E3 ANALYTICS

# ACCELERATING POWER SECTOR TRANSFORMATION IN THE REPUBLIC OF KOSOVO: DE-RISKING ANALYSIS AND POLICY OPTIONS

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Note that this analysis is without prejudice to positions on status and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

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# 1. INTRODUCTION

There is a growing consensus among researchers working on the global energy transition that in order for a sustainable transformation of the power system to occur, it is necessary that the transition be economically, socially, and politically accepted by local citizens and businesses. As such, it is not sufficient simply to develop a coal phase-out strategy: policies and strategies need to be developed and implemented that adequately deal with the many interrelated challenges and barriers (including local opposition) as well as investment needs that such a transition generates.

Kosovo needs a detailed plan that lays out specific alternatives of where to invest, what the alternatives are, and what policies and incentives can be introduced to help unlock those investments.

In this regard, **the Republic of Kosovo stands at a crossroads**: as a small, landlocked country in the heart of South East Europe, it has tremendous potential to transform its energy system toward a lower carbon paradigm. As with many other countries around the world, its relatively small size has the potential to prove an advantage in the energy transition: in contrast to larger countries with complex regional power systems, Kosovo has a fairly small electricity system, with total installed capacity of 1.442MW with total operational capacity at 1.110MW, the bulk of which is located at two large coal-fired power plants. In addition, total annual electricity demand stands at approximately 6 TWh, with most forecasts showing only a gradual increase in the coming decades.[1]

Thus, **given its small size, its land-locked geography, and its largely untapped renewable energy resources, Kosovo is well positioned to undertake a rapid decarbonization of its electricity system**, with the potential to go swiftly from laggard to leader among the Western Balkan states with the right combination of policies and investment frameworks.

However, despite these favourable circumstances, the Republic of Kosovo faces a number of considerable challenges: almost a third of Kosovo's population lives below the poverty line, with average per capita income about one-tenth that of the EU average. In addition, Kosovo has one of the highest unemployment rates in the EU at roughly 33 percent, with youth unemployment posing a particularly challenging problem at about 60 percent for those aged 15-24.[2] As such, economic diversification and the creation of new, sustainable jobs rank among the highest priorities in the years ahead.

In addition, the country's current electricity system is outdated, and unreliable, suffering frequent power outages that hinder investment and disrupt economic development in the country.

[1] Bankwatch Network, (2020). The Energy sector in Kosovo. Retrieved from https://bankwatch.org/beyond-coal/the-energy-sector-in-kosovo the 29.11.2021. Note however that most analyses of Kosovo's future electricity demand are based on recent historical patterns of electricity demand growth and largely ignore the role of electric mobility as well as the potential of heat pumps and other forms of electric heating to increase demand in the coming decades.

[2] World Bank, (2018). Energy in Kosovo. https://www.worldbank.org/en/country/kosovo/brief/energy-in-kosovo

**Kosovo's electricity mix ranks among the most coal-dependent in the world, with fully 97% of its electricity coming from coal-fired generation.** This heavy coal-dependence makes Kosovo particularly vulnerable to changes in policy and regulatory frameworks governing carbon emissions. Strictly speaking, **with regard to carbon pricing, Kosovo is a rule-taker**, and it will have to respond to changes in carbon pricing that are introduced at the EU level and beyond, such as via participation in the EU's Emissions Trading Scheme (ETS), or by having to adapt to future trade-related carbon pricing such as Carbon Border Adjustments.[3] This rule-taker status poses a substantial risk for a small, carbon-intensive economy like Kosovo's.

## Several factors now make a rapid transition of the electricity sector easier than it has ever been

The rapid decline in the cost of renewable energy technologies such as wind and solar power combined with ongoing technological improvements in grids, inverter technologies, electricity market design, smart meters, demand side flexibility, as well as the rise of electric mobility are making it easier to undertake a comprehensive energy transition than it was in decades past. These ongoing trends have also helped re-shape the discussion in Kosovo: after years of effective stasis with a power system dominated by lignite, the energy transition in Kosovo is picking up pace.

## Carbon prices in the EU continue their upward march

Some factors are already putting additional pressure on Kosovo's coal-fired plants, including the EU's air pollution regulations and rising CO2 prices. Since 2020, prices for emissions allowances on the EU-ETS have gone up from a range of between EUR 10-25 per tonne throughout the period from 2018 to the end of 2020, to over EUR 90 per tonne recently.[4]

**FIGURE 1: EU-ETS PRICES FOR CO2 CERTIFICATES IN 2021 (JANUARY 4TH THROUGH DECEMBER 9TH 2021)**


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[3] For more insights into the impacts of such carbon pricing mechanisms on Kosovo and other countries throughout the Western Balkans, see: Enervis, (2021). The Future of Lignite in the Western Balkans: Scenarios for a 2040 Lignite Exit. https://static.agora-energiewende.de/fileadmin/Projekte/2020/2020-03_WB-6_Coal_Phase-Out/A-EW_225_Future-Lignite-Western-Balkans_WEB_1.pdf

[4] Hodgson, C., (2021), October 4th. European gas crunch pushes up carbon price. In Financial Times. https://www.ft.com/content/c1595f64-5a31-4e7b-bf98-9f5fcbb4e970. See also: Trading Economics, (2021). EU Carbon Permits. https://tradingeconomics.com/commodity/carbon

The upward march of carbon prices acts as an early warning signal for countries like Kosovo that have a high reliance on coal and provides a further impetus to the country's decarbonization efforts.[5]

As a result, there is a growing consensus that countries throughout the Western Balkan region should start applying **shadow carbon pricing** in order to be better prepared for the eventual arrival of carbon pricing. Failure to factor in carbon prices significantly increases the risks of stranded assets and mis-allocated investments, and since many utility operators in the region remain partially or fully-government owned, this is a risk not only for the companies themselves but also for governments.[6]

## Momentum in Kosovo is picking up rapidly

Despite facing many challenges, there are positive signs on the ground in and around Pristina: After years of inaction on renewable energy, momentum is finally picking up in Kosovo for the development of renewable energy projects, with several hundred MW of new projects having been announced over the course of 2020 and 2021.

Kosovo's first major wind farm, the 32 MW Kitka plant, started operating in late 2018 and efforts are underway to expand it by another 20MW by 2022.[7] In addition the 105 MW Bajgora wind power plant has started to achieved commercial operation during the summer of 2021, with the first part of the project coming online in August 2021.[8]

With regard to solar power, Kosovo's installed capacity at the end of 2020 stood at 20,9MW, the bulk of which are sited at agricultural facilities throughout the country. However, a few recently announced solar power projects are poised to increase that number significantly.[9]

As a sign of shifting priorities within Kosovo, the government recently announced that the country's utility (KEK) should be repositioned to become a pillar of the country's diversification strategy. In response, KEK has announced that it plans to develop its own 100MW solar power project to diversify its electricity mix away from coal and facilitate the eventual decommissioning of one of its two major coal-fired plants, Kosova A.[10] These projects add to a burgeoning list of recently announced projects in the country (see Table 1).

[5] European Parliament, (2021, March 25th). Enlargement reports : MEPs fully support Western Balkans' European future. https://www.europarl.europa.eu/news/en/press-room/20210322IPR00528/enlargement-reports-meps-fully-support-western-balkans-european-future

[6] Bankwatch Network, (2017, March 29th). Carbon costs for planned coal power plants in the Western Balkans and the risk of stranded assets. https://bankwatch.org/wp-content/uploads/2017/03/briefing-Balkans-CO2-29Mar2017.pdf

[7] Reve, (2020, September 11th). Kosovo signs agreement for wind energy expansion. https://www.evwind.es/2020/09/11/kosovo-signs-agreement-for-wind-energy-expansion/77127

[8] Todorović, I., (2021, September 3rd). First part of Bajgora wind power plant starts trial operation. In Balkan Energy News. https://balkangreenenergynews.com/first-part-of-bajgora-wind-power-plant-starts-trial-operation/

[9] Spasić, V., (2021, July 27th). Kosovo could add 900MW of solar by 2030, 250 MW for self-consumption. In Balkan Energy News. https://balkangreenenergynews.com/kosovo-could-add-900-mw-of-solar-by-2030-250-mw-for-self-consumption-usaid/

[10] Todorović, I., (2021, August 20th). Kosovo's coal plant operator KEK plans soar power plant of 100MW. In Balkan Energy News. https://balkangreenenergynews.com/kosovos-coal-plant-operator-kek-plans-solar-power-plant-of-100-mw/

**TABLE 1: RENEWABLE ENERGY PROJECTS CURRENTLY BUILT OR UNDER DEVELOPMENT IN KOSOVO**

| Project Title | Technology | Installed Capacity | Developer |
|---|---|---|---|
| Kitka | Wind Power | 32,4MW (being increased to 52MW by 2022) | Güris Holding |
| Budakova | Wind Power | 46MW | Bondcom Energy Point |
| Bajgora | Wind Power | 105MW | SoWi Kosovo |
| Cicavica | Wind Power | 100MW | Akuo Energy |
| Kamenica Wind Farm | Wind Power | 2 x 34.8MW (up to 99.6MW) | Air Energy 2 |
| Jasenovic | Wind+Solar Hybrid | 170MW (132MW Wind and 38MW Solar) | StubllaEnergy |
| Kosovo Solar Project | Solar PV | 50MW | Private, with IFC support |
| KEK Solar Project | Solar PV | 100MW | Utility-led |
| Peja-Pec | Solar PV | 192MW (potentially up to 250MW) | Dukagjini Solar, Ibex Energy and Jaha Solar |
| Gjakova Solar Project | Solar PV | 150MW | Solar Energy Group Europe |
| Lipjan Solar Project | Solar PV | 3MW | Funded by ProCredit Bank |
| PV Birra Peja | Solar PV | 3MW | Birra Peja |
| PV Frigo Food Kosova | Solar PV | 3MW | Frigo Food |
| Koznica | Wind Power | 34.5MW | Prishtina Energy |
| Zatrici | Wind Power | 64.8MW | EV Wind Energy |
| Data System L.L.C. – Energy Division "Mareci" | Wind Power | 32.4MW | |
| Katkos L.L.C. Kline | Solar PV | 105MW | Katkos |
| Ramjan | Solar PV | 104.8MW | Jaha Solar |
| Katkos L.L.C Junik | Solar PV | 50MW | Katkos |

