices on natural gas from the US and the EU countries);
- Four (4) options for the use of natural gas as a transition fuel in Kosovo; and
- Climate and environmental benefits of natural gas vis-à-vis decarbonization process.

Kosovo needs to make dramatic progress towards diversifying its energy supplies, especially of natural gas. This should come through a political will as well as improved regional cooperation which will result in considerable economic benefit while decreasing the countries' vulnerability to outside energy world crises pressure. We need to end the silence on a role for natural gas in the future Kosovo's energy mix, thus, the introduction of natural gas remains a viable option. Therefore, understanding the current and future situation of gas developments in Kosovo is of utmost importance for both the public and private sector.

⁵ IEA (2019). *The Role of Gas in Today's Energy Transitions*, IEA, Paris. Available at: <https://www.iea.org/reports/the-role-of-gas-in-todays-energy-transitions>

1. Introduction

Kosovo's electricity supply options are severely limited due to the lack of renewable resources, aging and unreliable lignite-fired generation plants, a lack of flexible generators, supply shortages in neighboring countries (particularly during peak demand, limiting Kosovo's ability to import modulated electricity), and a lack of natural gas resources or infrastructure to import gas.⁶ As Kosovo enters in the year 2022, it is at a crossroads in terms of electricity and natural gas issues as well there are a number of critical, multi-faceted issues facing Kosovo's regulators, policy makers, and other stakeholders. Kosovo, which was forced in the month of December 2021 to roll out systematic, temporary electricity outages, needs to accelerate investments in district heating as soon as possible to reduce electricity demand. Kosovo is at the cusp of energy sector transformation that could be driven by natural gas. Its ambitious economic and social goals require accelerated progress in expanding energy capacity. Therefore, we think that this can be met through investment in clean energy sources, supplemented by a rapid uptake of natural gas as a clean transition fuel. In meeting the daunting prospect of an increase in the energy demand in the coming few decades, natural gas offers a clean base-load power to bridge the introduction of renewable energy.

Natural gas is currently one of the most important fuels for large-scale, round-the-clock power generation, alongside coal, nuclear, hydro, and fuel oil. If the goal is to reduce the carbon footprint of energy production as quickly as possible while also ensuring continuous supply, *natural gas is an obvious option*. This is because it emits less carbon than coal or fuel oil.⁷ According to the conclusions from the ACER paper⁸, in many areas, natural gas is likely to continue to be a key energy vector in the 2020s and potentially beyond, for example in conjunction with carbon capture and as a part energy transition. In the context of Kosovo, currently it has no gas market access, no infrastructure, and no supplies of natural gas. The country's regulatory framework remains rudimentary. However, opportunities exist to provide a natural gas supply route from North Macedonia or from Albania via pipelines as well as LNG from near main terminals. Yet, in a wider debate in Kosovo on how to decarbonize the country's energy sector that is heavily reliant on lignite, access to gas supplies via pipelines or other routes currently is not gaining traction with the Government as a viable option for now. However, the debate is still ongoing.

Therefore, in the wake of recent energy crises, to reduce Kosovo's heavy reliance on coal, the Government of Kosovo needs to explore natural gas as an alternative energy supply source to meet both heat and electricity demand. Direct use of natural gas may save end-users money on heating bills, while also having a significant positive environmental impact in the country. Within this context, the purpose of the paper is to provide an analysis of the sustainable energy transition focusing in the

⁶ Ministry of Economy (2018). Energy Strategy of the Republic of Kosovo 2017-2026, available at: https://mzheks.net/repository/docs/Energy_Strategy_of_the_Republic_of_Kosovo_2017_-_2026.pdf

⁷ UNECE (2019). How natural gas can support the uptake of renewable energy, available at: https://unece.org/DAM/energy/se/pdfs/CSE/PATHWAYS/publ/NG_RE.pdf

⁸ ACER Paper. The Bridge beyond 2025 available at: https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agency/SD_The%20Bridge%20beyond%202025/The%20Bridge%20Beyond%202025_Conclusion%20Paper.pdf

development of the natural gas sector in Kosovo. We show that the narratives surrounding natural gas in Kosovo might be a politically and socially constructed outcome representing particular interests.

Kosovo where the share of renewable for electricity according to the latest Eurostat⁹ data is 5.2%, then the remaining 94.8% originates from coal and knowing that Kosovo has very little or no history of using natural gas or its products as a particular energy source. Furthermore, Kosovo does not have a natural gas market currently as it lacks a domestic gas production source and is not connected to the regional gas transmission network. There is growing pressure from the European Union-EU (EBRD energy sector strategy), World Bank, and other international donors towards Kosovo to diversify its energy supply mix to alleviate its heavy dependence on coal and to increase energy supplies from other sources (including the development and deployment of gas).

Therefore, it is important to seek other sources of energy mix like natural gas. As a result, the existing National Energy Strategy¹⁰ (the fourth objective is about supporting natural gas projects in Kosovo, such as inclusion of the Trans Adriatic Pipeline (TAP) that offers opportunistic availability of Kosovo connection in this network) of Kosovo states the plans to increase its long-term energy security by diversifying its energy supply mix as well as the gas development.

However, we have to bear in mind that energy transition to natural gas will be dependent on obtaining consistent, low-cost gas supplies. Inability to secure both reliable natural gas deliveries and competitive prices will limit the number of customers who eventually convert, slowing the industry's overall growth. It is assumed that some form of government assistance or other subsidies will be required to cover the majority of the cost for most households, particularly low-income households, to be willing to connect to natural gas service.

Progress on decarbonization of energy is already underway and needs to accelerate in the near term, not just in the medium and long term. Considering that the EU finally admits that natural gas and nuclear are key to the decarbonization and can be considered as green investments.¹¹ The delivered cost of natural gas as an energy source with the introduction of carbon pricing is expected to be cheaper than coal-based fuel sources and electricity in Kosovo, as the replacement and rehabilitation of the old and inefficient Kosovo A and Kosovo B facilities will eventually drive up electricity cost. Customers who switch to direct natural gas use could pay lower bills for the same amount of energy consumed. Therefore, within the decarbonization pathway and increasing electricity demand in coming years Government of Kosovo (GoK) should favor the use of natural gas in its energy mix.

⁹ Statistical Office of the European Communities, Eurostat Database (2020). *Eurostat*. Luxembourg, available at: <https://ec.europa.eu/eurostat/web/energy/data/shares>

¹⁰ Ministry of Economy (2017), Energy Strategy of the Republic of Kosovo 2017-2026, available at: https://mzheks.net/repository/docs/Energy_Strategy_of_the_Republic_of_Kosovo_2017_-_2026.pdf

¹¹ EU Commission, available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2

2. Methodology

The applied methodological approach includes case studies, comparative analysis, semi-structured interviews and focus groups. A methodology was determined by the specific nature of this research and the fact that the analyzed sector and entity are strategic from the point of view of the country's economy, which imposes the confidentiality of some data related to the studies and determines the possibility of making them public. A desktop-based information gathering exercise has been undertaken supported by a set of stakeholder interviews to provide the basis for a qualitative analysis and assessment of the current status and future potential for natural gas in Kosovo. This paper aims to take a closer look at previous energy transitions in the interest of extracting insights that would be beneficial in the future. An analysis of the opportunity for gas to support Kosovo's progress towards a decarbonized energy future.

The main method of research has been primarily through online semi-structured interviews with relevant stakeholders as well as secondary, in other words, literature review, desk research. The general approach to this research process has been to collect existing information on the gas sector, from government institutions dealing with gas sector or other trusted sources whenever the information was public, and interview with relevant public authorities online or individual meetings. Thus, the research methodology was deductive: conducted a review of existing gas studies in Kosovo, identified the gas sector stakeholders, other data collection (reports, analyses, and review of findings, etc.) relevant to the gas sector.

As a result, analysis in this paper includes data obtained through governmental documents (laws, strategies, action plans, administrative instructions and other reports in the gas sector) online sources, such as pre-feasibility study Kosovo-Albania, latest Energy Community Secretariat gas sector reports for Kosovo and WB6, review of natural gas project documents from WB6 region and EBRD gas reports, World Bank (WB) reports on gas developments in the region, Kosovo governmental documents, various studies on natural gas in WB6, and so forth.

In the first analysis, we examine the existing literature on natural gas for Kosovo and neighboring countries. To search for relevant academic literature, we searched online for the various combinations of the following *keywords*: *natural gas as a bridge fuel, Kosovo, decarbonization, energy transition, gas in Western Balkans*, etc., limiting to the fields of gas infrastructure, natural gas, and the period from 2002 to 2022 to focus mostly on latest developments around the WB6 and EU countries. In total, over 50 documents including feasibility studies, reports, natural gas articles for WB6, were identified from both internet sources and hard-copy sources regarding natural gas in Kosovo and WB6.

Furthermore, the document reviews explored the current gas situation of Kosovo its legislation, measures, and potential outcomes of feasibility studies on gas development; the best policy options used for the gas as an energy source in Kosovo; best practices examples from the US and four EU countries namely Germany, Poland, Bulgaria and neighboring North Macedonia and the factors influencing the gas policy processes. Next, we further scrutinized the early experience and lessons

from other WB6 countries with the development of gas infrastructure. Finally, the paper concludes by noting the conclusions and recommendations.

3. Current situation of natural gas sector in Kosovo

The natural gas industry or gas market is inexistent in Kosovo (some LPG is used).¹² There is no or very limited infrastructure for gas transport in Kosovo (e.g. the short section from Pristina towards North Macedonia; previous network for gas from coal gasification).¹³ Despite its primary legislation adoption in the natural gas sector, very little activities took place in adopting gas market secondary legislation. According to the Energy Community Implementation Report 2020 and 2021¹⁴, the creation of an adequate regulatory framework is crucial for the future of gas supply to Kosovo.

In the context of legislation, the main law incorporating the EU legislation on natural gas in Kosovo is the *Law no. 05/L-082 on Natural Gas*¹⁵, adopted in 2016, which transposes provisions from the third energy package. This Law specifies the organization and functioning of the natural gas sector, access to the market, the criteria and procedures applicable to the granting of authorizations for transmission, distribution, supply, usage and storage of natural gas and the operation of systems.

However, a considerable amount of Natural Gas Law most important provisions are not yet implemented, due to the legally provided conditions that such provision need to be implemented only before the first physical natural gas inflows. In addition to the primary legislation there is also *secondary legislation*, the Administrative Instruction (AI) No. 08.2017 on the security of natural gas supply has been adopted.

This AI aims to establish measures for the security of natural gas supply as well as rules for safeguarding of the adequate level of security of supply, ensuring the proper and continuous functioning of the internal market of natural gas. Two important rules were adopted which derive from the Law on the Energy Regulator are the Rule on Licensing of Energy Activities in Kosovo¹⁶ which also includes natural gas as well as the Rule on Wholesale Energy Market Integrity and Transparency (REMIT).¹⁷ Another important secondary act adopted concerning the cross-border gas sector, (*acquis* in infrastructure) is the transposition of the Regulation (EU) 347/2013 on guidelines for

¹² Energy Community Secretariat (2020). Annual Implementation Report 2020, available at: <https://www.energy-community.org/implementation/IR2020.html>

¹³ Personal Interview with the public official from the ERO.

¹⁴ Energy Community Secretariat (2020). Annual Implementation Report 2020

¹⁵ Official Gazette of the Government of Kosovo, Law no. 05/L-082 on Natural Gas, available at: <https://gzk.rks-gov.net/ActDetail.aspx?ActID=12688>

¹⁶ Kosovo Energy Regulator Office, Rule on Licensing of Energy Activities in Kosovo, available at: http://ero-ks.org/2017/Rregullat/07_2017_RREGULLA%20PER%20LICENCIMIN%20E%20AKTIVITETEVE%20TE%20ENERGJISE%20KOSOVE.pdf

¹⁷ Kosovo Energy Regulator Office, REMIT rule, available at: <https://www.ero-ks.org/zrre/sites/default/files/Legjislacioni/Rregullat/Rule%20on%20Wholesale%20Energy%20Market%20Integrity%20and%20Transparency%20-%20Copy.pdf>

trans-European energy infrastructure. As a result, Kosovo¹⁸ is one of the few Contracting Parties that has already transposed this Regulation (EU) 347/2013.

The main policy documents in the area of energy (including gas) are the *Energy Strategy of the Republic of Kosovo 2017-2026 and the Energy Strategy Implementation Programme 2018-2020*. The general guidelines of Kosovo's government policy regarding the natural gas sector are set out in the current Energy Strategy 2017-2026¹⁹. The Strategy (its fourth objective) has its focus on developing natural gas infrastructure as an alternative energy supply source to meet both heat and electricity demand in the country and to support its citizens switching from wood, oil and other sources to district heating. This provides an indication of efforts made by the Government of Kosovo (GoK) to promote gas and act as a good starting point.

Further, a revised Energy Strategy 2022-2031²⁰, is in line with a Green Deal and the Green Agenda for the Western Balkans which ensure a transition to a new period of energy policy, providing accessible, safe and high-quality energy supply. Gas supply and consumption in Kosovo is therefore limited to bottle LPG (liquefied petroleum gas). Besides having no production of gas in Kosovo, there is no import capacity by pipelines. Kosovo is net importer of hydrocarbons products²¹ mostly originating from neighboring countries (N. Macedonia, Greece, Serbia, and Croatia).

According to ERO officials, the gas demand in Kosovo (per two studies already done till 2040) is estimated about 1 billion cubic meters. While the ALGOKAP study has highlighted up to 2 billion cubic meters, but this is excessively high²². However, the Government policy based on the Energy Strategy (2017-2026)²³ is to promote and support Kosovo's connection with the regional gas supply projects increasing security of supply and diversification of energy resources in Kosovo is considered as a very important component for sustainable and quality energy supply. In this regard, the development of gas in Kosovo, through gas project lines in the countries of the region, is considered a good opportunity for future supply of natural gas. Connecting to regional gas supply lines is an important option, given the positive impact both in terms of increasing energy security, as well as in terms of increasing and diversifying energy sources and the country's economic development.²⁴

Kosovo is expected to have completed the natural gas system for final consumption needs, to be used as an energy source, for transformation into electricity, thermal, or combined, and to serve especially industry for energy supply or diversification by 2030.²⁵ It is worth mentioning the latest key

¹⁸ Energy Community Secretariat (2020). Kosovo Implementation Report 2020

¹⁹ Ministry of Economy (2017). Energy Strategy of the Republic of Kosovo 2017-2026, available at: https://mzhe-ks.net/repository/docs/Energy_Strategy_of_the_Republic_of_Kosovo_2017_-_2026.pdf

²⁰ Personal interview with public official from the Ministry of Economy.

²¹ Energy Regulatory Office, Statement of Security of Supply, available at [http://ero-ks.org/2019/Publikimet/Deklarate_mbi_Sigurine_e_Furnizimit_ne_Kosove\(energji_elektrike_gaz_natyror_nafta\)ZRRE_31_07_2019_eng.pdf](http://ero-ks.org/2019/Publikimet/Deklarate_mbi_Sigurine_e_Furnizimit_ne_Kosove(energji_elektrike_gaz_natyror_nafta)ZRRE_31_07_2019_eng.pdf)

²² Personal Interview with the public officials from the Ministry of Economy

²³ Ministry of Economy (2017). Energy Strategy of the Republic of Kosovo 2017-2026

²⁴ Personal Interview with the public official from the ERO

²⁵ Personal Interview with the public official from the Ministry of Economy.

development in the energy sector, from December 2020, Kosovo's electricity network system operator, KOSTT, has begun to operate independently across the whole of the country as a regulatory zone and as part of a new energy bloc with neighboring Albania. As a result, Kosovo is one step closer to becoming a part of the European Network of Transmission System Operator for Electricity (ENTSO-E) and later as well as ENTSO-G²⁶ for gas.

According to the Transmission Development Plan 2021-2030²⁷ which represents Kosovo's network development plan for the next 10 years. A very influential factor in the diversification of energy sources will be the development of gas infrastructure. It is expected that in these 10-year period Kosovo will have fully or partially developed the gas transmission network and a part of the gas distribution network. It is expected²⁸ that following the finalization of the TAP project, Kosovo will be connected to the natural gas network through the ALKOGAP project.

However, key challenges stand in the way of rapid uptake of natural gas in the energy sector and in realizing the key role of gas in meeting challenges of energy access, capacity expansion, diversification and decarbonization of Kosovo's energy sector. Further, the challenges are achieving greater energy security and/or independence, low energy diversification, mitigating negative environmental impacts. The alternatives for supply are expected to increase in Kosovo with the development of Trans Adriatic Pipeline, LNG imports in Greece, and Caspian Supply WBIF/EBRD platform. The development of new natural gas routes (even with modest initial capacities) would diversify sources, suppliers, and routes for consumers in the Western Balkans and Kosovo.

