

PVS

SECTOR IN

KOSOVO



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INTRODUCTION

In the pursuit of a sustainable and environmentally responsible energy landscape, the harnessing of renewable energy sources has become an imperative for nations worldwide. Among these sources, photovoltaic (PV) technology stands as one of the leaders, offering a clean and inexhaustible means of electricity generation. Within the context of Kosovo, a region undergoing significant transformation in its energy sector, the role of PVs has gained heightened relevance. Kosovo, a landlocked nation nestled in the Balkans, has long grappled with complex energy challenges. The legacy of a centralized, coal-dependent energy system has cast shadows over environmental sustainability, economic viability, and energy security. However, as the global shift towards greener energy alternatives gains momentum, Kosovo has embarked on a journey towards a more sustainable future. At the heart of this transformation lies the ambition to integrate photovoltaic systems into its energy landscape.

Kosovo, as a Contracting Party (CP) to the Energy Community Treaty (EnCT), has committed to meeting mandatory targets for renewable energy (RE) share in its final energy consumption. The region's solar potential is promising, with an average daily yield of 3.7 kWh/kWp, making solar PV projects highly viable and attractive for investment. The technical potential for photovoltaic (PV) installations in Kosovo is estimated at 3,600 MW, considering a ratio of 2 hectares per megawatt (MW). The country's Energy Strategy for 2022-2031 aims to develop 600 MW of new solar PV capacity, along with 20 MW of biomass power capacity and at least 100 MW as procurers.

Currently, Kosovo's total operating capacity for electricity generation stands at 1,236 MW, with the majority (77.7%) coming from outdated lignite-fired thermal plants. Renewables contribute 270 MW (22.3%), including 10 MW from solar PV panels. The transmission system is considered sustainable and stable, with significant enhancements made to integrate the proposed “Kosova e Re” power plant, which will not proceed. Instead, plans for a 170 MW energy storage system by 2031 are in place to balance the grid and accommodate renewable energy targets. The distribution system in Kosovo can efficiently integrate around 300 MW of RES capacity. Beyond this threshold, it may be more cost-effective to connect larger RES projects directly to the transmission system to mitigate integration expenses.

This research paper, titled “**PVs sector in Kosovo**”, endeavors to explore the multifaceted dimensions of photovoltaics within the context of Kosovo. Our focus extends beyond the mere potential of solar power, it goes deep into the obstacles that have impeded its widespread adoption. Through this paper, we aim to provide a comprehensive understanding of the challenges that Kosovo faces in realizing the promise of photovoltaics. In this pursuit, our research spans across various domains, from the technical intricacies of PV systems to the socio-economic implications of their deployment. Through rigorous analysis and empirical evidence, we aim to shed light on the potential of photovoltaics in Kosovo and the strategies required to overcome the existing challenges. Exiting barriers for promoting PVs have been identified, and the document provides recommendations to address them effectively.

ELECTRICITY PRODUCTION IN KOSOVO BY SOURCES

Kosovo's energy sector currently relies heavily on two outdated lignite-fired power plants, Kosovo A and Kosovo B. However, the insufficient capacities of these power plants to meet domestic demand, especially during winter, and provide the necessary reserve capacity pose significant risks to Kosovo's energy security. To ensure a stable and sustainable energy future, a complete decarbonization of the energy sector is essential, with renewable energy sources (RE) such as wind, solar, and energy efficiency taking center stage in this transformative process.

Kosovo recognizes the urgency of transitioning away from fossil-based energy sources and has initiated a long-term, gradual transition plan that aims to achieve complete decarbonization by 2050. The immediate focus is on incorporating renewable energy sources, primarily solar power, into the energy mix. This ambitious approach will ensure a more reliable and resilient energy supply, reducing dependence on imported fossil fuels and mitigating environmental impacts.

As of 2022, Kosovo's total operating capacity for electricity generation stands at 1,236 MW. The majority, 77.7%, is sourced from thermal plants, primarily outdated lignite-fired facilities. The remaining 270 MW (22.3%) comprises hydro plants and other renewable energy sources, including wind plants and photovoltaic panels. Among these renewables, solar photovoltaic panels contribute 10 MW to the overall capacity.

Here is the capacity and production of electricity according to the energy source:¹

	Installed Capacity in 2022	Capacity Neto in 2022	Production in 2022	Share in production
TPP (A+B)	1288 MW	960 MW	5678 GWh	89.91%
RES (Hydro+Wind)	269 MW	266 MW	623 GWh	9.87%
PVs	10 MW	10 MW	14 GWh	0.22%
Total	1567 MW	1236 MW	6319 GWh	100%

Over the past 10 years, the Energy Regulatory Office (ERO) in Kosovo has issued final authorizations for the construction of 10 MW of PVs. These PVs include six large solar generator projects, each with a capacity exceeding 100 kWp. These large solar generator projects have been supported through a scheme based on Feed-in Tariff (FiT). The feed-in tariff was a key mechanism used to incentivize the development of renewable energy capacity, particularly in the electricity sector, in Kosovo. However, in 2020, the Energy Regulatory Office (ERO) made the decision to suspend the feed-in tariff scheme. This suspension was prompted by the emergence of more cost-efficient and competitive support mechanisms (e.g. auction) that proved to be more effective in increasing the deployment of clean technologies in the country's energy sector.

It is worth noting that from 2018 until 2022, based on the Rule of Support Scheme the Energy Regulatory Office (ERO) has issued decisions for authorizations to construct photovoltaic systems (PVs) for self-consumption/prosumers (based on net-metering with capacity per project up to

¹ Annual report published by ERO, accessible at: www.ero-ks.org

100kWp), with a total capacity of 7.8 MW. On average, this amounts to 1.57 MW per year during the mentioned period.

PV self-consumption	kW
2022	4202.85
2021	1919.8
2020	978.73
2019	502.2
2018	250.2
Total	7853.78²

The approval of these photovoltaic installations for self-consumption indicates a growing interest in decentralized renewable energy solutions within Kosovo. By allowing individuals and businesses to generate their own electricity through solar panels, the country can further diversify its energy sources and reduce the burden on the centralized grid. Moreover, promoting self-consumption PV systems contributes to energy independence, as consumers become more active participants in the energy generation process, lessening their reliance on traditional energy suppliers. This shift towards distributed renewable energy supports the overarching goals outlined in the Kosovo Energy Strategy 2022-2031, facilitating the country's progress toward a more sustainable and secure energy future.