Note that this list of projects is not exhaustive, and does not include other projects that are currently identified in KOSTT's energy plan for the period from 2021-2030. For more information on additional renewable energy projects being planned, See: https://www.usaid.gov/sites/default/files/documents/Assessment_of_PV_Generators_in_Kosovo.pdf

**Sources**: https://balkangreenenergynews.com/bajgora-wind-park-in-kosovo-linked-to-grid-with-20-kilometer-overhead-line/
https://balkangreenenergynews.com/hybrid-power-plant-project-jasenovik-of-170-mw-underway-in-kosovo/
https://balkangreenenergynews.com/update-procredit-bank-kosovo-invites-bids-for-building-operation-of-3-mw-solar-power-plant/
https://balkangreenenergynews.com/kosovos-coal-plant-operator-kek-plans-solar-power-plant-of-100-mw/
https://balkangreenenergynews.com/kostt-signs-connection-agreement-for-192-mw-for-solar-park-in-kosovo/
https://renewablemarketwatch.com/news-analysis/373-the-government-of-kosovo-signed-an-agreement-with-ifc-to-support-development-of-a-50-mw-solar-pv-power-plant
Operatori i Sistemit, Transmisionit dhe Tregut, KOSTT, Plani Zhvillimor i Transmetimit, see: https://www.kostt.com/Content/ViewFiles/Index/Plani_Zhvillimor_i_Transmetimit.pdf
Operatori i Sistemit, Transmisionit dhe Tregut, KOSTT, Raporti Vjetor 2020

Taken together, **the projects announced to date in Kosovo would bring a total of roughly 666MW of wind power and 799MW of solar power online, pushing Kosovo to nearly 1.500 MW of installed renewable energy capacity**, and thereby substantially exceeding the country's total installed coal-fired capacity.[11]

With all of this project development and investment activity, momentum is picking up and Kosovo is managing to benefit from a flood of foreign investment as it pushes forward with its efforts to diversify its energy mix

→ **WIND AND SOLAR PV PROJECTS CURRENTLY PLANNED OR UNDER DEVELOPMENT EXCEED KOSOVO'S ENTIRE INSTALLED COAL-FIRED CAPACITY.**

However, interviews with investors, lenders, and developers in Kosovo indicate that there are still several major barriers to project investment, and that the cost of capital remains higher than in other markets in the region; this indicates that the Government of Kosovo can reap a number of benefits including cost savings from further de-risking its policy and regulatory environment.

## Kosovo's cost-effective renewable energy potential estimated at between 3000 and 4350MW

Despite Kosovo's relatively small size, the country's has substantial renewable energy potential: numerous analyses have shown that there is more than enough cost-effective renewable energy potential in the country to enable a successful phase-out of lignite.

**TABLE 2: OVERVIEW OF RECENT STUDIES ON RE POTENTIAL IN KOSOVO**

| Publication | Solar PV | Wind |
|---|---|---|
| IRENA Cost-competitive potential (Actual generation output in GWh in brackets) | 581 MW (834 GWh) | 2327 MW (3849 GWh) |
| SEERMAP Decarbonisation scenario (2050 minus 2016) (Actual generation output in GWh in brackets) | 1494 MW (1501 GWh) | 1447 MW (3300 GWh) |
| SEE-SEP The EU Road scenario MW (Actual generation output in GWh in brackets) | 2790 MW (4730 GWh) | 980 MW (2850 GWh) |
| REKK-TU Vienna report | 1526MW – 1985MW | 970MW – 1595MW |

[11] It is important to note that many of these projects remain at the pre-construction phase, and are awaiting the next round of auctions to receive the required permits to commence construction. According to the national off-taker KOSTT, the current volume of projects officially in the queue total approximately 400MW.

Kosovo set a target to achieve 25% of renewables in its final energy consumption by 2020, with a further target to have 400MW of renewable energy capacity connected to the grid by 2026. After several years of standstill in terms of power sector development in the country, recent trends show an upswing in project development, bringing Kosovo roughly half way toward achieving its objectives. Indeed, the main elements of a cleaner and more sustainable energy future in Kosovo are already clear:

| TABLE 3: OVERVIEW OF CURRENT MARKET DYNAMICS IN KOSOVO |
|---|
| Analyses show that by 2050, Kosovo will need between 3.200 and 4.350MW of **wind and solar capacity** connected to the grid, bringing substantial **investments** and driving job creation throughout the country. |
| The expansion of grid interconnection with neighbouring countries will enable **greater integration** with the electricity market in the South East Europe (SEE). |
| Greater interconnection with the region will bring greater **energy security** and power system flexibility with the potential to turn Kosovo into an exporter of clean electricity during several months of the year. |
| The surge in local power sector investment will help **make it easier to decommission** Kosovo A, the oldest lignite-fired power plant in the country originally scheduled to be decommissioned in 2014-15.[12] |

[12] Buck, M., et al., (July 2018). Phasing in Renewables: Towards a prosperous and sustainable energy future in Kosovo: challenges and possible solutions. https://germanwatch.org/sites/default/files/2018-09/Study%20Phasing%20in%20Renewables.pdf

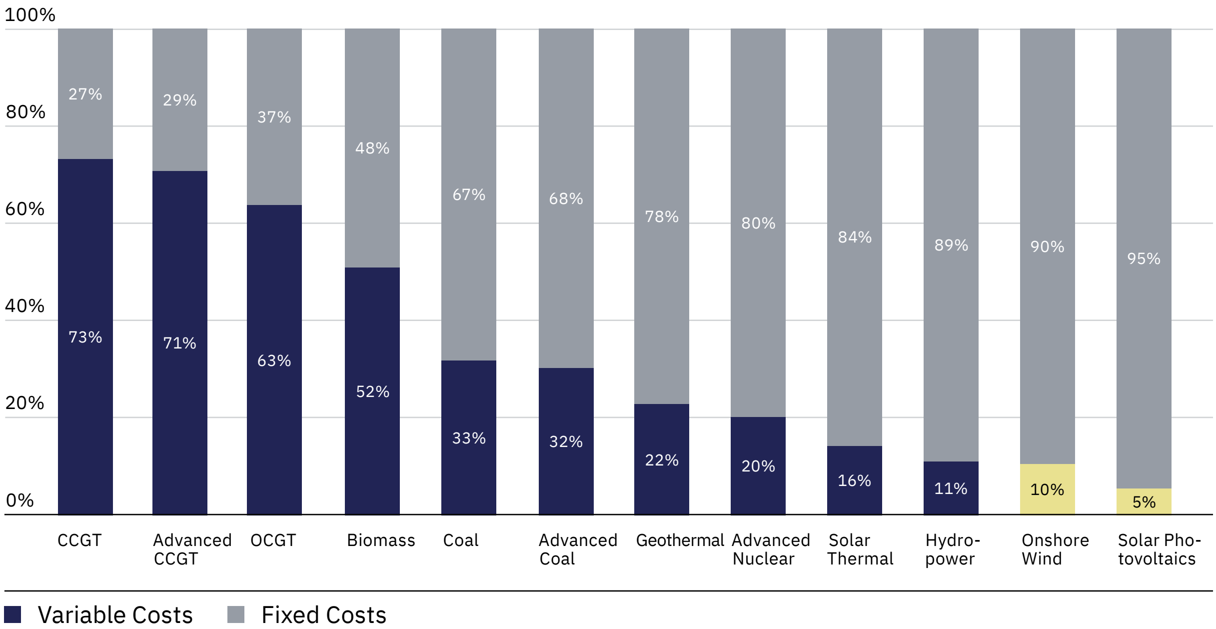
# 2. DE-RISKING RENEWABLE ENERGY FINANCE

## The cost of capital is a key variable in the energy transition

Transitions to low-carbon energy systems involve great challenges, resources, and time. The abundance of solar or wind resources is by no means enough to secure a just and efficient energy transition. On the way, multiple barriers and associated risks will appear and hinder the public and private efforts to expand renewable energy capacities.

As a general rule, renewable energy technologies are more capital intensive than their carbon-intensive counterparts (coal and gas plants). It is in the nature of almost all renewable energy sources (RES) (except from biomass) that they do not require any fuel. Conversely, when comparing investments in renewable energy (RE) and fossil-fuel based power generation technologies, the investment costs over the lifetime of the asset largely occur upfront, whereas with fossil-fuel based power plants the costs are spread more evenly over the lifetime of the project in the form of variable costs (such as fuel costs) as well as maintenance-related costs.

**FIGURE 2: RATIO OF FIXED TO VARIABLE COSTS FOR DIFFERENT POWER GENERATION TECHNOLOGIES**



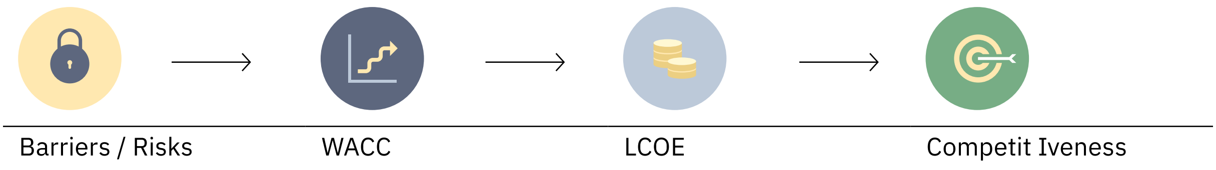

Source: IEA-RETD 2016, http://iea-retd.org/wp-content/uploads/2016/03/IEA-RETD_RE-TRANSITION.pdf

The consequence of being more capital intensive is that investors in RE need to raise abundant capital upfront, a moment at which risks and uncertainty are higher. Project developers generally source their capital from two main sources: **debt** (i.e. a loan) typically provided by a bank or development finance institution, and **equity** (or private sources of finance). The share of debt and equity used to finance a particular project is referred to as the **capital structure**: in markets with higher risks, or for developers with a less well-established track record, banks will tend to require a higher share of equity and be unwilling to issue a loan without a significant equity share. Since equity is typically more expensive than debt, having more equity in the project tends to increase the overall cost of capital. The total combined cost of capital used to finance a particular project is often referred to as the "weighted average cost of capital," or WACC.[13]

The cost of debt is the interest that investors have to pay back to the lender, whereas the cost of equity is represented by the return that investors expect. Simply put, the WACC differs depending on the project's risk.