4. Kosovo's commitments towards decarbonization in EU and EnCT

All of the WB6 countries are members of the Energy Community Treaty (EnCT) and therefore they have to make efforts in reaching different targets and implement the EU energy *acquis* which is at the heart of this treaty. Gas is one of the key energy sector benchmarks in the implementation reports²⁹ for each country, and the implementation of gas *acquis* looks at the unbundling, third party access, wholesale market, retail market and interconnectivity.

Kosovo as a contracting party to the EnCT since 2006 and as such should approximate and implement the *acquis* of the EU listed in Article 10 of the Treaty³⁰, establishing the Energy Community. The Stabilization and Association Agreement (SAA) of 2016, as far as energy is concerned, places the Energy Community at the basis of the integration of Kosovo in EU energy markets. Article 114-

²⁶ European Network of Transmission System Operator for Gas, available at: <https://www.entsog.eu/about-entsog>

²⁷ KOSTT- Transmission Development Plan (2021-2030). available at: https://www.ero-ks.org/zrre/sites/default/files/Konsultimet%20Publike/KOSTT_Transmission%20Development%20Plan%202021-2030.pdf

²⁸ Energy Community Secretariat (2020). Annual Implementation Report 2020, available at: <https://www.energy-community.org/implementation/IR2020.html>

²⁹ Energy Community Secretariat (2020), Implementation Report 2020

³⁰ Energy Community Treaty (2006). Article 10 of the Treaty establishing the Energy Community, available at <https://www.energy-community.org/legal/treaty.html>

Energy, states that cooperation shall focus on priority areas related to the Community *acquis* in the field of energy (including gas) and be based on the Treaty, with a view to the gradual integration of Kosovo's into Europe's energy markets. Further, the medium-term priorities of *acquis* chapter 15-Energy and chapter 21-Trans European Networks of the National Plan for Implementation of SAA³¹ have listed two gasification studies for Kosovo.

European Commission Kosovo 2020 Report³², (Energy point 6.22., Page 97) states the following:

Kosovo is exploring possibilities for gas interconnectors with neighboring countries. Further, states the completion of the study on the gas pipeline between Kosovo and Albania based on the TAP project, as well as the launch of the pre-feasibility study on a gas pipeline from N. Macedonia to Kosovo.

Kosovo is also a part of the Central and South Eastern Europe Energy Connectivity (CESEC)³³ which works to accelerate the integration of central eastern and south eastern European gas and electricity markets. Under the CESEC³⁴, the Commission will continue to closely monitor market reforms in WB6 in order to accelerate the integration of Central and South Eastern European gas and electricity markets. Kosovo with its strong determination to further pursue and accelerate the efforts towards the EU accession process, has signed the Sofia Declaration, on the Green Agenda for the Western Balkans³⁵ that aligns with EU Green Deal. As a result, Kosovo has committed to a number of actions like introducing carbon pricing instruments and market-based renewables support schemes, as well as phasing out coal subsidies.

Kosovo has been part of the European integration process for more than a decade, but it still lacks ambitious and robust climate and energy policies to drive energy transition forward in line with the Paris Agreement and the Clean Energy Package. The transposition and implementation of the EU energy *acquis* has been slower and less effective than envisioned. Despite a strong push from the EU and Energy Community, Kosovo has faced great difficulties, not only in embracing energy transition but also in meeting some of the basic energy policy conditions for EU. Kosovo's commitment to the EU's Green Agenda for the Western Balkans hinges on it developing concrete plans for the decarbonization process.

³¹ Government of Kosovo (2020). National Plan for the Implementation of SAA, available at: <https://www.mei-ks.net/en/pkzmsa-2020-2024>

³² European Commission (2020). Report on Kosovo 2020, available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/kosovo_report_2020.pdf

³³ CESEC (2020), Central and South Eastern Europe Energy Connectivity, available at: https://ec.europa.eu/energy/topics/infrastructure/high-level-groups/central-and-south-eastern-europe-energy-connectivity_en

³⁴ European Commission (2020). WB Economic and Investment Plan, available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf

³⁵ European Commission (2020). Green Agenda for the Western Balkans, available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/green_agenda_for_the_western_balkans_en.pdf

5. Lessons from the five case studies - “Natural Gas as a bridge fuel”

In the following section, we describe the best examples from the selected five case studies (USA, Germany, Poland, Bulgaria, and North Macedonia) of the use of natural gas in the energy transition. They have been selected in the basis that they rely heavy on coal as is the case of Kosovo.

The case studies discussed in this paper allow us to draw options for the gas introduction and some tentative conclusions on how this can be achieved. However, one always has to take into account specific country contexts so that the “*lessons learned*” should certainly not be read as a “*blueprint*” to be applied in other political contexts. The analysis of the case studies from the USA and four European countries suggest that Kosovo’s policymakers and relevant stakeholders may benefit from considering possible scenarios that may evolve in the competitive dynamics of industry and trade alongside market integration and equilibria into their energy transition planning. Therefore, the following case studies of energy transition using natural gas serve as a good candidate to learn from.

5.1. The United States case

The United States are increasingly seen as a world leader in the use of natural gas as a transition fuel with the rise of use of natural gas in energy mix from 19% to 38%.³⁶ Coming from a high dependency on coal, the government has implemented various policies to boost its clean energy development. As coal-plant operators seek ways to repurpose their old units to avoid those becoming stranded assets, conversion to natural gas has been a widely-adopted strategy in the US.

The decline of coal production can be explained by changing market dynamics and federal regulatory environment. Historically, key factors underlying the transformation of US coal industry include: i) growing mechanization of coal mining; ii) the Clean Air Act of 1990 that adversely impacted the demand for Appalachian coal in favor of low-sulfur Western coal; iii) the shale gas revolution resulting in dramatic fall in natural gas, and iv) increase competitiveness of renewables.³⁷ From 1980 to 2008, the share of coal in electricity generation has dramatically increased by 83%. Majority of coal-fired power stations were built before 1980, followed by additional natural gas-fired units in 2000s and renewable units in late 2000s.³⁸ Between 2011 and 2019, 121 coal-fired units in the US were repurposed to burn other types of fuel, according to the US Energy Information Administration. The Obama administration’s decarbonization efforts set out under the Clean Power Plan has put further limits on carbon dioxide and other greenhouse gases emissions from coal-fired power plants.³⁹

³⁶ EIA US (2021). Natural gas in USA. Available at: <https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php>

³⁷ Betz, Michael, et al. (2015). Coal mining, economic development, and the natural resources curse. *Energy Economics* 50: 105-116.

³⁸ US EIA. (2011). Age of electric power generators varies widely. available at: <http://www.eia.gov/todayinenergy/detail.php?id=1830>

³⁹ Cama, Timothy. 2016. EPA chief: US must help coal country transition. *The Hill*, May 6, <http://thehill.com/policy/energyenvironment/279056-epa-chief-us-must-help-coal-countrytransition>

The decision for plants to switch from coal to natural gas was driven by stricter emissions standards, low natural gas prices, and more efficient new gas turbine technology.⁴⁰ Technology upgrades were necessary for coal-to-gas conversion, to convert the units to operate solely on natural gas fans and control systems need modification, as well as the boilers. During this time period, 104 coal-fired plants adopted the second approach, converting the steam boiler to burn other fuels, most commonly natural gas, although some were configured to burn petroleum coke (a refinery by-product), waste materials from paper and pulp production, or wood waste solids.

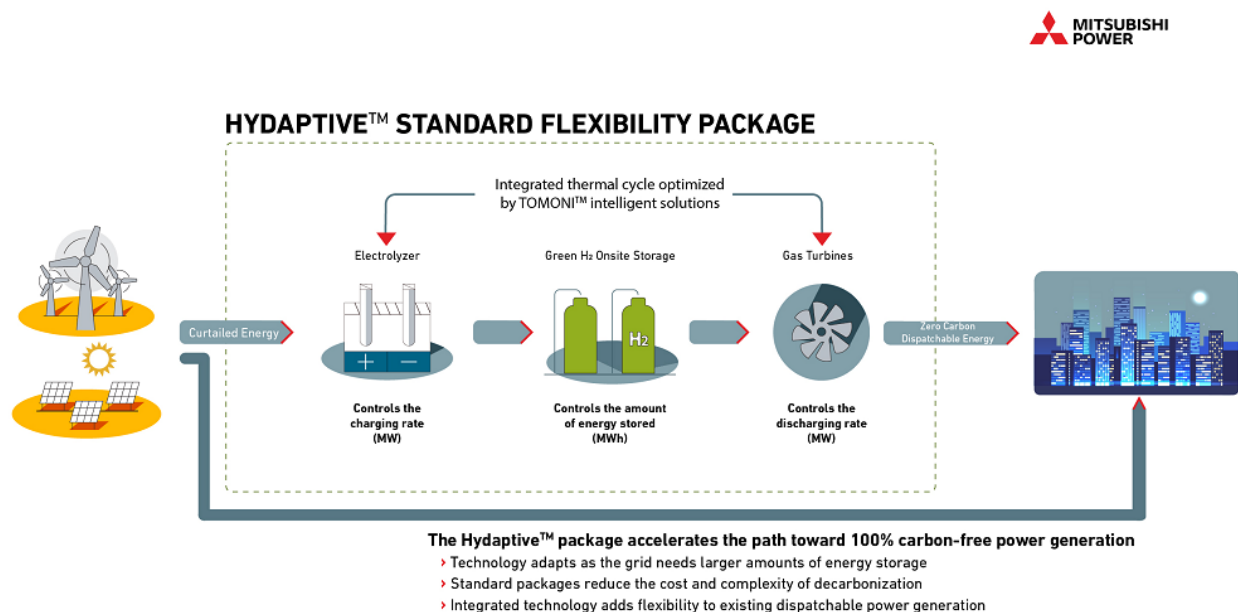


Figure 1. Schematic of Mitsubishi Power’s Hydaptive package⁴¹

Switching from high-carbon coal to lower-carbon natural gas is a quick-acting abatement option available on many global grids. In this case study, we look at the mechanics of coal-to-gas fuel switching in the United States and discuss how it affects carbon dioxide emissions. Between 2008 and 2017, coal-fired generation fell by 40%, while coal capacity fell by 13%. Lower utilization rates, rather than plant closures, are driving the decline: the average US coal plant operated with a capacity factor of 49 percent in 2017, down from 67 percent in 2008. The primary reason for coal's decline is the availability of cheap natural gas.

⁴⁰ U.S. Energy Information Administration. Today, Energy. available at: <https://www.eia.gov/todayinenergy/detail.php?id=44636>

⁴¹ NSEnergybusiness.Gas Turbines Hydrogen. Available at: <https://www.nsenerybusiness.com/features/gas-turbines-hydrogen-us/>

When a gas turbine replaces a coal unit, overall emissions are reduced by an average of 0.6t CO₂e/MWh. This is due to the fact that gas is cleaner than coal and that gas turbines are more efficient.⁴²

In the US the gas consumption has increased dramatically since 2008, at the expense of coal consumption. This fuel switch has done more to reduce carbon emissions in the United States over the last decade than any other single factor, including new renewable construction. Operational fuel switching, or starting one plant instead of another, is completely reversible. This is not the case with structural changes such as the retirement of coal plants or the installation of renewable energy. However, structural changes take time.

The result has been a 70% increase in natural gas-fired power generation since 2005, with gas now responsible for a third of total US electricity generation. There has been a corresponding decline in the share of coal-based generation from 50% to 30% today. Alongside growth in renewables and advances in efficiency, coal-to-gas switching has contributed to the 21% drop in US power sector emissions intensity since 2010 respectively 200 Mt CO₂ in emissions in 2017 compared to 2010.⁴³

In the case of US, even with falling battery costs, natural gas is currently the most viable near-term option in most parts of the United States for balancing variable renewable energy at scale and providing essential load-following services.⁴⁴ Further, there is also other the advantages of natural gas as a transportation fuel include its domestic availability, widespread distribution infrastructure, and reduced greenhouse gas emissions over conventional gasoline and diesel fuels.⁴⁵ Natural gas powers more than 175, 000 vehicles in the United States and roughly 23 million vehicles worldwide. Natural gas vehicles (NGVs) are good choices for high-mileage, centrally fueled fleets because they can provide similar fuel range support for applications that stay within a region supported by reliable CNG fueling. For vehicles that travel long distances, liquefied natural gas (LNG) offers a greater energy density than CNG, meaning the fuel range is more comparable to conventional fuel. The advantages of natural gas as a transportation fuel include its domestic availability, widespread distribution infrastructure, and reduced greenhouse gas emissions over conventional gasoline and diesel fuels.⁴⁶ Even an Electric Vehicles charged purely on coal- or gas-fired electricity still has lower emissions than a petrol or diesel car, which comes to around 240g CO₂/km⁴⁷ (if one includes the emissions needed to extract, refine, and transport the fuel). An EV run on coal-fired electricity emits around 180g CO₂/km during use, while the figure for gas-fired electricity is about 90g CO₂/km. This is possible because internal combustion engines are less efficient than the turbines used in power stations. The case also illustrates that switching to an EV now, your impact is far greater than just your personal reduction in emissions.

⁴² Powering Past Coal. Available at: <https://www.poweringpastcoal.org/insights/coal-to-gas-switch-slashes-us-power-sector-co2>

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ AFDC. Vehicles, natural gas. available at: https://afdc.energy.gov/vehicles/natural_gas.html

⁴⁶ Natural Gas Vehicles USA (2020). Available at: <https://ngvamerica.org/environment/>

⁴⁷ The Conversation, Climate explained why switching to electric transport makes sense even if electricity is not fully renewable. Available at: <https://theconversation.com/climate-explained-why-switching-to-electric-transport-makes-sense-even-if-electricity-is-not-fully-renewable-136502>

Early adopters are vital. The more EVs we have, the more people will get used to them, the easier it will be to counter misinformation, and the more pressure there will be to cater for them. Many people have found that switching to an electric car has been empowering and has stimulated them to start taking other actions for the climate. The US case illustrates the success of the switch from coal to gas power plants as well as the use of NGV vehicles charged on gas which stimulated citizens taking actions for the climate.

Table 1. Lessons learned from the United States Case

The United States case		
Lessons learned from US case	Advantages in Kosovo context	Disadvantages in Kosovo context
Adoption of the approach of coal-fired plants, converting the steam boiler to burn natural gas	-	Lack of strong political support in the natural gas sector
Clean Air Plan	Law on protection of Air from Pollution exist	Lack of legislation enforcement Revision of Clean Air Law
Fuel switch from coal to natural gas has done more to reduce carbon emissions in the US over the last decade than any other single factor, including new renewable construction.	Possibility to switch from coal to natural gas	Lack of finances for the energy transition
Major increases in wind and solar renewables by 2030, will not fill the gap	-	Delivery infrastructure doesn't exist

from coal retirements, due to their intermittency and low capacity factors (average of 20%)		
Use of Natural Gas Vehicles (NGV)	-	Lack of finance, lack of technology, lack of people interest in buying NGC

Source: INDEP analysis.

5.2. The German case description

Germany is the largest natural gas consumer in the European Union (EU). In 2018, the German gas consumption was 92 bcm. Germany’s gas supply depends on other countries, as the country imports more than 90% of its natural gas consumption (44 bcm came from Russia, 34 bcm from the Netherlands and 22 bcm from Norway (3 bcm unspecified, 33 bcm re-exports)⁴⁸. Germany has an extensive gas infrastructure, which includes more than 515,000 km of gas pipelines, cross border connections to all its neighbors, as well as Russia and Norway, as well as the largest gas storage capacities in the EU (~23 bcm, corresponding to around a quarter of annual German consumption).⁴⁹ In July 2020, the German coal power exit law, as well as a law that provides support to coal regions for the transition, was adopted. The first law stipulates a coal exit by 2038 with an option to forward it to 2035 and creates the basis for the retirement of an assumed 40 coal plants with a capacity of 23 GW by 2030 in addition to retirements that were announced already.⁵⁰ In Kosovo’s context, there are no legislation even talks for the coal phase out. Currently, we don’t even know if the old TPP Kosovo A will be decommissioned or not?

Harnessing Germany’s vast gas infrastructure has the potential to play a critical role in helping to meet the country’s greenhouse gas reduction goals. The network of storage tanks and pipelines could deliver all sorts of carbon-neutral green gases for use in heating, industry and transport. By obviating the need for extensive investments to expand its electricity network and for the installation of new electric end-user appliances (such as heat pumps), Germany could save as much as EUR 12 billion a year by using

⁴⁸ IEA (2019). Natural Gas Information OECD/IEA, Paris.

⁴⁹ The European Natural Gas Network (2019). European Network of Transmission System Operators for Electricity, Brussels, Belgium. Available at: https://www.entsog.eu/sites/default/files/2019-10/ENTSOG_CAP_2019_A0_1189x841_FULL_400.pdf.