To encourage investments in self-consumption generators, particularly among commercial consumers, the Kosovo Fund for Energy Efficiency (KEEF) should consider introducing a new investment window. These avenues could resemble the existing energy efficiency program, wherein KEEF extends support by covering a significant portion of the investment, possibly up to 40%, in the form of grants. Given that commercial consumers contend with elevated electricity tariffs, facilitating investment subsidies for this consumer segment would yield advantages across the entire electricity sector. This approach could trigger substantial interest in investments, directly contributing to alleviating the overload on Kosovo's electricity grid. By doing so, the ambitious goals pertaining to self-consumption generator implementation could be more readily attained.

The ERO has officially adopted new regulation for self-consumption of electricity. This regulation applies to electricity consumers across all voltage levels, and they introduce the categories of Prosumers and Self-Consumers. The following criteria outline the eligibility for each category:³

- **Low Voltage Consumers (0.4kV) - Household Consumers:** Household consumers connected to the low-voltage distribution network (0.4kV) are now entitled to establish generation capacities for self-consumption. The installed power of the production unit can be based on the energy consumed, as long as it adheres to the Electrical Consent and does not exceed 7 kW.

² Annual reports 2018-2022, published by ERO, accessible at: www.ero-ks.org

³ Energy Regulatory Office, News, accessible at: [https://www.ero-ks.org/zrre/sites/default/files/Lajmet/njoftimet/DRAFT-RREGULLA%20PER%20VET-%20KONSUMATORET%20ME%20BURIME%20TE%20RIPERTRTSHME.%20\(00000002\).pdf](https://www.ero-ks.org/zrre/sites/default/files/Lajmet/njoftimet/DRAFT-RREGULLA%20PER%20VET-%20KONSUMATORET%20ME%20BURIME%20TE%20RIPERTRTSHME.%20(00000002).pdf)

- **Low Voltage Consumers (0.4kV) - Non-Household Consumers:** Non-household consumers linked to the low-voltage distribution network (0.4kV) are also granted the right to set up generation capacities for self-consumption. The installed power of the production unit can be determined based on the energy consumed, while adhering to the Electrical Consent. However, this capacity must not surpass the threshold of 100 kW.
- **Adjusted Authorization for Prosumer Status - 0.4kV Consumers:** In instances where the calculated engaged power, determined using annual consumption data, falls below the contracted power for consumers connected to the 0.4kV voltage level, the authorization for the Prosumer status capacity will be provided based on the power calculated from the annual consumption data.
- **Medium Voltage Consumers (10kV and 35kV) and Transmission Network Consumers - Non-Domestic:** Non-domestic consumers linked to the medium voltage distribution network (10kV and 35kV), as well as those connected to the transmission network, are eligible to establish generating capacities for self-consumption. The installed power of the production unit can be determined based on the average power engaged over a 12-month period, while considering the Electrical Consent. This capacity, however, must not exceed the threshold of 200 kW.

This regulation marks a significant step towards fostering self-consumption of electricity, providing consumers with greater autonomy over their energy generation and consumption. It also establishes clear parameters for various consumer categories, ensuring a fair and efficient implementation of self-consumption practices.

A noteworthy aspect that requires mentioning is the requirement for approval by the ERO Board concerning small capacities, also referred to as prosumers. This particular condition has resulted in significant delays in the authorization process. Considering this situation, it is advisable to streamline the decision-making process for small capacities. One effective approach could involve the establishment of a standing committee, consisting of ERO's technical and operational personnel. This committee would ideally comprise members from various departments such as the legal department, tariffs, and market department.

By implementing such an approach, decisions related to small capacities could be expedited, minimizing unnecessary delays. This adjustment would not only enhance efficiency but also contribute to a more agile and responsive authorization process for prosumers.

One of the significant hindrances for self-consumption generators until 5th of September 2023 was the obligatory need for a construction permit. Notably, this requirement possessed a challenge, considering that approximately 90% of existing buildings lack the essential construction permit. This situation created a substantial barrier for individuals or entities seeking to install self-consumption generation systems. With the decision of September 5, 2023, from the Ministry of Environment, Spatial Planning and Infrastructure, citizens will not need to obtain a building permit for the installation of photovoltaic solar panels for family consumption, with installed capacities of up to 7 kW. This was one of the main recommendations of this research, so the facilitation of measures for citizens interested in the deployment of this technology is welcome.

PV POTENTIAL IN KOSOVO

Kosovo, with its favorable climate conditions, is endowed with abundant solar resources, experiencing an average of more than 172 hours of sunshine each month, according to climate data.



Figure 1. Yearly sunny hours of Kosova

Based on data from the Global Solar Atlas, Kosovo showcases a promising average daily yield potential of 1 kW of installed solar photovoltaic (PV) capacity, estimated to be around 3.7 kWh/kW_p. This translates to an annual yield potential of approximately 1,350 kWh/kW_p⁴. The PV power output (PVOUT) is a critical metric used to assess the long-term performance of a solar PV system, indicating the amount of power generated per unit of installed PV capacity. It is measured in kilowatt-hours per installed kilowatt-peak of the system capacity (kWh/kW_p). The reported power output of 3.7 kWh/kW_p⁵ in Kosovo is regarded as supportive of new solar PV development and is considered to offer an acceptable return on investment.

The practical PV potential considers various factors to provide a more realistic estimation of power output achievable by a typical configuration of a utility-scale PV system. It considers factors such as the theoretical potential, local air temperature, system configuration, shading and soiling effects, and topographic constraints. By factoring in these real-world variables, the practical PV potential provides a more accurate assessment of the expected power output from a solar PV system.

Kosovo's solar potential, with an average daily yield of 3.7 kWh/kW_p, presents a favorable environment for the development of solar PV projects. This level of yield indicates that solar energy can be harnessed effectively in the region and supports the viability of solar PV installations, encouraging further investment in the solar energy sector. The reported data from the Global Solar Atlas highlights the immense opportunity for solar PV development in Kosovo, aligning with the global trend of increasing adoption of renewable energy sources.