One implication of the WACC is particularly relevant for jurisdictions undertaking a low-carbon energy transition: when investing in RE projects, the country-specific WACC can play a bigger role than even wind speed or solar radiation in determining the levelized cost of electricity that a project generates.[14] This is due to the fact that the financing costs (or WACC) represent a significant part of the overall costs of a specific RE project.[15] Thus, although the quality of the renewable energy resources in a given region are important, financing conditions are also critical.

**FIGURE 3: RELATIONSHIP BETWEEN RISKS, THE COST OF CAPITAL, AND THE COMPETITIVENESS OF RENEWABLE ENERGY TECHNOLOGIES**




A higher WACC increases the LCOE of renewables, which can slow down the energy transition and increase the costs to society. In turn, the higher the WACC, the higher the levelized costs of producing electricity (LCOE). The LCOE is defined as the "aggregated discounted lifetime cost (fixed plus variable costs) of generating electricity per unit of output and is expressed in EUR per MWh (€/MWh)".[16] As the WACC is used as the discount rate in the LCOE formula, RE projects with higher financing costs (WACC) will also face higher costs of producing electricity (LCOE).[17]

As the expected returns that determine the WACC are related to the time value of money and a premium for risk, the riskier the country is, the higher the WACC will be.[18] Several projects

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13 Fabozzi, F. J., & Peterson Drake, P. (2009). Finance: Capital Markets, Financial Management, and Investment Management. John Wiley & Sons, Inc.

14 Hirth, L., & Steckel, J. C. (2016). The role of capital costs in decarbonizing the electricity sector. Environmental Research Letters, 11(11), 1–8. https://doi.org/10.1088/1748-9326/11/11/114010

15 Steffen, B. (2019). Estimating the Cost of Capital for Renewable Energy Projects. In SSRN Electronic Journal, 0–39. https://doi.org/10.2139/ssrn.3373905

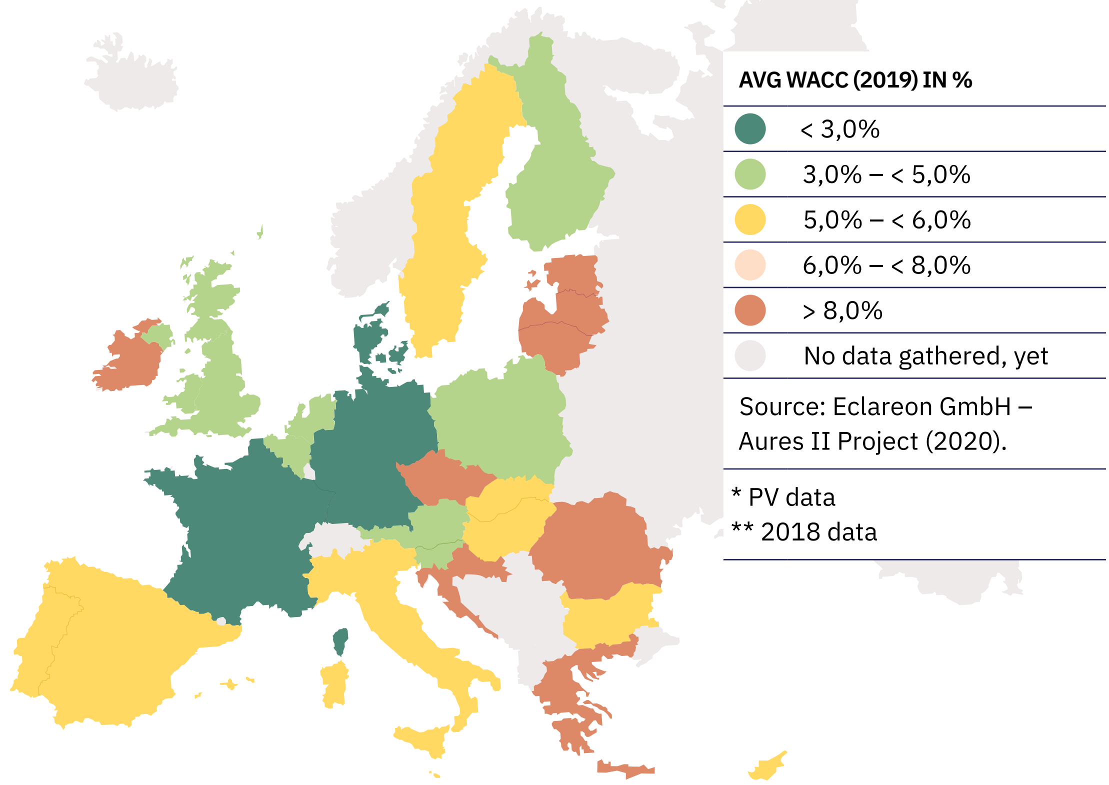
16 Open Electricity Economics. (2020). Retrieved from http://open-electricity-economics.org/

17 Fraunhofer ISE. (2015). Current and Future Cost of Photovoltaics. Long-term Scenarios for Market Development, System Prices and LCOE of Utility-Sale PV Systems. Study on behalf of Agora Energiewende.

18 Angelopoulos, D., Doukas, H., Psarras, J., & Stamtsis, G. (2017). Energy Policy, 105. In Risk-based analysis and policy implications for renewable energy investments in Greece. 512–523. https://doi.org/10.1016/j.enpol.2017.02.048
Steffen, B. (2019). Estimating the Cost of Capital for Renewable Energy Projects. In SSRN Electronic Journal, 0–39. https://doi.org/10.2139/ssrn.3373905
Egli, F., Steffen, B., & Schmidt, T. S. (2019). Bias in energy system models with uniform cost of capital assumption. In Nature Communications, 10(1), 1–3. https://doi.org/10.1038/s41467-019-12468-z

conducted across the EU including DiaCore (2014), ReFrame (2016), Pricetag (2017) and AURES I & II (2018-2020) have demonstrated clearly that there is a wide range of different values for the WACC across the various EU Member States (Figure 2).[19] Figure 4 below provides an overview of the cost of capital used to finance onshore wind projects in 2019 in the EU.

**FIGURE 4: WACC FOR ONSHORE WIND POWER IN THE EU (2019)**




| | | | | | |
|---|---|---|---|---|---|
| Austria | 4,3 - 5,0% | France | 1,5 - 4,3% | Portugal | 3,0 - 9,0% |
| Belgium | 2,6 - 5,0% | Germany | 1,3 - 2,5% | Romania | 7,5 - 8,0% |
| Bulgaria | 3,8 - 6,7% | Greece | 5,0 - 7,6% | Slovakia* | 5,5% |
| Croatia | 6,5 - 9,0% | Hungary* | 4,4 - 6,1% | Slovenia** | 4,0 - 5,0% |
| Cyprus | 5,2% | Ireland | 5,0 - 8,0% | Spain | 3,0 - 9,0% |
| Czech Republic | 5,0 - 7,0% | Italy | 4,6 - 6,0% | Sweden | 3,2 - 8,0% |
| Denmark | 2,0 - 3,0% | Latvia | 9,1% | United Kingdom | 2,1 - 4,6% |
| Estonia | 5,5 - 10,0% | Netherlands | 3,2 - 4,5% | | |
| Finland | 2,4 - 5,0% | Poland | 4,2 - 5,1% | | |

[19] Boie, I., Held, A., Steinhilber, S., Resch, G., Ortner, A., Welisch, M., Busch, S., Totschnig, G., Zehetner, C., Welisch, M., Breitschopf, B., Ragwitz, M., Busch, S., Liebmann, L., Totschnig, G., Noothout, P., de Jager, D., Tesnière, L., van Rooijen, S., Steinbäcker, S. (2016). Final Report Policy Dialogue on the Assessment and Convergence of RES Policy in EU Member States (Issue July).
Tesnière, L., de Jager, D., Noothout, P., Boutsikoudi, S., Brückmann, R., Borek, F., Naydenova, I., Nicola, S., Valach, B., Dukan, M., Jerkic, L., & Dabetic, M. (2017). Mapping the cost of capital for wind and solar energy in South Eastern European Member States. https://balkangreenenergynews.com/rs/wp-content/uploads/2017/01/PRICETAG_Report_draft_v8-3.pdf
Eclareon, & Fraunhofer ISI. (2018). RE-Frame database. http://re-frame.eu/

## De-risking instruments can help facilitate RE investment

Financing conditions in general, and the WACC values in particular, are affected by different variables, such as the macroeconomic situation and the interest rates development. But specially in the RE sector, the existence of barriers and their associated risks that investors face have a strong impact on the WACC level. RE investors can face a wide range of risks, such as power market risk, permit granting risk, social acceptance risk, grid integration risk, counterparty risk, political risk, currency risk, as well as financial sector risk.[20]

The de-risking framework provides a set of policies that governments can implement to enable greater private sector investment in the renewable energy sector and reduce the overall costs to society of the transition.