⁵⁰ Raitbauer, L. (2021). German coal power exit law, available at: <https://doi.org/10.1163/18786561-11020003>

its gas infrastructure to transport energy. The savings would help underpin popular support for Germany's Energiewende, or energy transition.⁵¹ In the Kosovo context, first we have to build the new gas infrastructure with the latest technology and use of Hydrogen as a fuel for 30%, or import from nearby countries through pipe line connection or the option of LNG. Kosovo too can save energy and costs if they chose the option of phasing in natural gas.

The case study of Germany's energy market shows that using the country's gas infrastructure to transport energy in the form of green gas can make a valuable contribution to decarbonization in future. Indeed, our analysis finds that it may be unrealistic to imagine that Germany will be able to rely on intermittent supplies of solar and wind power without continuing to use the extensive storage capacity of its gas network. Using both gas storage and gas networks will be cheaper than all electricity alternative and is likely to find favor with a public still skeptical of the details of the Energiewende.⁵² This approach that not only renewables can supply the energy mix in future but the need of natural gas as an intermittent supply should be considerate in the Kosovo context too as per German case.

Policy support may create demand that outstrips the local supply chains' ability to expand – thus generating the high tech “green jobs” overseas. An illustration is provided by Germany's solar photovoltaic (PV) industry being unable to match the surge in demand precipitated by aggressive policy support. This forced German customers to resort to imports, mostly from China.⁵³ The Chinese industry has been serving solar PV markets in Germany as well as other countries. Simultaneously, dissatisfaction grew in Germany around a wasted opportunity to create jobs and expand the PV manufacturing sector. One of the successes of the Energiewende regards R&D and innovation.⁵⁴

An important lesson to be elicited from the German case studies presented is that competitive pressures exercised on the new technology may be intentional or unintentional. These dynamics arise from myriad forces: domestic and foreign, technology- and market-driven. Best examples from the German case is to use the dedicated task force or commission should be mandated to facilitate the transition and serve the best interests of affected stakeholders, including the states, corporations, workers, communities, and consumers along the coal value chain. This commission should have as wide a societal and geographic representation as possible to ensure that all stakeholders are included. A special task force was designated in Germany, through the German Coal Commission.⁵⁵

The Germany as an ideal case to examine this tension because the country is widely recognized as a climate leader with impressive progress in its energy transition and ambitious decarbonization plans while at the same time offering strong state support to three new LNG terminals. We also believe that

⁵¹ Frontier Economics (2018). Gas infrastructure can smooth Germany's energy transition, available at: <https://www.frontier-economics.com/media/2915/gas-infrastructure-can-smooth-germany-s-energy-transition.pdf>

⁵² Ibid.

⁵³ Amro M. Elshurafa, Hind M. Farag, David A. Hobbs, (2019). Blind spots in energy transition policy: Case studies from Germany and USA, Energy Reports, Volume 5, ISSN 2352-4847. <https://doi.org/10.1016/j.egy.2018.11.001>.

⁵⁴ CERRE (2015). The energy transition in Europe: initial lessons from Germany, the UK and France. Available at: https://cerre.eu/wp-content/uploads/2020/07/151006_CERREStudy_EnergyTransition_Final.pdf

⁵⁵ P.-Y. Oei, H. Brauers, P. Herpich (2019). Lessons from Germany's hard coal mining phase-out: policies and transition from 1950 to 2018 Clim. Pol. 10.1080/14693062.2019.1688636

Germany is a particularly instructive case for a challenge, which other states may face as they enter the ‘next phase’ of the energy transition – when renewables reach a larger share of the electricity sector and the decline of existing technologies begins. From the Case of Germany, the main takeaway is the importance of the use of renewables. The German experience shows us that the take-off of an integrated long-term governance perspective is the outcome of a process of cumulative causation where institutional change, market formation, entry of firms and the formation and strengthening of advocacy coalitions are the constituent parts.

The German experience illustrates the trade-offs. On one hand, it has been costly for Germany to be one of the first movers of the Energy Transition. An important fraction of the low carbon investments were carried out when the technology was not mature. Indeed, the externalities generated by the German renewable energy rollout have allowed other countries to benefit from lower investment costs. A key lesson from the examined German case study is that the Energy Transition is a long process that requires strong political support. Another important take away is the use of Coal Transition Mechanisms (CTMs) “competitive auctions” to compensate coal plant owners for early retirement.⁵⁶ However, the German example illustrates that the complexity of the challenges of a transition can be mastered if municipalities, regional, and national governments, and institutions cooperate in a polycentric approach.

Table 2. Lessons learned from the German case

The German case		
Lessons learned from German case	Advantages in Kosovo context	Disadvantages in Kosovo context
Energy transition a very long process	Some of natural gas policies in place already	Lack of strong political support in the gas sector
Awareness with the whole stakeholders and just transition	Active civil society organizations	Lack of institution cooperation in a polycentric approach
The law on coal exit and just transition	Potential decommissioning of Kosovo A power plant	Lack of finances for the energy transition

⁵⁶ Coal Asset Transition Accelerator (CATA) (europeanclimate.org)<https://europeanclimate.org/wp-content/uploads/2021/11/cata-inception-phase-overview-cop26.pdf>

Coal Transition Mechanisms	Development of the same mechanism	Lack of this mechanism and policies
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Source: INDEP analysis.

5.3. The Polish case study description

Poland makes an interesting case study, as a big EU country with heavy reliance in coal like the case of Kosovo. Poland is the largest hard coal and second largest lignite producer in the EU, generating around 80 percent of its electricity from coal.⁵⁷ The Polish coal sector is in a dire financial situation. Without direct subsidies and government enforced bailouts, there would hardly be any hard coal mining left within Poland: Problems persist with profitability and liquidity in the hard coal mining sector leading to bankruptcies⁵⁸. The lignite sector is still generating (at least small) revenues; but lignite reserves in currently operating mines are shrinking. Also, the economics of coal-fired power plants is eroding, partly because of rising CO₂ prices.⁵⁹ Polish coal has still no major competition in the electricity sector, with only slowly improving market shares of wind energy and natural gas (renewables <15% share in electricity production, solar <1% and natural gas ~7% in 2018). A way for energy transition and to lower dependence on the Russian gas, Poland build a state-owned Liquefied Natural Gas (LNG) terminal, to important gas e.g. from Norway or the MENA region.⁶⁰

Reducing coal consumption has two dimensions in Poland. One is linked to the energy sector, as coal remains the main source of electricity (more than 70% in the mix). The other is related to the residential sector. Coal remains the primary source of heat for a large proportion of households (40.5%) and most houses (70%). Burning coal in domestic boilers causes smog, which is responsible for premature deaths in Poland.⁶¹ The transition to energy in the household sector is a major challenge in energy policy challenge. In 2018, the Polish government launched the Clean Air program, which focused on thermal modernization of single-family buildings, replacement of solid fuel heat sources by modern low-carbon heat sources that meet the highest efficiency standards, and connecting households to the heating or gas network. This program can be classified as one of a number of European policy actions enabling the transition to a low-carbon economy. Coal-fired boilers are being replaced by less polluting energy sources, of which gas boilers are the most common (45% share).⁶² The large role of fossil fuels in Poland's energy mix translates into a high level of CO₂ emissions

⁵⁷ IEA (2017). Coal Information 2017 OECD/IEA, Paris.

⁵⁸ Vaněk et al., (2017). Benchmarking of mining companies extracting hard coal in the upper Silesian coal basin Resour. Pol., 53 pp. 378-383, 10.1016/j.resourpol.2017.07.010

⁵⁹ Carbon Tracker Initiative (2018). Burning more money than coal. available at: <https://www.carbontracker.org/reports/burning-more-money-than-coal/>

⁶⁰ Brauers, H. et al. (2020). The political economy of coal in Poland: Drivers and barriers for a shift away from fossil fuels. Available at: <https://www.sciencedirect.com/science/article/pii/S0301421520303578#bib104>

⁶¹ EEA (2020). Air Quality in Europe – 2020 Report, available at: <https://www.eea.europa.eu/publications/air-quality-in-europe-2020-report>

⁶² Karpinska, L., Smiech.S. (2021). Will energy transition in Poland increase the extent and depth of energy poverty? Journal of Cleaner Production. Elsevier

compared to the European Union. The latest data show that Poland is responsible for Energies 2021, 11.2% of CO₂ emissions in the EU, which places it in third place after the largest emitters: Germany and Italy.⁶³

The first strategy “*Energy Policy of Poland until 2025*”, adopted by the Council of Ministers in 2005⁶⁴, continued prescribing an amplified scope of natural gas in the country's energy system. The envisaged growth of gas use in electricity generation was recognized as significant for reducing carbon dioxide emissions and decreasing coal's environmental load in the energy sector. It also emphasized Poland's geostrategic transit position and the necessity of developing a competitive gas market that would be well connected to the European gas network. As a result, Poland's natural gas demand would sharply grow in all four alternative scenarios contained in PEP2025, from roughly 18 bcm in 2010 up to 27–35.6 bcm in 2025.⁶⁵ Diversification of supplies and expansion of the network infrastructure of natural gas, crude oil and liquid fuels important positive and negative lessons can hereby be learned from other international examples, e.g. structural policy programs guiding the phase-out of coal mining in Germany since the 1960s.

Ultimately, Poland's Energy Policy until 2040⁶⁶, adopted by the government in 2021, assumes a transition to the path of sustainable development in the energy sector, which is to lead in 2040 to a level where more than half of the installed capacity will be zero-emission sources. The phase-out of fossil fuels is to take place thanks to the implementation of offshore wind energy into the Polish power system and the commissioning of a nuclear power plant. Moreover, the energy policy envisages transformation of all areas related to energy sources, including, inter alia, increasing the use of alternative fuels in transport. Given the long-term nature of transition processes, the most important challenge for energy transition governance lies in ensuring that future governments will remain credibly committed to overall transition visions and goals.

As a coal-dominated country today, ignoring such long-term trends could inflict great near-term costs, including rising environmental compliance costs from a highly inefficient, fossil fuel-based energy system, and the resulting, premature write-off of fossil fuels assets. Poland is a case in point. Having long resisted EU low-carbon targets and policies, the country's biggest energy company, the highly coal-intensive PGE (Polska Grupa Energetyczna), recently described itself as under threat of bankruptcy.⁶⁷ The biggest problem faced by the natural gas industry is simply that there is very little appetite amongst politicians to address the practical aspects of tackling the climate emergency, decarbonization, sustainable energy provision and air quality. Likewise, there is an increasing need to

⁶³ Statista. Carbon dioxide (CO₂) emissions in the European Union in 2000, 2010 and 2020. 2021. Available at: <https://www.statista.com/statistics/1171389/co2-emissions-european-union/>

⁶⁴ MG Polityka Energetyczna Polski Do 2025 Roku Ministerstwo Gospodarki, Warszawa(2005)

⁶⁵ Antosiewicz, M., et al. (2020). Pathways for the transition of the Polish power sector and associated risks, *Environmental Innovation and Societal Transitions*, Volume 35, Pages 271-291, ISSN 2210-4224, Available at: <https://doi.org/10.1016/j.eist.2019.01.008>.

⁶⁶ PEP 2040 (2020). Polish energy Policy 2040. Available at: <https://www.dentons.com/en/insights/articles/2021/march/15/polish-energy-policy-2040>

⁶⁷ Warsaw Business Journal, (2020). Energy firm in danger of collapsing. Available at: <https://wbj.pl/energy-firm-in-danger-of-collapsing-says-head/post/127707>

educate the public about these issues. Polish example illustrates that the energy transition from coal is a lengthy process. Thus, in light of the long-term dimension of the Energy Transition, there is a need for adequate long term policy planning. The lessons from the Polish case are a good takeaway for Kosovo's context.

Table 3. Lessons learned from the Polish Case

The Polish case		
Lessons learned from Polish case	Advantages in Kosovo context	Disadvantages in Kosovo context
Energy transition a very long process and a need for long term policy planning	New energy strategy is being finalized with the awareness component for just transition	Lack of Public awareness about just transition from coal
Clean Air Program	Law on Air protection exist but very low enforcement	Livelihood dependence on coal sector
Coal-fired boilers are being replaced by less polluting energy sources, of which gas boilers are the most common (45% share)	-	Lack of know-how on transitioning from coal to clean energy and in need of support on identifying innovative financial solutions
Having long resisted EU low-carbon targets and policies, the country's biggest coal energy company-PGE, recently described itself as under threat of bankruptcy	KESCO and KEDS have been privatized	KEK in the near future with the intro of carbon pricing could be the case of bankruptcy

Source: INDEP analysis.

5.4. The Bulgarian case study description

Bulgaria is virtually entirely dependent on Russian gas under a long-term supply contract from only one supply route (via Ukraine). Domestically-produced gas makes up the balance, peaking at 10-15% of the total but currently only 2.6%⁶⁸ The vast majority of Bulgaria's relatively small ~3 bcm/year gas demand is met by supplies under a long-term contract with Gazprom export, with a very small component of domestic production (80 MMcm/year in 2016 or 2.6% of the total).⁶⁹

Energy generation in Bulgaria relies equally on solid fuels and nuclear. Hydro contributes to balancing and peak generation, gas and variable RES play a minor role in the system. The share of lignite in

⁶⁸ Energy and Water Regulatory Commission Report to EC (2017). Available at: <http://www.dker.bg/PDOCS/EWRCReport-EC-ACER-2017-%D0%B5n.pdf>

⁶⁹ Baringa Partners LLP (2018). The role of gas in decarbonization in Bulgaria, available from: <https://www.baringa.com/getmedia/e67d81fa-77f1-4282-b956-d11e643fb6c3/Baringa-Bulgaria-Report-ENGLISH-VERSION-FINAL-WEB/>

power generation is therefore projected to fall at a fast pace, and the aged lignite fleet to be fully decommissioned until 2040. The development of additional gas capacity occurs post 2025; however, the energy efficiency of the gas fleet is poor compared to modern large-scale CCGT. This is why the capacity gap created by the decommissioning of inefficient gas plants in 2030 and 2040 is filled by the deployment of two new CCGT plants (790 MW and 844 MW) in the respective years.

Thermal power plant (TPP) Varna decommissioned three coal-fired units with an installed capacity of 630 MW in total in 2017 as it replaced them with three equivalent gas units. The transformation plan comprises the construction of two combined cycle power units on the site of old units 1, 2 and 3 and the ability to include hydrogen with a share of up to 30%.⁷⁰

The important lesson derived from Bulgaria’s case is the urgent decommissioning of old coal plants with new natural gas plants. Therefore, the example of Bulgarian gas market, which has some similar characteristics to Kosovo, may provide a useful model for the source of funding coming from energy transition. Given the long-term nature of energy transition processes, the most important challenge for energy transition governance lies in ensuring that future governments will remain credibly committed to overall transition visions and goals.

Further, it is the importance of combining not only policies addressing unemployment and the attraction of new energy corporations and investments, but also measures improving infrastructure, education, research facilities and soft location factors. Protecting a declining industry for decades caused increased energy transition costs compared to an earlier phase-out. Economic reorientation and changing regional identities have proven most difficult in the past.

Table 4. Lessons learned from the Bulgarian Case

The Bulgarian case		
Lessons learned from Bulgarian case	Advantages in Kosovo context	Disadvantages in Kosovo context
The most important challenge for energy transition governance lies in ensuring that future governments will remain credibly committed to overall transition visions and goals	New Energy Strategy is being finalized Financial Assistance from the Western Balkan Green Agenda	Governments not completing its mandate
Awareness with the all stakeholders and just transition	Strong CSO in the field of energy	Livelihood dependence on coal sector
Decommissioned of coal-fired units and replaced with equivalent gas units	Same environment can adopt the same approach	Financial costs

Source: INDEP analysis.

⁷⁰ Balkan Green Energy (2021). <https://balkangreenenergynews.com/two-bulgarian-coal-power-plants-to-be-converted-to-natural-gas-hydrogen/>

5.5. The North Macedonian case study description

North Macedonia makes an interesting case study of a small country and a largely state-owned energy sector, which has used variable renewables and natural gas to cut fossil fuel and electricity imports, and increase domestic energy security. North Macedonia made a strategic decision to ramp up renewable power and use the natural gas interconnection. We see some parallels with Kosovo and possible natural gas connection between both countries and the potential for rapid growth in variable renewables in Kosovo. North Macedonia is 100% reliant on natural gas imports from Russia through the International Corridor 8 that passes through Ukraine, Moldova, Romania, and Bulgaria through a single interconnection point from Bulgaria. The total capacity of the natural gas transmission system is 800 million nm³/annually, with an operational pressure of 54 bar and diameter of the magistral pipeline of 530 mm⁷¹. Gas is mainly consumed by industrial customers and the three CHP plants, while households have an almost negligible share of total consumption due to the very limited spread of distribution networks.