⁴ Global Solar Atlas, accessible at:

<https://globalsolaratlas.info/map?c=41.263197,19.92041,7&s=38.581873,22.875733&m=site>

⁵ KOSOVO ENERGY SECURITY OF SUPPLY JO 27: ASSESSMENT OF PV GENERATORS IN KOSOVO

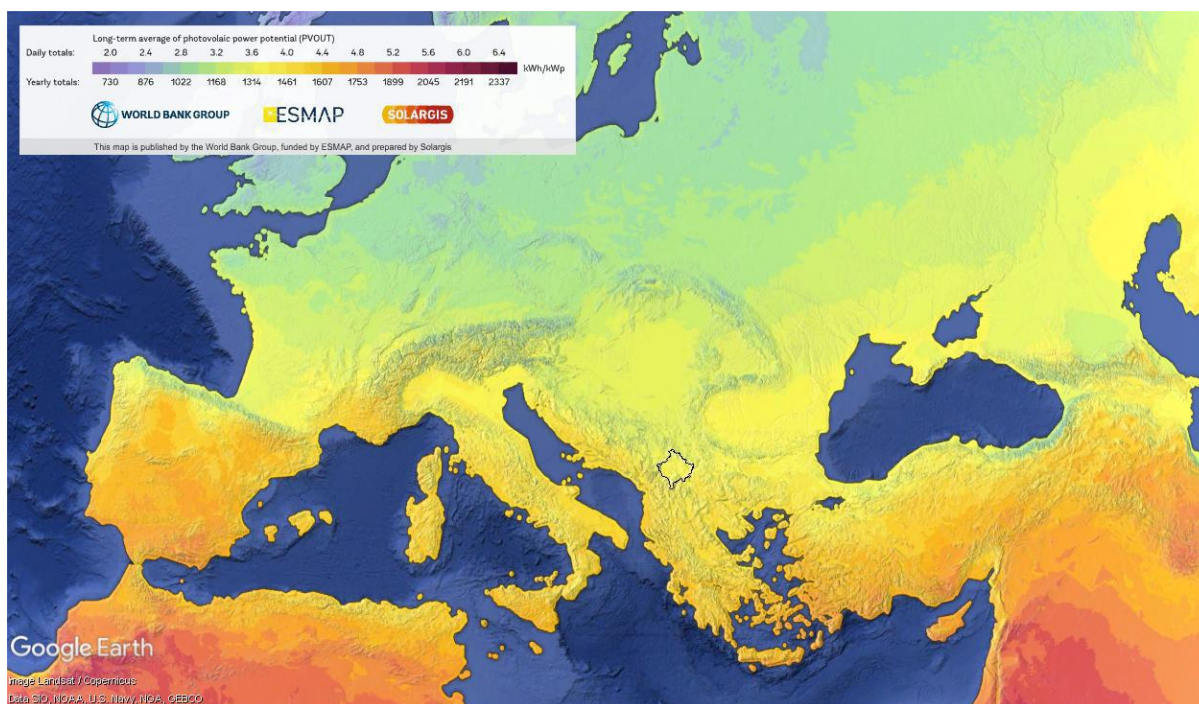


Fig 2 - Long-term average photovoltaic power potential (PVOUT)

According to the USAID report titled "Assessment of PV Generators in Kosovo," it is estimated that approximately 100 MW of solar PV capacity could be installed by the year 2030. This capacity would be distributed as follows: 50 MW in rooftop installations for households and an additional 50 MW for public institutions.⁶

As per the World Bank study conducted in 2020, the technical potential of ground-mounted solar power plants is assessed based on the available suitable area. The study indicates that the total suitable area for such plants is approximately 370,000 hectares, and the technically usable area is estimated to be 2% of the total suitable area, which amounts to 7,400 hectares.

The technical potential of photovoltaic (PV) installations is calculated by assuming a ratio of 2 hectares per megawatt (MW) and is estimated to be 3,600 MW. This means that the ground-mounted solar power plants have the capacity to generate a total of 3,600 MW based on the available suitable area of 7,400 hectares.

Below is the table representing the availability factor for active PV projects for the year 2022, which are under feed-in supporting scheme:

Name of PV project	Capacity (MW)	Production in 2022 (MWh)	Availability factor
Solar-c	0.1	118	13.47%
Solar Onix	0.5	638	14.57%
Solar Birra Peja	3	4,184	15.92%
Solar Frigo Food	3	4,187	15.93%
Centrali Solar"Eling"	0.4	646	18.44%
Centrali Solar Green Energy	3	4020	15.30%

⁶ KOSOVO ENERGY SECURITY OF SUPPLY JO 27: ASSESSMENT OF PV GENERATORS IN KOSOVO

Total	10	13,793⁷	15.75%⁸
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Table 1 - Availability Factor for existing PV's generator

The availability factor is expressed as a percentage and indicates the percentage of time during the year that each PV project was operational and capable of generating electricity. A higher availability factor signifies a more efficient and reliable PV system, as it demonstrates a higher uptime and productivity throughout the year. The proven availability factor data presented in the table above holds significant value in achieving the ambitious goal of reaching 600 MW of installed solar photovoltaic (PV) capacity by 2031. This data provides crucial insights into the efficiency and reliability of active PV projects, which are essential considerations for the successful implementation of competitive auction schemes or premium feed-in tariffs (FiT).

Competitive auction schemes involve inviting bids from developers to supply a certain amount of solar PV capacity at the lowest price. The availability factor plays a key role in such auctions, as projects with higher availability factors are more likely to be deemed reliable and attractive to investors. Higher reliability ensures consistent electricity generation, increasing the overall appeal of a project in the auction process. Similarly, for premium feed-in tariffs, the availability factor influences the level of support provided to PV projects. Projects with proven high availability factors are typically eligible for premium rates, reflecting the system's ability to consistently generate electricity and contribute to the energy grid. In both cases, the price of electricity in the wholesale market serves as a reference point for setting competitive prices and determining the viability of solar PV projects. Projects with high availability factors may offer competitive prices in the auction or premium feed-in tariff systems, making them more likely to be selected for development.