## Kosovo can learn from prior experiences with de-risking frameworks worldwide

De-risking initiatives are not new. One of the first intentional de-risking programs was launched in 2010, as part of the Deutsche Bank Climate Change Advisors' GET FiT Programme (Global Energy Transfer Feed-in Tariffs). Under this programme, developing countries received support through a mix of instruments including funds for support schemes, international guarantees, and knowledge transfer to tackle non-financial barriers.[21]

A central part of the foundation laid by the Deutsche Bank Climate Change Advisors was summarised under "TLC" framework: namely, that the aim of renewable energy policy should be to provide Transparency, Longevity, and Certainty. By providing TLC, renewable energy policy could not only help catalyse investments, it directly helps reduce costs of capital and thereby save money for electricity consumers and governments.[22]

The GET FiT programme was not developed as a prescriptive recipe to apply in all developing countries, instead, it was conceived as an approach that could be adapted to different national contexts, taking into consideration the existing policy support mechanisms and the country specific barriers.[23]

## Several de-risking initiatives have been successfully launched around the world

In 2013, the UNDP developed the "framework to support policymakers in selecting public instruments to promote renewable energy investment in developing countries", laying the foundation for its De-risking Renewable Energy Investment (DREI) initiative. The DREI framework

20 Waissbein, O., Glemarec, Y., Bayraktar, H., & Scmidt, T. S. (2013). De-risking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries. In United Nations Development Programme. http://scholar.google.ch/scholar?q=De-risking+Renewable+Energy+Investment+undp&btnG=&hl=en&as_sdt=0,5#0

21 Fulton, M., Sharples, C., Baker, J., & Cotter, L. (2011). GET FiT Plus: De-Risking Clean Energy Business Models in a Developing Country Context. In New York (Issue April).

22 Fulton, M., Kahn, B. M., Mellquist, N., Soong, E., Baker, J., & Cotter, L. (2009). Paying for Renewable Energy: TLC at the Right Price, Achieving Scale through Efficient Policy Design, December. New York, NY: Deutsche Bank Group, December.

23 Fulton, M., Sharples, C., Baker, J., & Cotter, L. (2011). GET FiT Plus: De-Risking Clean Energy Business Models in a Developing Country Context. In New York (Issue April).

is now one of the most widely recognized de-risking methodologies worldwide, and has been applied in several different countries including South Africa, Panama, Mongolia, Tunisia, Cambodia, and Kenya, among others, resulting in detailed sets of policies to reduce key investment risks.

The UNDP framework classifies de-risking instruments in two broad categories:

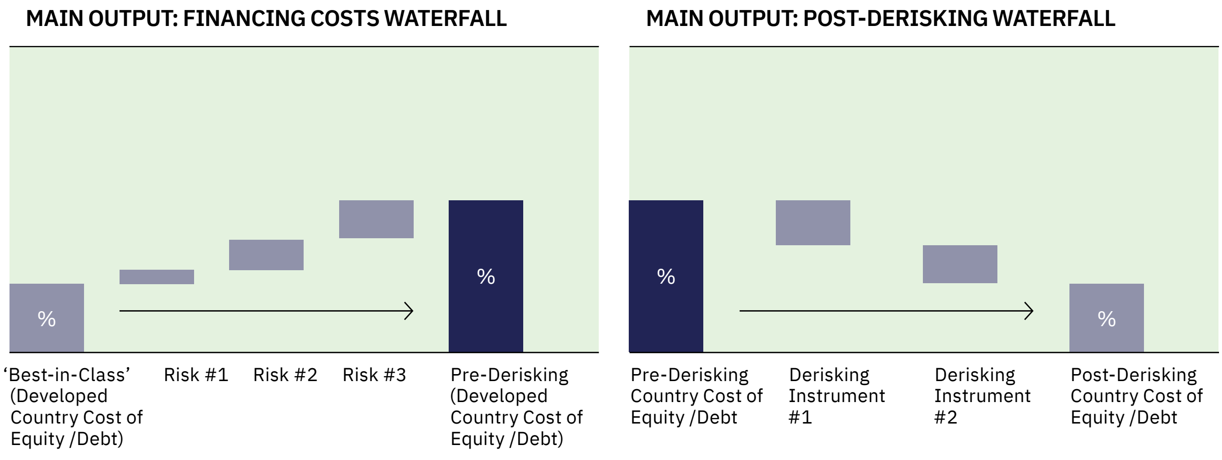
1) **policy de-risking instruments, and**
2) **financial de-risking instruments.**

The first category of de-risking measures aims to reduce risks by overcoming the underlying barriers to those risks, for example, grid connection and management, institutional capacity building, or skills development for local operations and maintenance.

The second category of de-risking measures does not directly address the underlying risks but rather seeks to *transfer* them to other actors such as governments, public actors, insurance providers, or to development finance institutions (DFIs). Some examples of financial de-risking measures include providing loan guarantees, establishing sovereign guarantees for the power purchase agreement, or the electricity buyer (i.e. off-taker), or purchasing currency risk insurance or political risk insurance, among others.[24] Governments can combine the use of both policy and financial de-risking measures to further reduce investment risks, decrease the cost of capital, and increase the overall volume of investments flowing into the country. Indeed, the de-risking framework has been used to drive renewable energy investment in a number of countries with little prior investment (either domestic or foreign) in large-scale renewables, including in Zambia, and in Senegal.

Another important aspect of both the UNDP's and the GET-FIT frameworks is the use of financing cost *waterfalls* (Figure 5).

**FIGURE 5: FINANCING COST WATERFALLS FROM UNDP FRAMEWORK**




Source: (Waissbein et al., 2013).

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[24] Waissbein, O., Glemarec, Y., Bayraktar, H., & Scmidt, T. S. (2013). De-risking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries. In United Nations Development Programme. http://scholar.google.ch/scholar?q=De-risking+Renewable+Energy+Investment+undp&btnG=&hl=en&as_sdt=0,5#0

The waterfalls indicate the individual contribution that specific de-risking measures can make toward reducing the cost of capital. The implementation of the de-risking framework can help policymakers not only to identify the main investment risks that developers and lenders in the country face, but also to assess their actual quantitative impact on financing costs.

De-risking can help reduce the cost of capital in four specific ways:

1 **A lower level of risk enables projects to be financed with a higher share of debt**, enabling (for instance, 80:20 debt-to-equity ratios instead of 70:30). A higher share of debt serves to reduce the overall cost of capital for the project.

2 **A lower level of risk translates into lower cost of capital**: this applies to both the rates charged on loans (i.e. the cost of debt), as well as investors' return expectations (the cost of equity).

3 **A lower level of risk enables projects to be financed with longer loan tenors**, or durations. A longer loan tenor enables more favourable project economics, as the debt service costs are lower (i.e. are structured over a longer time horizon).

4 **De-risking measures also help widen the pool of potential investors and developers** interested in entering the market. This can increase competition for projects and permits within the market and help drive down the cost of capital as different consortia of developers and lenders compete against one another to get projects built.

## Lessons from other countries provide valuable insights

In the European Union context, the first major analysis of the costs of capital used to finance renewable energy projects was conducted as part of the DiaCore project from 2015 - 2018. This multi-year research project identified specific risk categories that impact renewable energy investment across the EU, with a specific focus on onshore wind power projects.

At the time the DiaCore project was conducted, the most pressing risk category identified among Member State was the **policy design**, which refers to the choice of the support mechanism (Feed-in Tariff, Feed-in Premium, Quota mechanisms with tradable certificates, etc.). One of the highlights of the project is that governments can play an important role in mitigating renewable energy investment risks, for example by providing clarity on grid procedures, implementing long-term targets and policies, or improving the structure and quality of the administrative and permitting process.[25]

In particular, the DiaCore project identified nine risk categories that affect a RE project:

[25] Noothout, P., de Jager, D., Tesnière, L., van Rooijen, S., Karypidis, N., Brückmann, R., Jirouš, F., Breitschopf, B., Angelopoulos, D., Doukas, H., Konstantinavičiūtė, I., & Resch, G. (2016). The impact of risks in renewable investments and the role of smart policies (Issue February).


And for each of these risk categories, there are different **policy de-risking measures** that can be applied to reduce the cost of capital:

| TABLE 4: SUMMARY OF SELECT POLICY DE-RISKING MEASURES |
|---|
| Long-term PPAs |
| Pre-packaged land (to minimize the pre-construction and other risks relating to securing the rights to land) |
| Publicly-funded consultations with citizens and communities to increase awareness and provide a forum for debate and discussion |
| Streamlined grid interconnection procedures (or pre-built transmission capacity) |
| Priority dispatch (to ensure electricity is taken on a priority basis over other generation sources) |
| The introduction of take-or-pay rules in Power Purchase Agreements (PPAs) to reduce the financial risks associated with curtailment |

In addition, a range of **financial de-risking measures** that can further reduce risks by shifting them onto other actors, including, among others:

| TABLE 5: SUMMARY OF SELECT FINANCIAL DE-RISKING MEASURES |
|---|
| Political risk insurance |
| Sovereign guarantees |
| Credit enhancements |
| Currency risk insurance |

Although the various de-risking frameworks have similar methodologies and tools, each country context is unique, and de-risking measures need to be carefully adapted to the prevailing political, economic, and financial market realities that the country faces. For instance, a country with weak national utility acting as the single buyer and a fragile banking sector is going to require a different set of policy measures than a country with a strong single buyer and good access to capital markets. These challenges are exhibited clearly in the case of Argentina which has recently set out to implement its own de-risking strategy to attract investment (see Text Box 1).

**TEXT BOX 1: CASE STUDY ON ARGENTINA**

The energy transition and climate change mitigation efforts are a challenging task in developing countries that face high country risks, low sovereign rating, high fossil fuels subsidies, inflation, currency depreciation, legal risks, among others. Therefore, de-risking policies can help governments achieve a more affordable and efficient energy transition.

In Latin America, Argentina provides a clear example of a country with abundant renewable energy resources and cheap land, but one that suffers from severe macroeconomic risks, including the second highest inflation rate of the region (after Venezuela), multiple defaults with international creditors, a persistent budgetary deficit, and ongoing currency depreciation. Argentina passed multiple energy laws setting ambitious RE objectives for the next decade, and there is broad public support across the country's main political parties for the energy transition. However, due to the country's high investment risks, it opted to implement a comprehensive de-risking framework to attract national and international project developers and investors.