An interconnection with Greece, currently in design stage, which will be potentially operational before 2025 may diversify routes and enhance gas to gas competition. Other interconnections with Serbia, Albania and Kosovo have also been proposed. Currently, natural gas contributes to only 7% of the primary energy consumption and average annual utilization of existing transmission system is low, ranging from 5-15% in the summer season to 50-80% in the winter. Gas is mainly used for electricity production (79.26%), industry (18.44%) and commercial and public services. Only two municipalities, Kumanovo and Strumica have a distribution network.

Air pollution, in the form of particulate matter (PM), mainly due to solid and oil fired space heating in households and commercial sector is increasing. Recent data for the period 2004 to 2017 show that during the entire period, population in larger cities has been exposed to PM concentrations in excess of limit values. To this end, the government of North Macedonia, assisted by international donors, has put forward an ambitious gasification plan since the early 2010s.⁷²

Further, North Macedonia and Greece signed an agreement for the construction of a gas interconnector of 1,5 Bcm annual capacity. The company “Nacionalni Energetski Resursi” continues to make progress in constructing new transmission infrastructure, despite delays caused by the Covid-19 lockdown. Two sections, Klecovice-Negotino and Negotino - Bitola, are expected to be finished by the end of 2021. Once finalized, these pipelines will be integrated into the single national transmission grid.

The main purpose of the construction of this main gas pipeline section arises from the strategic commitment of the Government of the N. Macedonia in order to achieve higher level of overall functionality of the energy system in the country and to provide conditions for significantly greater

⁷¹ Energy and Water Services Regulatory Commission of the N. Macedonia. Available at: https://www.erc.org.mk/odluki/2019.07.23_GI%20za%20rabotata%20na%20RKE%20za%202018%20godina-ENG.pdf

⁷² EBRD (2020). Gas distribution network in North Macedonia

infrastructural and economic integration with the neighboring and the remaining European countries. This project will ensure the diversification of natural gas sources and supply routes (see Fig 2) and the liberalization of South-eastern Europe's energy market. Allowing access to energy fuel on the territory around Ohrid and possibility for interconnection with TAP. Public private partnership (PPP) for the construction and operation of new gas power plant. The duration of the concession/PPP scheme is estimated of the order of 20 and 25 years for a period of 20 years.

The project gas interconnector between Kosovo and North Macedonia (see Fig 3) which is currently at its blueprint stage, envisages the construction of a gas interconnector between Kosovo and North Macedonia. The development of interconnectivity between Kosovo and North Macedonia will boost energy security and contribute to further energy market integration.⁷³ This investment project will build 16 km of gas pipeline, from the Skopje – Kičevo pipeline at the village of Upper Matka (17 km west of Skopje) to the border with Kosovo. The interconnection has a total length of approximately 86 km: 16 km in North Macedonia and 70 km in Kosovo. In addition, N. Macedonia has signed three memoranda with Greece to secure the supply of natural gas from the planned liquefied natural gas terminal in Alexandroupolis and of electricity from a nearby gas-fired power plant in order to implement its strategy to phase out coal and switch to renewables and gas. The country intends to use gas to reduce pollution and strengthen environmental protection.⁷⁴



Fig. 2. Gas infrastructure in N. Macedonia

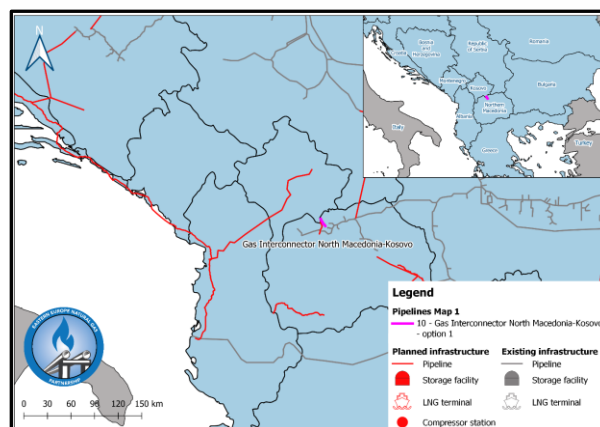


Fig. 3. Gas Interconnector N. Macedonia-Kosovo⁷⁵

The country will participate with 25% in the construction of the 800 MW natural gas power plant in Alexandroupolis. Investment in the combined cycle power plant is estimated at EUR 380 million. North Macedonia intends to acquire a 10% share in the EUR 370 million LNG terminal.⁷⁶

⁷³ Ibid.

⁷⁴ Balkan Green Energy News (2022). North Macedonia Securing Gas Electricity Supply amid Coal phase-out. Available at: <https://balkangreenenergynews.com/north-macedonia-securing-gas-electricity-supply-amid-coal-phaseout/>

⁷⁵ USEA (2021). Eastern Europe Natural Gas Partnership available at: <https://usea.org/sites/default/files/EE-NGP%20Catalog%20of%20Potential%20Eastern%20European%20Natural%20Gas%20Investment%20Projects%20in%20Support%20of%20the%20Three%20Seas%20Initiative.pdf>

⁷⁶ Ibid.

North Macedonia to shut REK Bitola coal plant unit, switch to gas. Prime Minister of North Macedonia said the first unit in coal power plant REK Bitola⁷⁷ would be closed and then switched to natural gas from a planned pipeline, as part of the strategy to abandon lignite use altogether in the country. He noted the government must comply with European Union rules on carbon dioxide emissions before joining it. Further, Government of North Macedonia intends to switch the 210 MW thermal power plant TEC Negotino from fuel oil to natural gas.⁷⁸ TPP Negotino was built in 1978. According to the local media, the price of electricity produced in Negotino is very high, around 130 EUR/MWh. The plant will use natural gas and provide opportunities for increased agricultural production.⁷⁹

The N. Macedonian case provides a useful example as the energy sectors of Kosovo and N. Macedonia share some common features. The main lessons was to provide subsidized to switching to natural gas to a large number of less well-off households unable to participate in other types of financing schemes as well as the use of public private partnership (PPP) for the construction and operation of new gas power plant. Another lesson from the case of N. Macedonia is that the model of having contracts to import the LNG from Greece and to switch to gas from coal plants which are viable options in Kosovo too.

Table 5. Lessons learned from the North Macedonia Case

The North Macedonian case		
Lessons learned from N. Macedonia case	Advantages in Kosovo context	Disadvantages in Kosovo context
Incentives for substitution of other energy sources by natural gas as an example the case of zero VAT and the extreme of zero VAT and full subsidization of the heating equipment.	Know – how from earlier use of incentives for energy efficiency and feed in tariffs	The lack of gas infrastructure and proper gas market hinder gas power investments Low diversification of energy sources No incentives for gas/no market yet
Contracts to import the LNG from Greece and to switch to gas from coal plants	Good geographical location in the region	Government willingness to go with this approach of import of LNG from Greece
Switch to gas from coal plants	Power coal plants that could potentially switch to gas	The lack of gas infrastructure and proper gas market hinder gas power investments

Source: INDEP analysis.

⁷⁷ Balkan Green Energy News (2022). North Macedonia to shut Rek-Bitola-Coal-Plant-Unit-Turn-To-Gas. Available at: <https://balkangreenenergynews.com/north-macedonia-to-shut-rek-bitola-coal-plant-unit-turn-to-gas/>

⁷⁸ Ibid.

⁷⁹ Government of Macedonia. National Energy Strategy. Available at: https://economy.gov.mk/Upload/Documents/Adopted%20Energy%20Development%20Strategy_EN.pdf

6. Options for the natural gas as a transition fuel in Kosovo

Kosovo is heavily reliant on coal for power production, and is under pressure to reduce its fossil fuel footprint and pollution as they aspire to join the European Union. The Signed Green Agenda for Western Balkan will impose a strict rule on coal and phasing-out coal subsidies to the extent they consider State aid and putting in place adequate carbon pricing mechanisms. Natural gas, due to having approximately half the CO₂ polluting effects vis-à-vis other fossil fuels has been considered as a transition fuel before renewable energy's technological viability can surpass its challenges to produce secure and sustained energy⁸⁰. Recent analysis by the Energy Community shows that Kosovo's lignite power plants today on average exceed LCPD dust limits by 400% and are nearly double applicable NO_x limits.⁸¹ Considering that we are in the year 2022 and in 28 years we need to achieve to carbon neutrality as Kosovo has signed the Sofia Declaration, on the Green Agenda for the Western Balkans⁸² that aligns with EU Green Deal. Finally, the European Union has admitted the obvious: if decarbonization is the goal, natural gas and nuclear must be a big part of the continent's energy mix.

In January 2022, the European Commission⁸³ released a statement which said “there is a role for natural gas and nuclear as a means to facilitate the transition towards a predominantly renewable-based future.” The move means that gas and nuclear could be classified as “sustainable investments” under certain conditions. According to the latest European Commission proposal⁸⁴ the investments in natural gas power plants would also be deemed green if they produce emissions below 270g of CO₂ equivalent per kilowatt hour (kWh), replace a more polluting fossil fuel plant, receive a construction permit by Dec. 31 2030 and plan to switch to low-carbon gases by the end of 2035.

According to the latest report of US Energy Association⁸⁵ a key finding is that South East Europe including Kosovo cannot remove a huge percentage of the coal and lignite generation by 2030 without **large increases in natural gas generation** (other technologies are not yet ready to fill the gap). In many ways, **natural gas needs to be the bridge fuel to a decarbonized future** of the region. This also emphasizes the importance of a diversity of gas supply to meet the need for new gas generation, and the need for pipeline infrastructure and finances to realize those additions.

Another report from Institute for Energy Economics⁸⁶ and financial analysis the electricity demand in Kosovo is expected increase as much as 20% by 2030, driven by income growth and gradual electrification of the wider energy sector, implying an additional 1,200 gigawatt-hour (GWh) annual

⁸⁰ Smil V. (2015). Natural gas: fuel for the 21st century. Hoboken, New Jersey: Wiley.

⁸¹ Energy Community, (2020). WB6: Energy Transition Tracker.

⁸² European Commission (2020). Green Agenda for the Western Balkan, Available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/green_agenda_for_the_western_balkans_en.pdf

⁸³ European Commission (2022). Euractive article. Available at: <https://www.euractiv.com/wp-content/uploads/sites/2/2022/01/draft-CDA-31-12-2021.pdf>

⁸⁴ Ibid.

⁸⁵ USEA (2021). Assessment of the Impact of High Levels of Decarbonization and Clean Energy on the Electricity Market and Network Operation in Southeast Europe. Available at:

<https://usea.org/sites/default/files/SEE%20Decarbonization%20in%202030%20-%20EMI%20Executive%20Summary.pdf>

⁸⁶ Gerard Wynn, G., Flora, A. (2020). Beyond Coal: Investing in Kosovo's Energy Future.

demand in 2030. The Government needs to see natural gas as a state self-strategic investment and to engage in financial partnership with international financial institutions MCC, EBRD other IFi's to Gasify its National Energy System. Public private partnership (PPP) for the construction and operation of distribution gas networks. Natural gas's properties suggest that it will play an important role in Kosovo's future energy mix. With global prices expected to remain relatively low, gas is a cost-effective, abundant fuel that efficiently delivers and stores significant energy content. It can effectively contribute to addressing the *Energy Trilemma: delivering decarbonization, ensuring security of supply, and ensuring energy affordability*.

Kosovo needs to maximally utilize being a part of the Eastern Europe Natural Gas Development Partnership (EE-NGP)⁸⁷ was established by the United States Agency for International Development (USAID), the United States Energy Association (USEA), and Ministries and Natural Gas Transmission System Operators (TSOs) of Eastern Europe in May 2017 to build sustainable institutional capacity and to develop and utilize the region's first common transmission planning models.

In December 2021, Kosovo had a major energy supply crisis management with the reduction in electricity, Government needs to take steps to have alternative energy supply sources for its citizens. Thus, knowing the basic problems the energy sector in Kosovo faces:

- Unstable electricity supply due to outdated lignite electricity generation capacities, which provide about 90% of electricity for the needs of the country;
- Low diversification of energy sources due to lack of natural gas system, slow development of capacities for production of energy from RES, central heating and limited water resources;
- Low system flexibility for integration of variable sources of renewable energy;
- The lignite electricity generation chain is associated with major environmental pollution; and
- The lack of gas infrastructure and proper gas market hinder gas power investments.

Taking into account the thermal district heating plan, it is more efficient if Kosovo invests into small thermal oriented district heating companies that would produce sustainable heating systems with the energy community standards. That would drastically reduce the emission by the other categories of elements burned by the households, and also would radically reduce the energy consumption during the winter season in Kosovo. It is argued that the energy consumption during winter is twice as big as the summer consumption in Kosovo. If by this method, the energy consumption is flattened and compressed to lower figures, the network loss would also drop and the systems become more sustainable. Expected consumption of natural gas for both the Albania part and Kosovo will grow to up to 2,121 mil. m³ of natural gas in 2040 out of which 625 mil. m³ is for a potential CCGT in Kosovo

⁸⁷ USEA (2021). Catalog of Potential Eastern European Natural Gas Investment Projects in Support of the Three Seas Initiative. Available at: <https://usea.org/sites/default/files/EE-NGP%20Catalog%20of%20Potential%20Eastern%20European%20Natural%20Gas%20Investment%20Projects%20in%20Support%20of%20the%20Three%20Seas%20Initiative.pdf>

and 242 mil. m³ is for DH CHP systems in major consumption centers in Kosovo.⁸⁸ The World Bank/KfW South East Europe Gasification Study has considered the economics of bringing gas into Kosovo. Considering the demand for heating from the existing District Heating (Prishtina, Gjakova, and Mitrovica). Their total heat generation is approximately 250 GWhth/year, or about 4-5% of the Kosovo heating demand. The district heating facilities supply the most densely inhabited parts of the cities and public facilities such as hospitals, schools and administrative buildings as well as industrial enterprises⁸⁹. It concluded that it may be viable to supply industrial and commercial load and build gas distribution networks particularly in Prishtina and Mitrovica (the two main cities analyzed by the abovementioned study). The potential of the natural gas demand is 1.2 bcm (considering only industry, service and residential sectors) up to approximately 2 bcm (considering industry, service and residential sectors, DH & Cogeneration and 250 MW CCGT power plants).⁹⁰

Table 6. Gas demand in Southeast Europe 2013-2025⁹¹ (Final consumption, in cubic meters)

Country	2013	2025
Albania	6,842	523,741
Bosnia and Herzegovina	136,500	612,972
Bulgaria	1,666,526	2,499,495
Croatia	1,700,632	1,977,717
Greece	1,504,605	2,300,190
Kosovo*	0	207,858
North Macedonia	33,053	355,764
Montenegro	0	120,681
Romania	7,900,079	8,092,248
Serbia	1,226,816	1,726,638
TOTAL	14,175,053	18,417,303

In the context of gas supply, i.e. interconnection infrastructure and gas entry points, is critical for gas uptake in the WB6 and Kosovo, since it affects pricing and power plant investment. Market integration ensures a diverse gas supply context, which practically means the WB6 have access to cheaper, more secure and flexible gas. Within a regional, integrated gas market, where investors receive the right signal regarding capital returns of new gas investment, the WB6 with increased exposure to carbon pricing, like Kosovo, can attract investment in infrastructure development and accelerate the substitution of solids. Further, Kosovo later can leverage gas as a balancing resource to accelerate the decarbonization of its power system. Kosovo is in the process of developing its National Energy and Climate Plan 2021-2030 with a long-term outlook to 2050, as well as revising its Energy Strategy 2021-2030. Moreover, given the flexibility of gas as a backup source, it's lower carbon footprint, and the

⁸⁸ Energy Community, Gas_13 / Albania – Kosovo Gas Pipeline (ALKOGAP), available at: <https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas13.html>.

⁸⁹ Development and Evaluation of Power Supply Options for Kosovo (2011). Available at: https://dhinfrastructure.com/wp-content/uploads/2015/03/Kosovo_generation_options_report_12312011.pdf

⁹⁰ Ibid.

⁹¹ UNECE (2020). Potential for natural gas to penetrate in new markets, available at: https://unece.org/DAM/energy/se/pdfs/CSE/PATHWAYS/publ/NG_Potential.pdf

failure to develop a new coal-fired TPP natural gas is expected to take on an even larger role in the future.