By leveraging the availability factor data alongside the reference wholesale electricity prices, policymakers and stakeholders can make informed decisions to optimize the development of solar PV projects. The combination of competitive auction schemes or premium feed-in tariffs with a focus on reliability and efficiency can help accelerate the deployment of solar PV capacity, bringing Kosovo closer to achieving its ambitious renewable energy target of 600 MW by 2031.⁹

To reach the ambition target by 600MW Kosovo must develop large utility scale solar PV projects. As of the current date, no large solar PV project above 3 MW has been developed in Kosovo. In May 2023, a significant milestone was achieved in Kosovo's renewable energy journey as the country conducted its first auction to produce electricity from solar energy. The outcome in terms of the lowest price offered by the winning bidder remains to be seen, but this landmark event marks a positive step towards achieving the defined targets for renewable energy capacity in Kosovo.

⁷ Annual Reports published by ERO, accessible at: www.ero-ks.org

⁸ Calculations by author

⁹ Kosovo Energy Strategy 2022-2031, accessible at: <https://mc.rks-gov.net/wp-content/uploads/2023/04/Energy-Strategy-of-the-Republic-of-Kosovo-2022-2031-1-1.pdf>

HIGH DEMAND FOR INVESTING LARGE LARGE-SCALE PHOTOVOLTAIC POWER PLANTS FOR SELLING IN FREE MARKET

The desire to invest in solar parks with significant capacities is palpable, and recent evidence of this trend can be found in the latest decision from the ERO, issued in August 2023. This decision pertains to granting authorization for the establishment of a solar park with a substantial 150MW capacity in the municipality of Gjakova.¹⁰ However, despite the promising potential, there are bureaucratic challenges at both the central and municipal levels present a notable hurdle. A notable issue is the lack of seamless coordination between the central level, represented by the Ministry of Environment, Spatial Planning and Infrastructure (MESP), and the various municipalities in Kosovo.

This lack of coordination stems from a specific regulatory requirement: solar projects can only be constructed within municipalities if they are accounted for in the municipal development plan (MDP). Complicating matters, these municipal development plans are developed once every 8 years. Consequently, there exists an interpretation that implies an 8-year waiting period for MDP revisions, during which zonal maps and development plans can be aligned to accommodate solar projects.

This timeline constitutes a significant impediment. To counter this, it becomes imperative for the Ministry of Environment, Spatial Planning and Infrastructure to collaborate closely with the municipalities. The objective here is to devise a simplified procedure that allows for the construction of solar systems in locations presently excluded from municipal development plans. Implementing such a streamlined approach would not only stimulate capital investments in the solar energy sector but also foster a favorable environment conducive to a surge in solar energy production.

So far, the prevailing approach has seen investors identifying suitable areas for investment and then start the procedural requirements to secure both municipal and Ministry of Environment, Spatial Planning and Infrastructure (MESP) approvals. However, as highlighted earlier, the bureaucratic challenges outlined above tend to emerge at this juncture. In light of this, a compelling recommendation is to establish a cohesive solution. The Ministry of Environment, Spatial Planning and Infrastructure (MESP), in close collaboration with the municipalities across Kosovo, is advised to formulate a comprehensive "one-stop-shop" framework. This framework's primary purpose would be to offer invaluable assistance and assurance to potential investors, facilitating their efforts to secure the essential land parcels (allocations). Furthermore, it should endeavor to streamline the often-time-consuming procedures associated with obtaining both municipal and MESP approvals.

Central to this proposed approach is the creation of a centralized platform that consolidates and expedites the administrative procedures. By doing so, this platform can significantly truncate the timelines required for acquiring municipal consents and the consents mandated by the MESP. Such an initiative would yield multiple benefits. First and foremost, it would provide a reliable and efficient avenue for investors to secure the necessary land allocations swiftly. Additionally, by

¹⁰ Energy Regulatory Office, News, accessible at: <https://www.ero-ks.org/zrre/sq/komunikate-20>

reducing the procedural bottlenecks, it could unleash a wave of investor interest in solar energy projects, thereby fostering economic growth and sustainable energy generation.

In conclusion, establishing a streamlined "one-stop-shop" mechanism, jointly developed by the MESP and Kosovo's municipalities, has the potential to be a transformative step. By ensuring seamless procedures and expediting essential approvals, it would not only attract investors but also accelerate the adoption of solar energy initiatives, ultimately contributing to a greener and more energy-resilient future.

INVESTING IN LARGE LARGE-SCALE PHOTOVOLTAIC POWER PLANTS THROUGH AUCTION

To reach the ambition target by 600MW Kosovo must develop large utility scale solar PV projects. As of the current date, no large solar PV project above 3 MW has been developed in Kosovo. In May 2023, a significant milestone was achieved in Kosovo's renewable energy journey as the country conducted its first auction to produce electricity from solar energy. The outcome in terms of the lowest price offered by the winning bidder remains to be seen, but this landmark event marks a positive step towards achieving the defined targets for renewable energy capacity in Kosovo.

The original deadline for the submission of offers was set for August; however, it has been postponed to September. While the success of the auction remains uncertain, there is a notable concern surrounding the 24-month construction timeframe for the project. This concern is amplified by the fact that solar projects typically do not require more than 6 months for completion. This situation raises the possibility of manipulation throughout the entire auction process.

The public's attention has been drawn to this issue, and it is incumbent upon the government of Kosovo to provide a clear rationale for establishing a construction deadline of 2 years rather than the more feasible 6 months. Particularly, considering the well-documented trend of decreasing construction costs in solar technology over the years, a prolonged construction timeline raises questions about the motives behind such a decision.

Moreover, the extension of construction deadlines could potentially set an undesirable precedent for future auctions, casting a shadow on their credibility. It also presents a significant impediment to achieving the ambitious targets set for solar energy adoption. The government must acknowledge these concerns and address them transparently to ensure the integrity of the auction process, foster public trust, and facilitate the realization of sustainable solar energy goals.

RES OBJECTIVES IN KOSOVO WITH FOCUS PVs

Kosovo, as a signatory of the Energy Community Treaty (EnCT), has committed to various obligations, including setting mandatory targets for increasing the share of renewable energy (RE) in its final energy consumption. In line with these commitments, the Kosovo Energy Strategy 2022-2031 was approved in 2022, outlining ambitious objectives and targets aimed at promoting renewable energy and ensuring energy security and sustainability for the nation.