In 2016, the Argentinian government launched a tender scheme called "RenovAr", which aimed to conduct auction rounds to increase its renewable energy capacity. Winners of the auction sign a power purchase agreement (PPA) with the Wholesale Market Administrator (CAMMESA), which acts as an intermediary between the seller and the buyer. CAMMESSA reimburses the seller for the electricity it generates, reducing the risk of relying on the national utility (Menzies et al., 2019). Argentina's de-risking approach includes three main levels of protection:

1. The winners are backed by a Trust Fund (FODER) that issues the payment if CAMMESA fails to reimburse the winner for the generated electricity.
2. Project developers can transfer project assets to FODER if CAMMESA fails to comply with payments during four consecutive months (or 6 non-consecutive months within any 12-month period). This second level guarantee can also be activated if the Argentinian Government suddenly changes the guarantee framework without developers´ consent (Menzies et al., 2019).
3. There is a form of sovereign guarantee: the RenovAr programme secured USD 730 million from the World Bank to protect investors in the event that the Argentinian Government proves unable to honour the repayment guarantees established through FODER (Marcacci, 2019).

The RenovAr programme proved successful: 6.5 GW of renewable energy capacity was allocated through auctions, enabling solar and wind power to emerge as the cheapest unsubsidized sources of electricity in the country. The renewable energy boom triggered multiple benefits for Argentina, including the creation of 11,000 green jobs in the country's renewable energy sector (Marcacci, 2019).

## However, de-risking frameworks exhibit shortcomings

In any de-risking analysis, it is necessary to make certain assumptions and simplifications about the relationship between policy risk and country risks, and with regard to the overall cost of capital in the market. Despite the many accolades that the de-risking methodology has garnered in recent years, interviews with investors and developers have highlighted a few concerns:

1 **The de-risking methodology atomizes the various risks in a given jurisdiction**, treating them in isolation, when in reality, project developers and their lenders typically apply a more holistic assessment of the overall risks in a given market. In addition, lenders in particular often apply their own lending rates for different asset classes, different project proponents (those with a strong track record vs. those without), as well as for different types of infrastructure project depending on the perceived riskiness of the investment and reliability of the revenue streams. In some cases, the perceived riskiness can be higher when financing a technology such as wind power or solar power for the first time, as the lenders involved may apply higher discount rates due to the lack of prior familiarity with the technology.

In addition, **bank lending rates are often set internally and constrained by internal bank policy**, making it difficult to adjust downward, even when de-risking measures have been adopted. Furthermore, in many countries, commercial banks lend on the basis of a certain number of basis points above central bank benchmarks such as the overnight lending rate (e.g. EURIBOR or LIBOR) or above the national bank's own prime lending rate. Such premia may be fixed by the bank's management, or by recent precedent, and may not be allowed to vary as easily or freely as the de-risking methodology assumes.

2 A second and related criticism is that the de-risking methodology **assumes a direct, quantifiable correlation between specific policy changes** (such as the introduction of streamlined grid interconnection procedures, or more strictly bounded curtailment rules) **and the actual costs of debt and equity**. In practice, however, the cost of capital often remains "sticky" and may not vary in clear and predictable way in response to specific changes in the policy and regulatory environment. For instance, with regard to the cost of equity, most equity investors have internal thresholds and "hurdle rates" that they need to achieve in order to proceed with the project at all, and such rates may not be susceptible to downward revision due to recent changes in the policy and regulatory environment. Investors may simply choose to invest elsewhere instead where their internal "hurdle rate" can be met.

3 A third criticism is that the de-risking methodology **arguably exaggerates the importance of policy risks versus country risks, and understates the importance of central bank policies on the local cost of capital**. Research conducted as part of the AURES project in the EU found that while policy risks have a clear impact on the cost of capital, it is often overshadowed in practice by broader changes in central bank rates. A related issue is that **interest rates are at historic lows** due to the extraordinary monetary policies being pursued by many of the world's central banks. In countries like Germany[26] and Switzerland,[27] interest rates on 10-year sovereign debt are currently negative (December 2021), and many banks are now starting to charge their customers for holding deposits above a certain amount.

With regard to the renewable energy investment landscape, competition between lenders means that in some cases there is "too much" capital chasing too few deals, which results in an extraordinarily low cost of debt. Once the permit and the land has been obtained, wind and solar projects in mature markets like Germany can be financed over 20-years at rates below 1%. At these low debt costs, there is not much further room for de-risking policies to have an effect, as lending rates are already at the lower bound of what is possible. By the same logic, however, this

[26] Bloomberg, (2021). German Rates & Bonds. https://www.bloomberg.com/markets/rates-bonds/government-bonds/germany

[27] Trading Economics, (2021). Switzerland Government Bond 10Y. Retrieved from https://tradingeconomics.com/switzerland/government-bond-yield the 29.11.2021

signals that the benefits of introducing de-risking measures is likely to pay dividends down the road when interest rates start rising again.[28] A further factor that is relevant in Kosovo is **the role and engagement of multilateral lenders** like the EBRD, which puts further downward pressure on the cost of debt available in the market. Since the involvement of a concessional lender like the EBRD is in itself seen as having a de-risking effect on the market, the involvement of such lenders further limits the "room for manoeuvre" for further reductions in the cost of capital.

This notwithstanding, there are three main advantages of applying a de-risking approach that are worth retaining, and that apply specifically in Kosovo's context:

**FIGURE 6: KEY BENEFITS OF UNDERTAKING DE-RISKING MEASURES**

First, de-risking measures can directly reduce the cost of renewable electricity supply, which can generate both **public and societal savings**.

Second, if well implemented, de-risking instruments can translate into greater **end-user affordability**.

Third, de-risking measures can **generate a "crowding-in" effect**, providing private investors with greater re-assurance that they can invest safely in the country, generating more investment and greater competition.

## The Scaling Solar framework brings together many de-risking best practices

Since 2017, the International Finance Corporation (a member of the World Bank Group) has launched its own framework to help de-risking renewable energy projects and mobilize capital at scale, "**Scaling Solar**".[29]

Under the IFC's framework, a wide range of investment and advisory services are provided directly to governments in the form of a one-stop-shop designed to deliver competitively priced solar power from independent power producers. The Scaling Solar approach provides governments with extensive project preparation support, fully developed templates including bankable project documents, tender support and management, as well as financial de-risking mechanisms such as credit enhancements, and political risk insurance.[30]

In this regard, the IFC framework attempts to take many of the insights and lessons learned from the literature on de-risking and to apply it in individual countries to accelerate renewable energy deployment, specifically with a focus on cost-competitive solar PV. And while Kosovo may not be in a position to launch its own initiative as part of Scaling Solar in the next year or two, there are several aspects of the Scaling Solar approach that could be replicated in Kosovo.

[28] Indeed, a recent survey economists conducted in October 2021 found that expectations for a rate rise were increasing. Sarkar, S., (2021, October 22nd). ECB to raise rates in 2024, but risk remains of earlier hike. In Reuters. https://www.reuters.com/world/europe/ecb-raise-rates-2024-risk-remains-earlier-hike-2021-10-22/

[29] Scaling Solar, (2021). Unlocking Private Investment in Emerging Market Solar Power. Retrieved from https://www.scalingsolar.org/

[30] For more information on the IFC's scaling solar initiative, see: International Finance Corporation, (2021). Scaling Solar: The Complete Package. https://www.ifc.org/wps/wcm/connect/f4df6171-1018-4003-ad9d-938ce4866c15/scaling-infra-solar-08.pdf?MOD=AJPERES&CVID=mSCZFCY

# 3. QUANTIFYING THE BENEFITS OF DE-RISKING IN KOSOVO

Ultimately, the overall calculation of the costs of capital used to finance a particular project is based on a complex interplay of factors, and may not respond linearly to specific policy interventions, including to targeted de-risking interventions. As a result, rather than attempting to attribute specific quantifiable reductions in the cost of debt or of equity from specific de-risking measures, the approach laid out in this report is based on three main scenarios:

1. A **full risk scenario** where few policy measures are put in place to de-risk investments
2. A **partially de-risked scenario** where some de-risking measures are introduced, and international lenders and development finance institutions are active in supporting individual project.
3. A **fully de-risked scenario** where comprehensive de-risking measures are introduced, including sovereign guarantees and improved transmission cost allocation and grid interconnection.

## The current financing landscape in Kosovo is already quite dynamic, with many players active

Debt financing is now widely available for renewable energy projects in Kosovo, being drawn from local banks for smaller projects and mainly for international banks and DFIs for larger projects. Indeed, multi-lateral lenders are currently part of most of the major transactions in the country, bringing lower cost debt, and a longer-term perspective to support project investment and decarbonization in the country.

Lending rates from large multilateral lenders like IFC, EBRD and KfW can reach as low as 2% depending on the project, with loan tenors extending up to 14 years for solar and wind power projects. For local banks, the loan tenors are typically shorter, ranging from 7-10 years in most cases. Typically, in the absence of multilateral lenders, lending rates are in the 4,0 – 6,0% range, and local banks have substantial collateral requirements, sometimes even exceeding the value of the loan being provided. The share of debt used to finance projects in Kosovo is typically in the 70%, with developers being required to bring the remaining 30%, or more, depending on size of the transaction and the strength of the proponent’s balance sheet.

Another important factor in Kosovo is the growing involvement from non-EU lenders in the country, including from Turkey and China. These trends make it more difficult to obtain a clear picture of all aspects of the financing environment, as information on the terms offered by national banks outside Kosovo were not disclosed.

With regard to the supply of equity, there are many different investors and developers active, though return on equity (ROE) expectations are markedly higher than in EU Member States, ranging from 14-20% for small and medium-sized projects, to roughly 10% for larger projects where multi-lateral lenders are involved (though the precise ROE expectations were not disclosed by some interviewees). One of the reasons for the high cost of equity is due to the high (perceived or real) political risk, the difficulties obtaining permits and grid connections, the relatively “islanded” nature of the country’s electricity market which limits developers’ ability to export surpluses to neighbouring markets and thereby reduce their reliance on the single off-taker. Further risk factors include political and geopolitical risks, notably in light of tensions with neighbouring Serbia.

## Multilateral lenders currently play a central role in Kosovo’s renewable energy investment landscape

Many of the solar PV projects currently being developed in Kosovo have benefitted from support from development finance institutions such as the EBRD or the IFC. Indeed, the role of DFIs has arguably been instrumental in helping catalyse investment, and in building other lenders’ confidence in providing loans to the sector. In other cases, international developers from countries like Turkey have brought their own funding from their own banks, making it difficult to compare projects narrowly with one another.

In order to assess the risks of renewable energy investment in Kosovo, several interviews were conducted with private sector developers, investors, lenders, as well as other stakeholders active in the country such as multilateral institutions. In total, approximately 20 interviews were conducted in order to better understand how renewable energy projects are currently being financed, and to better understand the main risks that project developers and investors face. By clearly identifying the main risks that investors face, and by applying the de-risking framework, it is possible to estimate the reduction in the cost of capital that an improved policy and regulatory environment could bring.

In order to estimate the lower bound of what is possible in terms of the cost of capital in Kosovo, projects relying on development finance institutions such as the EBRD and the IFC were used as a benchmark. Given the prominent role played by DFIs in financing current RE projects in the country, it is difficult (if not impossible) to separate the country’s renewable energy investment landscape from the impact of these lenders on investment conditions.

In other words, **the presence of DFIs has already helped accomplish a substantial share of what is possible in terms of de-risking in the country: it has reduced the cost of debt used to finance projects, and has helped crowd in private sector investors and developers**, arguably leading to greater competition in the market.

In light of the relatively limited renewable energy capacity (3GW to 4GW would suffice to meet the country’s entire electricity needs and even allow for exports during certain months of the year) a fully de-risked scenario assumes the continued involvement of DFIs in providing a portion of the debt financing and in providing guarantees either on the off-taker or the PPA itself.

## The potential gains from de-risking solar PV investments are substantial

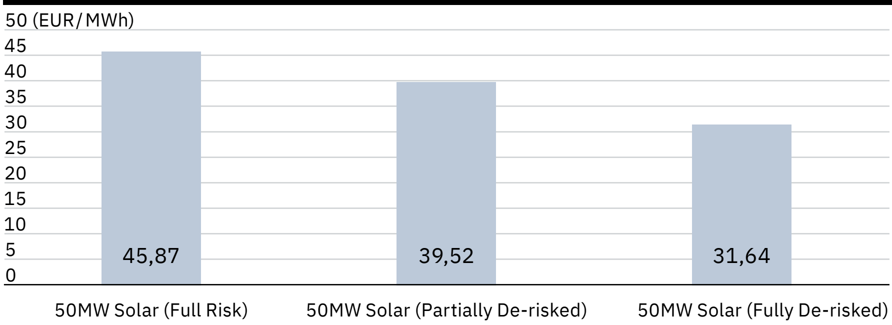
The table below provides an overview of the three main scenarios examined here:

**TABLE 6: OVERVIEW OF THE THREE MAIN SCENARIOS FOR SOLAR PV INVESTMENT**

| | Solar Full Risk | Solar Partially De-Risked | Solar Fully De-risked |
|---|---|---|---|
| Lender | Local Bank | International Bank or Development Finance Institution (DFI) | Development Finance Institution (DFI) |
| Off-take Agreement | PPA (no guarantee) | PPA (partial risk guarantee) | PPA with sovereign guarantee |
| Land Use and Environmental Assessments | No support | Streamlined permits and approvals | Pre-approved land + streamlined permits and approvals |
| Grid Connection Charging Methodology | Deep (Developer covers all grid-related interconnection and upgrade costs, including studies) | Hybrid (KOSTT, KEDS and Developer share any necessary grid-upgrade costs) | Shallow (Developer only covers costs up to existing transmission system; KOSTT/KEDS cover costs of any necessary upgrades) |
| Duration of PPA | 10 years | 12 years | 15 years (including potential for term extension) |
| Loan Tenor (duration) | 8 years | 10 years | 14 years |
| Ratio of Debt-to-Equity | 60:40 | 70:30 | 80:20 |
| Cost of Debt | 5,5% | 4,2% | 1,5% |
| Cost of Equity | 12% | 9% | 6% |
| WACC | 7.8% | 5.4% | 2.3% |

These different scenarios produce different levelized electricity generation costs for solar PV projects (this analysis assumes a standard 50MW solar PV project).

**FIGURE 7: LEVELIZED COST OF ELECTRICITY (LCOE) OF SOLAR PV PROJECTS IN KOSOVO UNDER VARIOUS DE-RISKING SCENARIOS**




Common Project Parameters: Installed Cost: EUR 550/kW; O&M Costs at EUR 11/kW/year; Solar Irradiation: 4.2 kWh/m2/day (ca. 15% capacity factor); Solar panel efficiency: 19%; Inflation: 2.68%; Economic life of the project: 25 years; Applicable Tax: 10%; Depreciation: Straight-line, 10-year.

As the chart above highlights the difference in LCOE varies by EUR 14/MWh between the "non de-risked" scenario and the "fully de-risked" scenario.

However, given that many of the projects currently being built in Kosovo already benefit from partial guarantees, or from partial support from development finance institutions (DFIs) such as the EBRD or the IFC, the "full risk" scenario is not an accurate representation of the current market. Kosovo is benefiting from significant support and interest from DFIs, including the presence of certain forms of guarantees.[31] As such, a **more accurate comparison of a pre- and post-de-risking scenario is between the "partially de-risked" and "fully de-risked"** scenarios highlighted here. **The cost differential between these two scenarios for solar PV projects is roughly EUR 8/MWh**.

## Wind power shows similar gains from de-risking as solar PV

The table below provides an overview of the three main wind power scenarios examined here:

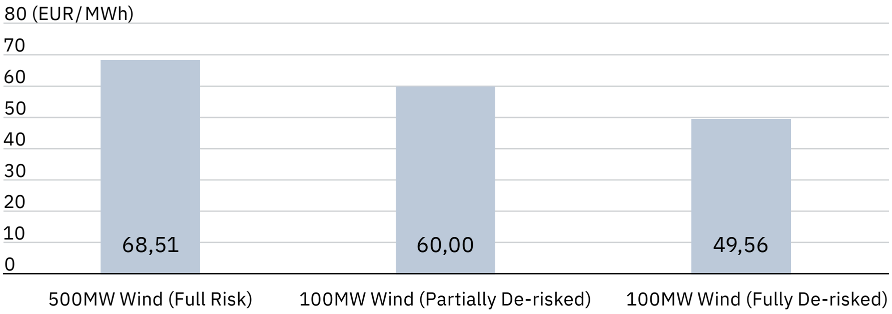
**TABLE 7: OVERVIEW OF THE THREE MAIN SCENARIOS FOR WIND POWER INVESTMENT**

| | Wind Full Risk | Wind Partially De-Risked | Wind Fully De-risked |
|---|---|---|---|
| Lender | Local Bank | International Bank or Development Finance Institution (DFI) | Development Finance Institution (DFI) |
| Off-take Agreement | PPA (no guarantee) | PPA (partial risk guarantee) | PPA with sovereign guarantee |
| Land Use and Environmental Assessments | No support | Streamlined permits and approvals | Pre-approved land + streamlined permits and approvals |
| Grid Connection Charging Methodology | Deep (Developer covers all grid-related inter-connection and upgrade costs, including studies) | Hybrid (KOSTT, KEDS and Developer share any necessary grid-upgrade costs) | Shallow (Developer only covers costs up to existing transmission system; KOSTT/KEDS cover costs of any necessary upgrades) |
| Duration of PPA | 10 years | 12 years | 15 years (including potential for term extension) |
| Loan Tenor (duration) | 8 years | 10 years | 14 years |
| Ratio of Debt-to-Equity | 70:30 | 75:25 | 80:20 |
| Cost of Debt | 6,0% | 4,5% | 2,0% |
| Cost of Equity | 12% | 10% | 8% |
| WACC | 7.5% | 5.6% | 3.1% |

[31] Millennium Challenge Corporation, (November 2019). Renewable Energy Independent Power Producers Finance Facilitation Project. https://www.energy-community.org/dam/jcr:0718ea81-79b5-4814-8140-7d948e8d145a/ECRB112019_MCC.pdf

Figure 8 provides an overview of how the impacts of an overall de-risking approach would impact the levelized cost of electricity from onshore wind power in Kosovo.

**FIGURE 8: LEVELIZED COST OF ELECTRICITY (LCOE) OF ONSHORE WIND POWER PROJECTS UNDER VARIOUS DE-RISKING SCENARIOS**




Common Project Parameters: Installed Cost: EUR 1250/kW; O&M Costs at EUR 30/kW/year; Wind Capacity Factor: 27%; Inflation: 2.68%; Economic life of the project: 25 years; Applicable Tax: 10%; Depreciation: Straight-line, 10-year.

As seen above, the total savings for de-risking between the partially de-risked and fully de-risked scenarios is approximately EUR 10.5/MWh.[32]

## Kosovo can save approximately 22% on its renewable energy procurement costs via de-risking

With a comprehensive set of de-risking measures, de-risking the policy and regulatory environment further could help unlock important savings for the government of Kosovo, while protecting electricity consumers from electricity price increases caused by the addition of new generating capacity and new transmission infrastructure in the country. In total, the estimated gains that can be unlocked from additional de-risking measures could further reduce the cost of renewable energy procurement by roughly 22% versus a partially de-risked scenario (i.e. versus current policy and regulatory conditions).

Based on the capacity deployment scenarios laid out in the recent study by REKK and TU Vienna, the total amounts of solar PV and wind power range from 1500 – 2000MW for solar PV, and 970MW to 1600MW for wind power.

However, given that roughly 1000MW of combined wind and solar PV capacity is already either in development, at the planning phase, or already connected to the grid (see Table 1 above), this leaves a smaller share of renewable energy capacity that can benefit from de-risking measures introduced in the future. Table 6 below provides a summary of the planned capacities, and the corresponding electricity output that can still benefit from de-risking.

32 Although most recent analyses conducted on Kosovo's solar and wind power potential indicate that the share of solar PV in Kosovo will likely exceed that of wind power, the current range of installed capacities envisioned for wind power capacity range from 970MW to roughly 1595MW, making an important contributor to the energy transition in Kosovo. And although the precise dynamics will differ by market and geographic region, wind power also has a different (and in many ways complementary) production profile to solar PV, producing more in the evening hours and during the winter when solar output is lower. (Slusarewicz, J. & Cohan, D., 2018. Accessing solar and wind complementarity in Texas. In Renewables: Wind, Water, and Solar. https://doi.org/10.1186/s40807-018-0054-3). Such complementarities are poised to become increasingly important to achieving high shares of renewables in countries where biomass and hydro resources are limited, or constrained by social, political, and environmental factors.

**TABLE 8: OVERVIEW OF THE SHARE OF GENERATION THAT CAN STILL BENEFIT FROM FURTHER DE-RISKING**

| Technology | Range of installed capacity (in MW) | Currently contracted capacity (or in development, in MW) | Remaining capacity that can benefit from future de-risking measures (in MW) | Range of electricity output still able to benefit from future de-risking (in GWh, in year 1) |
|---|---|---|---|---|
| Solar PV | 1526MW – 1985MW | 533MW | 993MW – 1452MW | 1302 GWh – 1903 GWh |
| Onshore Wind | 970MW – 1595MW | 505MW | 465MW – 1090MW | 1089 GWh – 2552 GWh |

Based on these output values and the de-risking related savings outlined above, Table 7 below provides an overview of the combined de-risking related savings, both an annual basis as well as over a 25-year period:

**TABLE 9: OVERVIEW OF THE ESTIMATED COST SAVINGS FOR KOSOVO ACHIEVABLE THROUGH FURTHER DE-RISKING**

| Technology | Range of Electricity Output (in GWh, in year 1) | Total Annual Cost Savings from De-risking Measures (in Millions) | Total Electricity Output (over 25 years, after degradation) | Total Cost Savings from De-risking Measures (over 25 years) |
|---|---|---|---|---|
| Solar PV | 1302 GWh – 1903 GWh | 10.26 – 15.00 Millions | 30.7 TWh – 44,8 TWh | 241.9 – 353.0 Millions |
| Onshore Wind | 1089 GWh – 2552 GWh | 11.37 – 26.64 Millions | 25.6TWh – 60.1 TWh | 267.3 – 627.4 Millions |
| Combined Savings from De-risking Measures | | 21.63 – 41.64 Millions | | 509.2 – 980.4 Millions |

As can be seen here, the **total annual savings range from roughly EUR 21 Million to 41 Million in de-risking related savings**. Levelized over the entire electricity consumption of the country, the potential de-risking benefits amount to a total combined cost saving of roughly **EUR 9/MWh**.

Assuming an approximate combined levelized cost of electricity output from solar PV and wind power of roughly EUR 40/MWh, this represents a saving to the government and to electricity consumers of roughly 22% over business-as-usual.

While certain elements related to country risk are unlikely to be overcome through policy related de-risking measures, in the fully de-risked scenario the following key elements are assumed:

- → **Lengthen the duration of the PPA from 12 years to 15 years or longer**;
- → **Provide a clear government guarantee on the PPAs signed**, in particular to support KOSTT in its role as off-taker;

- **Streamline administrative processes** including in particular to enhance grid connection procedures, and predictability: currently, developers face considerable uncertainty with regard to both the timelines required for grid connection as well as the costs they can expect to bear. Greater transparency and predictability around grid connection procedures would significantly reduce minimize delays and save developers and investors both time and money.

- **Harmonize environmental permitting rules**, including in particular aligning the environmental permit period (currently set at 5 years) with the duration of the PPA (e.g. 12-15 years).

- **Establish an escrow account to guarantee payments from KOSTT to project developers** for a period of at least 6 months. Escrow accounts can help minimize the risks of disruption to revenue streams, and represents a common way to reduce revenue risk in many jurisdictions worldwide.

A further aspect is that as the share of variable renewable energy sources such as solar and wind power grows in the coming years in Kosovo, greater focus will need to be placed on enhancing **power system flexibility**. An inflexible power system is more likely to have to rely on curtailment in order to balance supply and demand, losing a growing share of cost-effective renewable electricity supply in the process.

**In order to effectively integrate large shares of variable renewables into its power system, greater flexibility is vital.** Increasing flexibility can be done directly by utility-led investments, by encouraging new investments by the private sector, or it can be done by unlocking sources of flexibility that already exist, but that are currently left untapped due to the absence of incentives, market rules, and regulations enabling this flexibility to participate in the market.[33]

From an institutional standpoint, flexibility can be increased by moving from hourly dispatching to sub-hourly dispatching, by reducing the minimum full-load hours guaranteed to baseload generators such as lignite plants, or by improving forecasting. Certain loads can be made more flexible by establishing frameworks to encourage demand response while various sources of storage can be brought online such as thermal storage, or battery storage, that can provide a valuable new source of flexibility.

33 IEA Renewable Energy Technology Deployment, (March 2016). RE-Transition: Policy Frameworks for Cost-Competitive Renewables. http://iea-retd.org/wp-content/uploads/2016/03/IEA-RETD_RE-TRANSITION.pdf

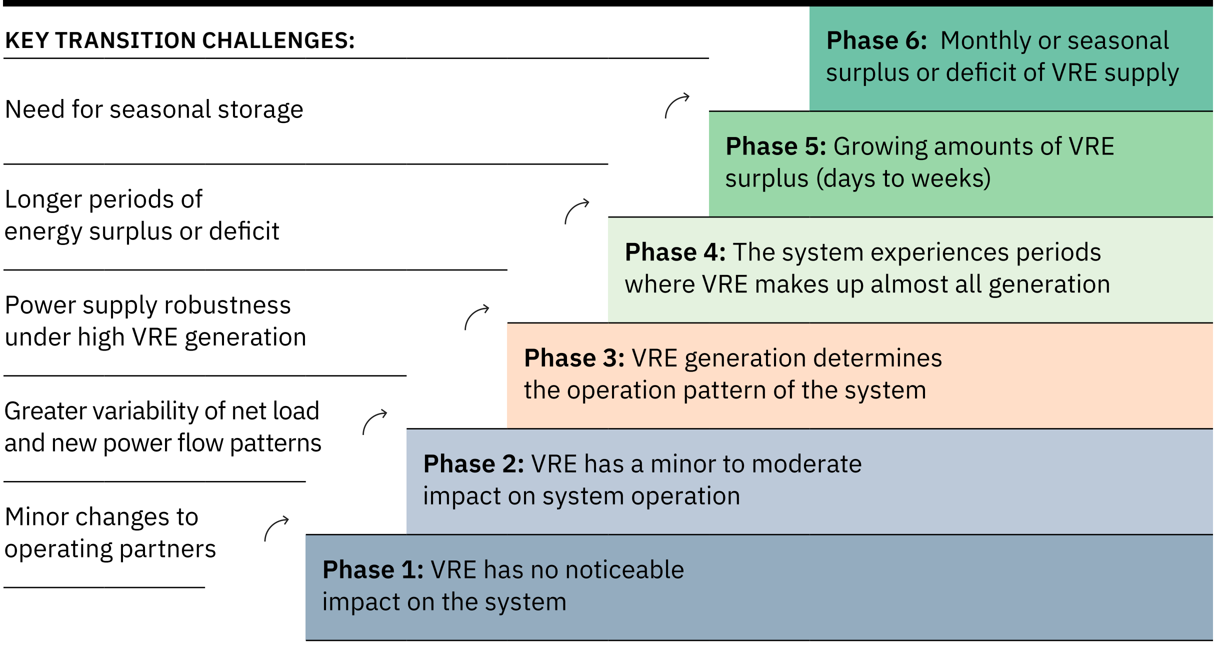
# 4. FLEXIBILITY AND THE ROLE OF STORAGE

Kosovo's ageing lignite plants pose unique challenges for the country's overall power system flexibility. While lignite has long been the bedrock of electricity supply in Kosovo, the future operation of the electricity system will rely more heavily on renewables such as solar and wind power. This has important implications for power system development, as well as for power system planning.

## Power system operations will come to be shaped increasingly by solar and wind power

The challenge of integrating growing shares of variable renewable energy resources can be viewed through a series of phases, with each phase representing different degrees of variable renewable energy (VRE) penetration. As the share of VRE grows, the need for flexibility grows along with it.

**FIGURE 9: CLASSIFICATION OF VRE PENETRATION PHASES AND KEY TRANSITION CHALLENGES PER PHASE**[34]




As Figure 9 above shows, the growth of variable renewables like solar and wind generates several new challenges that power system operators need to manage carefully. As Kosovo increases the share of solar and wind, it will need to put far greater emphasis on power system integration and on other aspects such as real-time weather forecasting in order to better govern the transition while maintaining reliability. Improved RE forecasting can help reduce the gap between actual and planned generation, thereby reducing the amount of flexibility that has to be called upon.

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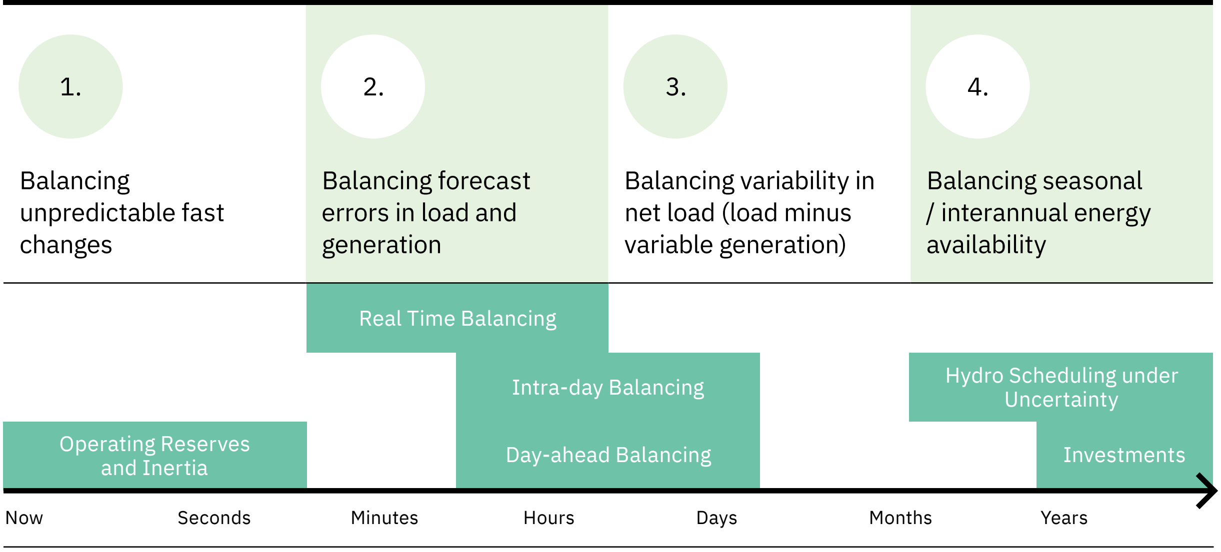
[34] International Energy Agency, (November 2018). World Energy Outlook 2018. https://www.iea.org/reports/world-energy-outlook-2018

The ability to forecast and plan power system operations over both very short-term as well as longer-term time dimensions also grows as the power mix starts to become dominated by weather-dependent renewables such as solar and wind power. Figure 10 below provides an overview of these various timescales and how balancing can be better managed over various time periods.

**FIGURE 10: TIMESCALES FOR FLEXIBILITY PROVISION[35]**



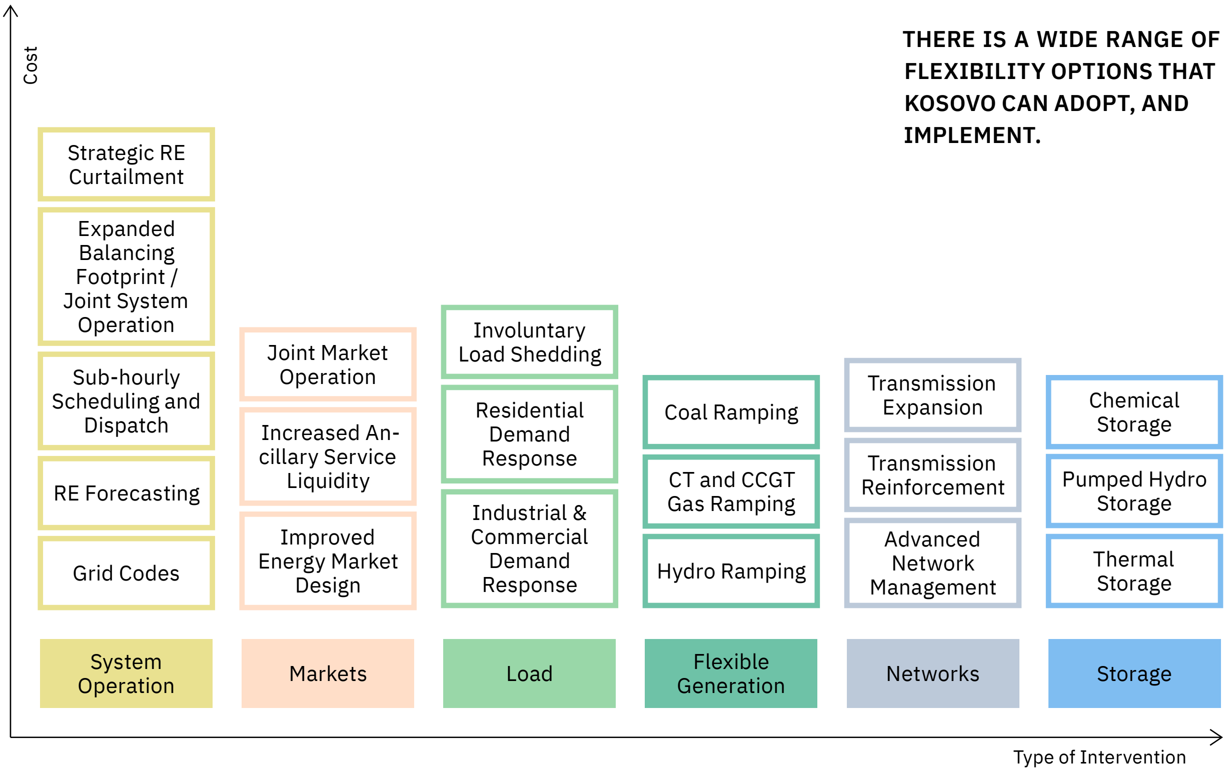

In order to maintain power system reliability throughout the year, power system operators need to ensure that sufficient supply is available 24-hours per day, 365-days per year. The supply traditionally provided by lignite will be scaled back, making way for a wider range of technologies and actors. **Central to the success of any strategy to boost power system flexibility is the participation of more actors and investors including on both the supply side and on the demand side** (e.g. through demand response), spurred on either by regulations, by mandates, or by incentives.

Another way to increase flexibility is the continued expansion of transmission capacity with neighbouring countries. Kosovo has recently completed a transmission line to Albania, which enables it to operate as an integrated regulatory zone with Albania featuring greater two-way power flows. However, since export and import capacities are limited Kosovo is unable to rely entirely on imports and exports to provide all of its future flexibility needs, underscoring the importance of additional flexibility measures.

And while options like storage (including battery storage, thermal storage, pumped hydro storage, hydrogen-based storage, and even compressed air storage) are all likely to play a role, it is important to note that certain storage options remain costly, and need to be weighed against other alternative means of boosting flexibility (see Figure 11).

35 International Renewable Energy Agency, (November 2018). Power System Flexibility for the Energy Transition – Part 1: Overview for Policy Makers. https://www.irena.org/publications/2018/Nov/Power-system-flexibility-for-the-energy-transition

**FIGURE 11: FLEXIBILITY OPTIONS TO INCREASE VRE INTEGRATION INCLUDING THEIR RELATIVE COST[36]**




## Efforts should include a wide range of flexibility measures

Batteries have seen a huge development progress in the past few years. Costs have come down and capabilities have significantly improved. Large scale batteries are already in operation in various jurisdictions worldwide, including in the U.S., Australia, and parts of the EU, as several major governments including India, and China are starting to require the addition of battery storage in some of their latest solar PV auction rounds.[37]

Most major battery types being deployed at a commercial scale to support grid flexibility can adjust their power output within milliseconds. Battery energy storage systems can provide voltage and frequency support through peak shaving/shifting, intermittency management and frequency regulation when they are charged and discharged. As such, batteries can be an important complement to a power system dominated by variable renewables; however, as the graph above shows, battery storage may not necessarily be the lowest cost option in Kosovo's context, particularly if greater access to supply from neighboring jurisdictions can be secured through expanded grid interconnection.

As such, battery storage options may be better deployed to provide system services such as voltage and frequency control, while other forms of storage such as thermal storage such as smart water heaters and smart electric space heaters may be useful in creating a new and growing source of flexible power demand that can be switched on or off depending on the

[36] International Renewable Energy Agency, (2017). Adapting Market Design to High Shares of Variable Renewable Energy. https://www.irena.org/publications/2017/May/Adapting-Market-Design-to-High-Shares-of-Variable-Renewable-Energy
[37] Gupta, U. (August 10th 2021). Indian developers signs PPA for 400MW round-the-clock energy supply, PV Magazine, https://www.pv-magazine.com/2021/08/10/indian-developer-signs-ppa-for-400-mw-round-the-clock-energy-supply/

abundance or scarcity of power supply in the system. Similarly, electric vehicles represent a major new source of flexible power demand, and are currently not being factored into most forecasts of Kosovo's electricity demand. Providing incentives for the small but growing fleet of electric vehicles in Kosovo to charge during certain hours of the day can help reduce the need for costly peak supply, and also provide another low-cost way to shape the overall profile of electricity demand in the future.

Another potential option that has long been discussed is the potential of pumped-storage: it requires two water reservoirs on different altitude levels. During times excess energy is available, water is pumped to the upper reservoir and later depleted to generate electricity. The total round-trip efficiency can be greater than 80%. Seasonal storage is in principal possible, but the total energy content will depend on the altitude difference and upper reservoir size. In Kosovo's case, the use of pumped hydro storage could potentially be feasible, but given the range of flexibility options available, it should not be considered necessary to achieving Kosovo's overall energy transition objectives.

Key to Kosovo's success at boosting power system flexibility is to put the wheels of several different flexibility options in motion now, so that many different sources of flexibility become available in the coming years as Kosovo's energy transition continues to gain momentum.

# 5. CONCLUSION

## A number of important barriers and risks for investors persist

Going from a lignite-dominated electricity system to one based on a cleaner and more diverse mix of renewable energy sources requires a stable and future-oriented regulatory framework, one that makes investment in renewable technologies easier and lower-risk. And while Kosovo has made considerable strides in improving its policy and regulatory framework, investors and developers interviewed as part of this analysis have articulated a need for further changes, and for more harmonization across national and regional authorities and the development of more standardized project documentation.

Indeed, despite having launched a series of auctions, **there are a range of barriers and issues that continue to persist, and that continue to increase the risks (and costs) of investing in Kosovo's energy transition**. These include complex negotiations with the national grid operator, KOSTT, in order to connect renewable energy projects to the grid, a lack of planning certainty, and considerable delays in obtaining the necessary authorizations.

## Kosovo needs to put the wheels in motion of a range of new flexibility options

In order to accelerate its energy transition and ensure both a reliable and secure energy supply in the future, Kosovo needs to start encouraging and unlocking a number of different flexibility options, including some from existing sources of demand (such as those at existing industries, via industrial demand response programmes) as well as from new sources of demand (such as smart water heaters, smart electric space heaters, and electric vehicles).

At the same time, an analysis should be undertaken of which storage options offer the greatest near-term and medium-term benefit for Kosovo, including whether storage systems should be stand-alone (e.g. located at substations) or predominantly co-sited with renewable energy projects such as solar PV and wind power, or owned by the incumbent utility, KEK. These strategic decisions will have an important impact on how Kosovo's electricity market evolves in the years ahead, including which actors play the largest role in providing flexibility.

As the share of variable renewable energy sources such as solar and wind power continues to grow in the coming years in Kosovo, it is increasingly clear that greater focus will need to be placed on enhancing power system flexibility. How Kosovo goes about increasing flexibility will be decisive in fostering the emergence of a clean, secure, and affordable energy supply.

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