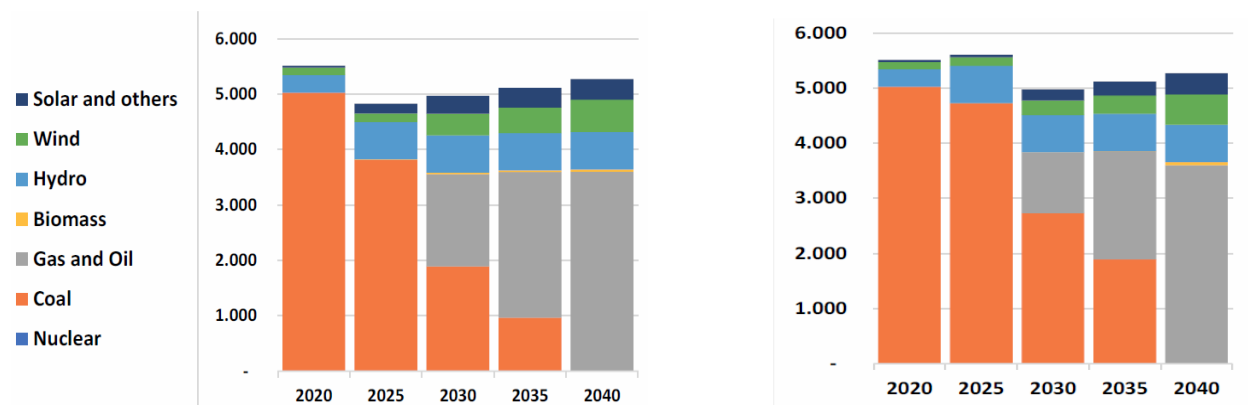


Figure 4. Full Carbon Pricing-Market integration **Figure 5.** Gradual-Carbon Pricing-Market Integration.⁹²

As can be seen in Energy generation outlook projections in the figure 4 and 5 above, the coal phase out in Kosovo might be possible in 2040 with the full market integration in tandem with full carbon pricing can hasten coal phase-out. In those conditions, variable RES dominate generation, backed by gas-firing power and cross-border balancing.

Table 7. Capacity expansion in Kosovo in MW across projections: Full_CP_M (Full Carbon Pricing-Market integration) and Gr_CPM_int (Gradual-Carbon Pricing-Market Integration)⁹³

	2015-2030					2030-2040				
	BSL	Gr_CP-M_Fr	Full_CP-M_Fr	Gr_CP-M_Int	Full_CP-M_Int	BSL	Gr_CP-M_Fr	Full_CP-M_Fr	Gr_CP-M_Int	Full_CP-M_Int
Nuclear	-	-	-	-	-	-	-	-	-	-
Coal	(87)	(148)	(222)	(537)	(537)	-	-	-	(610)	(610)
Gas and Oil	-	-	-	149	222	-	-	-	455	379
Biomass	12	8	8	2	8	-	8	10	14	5
Hydro	89	89	156	156	156	-	67	-	-	-
Wind	135	137	143	139	206	43	55	85	154	101
Solar and others	167	176	213	176	291	41	133	103	171	45

As can be seen in the table 7 above, under the Full Carbon Pricing-Market integration, the natural gas capacities in post-2030 will be around 379 MW whereas under the Gradual-Carbon Pricing-Market Integration is 455 MW.⁹⁴ As a result, Kosovo has committed to a number of actions like introducing carbon pricing instruments and market-based renewables support schemes, as well as phasing out coal subsidies. Therefore, the optimal solution for the development of Kosovo’s energy sector is a hybrid

⁹² EnCT, Kantor, EM (2021). A carbon pricing desing for the Energy Community, available at: https://www.energy-community.org/dam/jcr:82a4fc8b-c0b7-44e8-b699-0fd06ca9c74d/Kantor_carbon_012021.pdf

⁹³ Ibid.

model that entails a coal phaseout and transition to renewable energy sources, with natural gas and possible hydrogen as transitional fuels.

As shown in the table 8 below the Natural Gas can contribute in the energy mix and replace coal in power generation and at the same time provide the balancing services needed to address the intermittence of variable RES and facilitate their increased integration into the system. However, as gas markets remain fragmented, gas infrastructure investment is not flowing into the EnC and the WB6 are effectively denied access to cheaper and more flexible gas. While carbon pricing reduces solids-based generation, gas emerges as an important complementary transition fuel. Capturing the potential of gas can nevertheless only materialize under market integration conditions. Gas units perform the high-ramping operation needed to balance the major fluctuations of variable RES and facilitate their increased penetration in the electricity system. Natural gas sector development and energy reserves creation with the intent to facilitate renewables integration, relieve Kosovo’s dependence on coal, and achieve decarbonization goals.⁹⁵ Moreover, GoK option is to take a decision for the three non-working units A1, A2 and A3 of TPP Kosovo A, which could be decommissioned until 2025. The remaining two units (A4 and A5) to operate for ten more years until 2032.

Table 8. Key drivers for natural gas contribution in Kosovo’s energy mix

<ul style="list-style-type: none"> - Availability and prices of natural gas (NG), price relations between electricity and NG -The introduction of advanced technologies to supply gas through virtual pipelines, liquefied natural gas (LNG) - Meeting the WB Green Agenda requirements and EnCT and renewables and CO₂ targets, introducing the carbon pricing - Overall regional electricity market development and electricity trade in the region (including interconnections firstly with Albania, N. Macedonia). 	<ul style="list-style-type: none"> -Natural gas will be a bridge fuel in the energy transition -Environmental benefits-NG will emit significantly less CO₂, NO_x, and SO₂. -Reduction of electricity load and improve the overall reliability of Kosovo’s electric system 	<ul style="list-style-type: none"> In 2030, the gas network will be able to transport a mixture containing 10% of decarbonized gases -By 2040, the heating needs of all households will be covered by DH and by zero or low-emission 	<ul style="list-style-type: none"> -The infrastructure of NG, will be developed and DH expanded, and the diversification of supply directions will be ensured - NG can synergize with renewable technologies to balance intermittent electricity outputs
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Source: INDEP analysis.

⁹⁵ Millennium Challenge Corporation Kosovo. available at: <https://www.mcc.gov/resources/story/story-cbj-fy2022-compact-assistance>

As far as natural gas is concerned, gas Interconnection to Greece (LNG), to Republic of Macedonia, TAP Albanian will enhance the Kosovo security supply and will enable establishing further connections to the international gas networks and gas hubs (Southern Corridor, LNG terminals, EUSAIR). If these projects are not realized, Kosovo will remain in a highly vulnerable position at the moment as far as security of energy supply is concerned. The level of energy security of supply in Kosovo is not ideal however further diversification in supply is needed and natural gas is one of the most suitable options. Kosovo's commitment to the EU's Green Agenda for the Western Balkans hinges on it developing concrete plans for the decarbonization process. The new government has started drafting a future energy strategy, which will have a huge impact on Kosovo's economy. In the view of the EU, the USA (MCC) and IFI's their position is to bring the gas to Kosovo and to gasify Kosovo as is shown in the following paragraphs. This can offer the region⁹⁶ a widely available, secure and affordable source of energy that will keep the region competitive on an international scale, while significantly improving air quality and lowering emissions.

Regional cooperation is essential to decarbonization in the Balkans as it is a low-cost and simple way of achieving the desired security of electricity supply. Kosovo should strive to improve its cooperation and work towards energy market integration within the region. For Kosovo is an ideal option to use the technical assistance under the European Commission "Coal regions exchange program" respectively the initiative supporting transition in coal energy countries "Coal regions in the Western Balkans and Ukraine."⁹⁷ In accordance with the development of international gas pipelines, there are several options for interconnection of the gas pipeline system of Kosovo, with: TAP (Trans Adriatic Pipeline), N. Macedonia, LNG terminals in Greece and possible LNG terminal in Krk as well as other options through CESEC, EUSAIR and PECE/PMI projects.

Further, Kosovo started engaging in developing a *feasible and realistic supply route from North Macedonia*, in addition to or instead of the favored connection with Albania's gas network. The North Macedonia – Kosovo interconnector is gaining momentum and could receive assistance from international funds.⁹⁸ Moreover, according to the project of WBIF/EBRD⁹⁹ a gas interconnector with North Macedonia would be a cost-efficient option for the import of gas. Also, the *Gas Master Plan* for Kosovo is being prepared by the WBIF¹⁰⁰ with the main objectives of the project are the development of a medium-term natural gas master plan for Kosovo as well identification of priority investment projects, including regulatory framework review and assistance. The Millennium Challenge

⁹⁶ European Commission (2020). WB Economic and Investment Plan, available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf

⁹⁷ European Commission (2020). Initiative for coal regions in transition in the Western Balkans and Ukraine. Available at: https://energy.ec.europa.eu/topics/oil-gas-and-coal/coal-regions-western-balkans-and-ukraine/initiative-coal-regions-transition-western-balkans-and-ukraine_en

⁹⁸ Energy Community Secretariat (2020). Implementation Indicator Gas, available at: <https://www.energy-community.org/implementation/Kosovo/GAS.html>

⁹⁹ WBIF/EBRD, North Macedonia -Kosovo Gas interconnection, available at: <https://wbif.eu/project/PRJ-MKD-ENE-016>

¹⁰⁰ WBIF, Gas Master Plan for Kosovo, available at: <https://wbif.eu/project/PRJ-KOS-ENE-011>

Corporation (MCC)¹⁰¹ through the Energy Compact Program in Kosovo is preparing a *Gas Sector Development* Project.

The role of market integration is thus fundamental for enabling coal phase-out, albeit this happens only after 2040 due to low lignite costs before that. In particular, it focuses attention on investments in LNG terminals, which provide a useful example for analyzing the dynamics underpinning expansion of gas dependency within the Kosovo case. Therefore, Kosovo needs to plan the development of the natural gas cross-border infrastructure to diversify supply routes and increase market competitiveness. The results show that the highest yearly consumption amounts up to 650 mil. Nm³ or 521 ktce (Having in mind that most of the consumption is during winter period, the capacity of the pipeline should be at least two times higher than yearly consumption. Obviously, with no gas infrastructure Kosovo needs to assure regional infrastructure integration through completion of interconnection projects with Albania or N. Macedonia or import LNG from Greece or Krk Croatia. Development of infrastructure will grant access to larger, more liquid markets, and stimulate entrance of specialized gas players into the Kosovo market. This will grant higher competition and market-based setting of gas price securing sustainability of the gas sector at a competitive price.

Gas consumption growth is primarily driven by TPPs for electricity and heat production in from DH. As a result of high CO₂ price, the gas consumption is higher, and fuel switch from coal to gas is occurring in the industry. Additionally, the electricity price from gas power plants could be competitive than electricity price from RES, so the gas consumption for electricity generation will remain significant. In order to assure a holistic approach for development of gas distribution networks, it is necessary to create an action plan. Coordination of the Government and municipalities, as well as political willingness, are needed for successful completion. Moving from lignite towards cleaner energy is a difficult task and is not comparable to any recently executed reform or transformation by Kosovar society. Much of Southeast Europe and WB6 still has only limited access to gas and particularly to diversified supplies. The situation is improving as a result of both new pipeline connections TAP and LNG regasification terminals. However, particularly for smaller and generally poorer countries in the region, internal distribution networks are limited and it will be some time before much of the region can benefit from attractively priced gas. There is also potential for natural gas to be used increasingly both for power generation and heating, not least by replacing lignite. From the EBRD energy strategy¹⁰² the scenario most recommended in WB6 for transition from coal is that which promotes huge expansion of gas power generation.

Moreover, the strategy states that gas can have a role in shifting away from carbon-intensive fuels such as coal by supporting the scaling-up of intermittent renewables and switching to cleaner fuels to reduce GHG emissions and/or improve air quality. According to the Economic Investment plan for Western Balkans for those countries (which includes Kosovo) which are heavily reliant on coal key for moving

¹⁰¹ Millennium Challenge Corporation-Kosovo Compact Project, available at: <https://assets.mcc.gov/content/uploads/Final-Kosovo-Compact-609g-CN-Tranche-II.pdf>

¹⁰² EBRD (2019). Energy sector strategy 2019-2023, available at: <https://euea-energyagency.org/wp-content/uploads/2018/10/draft-energy-sector-strategy.pdf>

away from coal in the short to medium term could be a switch to modern, low emission gas infrastructure. Kosovo in this regard as EU potential candidate country should follow EU's advice on streamlining the agreements for joining the project in accordance with the EU energy law. GoK should also seriously consider and make concrete steps in joining the Trans-Adriatic Pipeline. Kosovo consumes effectively no natural gas, and thus the plan to connect ALKOGAP¹⁰³ through TAP to a national gas network will provide the opportunity to adopt gas as a source of domestic consumption.

Despite poor progress in energy infrastructure developments and insignificant changes in consumption patterns, the Kosovo government should emphasize the role of gas in the country's future energy system and particularly in electricity generation and district heating. Additionally, the US position is in bringing gas to Kosovo through the Northern Macedonia pipeline through the Millennium Challenge Corporate the compact energy program where there are working on the gas studies for Kosovo and the potential connection Kosovo and North Macedonia. With the interview with the officials from Millennium Challenges Corporation Kosovo¹⁰⁴ we learned that the first draft of the gas study has been drafted.

Finally, deploying intermittent RES requires larger shares of gas in the energy mix. Gas power plants, characterized by relatively low investment costs, can be used to provide low-cost flexibility¹⁰⁵, which can facilitate the integration of wind and solar power in the energy system. Gas firing technologies are currently more competitive than any energy storage technology.¹⁰⁶ The EU is focused on infrastructure projects that can contribute to significant de-carbonization within the energy sector (hydro, renewable sources, natural gas, etc.) in WB6 and the United States remains a significant source of foreign assistance to Kosovo, in energy sector through MCC compact program.

As stated, earlier Kosovo has no gas infrastructure, therefore, no connection to international gas transmission systems. The development of the gas market in Kosovo with all the new gas developments in the region and functionalization of the TAP is a necessity and will enable the country to a) increase the security of supply; b) attracting investments in the natural gas sector; c) participation in the regional natural gas market. Successful integration of the gas market for Kosovo will require the development of a national network of gas that will be powerful enough to meet projected consumer needs and achieve European standards and the inclusion of Kosovo as part of a sub-regional gas network that enables infrastructure development, aiming for greater sub-regional demand.

While market integration gas supply will ensure the distribution of gas in the domestic market and strengthen the national economy. The major obstacles for sustainable decarbonization are artificially low energy prices in the country. They are highly subsidized by the government and cannot cover the

¹⁰³ Energy Community Treaty. available at: <https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas13.html>

¹⁰⁴ Personal Interview with the public official from the MCC program

¹⁰⁵ P. Denholm, R.M. Margolis (2007). Evaluating the limits of solar photovoltaics (PV) in traditional electric power systems Energy Policy, 35 (5) pp. 2852-2861

¹⁰⁶ D. Elliott (2016). A balancing act for renewables Nat. Energy.

necessary capital investments for the energy sector. Because the Energy Community repeatedly declared coal subsidies a violation of state aid rules of its member states, it seems that, apart from renewables, natural gas should be the preferred option by the new government. In the short term, natural gas would reduce negative consequences of decarbonization to the economy and energy stability. In the following section we present the four possible options of natural gas introduction in Kosovo for bridging the remaining gap to meet domestic demand and meeting the environmental commitments for carbon neutral Kosovo until 2050.

6.1. OPTION 1. Introduction of natural gas via Albania - TAP pipeline

The Trans-Adriatic Gas Pipeline (TAP) project was established to strengthen regional cooperation between Albania and other countries in the region in meeting natural gas demands while also ensuring energy security and sustainability within the region. Currently, no gas pipelines are connecting Albania to Kosovo, nor other major regional markets. Based on recent studies it is presumed that the entire future gas consumption in Albania will be supplied from TAP and Ionian-Adriatic Pipeline (IAP). The IAP Project intends to connect the existing gas transmission system of Croatia via Montenegro and Albania to the TAP system, which is expected to be operational post 2020. Kosovo until now is not yet a part of ENTSO-G but it is continuing its work towards becoming a part of this European networks.

An ideal option for the introduction of natural gas in Kosovo is via the Albanian - Trans Adriatic pipeline. For this, the *pre-feasibility study for the ALKOGAP* project was completed, financed through Western Balkan Investment Framework (WBIF) and European Bank for Reconstruction and Development (EBRD).¹⁰⁷ Although there is no gas infrastructure, Kosovo can take advantage of its location geographical location within the Western Balkans region and become an actor in the development of a regional network for gas transmission becoming a part of TAP through ALKOGAP.

The pre-feasibility study ALKOGAP has provided follow-up recommendations, the preparation of a master plan for the distribution of natural gas in Kosovo, and then the complete feasibility study for the Albania-Kosovo gas pipeline is initiated and another study on the environmental and social impact.¹⁰⁸ The demand for natural gas was assessed in this prefeasibility study, it included a plant for electricity production, to a small extent, the industry with three major producers such as Sharrcem, Feronikeli and Trepça, but also the rest of the industry.¹⁰⁹ The region's potential access to new gas supply sources provides an opportunity to diversify sources of energy supplies.

The selection of the TAP as the main export route for Azeri gas from the Shah Deniz II Caspian gas development provides an opportunity for the Western Balkan region to obtain access to Caspian gas sources.¹¹⁰ TAP will provide the opportunity to gasify Kosovo and the region through spur lines and

¹⁰⁷ Personal Interview with the public official from the Ministry of Economy.