The Kosovo Energy Strategy 2022-2031 presents a clear roadmap for the country's transition towards a more sustainable and resilient energy future. By embracing renewable energy sources, particularly wind and solar power, and encouraging prosumer capacity, Kosovo aims to fulfill its commitments under the Energy Community Treaty and contribute to the global effort of combating climate change. Through effective implementation and the active engagement of all stakeholders, Kosovo can unlock the full potential of renewable energy and secure a greener and more prosperous future for its citizens.

Ambitious objectives and targets include:

- **Increase Renewable Energy Share:** The primary goal is to achieve a renewable energy share of at least 35% in the country's electricity consumption by 2031.¹¹ This signifies a significant shift away from traditional fossil fuel-based electricity generation towards cleaner and more sustainable sources.
- **Development of New RES Capacities:** To attain the ambitious target, the strategy focuses on developing new renewable energy capacities. This includes the establishment of 600 MW of wind power capacity, 600 MW of solar photovoltaic (PV) capacity, and 20 MW of biomass power capacity. These new RES projects will harness the abundant natural resources in Kosovo, such as wind and solar energy, to contribute to the overall energy mix.
- **Encouraging Prosumer Capacity:** Another key element of the strategy is the promotion of prosumer capacity, aiming to install at least 100 MW of distributed energy generation capacity. This approach empowers consumers to become producers of electricity, typically through rooftop solar installations or other small-scale renewable projects, thereby fostering a more decentralized and resilient energy system.
- **Total Installed RES Capacity:** The strategy sets an overall target of achieving a total installed renewable energy capacity of 1600 MW by 2031.¹² This figure includes both the planned new RES capacities, totaling 1320 MW, and the existing 279 MW of installed renewable energy capacity.¹³ This comprehensive approach ensures that existing renewable energy infrastructure is leveraged while also prioritizing the expansion of new projects.

¹¹ Kosovo Energy Strategy 2022-2031, accessible at: <https://me.rks-gov.net/wp-content/uploads/2023/04/Energy-Strategy-of-the-Republic-of-Kosovo-2022-2031-1-1.pdf>

¹² Kosovo Energy Strategy 2022-2031, accessible at: <https://me.rks-gov.net/wp-content/uploads/2023/04/Energy-Strategy-of-the-Republic-of-Kosovo-2022-2031-1-1.pdf>

¹³ Annual reports published by ERO, accessible at: www.ero-ks.org

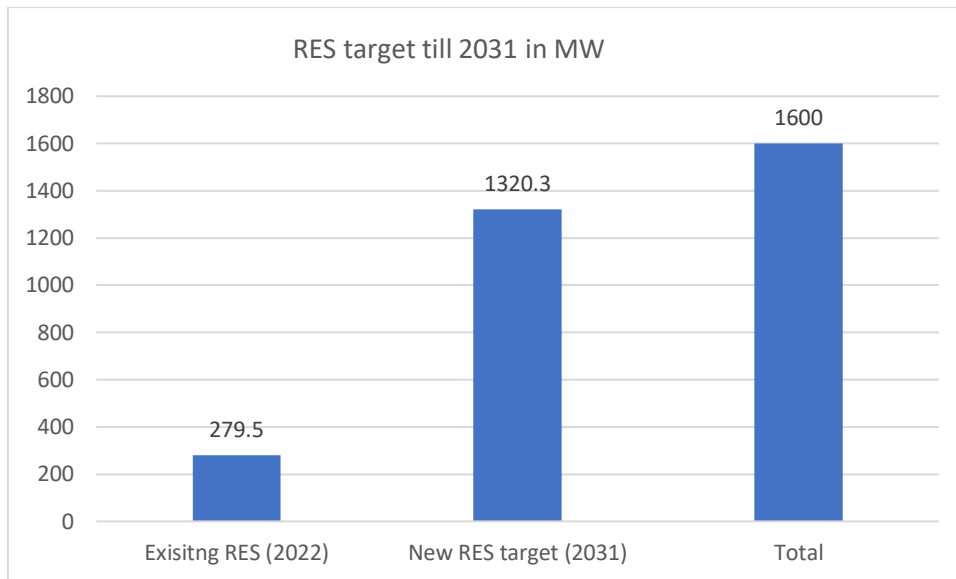


Fig 3 - RES target till 2031

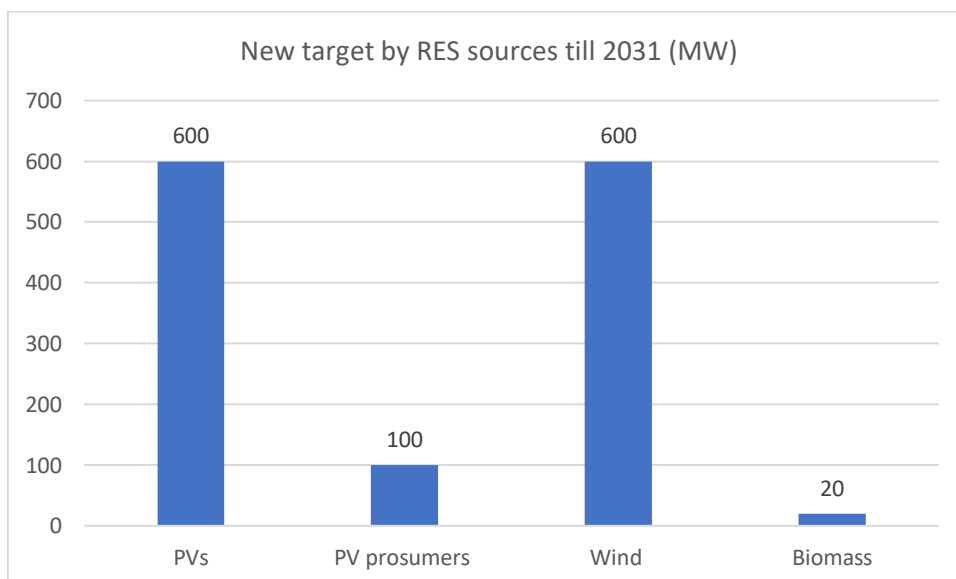


Fig 4 - RES target by sources till 2031

The goal of reaching 600 MW¹⁴ of photovoltaic capacity by 2031 demonstrates Kosovo's strong commitment to transitioning towards renewable energy and reducing its dependence on fossil fuels. The aggressive target aims to harness the abundant solar resources in the region and leverage photovoltaic technologies to significantly contribute to the country's overall electricity generation.