¹⁰⁸ Ibid.

¹⁰⁹ Personal Interview with the public official from the Energy Regulatory Office

¹¹⁰ The World Bank Report (2018). Western Balkans: Directions for the Energy Sector

increase flows to countries with limited access. TAP's most direct impact on the region will thus be as a means to enhance regional integration and likely stimulate further cooperation in infrastructure, security, and legal harmonization.

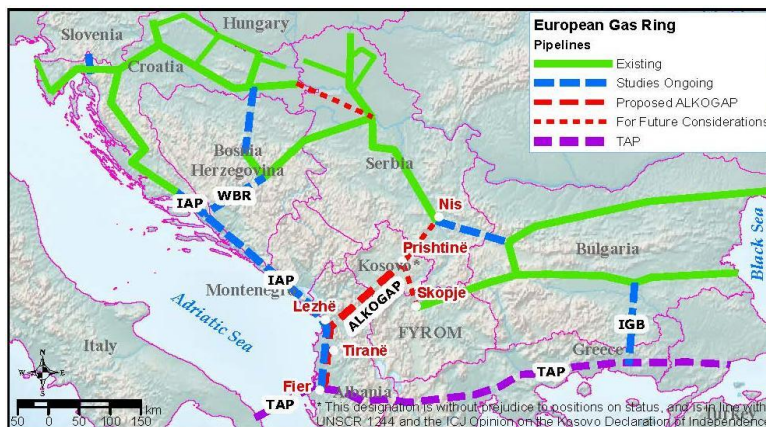


Figure 6. Projects of regional gas infrastructure and options for connection of Kosovo (including ALKOGAP)¹¹¹

As illustrated in figure 6 above, recent developments and the initiated construction of the Trans-Anatolian Natural Gas Pipeline (TANAP) and its extension the of TAP as a corridor for gas supply from the Caspian Sea to Europe create the necessary preconditions for the introduction of natural gas in the currently non-existent natural gas markets of Kosovo and Albania. Both project with great interest to Kosovo, the ALKOGAP¹¹² and the North Macedonia – Kosovo¹¹³ gas interconnector are also a part of the new list for Project of Energy Community Interest (PECI 2020).

The ALKOGAP aims to interconnect the existing and planned gas transmission system of Albania (including the TAP and IAP Project) with the future projected gas transmission system of the Republic of Kosovo, and the interconnectors of transmission, which are a part of the eastern branch of the Energy Community Gas Ring. In addition, the ALKOGAP¹¹⁴ project however shall be planned as a bi-directional pipeline, so the possible supply direction could also be north-south, from the Energy Community Gas Ring, or other sources. The benefits for Kosovo will include:

- introducing an environmentally more acceptable energy source in the region;

available at: <http://documents1.worldbank.org/curated/en/201391544823541838/pdf/Western-Balkans-Energy-Directions-Paper.pdf>

¹¹¹ Energy Regulatory Office (2019). Statement on security of supply for Kosovo (electricity, natural gas and oil), available at: [http://ero-ks.org/2019/Publikimet/Deklarate_mbi_Sigurine_e_Furnizimit_ne_Kosove\(energji_elektrike_gaz_natyror_nafta\)ZRRE_31_07_2019_eng.pdf](http://ero-ks.org/2019/Publikimet/Deklarate_mbi_Sigurine_e_Furnizimit_ne_Kosove(energji_elektrike_gaz_natyror_nafta)ZRRE_31_07_2019_eng.pdf)

¹¹² Energy Community, Gas_13 / Albania – Kosovo Gas Pipeline (ALKOGAP), available at: <https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas13.html>.

¹¹³ Energy Community, Gas_26 Gas Interconnection North Macedonia – Kosovo, available at: https://author.energy-community.org/enc-author-prd/enc/aboutus/secretariat/PCs/PC_PECI/questionnaire/Gas_26.html

¹¹⁴Energy Community, Albania – Kosovo Gas Pipeline ALKOGAP-Project description, available at: <https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas13.html>

- providing diversified gas supply to the region and access to Albanian storage capacities;
- providing significant transit capacity and income to Albania and Kosovo;
- International financial institutions readiness to invest and job creator.
- creating the preconditions for supporting the regional concept of South European Gas Ring;
- reducing CO₂ emissions in the region and facilitating economic development.

Table 9. Main parameters from the Albanian - Kosovo Gas Pipeline

Gas interconnector from Milot in Albania to Prishtina in Kosovo	Measure
Diameter	DN600 (24")
Operating pressure	82 bars
Pipe length in Albania	113 km
Pipe length in Kosovo	99 km
Capacity per year	1 bcm
Cost	circa 211 million EUR

Source: Pre-feasibility study for ALKOGAP¹¹⁵

As reflected in figure 7 below a potential Compressor Station will be located in Dardhë (near to the Albania-Kosovo Border, within Albania territory. Since there are no gas transmission in Albania, ALKOGAP would be implemented after the construction of IAP.

¹¹⁵ Energy Community, Albania – Kosovo Gas Pipeline ALKOGAP-Project description, available at: <https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas13.html>

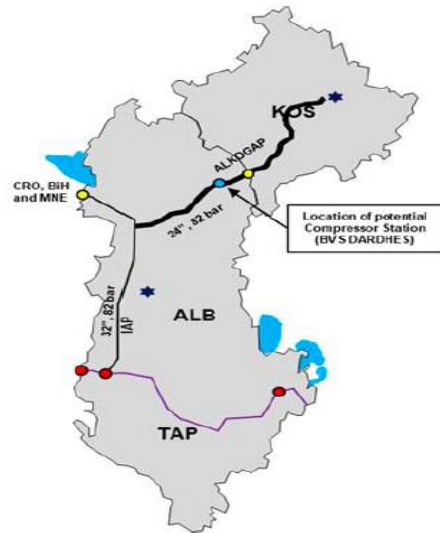


Figure 7. ALKOGAP pipeline routes connection with TAP and IAP in Kosovo and Albania¹¹⁶

6.2. OPTION 2. Introduction of natural gas via pipeline in Northern Macedonia

An important potential natural gas supply option for Kosovo remains the *supplies available from N. Macedonia and Greece*. Although there was a route which transported artificial gas extracted from the coal at TPP Kos A, so it is not exactly natural gas, and it was transported to Skopje to the aluminum plant.¹¹⁷ This route has existed within Kosovo, however the system has not been used since 1986. It is totally out of operation and all parts of it have been destroyed. The system previously supplied town gas, produced in Obilic, to Pristina, Mitrovica and Skopje in Northern Macedonia. Although initially designed for an operating pressure of 25 bar and a yearly capacity of 0.2 bcm, the present owners of the pipeline the officials from the Kosovo Power Corporation - KEK¹¹⁸ reported that the system has been completely damaged in several areas due to third party construction work on and around the pipeline. Moreover, the gas pipeline *Kosovo (Prishtina) – Skopje (North Macedonia)* remains clear and viable and the available upstream capacity and supplies available from N. Macedonia and Greece. Expected funding for the functionalization of this future gas pipeline will come from WBIF/EBRD as well as MCC project¹¹⁹ in Kosovo. The natural gas route to N. Macedonia¹²⁰, was shown that both in terms of financing, as well as in terms of implementation (distance, terrain), it was found that it is more favorable than the one with Albania. This Gas supply options in the WB6 are expected to increase with the TAP, Caspian supply alternatives, and LNG import from Greece. The projected influx of competitive gas supplies in the region will bring price stability and supply redundancy that will support the development of Kosovo’s natural gas industry. MCC with other IF’s EBRD and

¹¹⁶ Ibid.

¹¹⁷ Personal Interview with the public official from the ERO

¹¹⁸ Personal Interview with the public official from the KEK

¹¹⁹ Personal Interview with the officials from ERO

¹²⁰ Ibid

WBIF could include the investment package as follows: Gas Transmission. MCC invests in the Kosovo N. Macedonia pipeline segments from Ferizaj to Pristina.¹²¹

Table 10. Kosovo-North Macedonia Gas Pipeline pros and cons

<i>Pros</i>	<i>Cons</i>
Proposed gas pipeline right-of-way remains clear and viable	Old nonfunctional gas pipeline
Available upstream capacity and supplies available from N. Macedonia and Greece	Yearly capacity (bcm) not secured for this line?
Fast operationalization of gas pipeline (short pipeline circa 80km) Potential for lower bills for energy customers after the introduction of carbon pricing	Environmental implication (Flora and Fauna)

Source: INDEP analysis

Legally, the easement along the route *Kosovo to Northern Macedonia* should be available for the construction of a new pipeline, representing one of the possibilities to be used as right-of-the-way for transmission natural gas development network in the east of the country (Kosovo-Hani i Elezit). However, an assessment of the potential gas interconnector between Kosovo and Northern Macedonia is being drafted by the experts engaged from the MCC compact program.¹²² This data would give energy users a more efficient thermal energy option, support Kosovo's energy transition, and contribute to improved air quality. The project would include a collection of transmission and distribution pipeline, technical assistance to establish the management of the sector, as well as a connection fund to enable poorer consumers to benefit from the program.

It aims to diversify gas routes and supply sources for Kosovo, which would encourage the use of gas by making it seem more attractive and less vulnerable to supply disruptions.¹²³ Another option for gas supply could possibly come from the existing oil pipeline from Thessaloniki to Skopje converted to transport gas could be able to deliver about 1bcm/year to Skopje and provide diversity of supply to Macedonian and Kosovo consumers.¹²⁴ As per the feasibility study¹²⁵ a gas interconnector with North Macedonia is seen as the most cost-efficient option for the import of gas and would likely contribute to replacing lignite in power generation.

¹²¹ Personal Interview with the public official from the MCC program

¹²² Personal Interview with the official from Millennium Challenge Corporation (MCC).

¹²³ Personal Interview with the public official from the Ministry of Economy.

¹²⁴ Oxford Institute for Energy Studies (2017). *Towards-a-Balkan-gas-hub*, available at: <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/02/Towards-a-Balkan-gas-hub-NG-115.pdf>

¹²⁵ Personal interview with MCC official.

6.3. OPTION 3. Small-scale LNG deployment in Kosovo “virtual pipelines”

Changes in the technology for liquefied natural gas (LNG), such as floating storage and regasification, have improved gas supply options when infrastructure is limited and liquefaction has enabled the transport of gas to places with limited or no pipeline infrastructure. Another option for deploying natural gas to Kosovo is through the use of Small-scale LNG deployment in Kosovo “virtual pipelines”. As the EU energy policy and environmental targets in energy sector represent the base for considering wider application of LNG in energy consumption in transitional period. The transport sector, as it was previously mentioned, represents one of the problematic issues since electrification of heavy-duty trucks in road traffic or marine transport is not an alternative in near future. Therefore, use of LNG represents alternative in transitional period towards sustainable energy society.

In the Western Balkan region, the Gas supply security has improved in recent years as the result of the construction of the LNG terminal ‘Alexandropolis’ in Greece¹²⁶ and the LNG terminal in Krk, Croatia¹²⁷. From 2020 onwards, gas can come in by pipeline from the Caspian, via the Trans Adriatic Pipeline, as well as from new and expanded LNG terminals in Greece and the LNG terminal in Croatia. The alternative gas delivery and distribution via surface transport Liquefied Natural Gas (LNG) throughout Kosovo.

The potential source of supply of Kosovo’s natural gas market is the LNG terminal of Revithoussa Island in the neighborhood of Athens¹²⁸. For the deployment of LNG in Kosovo there are three possible ways for transporting LNG in Kosovo:

1. *Cryo containers* can be used for transport and for short-term storage on the regasification site. They can be transported by rail (on open wagon) and then unloaded on site, connected to regasification facility and used. Cryo containers can also be transshipped from a rail wagon to a truck trailer and then transported further to a final location. The empty containers shall be transported back to the filling station (i.e. in Revithoussa, Greece) and used in a circular way. In this case there is no need for fixed LNG storage at the regasification terminals. Optimized use of cryo containers offers flexibility regarding storage space and can be increased as consumption of natural gas intake is getting larger.
2. *LNG train tank cars* can be filled on the supply terminal (i.e. in Revithoussa Greece), transported by railway up to Kosovo (to the location of future Main Regasification and Distribution Station Pristina) where the LNG will be discharged into fixed LNG tanks built as part of the regasification station. For this the fixed LNG tanks need to be constructed, either as full containment concrete tanks, or as modular LNG storage tanks (vertical or horizontal) made from steel, which can be purchased and placed on site. This option is more high cost, but is more appropriate for higher volumes (high gas demand) and ensures a cheaper

¹²⁶ Gastrade projects. Available at: <http://www.gastrade.gr/en/the-company/the-project.aspx>

¹²⁷ First-Croatian-LNG-terminal-officially-inaugurated-Krk-island. available at: <https://ec.europa.eu/inea/en/news-events/newsroom/first-croatian-lng-terminal-officially-inaugurated-krk-island>

¹²⁸ Revithoussa LNG Terminal. Available at: <https://www.desfa.gr/en/national-natural-gas-system/lng-facility>

cost per unit. This LNG alternative requires the construction of a main Receiving/Regasification LNG station in Kosovo.

3. *LNG truck transport*, other sources of supply might come from the importation of gas from the future LNG terminal in Krk Croatia and regasification terminal Alexandropolis Greece through Macedonia using the LNG truck transport option.

6.4. OPTION 4. Construction of natural gas fired power plant in Kosovo

Viable option of the natural gas introduction in Kosovo is the construction of the new gas fired plant - Combined Cycle Gas Turbine (CCGT) with battery energy storage system and installed capacity of 250 MW. This new gas fired plant would be added to Kosovo energy mix potentially in 2027 or 2028; that can partly replace lignite plants and balance variable of RES. In addition to this flexibility, CCGT plants can be built relatively quickly at reasonable cost and can also use the hydrogen as a fuel up to 30 %. The average construction time is two years and the investments ranges between 50-60€/MWh and operating costs are also relatively low, €19-26/kWh¹²⁹. According to the IEA¹³⁰, gas-fired generation has a levelized cost of energy (LCOE) of \$90/MWh (~€76/MWh). The development of additional gas capacity occurs post 2027 with the new build fire gas plants can run with an efficiency of 60%.¹³¹ Consequently, they contribute to a significant energy saving if they replace older less efficient power stations.

Important to emphasize, the average emission intensity of natural gas fired power is approximately 60% lower than that of coal-fired power (430 kg CO₂/MWh and 1000 kg CO₂/MWh, respectively)¹³². Gas-fired plants mainly run during peak hours¹³³ and have the highest level of flexibility as they can be relatively easily switched on and off, depending on the demand profile. Natural gas power generation is complementary for systems with high percentage of coal TPPs as the case of Kosovo. CCGT have relatively low fixed costs and can therefore be feasible even as non-baseload plants, generating power to balance intermittent output from renewables, providing peak-load electricity and also providing secondary services to electrical system as balancing.

The possible commercial operation of a new gas fired plant could be expected to start by 2028. Under these conditions, the calculation of the load of supply is foreseen to be around 20 years, a time period (2028-2048), which can be considered economically viable for all projects of this type.

¹²⁹ European Commission, (2008). Second Strategic Energy Review, Energy Sources, Production Costs and Performance of Technologies for Power Generation, Heating and Transport, Brussels, p. 4

¹³⁰ IEEFA. (2020). Beyond coal Investing in Kosovo's Energy future. Available at: https://ieefa.org/wp-content/uploads/2020/09/Beyond-Coal_Investing-in-Kosovos-Energy-Future_October-2020.pdf?utm_source=rss&utm_medium=rss&utm_campaign=beyond-coal_investing-in-kosovos-energy-future_october-2020

¹³¹ Power engineering website. available at: <https://www.powerengineeringint.com/coal-fired/equipment-coal-fired/gas-turbines-breaking/>

¹³² Office of Energy Policy and Systems Analysis (2016). U.S. Department of Energy. Environment Baseline, Volume 1: Greenhouse Gas Emissions from the U.S. Power Sector.

¹³³ Ibid.