As stated above over the past decade, In Kosovo are installed a total of 10 MW¹⁵ of photovoltaic capacities. However, to achieve the ambitious target of 600 MW by 2031, an average of 67 MW¹⁶ (see fig 5) of photovoltaic capacities needs to be installed annually from 2023 to 2031, or every

¹⁴ Kosovo Energy Strategy 2022-2031, accessible at: <https://mc.rks-gov.net/wp-content/uploads/2023/04/Energy-Strategy-of-the-Republic-of-Kosovo-2022-2031-1-1.pdf>

¹⁵ Annual Reports published by ERO, accessible at: www.ero-ks.org

¹⁶ Calculation by author

two years by around 140MW¹⁷, given that during 2023 will not be expected construction of PV new capacities. This represents a significant increase in the rate of photovoltaic capacity deployment, which may be seen as an ambitious and challenging target to achieve.

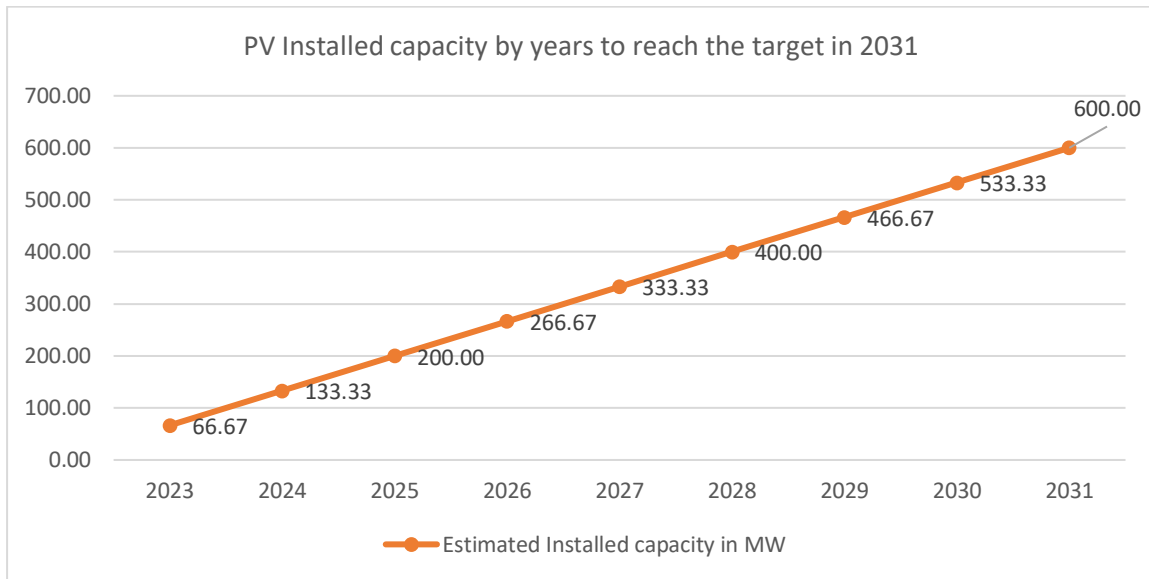


Fig 5 - Estimated installed capacities by years for large scale PV as per set targets on the Energy Strategy 2022-2031

The same trajectory is even for self-consumption stated in Fig 6:

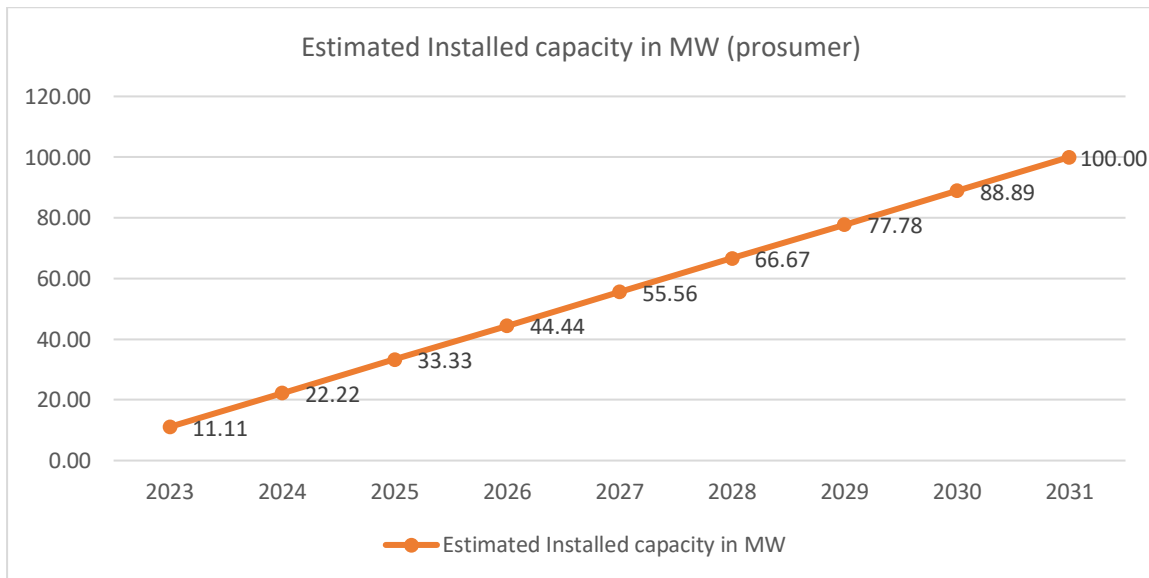


Fig 6 - Estimated installed capacities by years for prosumers as per set targets on the Energy Strategy 2022-2031

¹⁷ Calculation by author

RES INTEGRATION IN TSO AND DSO

The gradual replacement of fossil energy sources with renewable sources will be accompanied by the development of flexible units and energy storage plants. These storage facilities will be necessary to enable the smooth integration of renewable energy sources (RES) into the system. Over the next decade, there are plans to increase RES capacities gradually. By the year 2031, it is projected that the capacity of new wind sources will be increased by 600 MW (738 MW when combined with existing capacities), and an additional 700 MW will come from solar energy. Out of the solar capacity, 100 MW is expected to fall under the "self-consumption" category. The integration of these variable resource capacities necessitates careful planning of the transmission network and the provision of flexible resources to maintain real-time system balancing.

It is crucial to have a well-developed transmission and distribution infrastructure to enable the integration of renewable resources effectively. Accommodating a significant amount of variable renewable energy generation requires flexible grids, modern grid equipment, and smart grid control solutions. Modernizing the network will enhance the system's flexibility while reducing technical losses in the transmission and distribution network.

Currently, the transmission system in Kosovo is considered sustainable and stable, boasting robust interconnection capacities. Over the past decade, significant strides have been made in enhancing the internal transmission network, primarily to facilitate the integration of the proposed "Kosova e Re" power plant, which was intended to have a capacity of 600 MW. However, as per the energy strategy, the construction of "Kosova e Re" power plant will not proceed. In light of this, alternative plans have been formulated to address the grid's requirements. One such plan involves the establishment of an energy storage system with a capacity of 170 MW by the year 2031. This battery storage system is designed to play a crucial role in balancing the grid and ensuring that the Transmission System Operator (TSO) can effectively accommodate all the renewable energy targets outlined in the energy strategy for the period of 2023-2031.

According to a study conducted by the World Bank in 2020 regarding the integration of Renewable Energy Sources (RES) in Kosovo's distribution system, the following conclusions were drawn:¹⁸

- The majority of RES stations can be connected to the existing Medium Voltage (MV) network without the need for network reinforcements or new feeders.
- For new RES capacity of up to 100-150 MW, integration into the distribution network of Kosovo can be achieved at a minimum connection cost of 35,000 €/MW. This can be achieved by utilizing the available hosting capacity of the existing network.
- Higher RES capacities, ranging from 200-250 MW, can also be accommodated in the distribution network with limited reinforcements and new facilities. This would result in a reasonable average cost of approximately 40,000-45,000 €/MW.
- The distribution network can handle capacities of around 300 MW. However, this represents a borderline capacity that can be easily and economically integrated into the existing network.

¹⁸ RAPORTI FINAL I MIKSIT TË ENERJISË SË RIPËRTËRITSHME ME KOSTO MË TË ULËT REF: WB7035-06/19, P143055 November 2020, V1.0

Beyond this level, it may be more economically viable to consider deploying large-scale RES¹⁹ projects directly connected to the transmission system rather than expanding the public distribution network solely for the purpose of integrating distributed generation. This approach aims to avoid further escalation of network integration costs, including additional Medium Voltage (MV) and High Voltage (HV) facilities.

In summary, the study suggests that Kosovo's distribution system can efficiently integrate a considerable amount of RES capacity up to around 300 MW. Beyond this threshold, it may be more prudent to explore connecting larger RES projects directly to the transmission system to optimize cost-effectiveness and mitigate network integration expenses.

Given that Transmission System Operator and Distribution System Operator are natural monopolies and their activities are regulated, both have a responsibility to accommodate and prioritize the connection of all Renewable Energy Source capacities outlined in the energy strategy. The Energy Regulatory Office plays a pivotal role in this process by approving all investments in the development plans that are directly related to the security and reliability of both TSO and DSO when it comes to integrating RES.

Considering these factors, there are no apparent barriers or obstacles in the direction of integrating RES into the TSO and DSO grid. The obligation of TSO and DSO, along with the oversight of ERO, ensures that RES capacities are seamlessly connected, fostering the growth of renewable energy and contributing to the achievement of energy strategy goals.

¹⁹ STUDIMI FINAL I INTEGRIMIT NË RRJET REF: WB7035-06/19, P143055 November 2020, V1.1

BARRIERS AND RECOMANDATION

PV Self-Consumers

Barriers:

- **Lack of Clear Legislation:** The absence of a specific law on renewable energy sources (RES) or inadequate amendments in the existing Law on Energy (No. 05/L-081, June 2016) hinder the recognition and support of renewable self-consumption. To promote self-consumption, a comprehensive legal framework is necessary.
- **Construction permit:** One of the significant hindrances for self-consumption generators until 5th of September 2023 was the obligatory need for a building permit. Notably, this requirement possessed a challenge, considering that approximately 90% of existing buildings lack the essential construction permit. This situation created a substantial barrier for individuals or entities seeking to install self-consumption generation systems. With the decision of September 5, 2023, from the Ministry of Environment, Spatial Planning and Infrastructure, citizens will not need to obtain a building permit for the installation of photovoltaic solar panels for family consumption, with installed capacities of up to 7 kW. This was one of the main recommendations of this research, so the facilitation of measures for citizens interested in the deployment of this technology is welcome.
- **Low Prosumer Capacity:** The existing cap of 100 kW for prosumer installations is limiting the expansion of renewable self-consumption. Raising the capacity allowance to, for example, 400 kW would encourage larger installations and higher contribution to renewable energy targets.
- **Lack of CO₂ Offset Reporting:** Behind-the-meter installations lack reporting requirements for CO₂ offset, which could lead to challenges in tracking and monitoring emissions reductions. Implementing reporting standards would enhance transparency and accountability.
- **Customer Awareness:** The lack of awareness among customers about prosumer procedures and benefits results in lower participation in self-consumption schemes. Increasing awareness through effective communication and educational campaigns is essential.
- **Complex Authorization Process:** The current authorization process for prosumers is complicated and lacks standardization. Simplifying and standardizing the process, including the introduction of minimum charges, taxes, and levies for authorization and approvals, would facilitate the uptake of renewable self-consumption.
- **Delays for approval by ERO Board-** requirement for approval by the ERO Board concerning small capacities, also referred to as prosumers has resulted in significant delays in the authorization process.

Recommendations:

- **Introduce Comprehensive Law on RES:** Implement a new law dedicated to renewable energy sources or amend the existing Law on Energy (No. 05/L-081) to include specific provisions for renewable self-consumption, ensuring the right to produce, store, and consume excess electricity.

- **Raise Prosumer Capacity Allowance:** Increase the maximum capacity of prosumer installations from the current 100 kW to, for example, 400 kW, to accommodate larger renewable energy systems.
- **Implement CO₂ Offset Reporting:** Introduce reporting requirements for behind-the-meter installations to account for CO₂ offset, promoting transparency and environmental accountability.
- **Enhance Customer Awareness:** Conduct awareness campaigns and educational initiatives to inform consumers about the benefits and procedures of becoming prosumers, encouraging higher participation in self-consumption projects.
- **Streamline Authorization Process:** Simplify and standardize the authorization process and forms, and establish minimum charges, taxes, and levies for authorization and approvals, making it easier for potential prosumers to access renewable self-consumption.
- **Reducing the level of decision-making for issuing ERO authorization for small PV capacities–** instead of ERO Board it is recommended establishment of a standing committee, consisting of ERO's technical and operational personnel. This committee would ideally comprise members from various departments such as the legal department, tariffs, and market department.