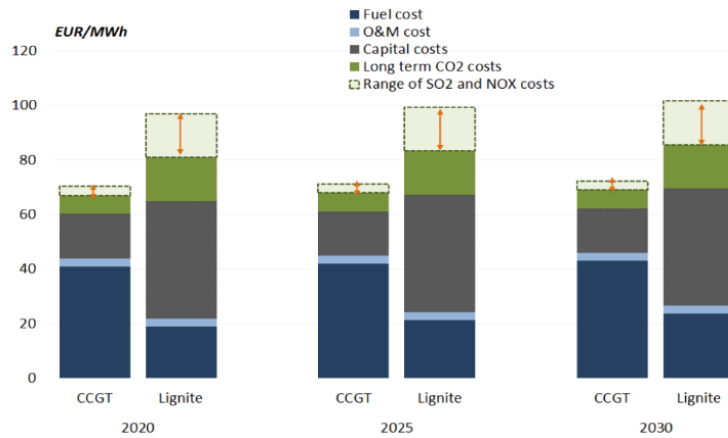


Figure 8. Levelized electricity generation costs gas plant vs lignite plant

As seen in figure 8 regarding the economic terms, gas can be more competitive than coal in the long run but there are significant uncertainties around the evolution of fuel prices and environmental costs. The comparison of the LCO generation, which is more appropriate when comparing new-build gas with new-build coal, shows that gas is the preferred option when taking into account the environmental costs of lignite-fired generation (including CO₂, NO_x and SO₂).¹³⁴ However, a diversity of low-carbon pathways requires further discussion and action; the range of options presented, in fact, may make the pathway to a decision challenging in a contentious environment. A focus on managing risk through diversification of resources (introduction of natural gas), where Kosovo currently relies on 95% lignite could reduce the recent price surges consumers have faced due to unreliable generation capacity from TPP Kosovo A and Kosovo B. New gas-fired power plant will need to demonstrate that: the project cannot viably be replaced by renewable energy sources; that it contributes to domestic energy security; and that it is consistent with a realistic energy transition pathway. Support for gas power where this supports decommissioning of coal, alongside a rapid increase in renewables, and where renewables cannot meet total demand immediately. This would help a country onto a decarbonization process and net zero pathway.

Considering all the ENCT and Green Agenda for Western Balkans that Kosovo has to comply, results in the coal capacities elimination under market integration only in or after 2045. However, for this option to be viable the government the Natural gas pipe line and supply contract should be in place in time for the commissioning of the gas turbines/engines. With the introduction of gas, the demand for coal generation could possibly disappear post 2040 or after 12 years of new gas fired plant operation. Further, the introduction of the natural gas to Kosovo's electricity portfolio by 2028 and natural gas might quickly facilitate a rise in solar PV deployment due to the ability to serve as a fast-ramping, flexible generator that compensates for the variability of solar PV due to cloudiness.

If natural gas will be available, the best TPPs candidates would be a new gas fired CCGT with battery storage for base load generation. Introduction of natural gas to replace electricity will reduce the

¹³⁴ The World Bank (2018). Western Balkans: direction for the energy sector, available at: <https://documents1.worldbank.org/curated/en/201391544823541838/pdf/Western-Balkans-Energy-Directions-Paper.pdf>

electric load requirements for industrial and commercial sectors, which could reduce the need for the country to construct additional electric generation capacity or purchase power from its neighbors. This will improve the overall reliability of Kosovo’s electric system. As a clean burning fuel compared to other oil-based fuels and coal, natural gas (replacing non-electric fuel or electricity from coal fired facilities) will emit significantly less carbon dioxide (CO₂), nitrogen oxides (NO_x), and sulfur dioxide (SO₂). CCGT using natural gas with Battery and Energy storage system for baseload operation and providing secondary and tertiary reserves and diesel fuel as backup. This could easily help offset the expected retirement of the Kosovo A coal units in the coming years.

To sum up, Kosovo will significantly benefit from such diversification in improving its energy security, reducing its dependence on coal, addressing the supply demand gap, and reducing pollution. All four options described above are viable options that can provide Kosovo a path to gradually transition the country’s energy sector to a well-diversified sector with natural gas playing an important role and facilitating the deployment of sizeable renewable energy per EU requirements.

7. Climate benefits and decarbonization using natural gas as a source of energy

“In the 21st century, every piece of coal we don’t burn is a small victory for life on Earth.” (Greenpeace, 2020). Looking into the European Commission proposal on the new targets that meet the EU Green Deal and Green Agenda for Western Balkan expectations. Kosovo needs to move faster toward the adoption of policies and projects that help the de-carbonization. As a result, Kosovo has committed to a number of actions like introducing carbon pricing instruments and market-based renewables support schemes, as well as phasing out coal subsidies. As per the Green Agenda Action plan some form of carbon pricing as an indicative time - frame from 2024 onwards.¹³⁵ Considering that the price of carbon on the European Emissions Trading System, currently over €89¹³⁶ per metric ton, protecting lignite will no longer be viable. Natural gas will play a major role in addressing climate change especially in the form of ‘green’ or ‘blue’ gas that has been largely or totally decarbonized, rather than as natural gas used for power generation or as feedstock for petrochemical products.¹³⁷

The most immediate issue for natural gas remains its relationship with renewable energy. The European Climate Foundation¹³⁸ suggested that “natural gas in particular plays a large and critical role through the transition”, while Shell¹³⁹ proposed that “natural gas will give the world an early opportunity to reduce overall CO₂ emissions from energy by displacing coal with gas. At the same

¹³⁵ EC (2020) Action Plan for The Implementation of Sofia Declaration, available at: <https://www.rcc.int/docs/596/action-plan-for-the-implementation-of-the-sofia-declaration-on-the-green-agenda-for-the-western-balkans-2021-2030>

¹³⁶ Ember Climate (2020). Available at: <https://ember-climate.org/data/carbon-price-viewer/>

¹³⁷ UNECE (2019). How natural gas can support the uptake of renewable energy, available at:

https://unece.org/DAM/energy/se/pdfs/CSE/PATHWAYS/publ/NG_RE.pdf

¹³⁸ ECF, (2010). Roadmap 2050: A Practical Guide to a Prosperous, Low-Carbon Europe, European Climate Foundation, The Hague, NL, available at: https://www.roadmap2050.eu/attachments/files/Volume1_fullreport_PressPack.pdf

¹³⁹ S.E. (2011). Shell Scenarios to 2050: An Era of Volatile Transitions Royal Dutch Shell, The Hague, NL and London, UK

time, a continued strong focus on energy efficiency and market-based CO₂ pricing will keep demand growth in check”.

While carbon pricing reduces solids-based generation, gas emerges as an important complementary transition fuel. Capturing the potential of gas can nevertheless only materialize under market integration conditions, irrespective of full or gradual carbon pricing. Gas units perform the high-ramping operation needed to balance the major fluctuations of variable RES and facilitate their increased penetration in the electricity system. Evidently, other balancing resources such as hydro pumping, hydro with reservoir, demand response and batteries will have an important role to play in the future, but primarily for peak shaving or peak load shifting.

These resources cannot provide ramping services directly but only reduce the system needs for ramping. Therefore, in spite of the dropping costs of batteries, gas units are more competitive in this context, because they do not supply only ancillary services but electricity too. When it comes to WB6 energy policy, decarbonization will play an important role because it affects the entire energy spectrum, from power generation to transportation, building, industry, trade, and services. The European Union’s emissions trading system (ETS), which requires manufacturers, power companies and airlines to pay for each ton of carbon dioxide they emit, is central to its efforts to cut net greenhouse gas emissions by 55% from 1990 levels by 2030.

Unlike the EU member states and other countries globally, greenhouse gas emissions in Kosovo are not taxed, which is another reason why the price of electricity produced by the coal plants remains low. If we would apply a carbon tax as low as EUR 20 to the CO₂ emissions from coal power plants, KEK would have to pay EUR 600 million on an annual basis. At the time of writing this paper, the CO₂ price¹⁴⁰ in the EU was EUR 89 per ton of CO₂ which will quadruple the price. It is important to note that these calculations do not account for other environmental and social costs, which if taken into account would drive the cost of electricity bills even higher. Thus, if all costs are considered coal is not cheap with the introduction of carbon pricing and health costs.

On a further note, existing or under construction gas infrastructure in the WB6 could, in a future context of decarbonization, support transporting and storing gases of small (or even zero) carbon footprint such as bio-methane, “green” hydrogen, and synthetic methane, as well as blending them with natural gas, avoiding to create devalued or stranded gas infrastructure assets. In order to deliver new gas possibilities in a timely manner. This is detrimental for Kosovo facing carbon lock-in, thus highly vulnerable to carbon pricing as the goal to reach carbon neutrality 28 years from now (2050).

Another cost, which is directly borne not only by the citizens of Kosovo, but also the neighboring and the EU countries, is the cost of pollution. Kosovo hasn’t been able to comply with its National Emissions Reduction Plan¹⁴¹, aimed at limiting the emission of specific pollutants primarily from fossil

¹⁴⁰ Carbon Credits website (2022). available at: <https://carboncredits.com/carbon-prices-today>

¹⁴¹ Energy Community Treaty (2021). available at: <https://energy-community.org/legal/cases/2021/case0821KO.html>

fuel power plants, namely the nitrogen oxides (NO_x), sulfur dioxide (SO₂), and dust (particulate matter). Twenty–three European Countries have announced they will phase out coal however, Kosovo and other EU four countries are *under no phase out plan or discussion* Kosovo: no coal phase out discussion.¹⁴² However, its existing plants aren’t expected to be compliant with EU pollution laws until 2028, while the current fleet is old and in breach of existing pollution limits. (Kosovo B was the highest emitting plant for dust, with 5,261 tons).¹⁴³

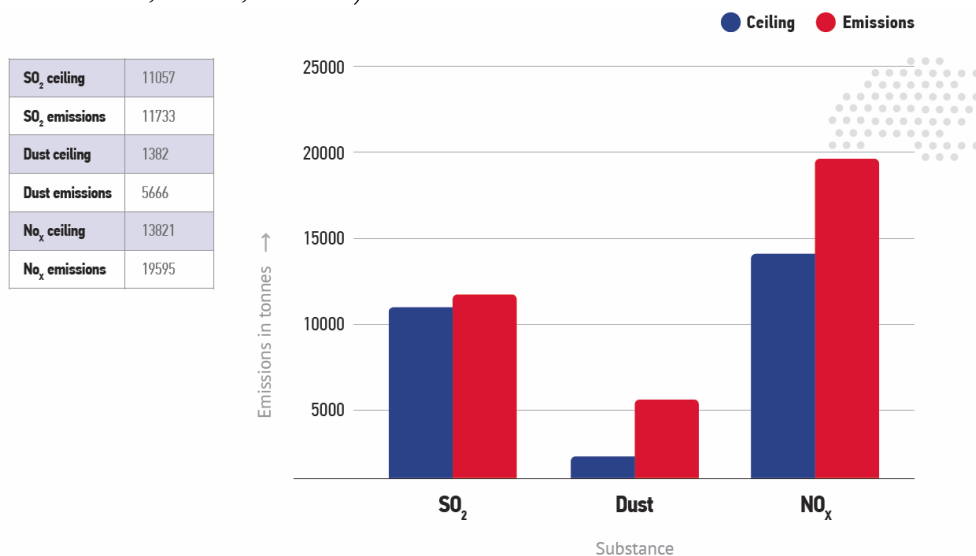


Figure 9. 2018 Kosovo emission ceiling breaches¹⁴⁴

Additionally, the role of gas in increasing flexibility and addressing issues of intermittency of renewables was acknowledged. The role of gas in improving air quality was also noted. Even though gas emits roughly 50% less CO₂ than coal when burned in power plants and it is comparatively cheaper than coal, it is nevertheless a fossil fuel that may slow down the decarbonization path.¹⁴⁵ However, under the clean energy transition, the natural gas may also be seen as a stepping stone in the gradual decarbonization, particularly for those partners with the heaviest reliance on coal, provided appropriate markets, financing and expertise are available. It is no coincidence that a group of eight EU countries from the Balkans and the east have joined forces to defend the “role of natural gas in a climate-neutral Europe”.¹⁴⁶ In a joint paper, the group of eight calls for “combined electricity–gas solutions” in the transition to net-zero emissions by 2050.

The joint paper makes the case for fossil gas in the transition away from coal power, which is a dominant form of electricity in many eastern EU member states. This means that Kosovo may be a good example that will benefit from the expansion or introduction of gas. This is because it would generally replace coal, especially lignite, and because new or expanded regional interconnections would

¹⁴² Europe’s coal exit website (2022). available at: <https://beyond-coal.eu/wp-content/uploads/2022/01/overview-of-national-coal-phase-out-commitments-13-January-2022.pdf>

¹⁴³ Bank Watch (2019). Comply or close. available at: <https://bankwatch.org/wp-content/uploads/2019/12/comply-or-close.pdf>

¹⁴⁴ Ibid.

¹⁴⁵ Mantulet, G. (2020). Green gas contribution for energy systems decarbonisation. Electric power. Université Grenoble Alpes.

¹⁴⁶ Simon, F. (2020). “Eight EU states back ‘natural gas’ in net-zero transition”, Euractiv, available at:

end the reliance on a single supplier and source of energy. However, for the sake of security of supply, the development of the natural gas component in Kosovo is essential¹⁴⁷. The challenges for Kosovo during the forging of the new European Green Deal and Western Balkan Green Agenda would not be very different from the ones that poorer member states in the EU (like Bulgaria) or coal-dependent ones (like Poland) already have¹⁴⁸. One of the decisive factors, with the EnCT which will define the negotiation process, would be the role of natural gas. Its role in the EU, even if large enough now, may decline in the period until 2030. The WB6, however, have not even started their “gas age” yet.

The transition to decarbonized power generation is not an easy regional issue, as in most of the WB countries and Kosovo electricity generation, which is mainly based on coal and lignite, supports thousands of jobs, while it forms the basis of an extensive industrial plexus. In order to increase the possibility for use of a cleaner energy source in Kosovo and knowing that natural gas has the lowest carbon content it would be an important future energy supply source for Kosovo. From an environmental and climate policy perspective, natural gas is considered preferable to coal due to its lower carbon intensity¹⁴⁹. In the longer term, these gas infrastructure investments will provide the basis for the next step in environmental protection, as they will allow for the introduction of decarbonized gas once available and competitive, allowing further reductions in CO₂ and the impact of air pollution. Therefore, these investments will future-proof the region’s energy supply.¹⁵⁰ A shift from “dirtier” fossil fuels, like coal (which emits on average 900g CO₂/kWh), to lower emissions fuels, like gas (which emits about 400g CO₂/kWh) and renewables, can also help to reduce power plant emissions.¹⁵¹

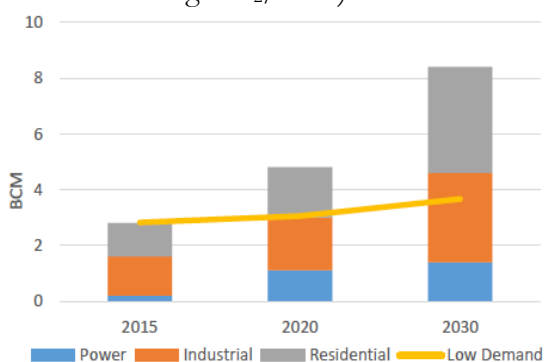


Figure 10. Actual and projected regional gas demand, 2020-30

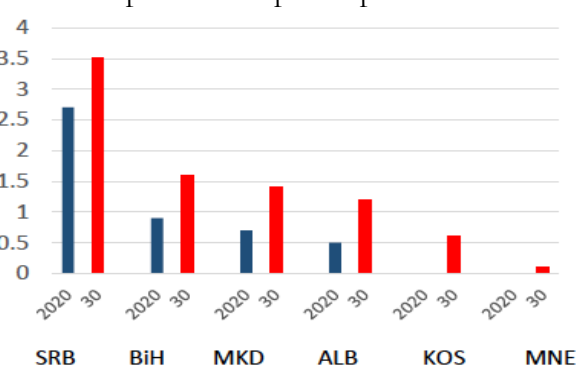


Figure 11. Potential gas demand growth by country, 2020-30

Source: World Bank (2018), Western Balkans: Directions for the Energy Sector Report¹⁵²

¹⁴⁷ Personal Interview with the public official from the Ministry of Economy.

¹⁴⁸ Georgiev, A. (2020). Natural Gas in the Western Balkans in the framework of the future energy Community Goals for 2030

¹⁴⁹ Union of Concerned Scientists (2014). Environmental Impacts Natural Gas Report, available at: <https://ucsusa.org/resources/environmental-impacts-natural-gas>

¹⁵⁰ European Commission (2020). WB Economic and investment plan, available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf

¹⁵¹ London School of Economics (2020). “What is “decarbonization” of the power sector? Why do we need to decarbonize the power sector in the UK?”.

¹⁵² The World Bank (2018). Western Balkans: Directions for the Energy Sector, available at: <http://documents1.worldbank.org/curated/en/201391544823541838/pdf/Western-Balkans-Energy-Directions-Paper.pdf>

In the future, gas demand in WB6 is expected to grow to about 4 bcm in the base case scenario and could reach potentially up to 8 bcm by 2030 if policies to increase gas offtake are implemented (see fig. 10 & 11). The integration of natural gas and renewable energy resources in power generation ensures energy security and sustainability, while contributing toward a significant reduction of GHG toward a sustainable energy system, in line with the Paris Agreement adopted in 2015.¹⁵³

8. Conclusions

Kosovo has long relied on coal. But as the international community mobilizes to tackle the climate crisis, coal is becoming uneconomical and the region's obsolete power plants will have to be shut down in the coming years. Also, new EU climate policies and Green Agenda for WB designed to make coal energy more expensive and eventually obsolete with Carbon pricing and - from the EU's 2030 climate targets to the planned Carbon Boundary Regulation Mechanism - will affect coal-based electricity imported from the Western Balkans and will lead to a gradual reduction of coal production in Kosovo. This policy paper should be a good input to the preparation of Kosovo's new national energy strategy and national energy and climate plan. The key added value of this policy paper is an integrated view of the use of natural gas and the combination of power and gas sectoral issues. Additionally, we found out that Kosovo has a great opportunity to seize on the readiness of international financial institutions and development banks to invest in the country's energy transition beyond coal and use natural gas as a "bridge fuel".

This paper analyzed the current natural gas sector in Kosovo including legislative framework, as the development of gas infrastructure vis-à-vis decarbonization, five case studies and options recommended. An analysis of the options of natural gas introduction in Kosovo has been provided. The aim was to provide the best examples from five case studies. Further, it seeks to raise awareness about developments concerning natural gas in Kosovo's more generally, which is currently receiving little attention, particularly in mainstream discourses. It is therefore important to ensure that the energy transition in Kosovo is based on sound economic principles and leads to the selection of the best-value technologies for decarbonization, learning from the experiences from other countries. Meaning that the first real stress-test for the political will of the new government will be in the energy sector.

The recent collapse of the coal-based energy system in Kosovo, debunks the popular myth of coal's reliability. On December 12, 2021, the electricity production in TPP Kosovo B coal fired thermal power plants, the energy backbone of Kosovo, collapsed. The consequences would have been milder if all of this was not happening at the time of a serious global energy crisis, prompted by the reliance on fossil fuels. As such Kosovo had to import electricity, and at a very high price. While thousands of

¹⁵³ Denchak, M. (2018). *Paris Climate Agreement: Everything You Need to Know*. (New York: Natural Resources Defense Council). <https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know>.

households were left without electricity and heating, we need to focus on lessons learned for the sake of ensuring the best way forward.

Hence, an opportunity exists for natural gas to become increasingly significant in support of Kosovo's tackling the so-called *Energy Trilemma: delivering decarbonization, maintaining security of supply, and ensuring that energy is affordable*. In a world affected by climate change and sharp energy price rises, Kosovo is increasingly caught between the need to implement the energy transition while guaranteeing its energy supply and securing for its citizens. Natural gas plays a major role in the short- to mid-term transition toward sustainable energy systems. Therefore, a decision on the future role of natural gas is strategic, while the development of additional infrastructure is accompanied by very complex geopolitical activities, which adds a lot of uncertainty to the future security and costs of supply. With the exponential increase of development trends of new and sustainable technologies for the production of electricity, Kosovo is becoming more inefficient every year, bearing a tremendous cost, and keeping the country at bay from the energy transition efforts.

Without a doubt, the time has come for Kosovo to ensure long term sustainability of its energy system – a system which will guarantee stability and wellbeing of its citizens, and towards achieving its ENCT, Green Agenda and EU obligations in the context of the 21st century green global energy developments. At the present, the path of development of the natural gas sector in Kosovo is traced within the EnCT and the perspectives that this treaty offers for the energy stability of southeast Europe through regional cooperation of the energy sectors of neighboring countries. Within this framework, Kosovo has obtained the opportunity to connect with the natural gas pipeline networks of the Southeast Europe. However, during the interviews with government officials and other stakeholders has been noticed a pronounced lack of information and a general lack of inactivity among officials regarding where the gas sector in Kosovo should be oriented. By providing insights about the role of natural gas as a “bridge fuel”, this paper intends to provide evidence for Kosovo policymakers.

Kosovo's high dependency on a single supplier and a single energy source (coal), its lack of access to gas infrastructure, and its low competitiveness vis-à-vis lignite in power generation explain the lack of gas penetration. The limited availability of gas infrastructure in the region is also a barrier to the potential for demand growth. Diversification of energy sources is not only a trend but also a necessity and thus also a priority for Kosovo. Considering the WB6 Green Agenda and the EC Economic Investment Plan commitments to gas infrastructure as well as other IFI's in Kosovo. It is important that the GoK also sees the opportunities to involve gas and its products in its energy supply.

A key first step for the Kosovo government, during its national energy strategy revision, to engage thoroughly with relevant stakeholders (including civil society and energy NGOs) to build a complete picture of the opportunity for natural gas and the role it can play in Kosovo's future energy mix. Nonetheless, if the status quo for natural gas in Kosovo is unchanged, the opportunity for the energy transition and decarbonization, low cost and secure energy supply in Kosovo will be missed. Taking the entire energy sector in Kosovo into account, it can be concluded that the development of the

natural gas sector in the country is currently below the satisfactory level. Kosovo does not have a well-regulated legal framework that defines the natural gas sector and takes concrete steps to address it. The GoK should correctly define the natural sector in current legislation and energy policymaking and start taking concrete steps in developing its infrastructure. Natural gas can play a critical role in Kosovo's energy future and pathway to decarbonization thus the best policies for developing the gas market on a national level are those that empower the laws governing this market, ensuring the rule of law, transparency, and openness of the market. Here we can include the revision of the new National Energy Strategy 2021-2030. It should build on the evaluation of the neighboring countries' current energy policies as well as the EU Green Deal and Green Agenda for WB. Further, the new development in the gas infrastructure and supply in the region specifically the operationalization of TAP, will allow Kosovo through ALKOGAP to develop its gas infrastructure as well as connect to other gas suppliers in the region-North Macedonia.

This paper concludes that the energy derived from gas should not be disregarded, as it is also part of the efficiency measures on the green standards. In the face of challenges from decarbonization Kosovo must take proactive steps to remain on track for decarbonization and natural gas can play a key role in substituting coal-fired generation and providing flexibility in support of increased renewables capacity. Thus, the role of natural gas in the Kosovo's energy mix should be considered as a key option in sustainable energy transition given characteristics of natural gas as a fuel.

Overall, there is a need to redouble efforts and to acknowledge the natural gas as a main priority and invest in natural gas infrastructure. It is also crucial to ensure that the natural gas development is addressed as a priority in the new national energy strategy 2022-2031. Urgently to address the need for energy diversification considering a natural gas as a viable option. Further, decide whether to close or rehabilitate TPP Kosovo A and ensure Kosovo's energy transition in line with Western Balkan Green Agenda and EU Green Deal rather than lifetime extension of coal plants (Kosovo A and B).

9. Recommendations

Drawing on the lessons from this paper, the following are the INDEP recommendations for the Government of Kosovo (GoK) to include **the natural gas** as an objective of the revised National Energy Strategy 2022-2031 and **deploy investments in the natural gas** in Kosovo. Hence, next are the ten recommendations for **phasing in natural gas** in Kosovo:

***I.* The GoK should include the natural gas as a part of the revised National Energy Strategy, should prioritize and deploy investments in the natural gas in Kosovo.**

Kosovo's policymakers need to let go of the power keys they are tightly holding onto and open the floor for dialogue between a wide spectrum of stakeholders, to decide on an effective future of energy transition collectively and responsibly, of the plan to phase-out coal, to introduce natural gas and take in the renewable energy sources.

Therefore, the GoK has an opportunity to use the natural gas as a "bridge fuel" to its decarbonization path. In the revised National Energy Strategy 2022-2031, the GoK should prioritize and deploy investments in the natural gas in Kosovo. Ensure full inclusion of natural gas as a priority and introducing specific financing measures for gas subsidies and investments. The gas demand will increase steadily and the main consumers in the first phase will be energy generating TPP, district heating companies, industry, and at a later phase residential sector. Natural gas-to-power generation should be incorporated into the government's medium-to long-term energy sector strategy. Noting that the government must comply with Western Balkan Green Agenda (carbon dioxide emissions standards) before joining in the EU. The new investments in the energy sector should be a part of Kosovo's strategy to phase out coal and switch to power production from renewables and natural gas. Diversification of energy sources will ensure resilience and flexibility of the energy supply. The GoK must make a high-level commitment to diversify the country's energy mix and deploy natural gas. In addition, public messaging on the benefits of switching to natural gas must be developed to prepare consumers and industry.

***II.* GoK should implement both planned natural gas interconnections with N. Macedonia and Albania and, as well as the Kosovo gasification plan.**

As a first step, the GoK needs to decide which is the most viable and immediate solution for gas supply in Kosovo, the ALKOGAP or Kosovo-North Macedonia pipeline, or both of them. Gas market development in Kosovo will increase the security of supply by attracting investments in the natural gas sector and participation in the regional natural gas market. Complete the remaining natural gas sector legal and regulatory obligations. With this, it is anticipated that the natural gas as a transition fuel until 2050, combined with RES, will play an important role in replacing coal used for power generation. New cross-border infrastructure will diversify supply routes and increase market competitiveness of natural gas. Studies on the Transmission interconnection; Public opinion surveys or trends related to how the Kosovo population views natural gas investments. In addition to providing an

alternative supply source, reducing the gap between energy demand and supply to enhance reliability, wide-scale use of gas is expected to have significant positive environmental impact in the country. Lessons from Bulgaria and N. Macedonia gives example of importance of cooperation with IF's and gas interconnection with its neighbors.

III. GoK should ensure the financial support – for the natural gas “phase in” from IF's

To ensure the financial support GoK should increase cooperation with international actors. Considering that attracting external investment for gas introduction is backed by EU commission new proposal which paves the way towards meeting the political pledges under the 2020 Sofia Declaration. To achieve the wider goal of decarbonization and to fully fund the low-carbon transition, public resources committed to green measures must be used strategically to mobilize capital from private sources. Since financial investments are of utmost importance for gas development, GoK is already receiving significant assistance from financial institutions such as EBRD, WBIF, and MCC whose technical assistance and data collection projects will improve estimations and better equip the government during its investment planning process. IFIs in general, should remain closely involved in Kosovo to facilitate energy transition and economic decarbonization, not only because they have access to the most recent developments in the gas sector, but also because they use financial resources efficiently and have the necessary expertise gained from previous experiences in the region and beyond. GoK should benefit from the exchange program under the European Commission called Coal regions exchange program¹⁵⁴ which allows regions in the Western Balkans, Ukraine, and the EU to share knowledge on coal phase out and clean energy transition. Lesson learned from the case of Bulgaria and Northern Macedonia.

IV. The GoK should focus on the creation of the gas infrastructure and establish a newly public company, potentially titled “*Kosovo Gas*”

In order to address the challenges in the gas sector, several actions need to be taken by GoK as are: connecting to the network of natural gas pipelines in Southeast Europe are active participation and cooperation in the Energy Community and CESEC, as well as more powerful lobbying activity with the key players and decision-makers in the natural gas sector in Kosovo and the region as are the EU, the United States, and Turkey. As the first step, the GoK should focus in the creation of the gas infrastructure and establish a newly public company, potentially titled “*Kosovo Gas*”, to play the role of combined transmission and distribution operator for natural gas (TSO/DSO). The Kosovo Gas to play the role of combined transmission and distribution operator for natural gas (TSO/DSO). Additionally, in coming years Kosovo to apply first as an observer and then for a full membership in ENTSO-G. As a parallel activity, the GoK would need to

¹⁵⁴ https://energy.ec.europa.eu/topics/oil-gas-and-coal/coal-regions-western-balkans-and-ukraine/coal-regions-exchange-programme_en

establish a gas pipeline company and a national gas distribution company public private partnerships (PPPs) in the gas distribution part of the project. The gas pipeline piece of the project will be accomplished by establishing a public sector gas pipeline company with open access to all market participants focusing on developing natural gas as an alternative energy supply source to meet both heat and electricity demand in the country and to support its citizens switching from wood, oil and other sources to district heating.

V. *The GoK should decommissioning three non-working TPP of the Kosovo A which should be supplemented with a combination of new RES and gas fired capacities.*

The three non-working units A1, A2 and A3 of TPP Kosovo A should be decommissioned until 2025. The remaining two units (A4 and A5) to operate for ten more years until 2032. As the case examples from USA and N. Macedonia showed there could be a possibility of converting/switching the three units of coal power plant Kosovo A to natural gas from a planned pipeline, as part of the strategy to abandon lignite use altogether in the country. Because the Energy Community repeatedly declared coal subsidies a violation of state aid rules of its member states, as well as the Green Agenda carbon neutrality targets it seems that, apart from renewables, natural gas should be the preferred option by the new government. In the short term, natural gas would reduce negative consequences of decarbonization to the economy and energy stability. Highly recommended is the consideration of the way in which natural gas can support the development of renewable energy needs to be matched by consideration of the way in which natural gas is simply complementary to renewable energy the main strength of natural gas is its ability to serve as a baseload supplier not only has the potential to put it in competition with renewable energy.

VI. *GoK should consider as an option the construction of new gas fired plant (250 MW) in near and medium term.*

The GoK should support the construction of natural gas infrastructure either for direct consumption or for the production of electricity and heating for the supply of new district heating systems. Government should undertake a thorough analysis of the requirements for the natural gas project's implementation, as natural gas is new to Kosovo. Together, the new natural gas fired plant and RES can help improve energy system flexibility and resiliency. Increasing penetrations of renewables means an increased need for flexibility, and electricity generation that is based on natural gas offers increased dispatchability and flexibility. For instance, natural Gas-fired generators can respond to rapid changes in renewable generator output, offering operational flexibility. When a gas turbine replaces a coal unit, overall emissions are reduced by an average of 0.6t CO₂e/MWh. The new gas fired plant CCGT can also use the hydrogen up to 30 %. Lessons learned from the case of Bulgaria.

VII. GoK should establish a balancing mechanism in short run and the Albanian-Kosovo control block for cross-border balancing

Diversification of energy sources and increasing security of energy supply is considered as an important component for sustainable and quality energy supply. In this regard, the development of the natural gas sector in Kosovo, through the connection with gas infrastructure projects with the region, is considered a good opportunity for future supply of natural gas. GoK should manage the energy system flexibility by establishing a balancing mechanism and connecting to regional natural gas supply lines as an important option for Kosovo. Resulting in a positive impact both in terms of increasing security of energy supply, as well as in terms of increasing and diversifying energy sources and economic development of country in general.

VIII. Usage of demand response options will be also important in the future (vehicle-to-grid)

Generally, it is recommended that the GoK with the main internal and external gas sector stakeholders will have to work together to craft a clear set of policies and regulations to enable gas to play a major role in the transportation element of the energy transition. The GoK should intend to focus on the installation of charging stations for electric vehicles. Further, in later stages the regulatory authority Kosovo Gas needs to adopt the tariff methodologies for access to the grids and LNG for electric vehicles. Usage of demand response and the way energy markets develop and, above all, the way that energy markets are designed, will play a significant role in determining the contribution that gas can play in tackling decarbonization and addressing energy sustainability. This comes from the lesson learned from the US case.

IX. Electrifying the heating sector through the expansion of district heating fueled by CHP on gas and biomass (including residual biomass).

For the stabilization and development of district heating, it will be crucial for thermal energy supply systems that currently use coal to ensure the transition to another (less emission intensive) fuel (biomass, or natural gas by 2028). At the initial stages possible gas pipeline from Skopje, N. Macedonia will bring gas to the existing district heating (DH) in the cities of Ferizaj, Prishtina and Mitrovica. Later on with possible new gas fired plant construction will expand the natural gas to the new build DH of other four major cities in Kosovo. Lesson from N. Macedonia are good examples of DH fueled by natural gas.

X. *The government should conduct awareness-raising campaigns for the benefits of using natural gas to decarbonize the economy of the country*

There is a huge awareness and information darkness about the natural gas opportunities in Kosovo. Thus, the GoK should ensure that consumers are well informed about rights and responsibilities to switch to natural gas when it is available and its benefits to the climate and health. Most importantly maybe, opening up an honest and inclusive debate about the future of coal should be a matter of good governance. A just transition, from coal which evidently poses challenges, depends on clear communication towards citizens and the stakeholders particularly affected. As example of Poland “Countries deferring that debate lose their autonomy to manage change and become exposed to external developments”. Diversification towards lower-carbon-intensive fuels and access to alternative sources of energy supplies call for increased public support for gas transit and transport infrastructure. In addition to providing an alternative supply source, reducing the gap between energy demand and supply to enhance reliability, wide-scale use of gas is expected to have significant positive environmental impact in Kosovo. The GoK should develop programs to promote natural gas use and raise awareness that natural gas is a cleaner, more dependable fuel alternative by involving civil society early on. The GoK should analyze the relevant laws that would regulate the gas industry and any gaps that would require new legislation or policy initiatives to develop a natural gas industry in Kosovo. Additionally, natural gas should be included in all strategic documents and policy priorities. Public awareness and engagement in early stages of energy transition of civil society was a good example from all five case studies.