By addressing these barriers and adopting the recommended measures, Kosovo can overcome obstacles and foster the integration of renewable self-consumers, promoting sustainable energy practices and contributing to national renewable energy goals.

Large Solar PV Generators Based on Unsolicited Procedures

Barriers:

- **Renting Land from Private Owners:** Securing land from private owners proves challenging due to past investment failures and the need to build confidence in the investment idea. Negotiating lease contracts, which typically span 25-35 years, especially regarding pricing, remains complex.
- **Obtaining Permits:** Acquiring permits from institutions responsible for renewable energy projects is an insurmountable challenge for investors. The lack of coordination and information on procedures hinders progress. Legal issues, particularly the "construction conditions" stage considered by the Ministry of Infrastructure and Environment, pose significant barriers.
- **Spatial Planning Documents:** The requirement that investments align with "Municipal Development Plan" and "Municipal Zonal Maps" creates difficulties, as these documents often lack provisions for renewable energy projects. The law on spatial planning necessitates updates every 8 years, making investors wait excessively long periods to realize their projects.
- **Land identification** - So far, the investors identify a suitable areas for investment and then start the procedural requirements to secure both municipal and Ministry of Environment, Spatial Planning and Infrastructure (MESP) approvals.
- **Financing Challenges:** Financial institutions' reluctance to support investments in Kosovo is due to the country's unfavorable international image, presenting obstacles to financing renewable energy projects.
- **Authorization by ERO:** The Government of Kosovo grants PV projects through auctions. The success of these auctions remains to be seen, while delays to issue authorization by ERO for large PV generator to sell electricity on the open market further complicate investments in that sector.
- **Lack of Government Guarantees:** The absence of a government guarantee for Power Purchase Agreements (PPAs) creates risks for lenders and project sponsors, discouraging non-recourse financing for large solar PV projects.
- **Lack of Methodology for Reference Prices:** The absence of a clear methodology for reference prices for renewable energy projects makes it challenging for investors to assess project viability and profitability.

Recommendations:

- **Streamline Bureaucratic Procedures:** The government should focus on simplifying and expediting bureaucratic procedures, reducing unnecessary formalities, and establishing a more investor-friendly process.
- **Engage with Private Landowners:** The government should work on creating a favorable environment for investors to engage with private landowners, building trust and confidence in renewable energy projects.

- **Improve Permitting Process:** Enhance coordination between institutions responsible for renewable energy projects, provide clear and accessible information on procedures, and establish a time-bound process for obtaining permits.
- **Amend Spatial Planning Laws:** The government should work on amending spatial planning laws to allow for more flexible updates to planning documents, accommodating renewable energy projects.
- **Enhance Kosovo's International Image:** The government should focus on improving Kosovo's international image, showcasing its commitment to renewable energy and sustainability, which will attract more financing and investment.
- **Creation an one-stop-shop:** The Ministry of Environment, Spatial Planning and Infrastructure, in close collaboration with the municipalities across Kosovo, is advised to formulate a comprehensive "one-stop-shop" framework. This framework's primary purpose would be to offer invaluable assistance and assurance to potential investors, facilitating their efforts to secure the essential land parcels (allocations). Furthermore, it should endeavor to streamline the often-time-consuming procedures associated with obtaining both municipal and MESP approvals.
- **Establish Clear Reference Price Methodology:** Create a transparent and well-defined methodology for determining reference prices for PVs projects, aiding investors in assessing project viability.
- **Promote Public-Private Partnerships (PPPs):** Encourage public-private partnerships to share risks and resources, facilitating investment in the PVs projects.
- **Engage with International Institutions:** Collaborate with international organizations to gain expertise and best practices in attracting foreign investment in renewable energy.

By addressing these barriers and implementing the recommended measures, Kosovo can create a more attractive investment climate for foreign investors interested in renewable energy projects.

Large Solar PV Generators Based on Solicited Procedures

Barriers:

- **Lack of Competitive and Transparent Bidding:** The absence of competitive and transparent bidding processes, such as tendering or auctions, hinders investor confidence and discourages credit project sponsors from participating in large solar PV projects. Without these processes, there may be concerns about favoritism, lack of fair pricing, and limited competition.
- **Construction timeframe-** one the existing auction for construction of 100MV it is stated that 24-month construction timeframe while typically do not require more than 6 months for completion. This situation raises the possibility of manipulation throughout the entire auction process.
- **Non-Standardized Terms and Conditions:** The lack of standardized terms and conditions for Power Purchase Agreements (PPAs), Grid Connection Agreements, and other project agreements, such as Land Lease Agreements, creates uncertainty and complexity for investors. Non-standardized agreements can lead to negotiation challenges, delays, and increased transaction costs.

Recommendations:

- **Use of Competitive and Transparent Bidding Processes:** The government should adopt competitive and transparent bidding processes, such as tendering or auctions, to attract more investors and project sponsors to large solar PV projects. These processes ensure fairness, competition, and better pricing for renewable energy projects.
- **Reduction of the construction timeframe not more than 6 months:** it is incumbent upon the government of Kosovo to provide a clear rationale for establishing a construction deadline of 2 years rather than the more feasible 6 months. Particularly, considering the well-documented trend of decreasing construction costs in solar technology over the years, a prolonged construction timeline raises questions about the motives behind such a decision.
- **Standardization of Project Agreements:** Standardizing the terms and conditions of key project agreements, including PPAs, Grid Connection Agreements, and Land Lease Agreements, will simplify and streamline the project development process. Having consistent and clear agreements will reduce negotiation time and lower transaction costs for all parties involved.

By implementing these recommendations, Kosovo can overcome the barriers faced by large solar PV generators based on solicited procedures. This will lead to increased investor confidence, more competitive project development, and a faster transition towards renewable energy sources, contributing to Kosovo's sustainable energy future.

SUPPORTED BY:



IMPLEMENTED BY:

