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Renewables Readiness Assessment

THE REPUBLIC OF ALBANIA

MARCH 2021

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Renewables Readiness Assessment

THE REPUBLIC OF **ALBANIA**

MARCH 2021

FOREWORD

From the Minister of Infrastructure and Energy

The Government of Albania recognises the key role of the energy sector in the economic development of the country. Albania is therefore giving new impetus to energy reforms while also consolidating existing efforts to both provide enabling conditions for renewable energy development and comply with its regional and international commitments.

As part of this, the government asked the International Renewable Energy Agency (IRENA) to conduct a Renewables Readiness Assessment (RRA) study for Albania. The assessment, prepared in co-operation with the Ministry of Infrastructure and Energy (MIE), outlines key issues for ongoing energy sector development. It identifies important short- to medium-term actions to strengthen policy, regulatory and institutional frameworks, aiming to accelerate renewable energy uptake and bring the targets of Albania's National Energy Sector Strategy 2030 within reach.

This report follows consultations with stakeholders across the sector that helped to identify challenges and devise solutions to accelerate renewable energy uptake. The resultant, comprehensive work highlights the main obstacles and proposes measures to move forward with an ambitious renewable energy scenario.

The RRA findings come at the right time to help us establish a clear strategic roadmap for renewables in Albania. While the market has witnessed considerable advances in recent years, we are now more determined than ever to step up the investments that will shape our energy future.

On behalf of the Ministry of Infrastructure and Energy, I would like to thank IRENA for undertaking and carrying out the RRA process in Albania. I am also grateful to all the representatives and stakeholders who contributed. The work invested in this report will have a significant, positive impact on Albania's energy transition in the coming years, making us more determined than ever to invest in a better, more sustainable future.

H.E. Belinda Balluku

Minister of Infrastructure and Energy,

Republic of Albania

FOREWORD

From the IRENA Director-General

As the countries of South-East Europe devise economic recovery plans to prepare for the post-pandemic future, they see the chance to accelerate their renewable energy uptake, reduce carbon dioxide emissions and align with the broader energy and climate vision of the European Union.

While Albania's energy mix already features one of the highest shares of renewables in the region owing to its extensive installed hydropower capacity, the essential need remains for a more secure, cost-competitive national energy supply.

Diversifying the electricity mix to include more renewables would strengthen Albania's energy security. Fossil fuels – mainly crude oil – account for more than half of total primary energy supply, while domestic hydropower supply varies widely with weather and climate conditions.

With annual energy demand set to grow by about 75% over the decade, the need for clean, sustainable power is more urgent than ever. Non-hydro renewables, such as solar and wind power, can contribute to a secure, stable, affordable national energy supply.

Renewable energy technologies would also bring numerous socio-economic benefits, including job creation, new income streams, local industrial development and reduced air pollution. All these result in higher GDP and improve people's overall welfare.

This assessment, produced in conjunction with the Ministry of Infrastructure and Energy, aims to support Albania in its energy transition. It recommends measures to integrate renewables faster, including through least-cost energy master planning, refurbishing existing distribution networks, allowing for bidirectional electricity flow and establishing priority zones for solar and wind power projects.

As a first step, this report aims to inform the National Energy and Climate Plan for 2021–2030 and make subsequent energy development more conducive to renewables.

Since 2011, more than 40 countries throughout 40 countries throughout Africa, the Middle East, Latin America and the Caribbean, Asia and the Pacific have undertaken similar Renewables Readiness Assessment (RRA) studies, exchanging knowledge and fostering international co-operation to accelerate the deployment of renewables. Each process has been country-led, with IRENA providing technical expertise and highlighting regional and global insights, along with facilitating consultations among different national stakeholders.

IRENA is grateful to the Albanian authorities – and particularly the Ministry of Infrastructure and Energy – for their support, as well as to other stakeholders whose insights have enriched this study. I am confident that the observations and recommendations presented here will help to strengthen the energy transition in Albania and the broader region.

Francesco La Camera

Director-General
International Renewable Energy Agency

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ABBREVIATIONS

AKBN	National Agency of Natural Resources
ALL	Albanian lek
ALPEX	Albanian Power Exchange
°C	Degree Celsius
CESEC	Central and South Eastern Europe energy connectivity
CfD	Contract for Difference
CIP	Climate Investment Platform
CO_2	Carbon dioxide
DFI	Development finance institution
EIA	Environmental impact assessment
EnC	Energy Community Secretariat
ENTSO-E	European Network Transmission System Operators for Electricity
ERE	Energy Regulatory Authority
EU	European Union
EUR	Euro
FiT	Feed-in tariff
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environmental Facility
GIS	Geographic information system
GWh	Gigawatt hour
HPP	Hydropower plant
INSTAT	National Institute of Statistics
IRENA	International Renewable Energy Agency
KESH	Albanian Power Corporation
ktoe	Kilotonne of oil equivalent
kV	Kilovolt
LCOE	Levelised cost of electricity
m^2	Square metre
m/s	Metre per second
MIE	Ministry of Infrastructure and Energy
MVA	Megavolt ampere
MW	Megawatt
MWh	Megawatt hour
NDC	Nationally determined contribution
NECP	National Energy and Climate Plan
NREAP	National Renewable Energy Action Plan
OSHEE	Distribution System Operator
OST	Transmission System Operator
PPA	Power Purchase Agreement
PPP	Public-private partnership
PV	Photovoltaic
RRA	Renewables Readiness Assessment
SE4All	Sustainable Energy for All
SWH	Solar water heating
TPES	Total primary energy supply
TWh	Terawatt hour
UNDP	United Nations Development Programme
USD	United States dollar
VAT	Value-added tax
WACC	Weighted average cost of capital

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EXECUTIVE SUMMARY

The Republic of Albania is a predominantly mountainous, coastal country in South-East Europe with a population of approximately 2.9 million people. Albania has made significant economic progress during the past three decades, moving from a low-income economy to a middle-income EU member state, with a gross domestic product (GDP) per capita that has risen from USD 200 in 1991 to USD 5 353 in 2019.

Albania remains a net importer of goods and services. Energy imports, in particular, restrict economic growth considerably, have a negative effect on the country's trade deficit and leave the country open to supply shocks.

Albania's energy mix is dominated by fossil fuels – mainly crude oil – which account for more than half of total primary energy supply (TPES). However, domestic production is not able to meet demand; Albania is therefore, on average, a net energy importer.

Hydropower accounts for the largest share of the country's electricity generation, representing around 95% of the Albania's installed power capacity. This means Albania's energy mix has one of the highest shares of renewable energy in South East Europe; however, it is also highly dependent on annual rainfall. The consequent vulnerability to climatic externalities for electricity production creates notable fluctuations in domestic energy production.

Aside from the socio-economic implications of its extensive reliance on hydro-power, Albania is among the most vulnerable of South-East Europe's countries to climate change, according to the World Bank, and changing weather patterns have already resulted in increased temperatures, decreased precipitation and more frequent extreme events such as floods and droughts.

Establishing energy security, energy sector sustainability and an ensured energy supply at cost-competitive prices are therefore some of the key challenges for the country to address in the near term. These challenges can be met by further increasing the share of renewable energy in the national energy mix and diversifying the country's electricity sector.

Opportunities for the deployment of solar energy are extensive. Albania's solar insolation is very high throughout most of its territory at more than 1 500 kWh/m^2 annually, with peaks of 1 753 kWh/m^2 annually, particularly in the western part of the country. Albania also has some of Europe's highest number of sunshine hours per year, presenting significant potential for development of solar PV for power generation and solar thermal for heating purposes.

Meanwhile, according to IRENA's estimates under a low-cost capital scenario, Albania has a cost-competitive wind potential of up to 7 400 MW and the Agency proposes in its REmap scenario a wind installed capacity of 616 MW by 2030, with an annual generation potential of 1 794 GWh.

In recent years, the Albanian government has taken commendable steps in the promotion of non-hydro renewable energy use. In its 2018

National Energy Sector Strategy, Albania stipulated a 42% share of renewable energy in total primary energy supply (TPES) by 2030. Also, Albania's National Renewable Energy Action Plan (NREAP) sets forth renewable energy targets till 2020 and in going forward, the NREAP will be superseded by the National Energy and Climate Plan (NECP), which is still to be developed and will set out renewable energy targets to 2030.

With a view to informing the development of these targets, and more generally to support Albania on its path toward the integration of a higher, more diversified share of renewable energy in its national energy mix, this Renewables Readiness Assessment (RRA) identifies critical actions that could significantly impact the scale-up of renewable energy, outlined in a number of key recommendations.

Developing renewable energy zones

For solar and wind resources in Albania, analysis of availability and economic potential is very limited. This hinders policy development in setting achievable targets. In particular, zoning for solar PV and wind generation projects should be prioritised. This entails the identification of areas of high-quality resource potential for power development, the exploitation of which is environmentally sound and both technically and economically viable.

The Albanian National Agency of Natural Resources (AKBN), as the institution tasked with gathering resource potential data, should therefore lead the development of a renewable energy zoning study for solar and wind, in co-operation with the Ministry of Infrastructure and Energy (MIE) and development partners, using IRENA's potential suitability analysis presented in the RRA as a basis.

Developing a comprehensive least-cost energy master plan

A comprehensive energy plan can support effective decision-making and guide the sector's development in a coherent way, offering clarity and visibility for various energy stakeholders, including investors and development partners. The planning department of the MIE, along with the AKBN, are encouraged to take the lead in developing a holistic least-cost master plan for the energy sector to aggregate sub-sectoral plans and assess the accompanying infrastructure needed to reach overall energy goals. Specifically, this plan should guide when, where and how investments in the energy sector should be made.

Strengthening the distribution network

The Albanian distribution network suffers from overloading in high-demand centres, such as in Tirana, posing serious obstacles to the injection of distributed generation such as solar PV net-metering systems. The distribution system operator, OSHEE, must immediately prioritise the refurbishment of the distribution grid around the main load centres of Tirana and Durrës; begin planning for an active grid that can allow for bidirectional electricity flow to accommodate renewable energy prosumers; and initiate grid upgrades close to planned renewable energy generation zones so that power can be effectively evacuated to major demand centres.

Strengthening support mechanisms for renewable energy deployment

Although Albania has made progressive efforts to establish various support incentives for the greater uptake of renewables, these could be further strengthened, for example by reducing VAT to incentivise deployment. Whilst exempted in some cases of imported solar PV machinery and equipment, in the domestic sale of equipment – especially for systems below 500 kW – the full 20% VAT is applied. VAT reductions could therefore be applied on all machinery and equipment related to all renewable energy technologies. Furthermore, the renewable energy financing obligation for those who purchase directly from the transmission system operator should be embedded into electricity pricing for non-tariff consumers connected to the transmission system (about 10–12% of consumers).

Establishing a dedicated renewable energy agency

Albania requires a dedicated renewable energy agency, with its own funding stream unconstrained by treasury limitations, to inform the coordinated development of renewables in line with national and international obligations. Based on an envisaged mandate stipulated within the Renewable Energy Law, such an agency could also keep an updated registry of renewable power producers and service providers; collaborate for training, certification and capacity building; track the energy balance contributions of all energy stakeholders and draft timely assessments; monitor the effectiveness and implementation of energy sector master plans; carry out resource potential analyses and pre-feasibility studies for renewable energy resource development; and provide transparent information on renewable energy data, incentives, energy sector development plans and permitting procedures for the public and private sectors.

Developing a strategy for a greener transport sector

Greening the transport sector through e-mobility has the potential to positively contribute to the balancing of the power system through peak-load shaving, reducing distribution losses and reducing air pollution. An overall energy strategy aimed at the diversification of the transport sector should be developed as a cross-sectoral collaborative effort between relevant authorities and both the MIE and Energy Regulatory Authority (ERE) to ensure a coordinated and coherent development pathway for both the energy and transport sectors. Such a strategy could also encourage the uptake of locally produced biofuels – including biodiesel, bioethanol and bio-methane – which should be produced in compliance with biomass sustainability criteria and which have the potential to reduce Albania's current dependence on oil imports while improving air quality in urban centres and diversifying agriculture and rural economies.

Developing a heat bylaw

A dedicated heat bylaw is required to provide for appropriate target-setting beyond 2020 for heating and cooling and accompanying technologies (such as solar thermal and geothermal) across the residential, services and industrial sectors. This should also provide guidance on the mechanisms for the deployment of heating technologies and methodologies for their contribution to the renewable energy share, especially with regards to the use of heat pumps. Currently, heat pumps are inadequately accounted for in data reporting on the national share of renewable energy. The Law on Energy Efficiency and the Law on Energy Efficiency in Buildings could be also linked directly to the heat bylaw so that energy efficiency measures would play a complimentary role in reducing heating and cooling demand.

Facilitating financing of bankable project proposals

Many renewable energy project proposals are discredited as "unbankable" due to the lack of thoroughly developed supporting documentation. The private sector should therefore utilise openly available tools and platforms, such as the Climate Investment Platform (CIP), for developing bankable project proposals and accessing financing. Also, thoroughly developed power purchase agreements (PPAs) are a key element in de-risking investments in renewable energy projects and can offset some of the perceived risk in project appraisal by financing institutions.

Local financial institutions can also play an increasingly prominent role in financing smaller-scale distributed systems by tailoring existing lending portfolios to include electric vehicles (under conventional vehicle loans) and rooftop solar PV, energy efficiency measures or efficient heat pumps (under housing loans).

Raising public awareness of the benefits of renewable energy

From the perspective of energy consumers, high upfront investment costs in renewable energy and a lack of understanding of payback periods for such investments deter wider uptake of renewables in Albania. Also, the public is not always aware of existing incentives, support mechanisms or plans for the deployment of renewable energy technologies. Therefore, the wider adoption of renewable energy in Albania requires government-backed, well-formulated awareness-raising strategies to sensitise the public to the direct benefits of renewable energy, both for individual citizens and the country as a whole. Coherently communicating the government's plans for the development of the sector will also serve to boost investor confidence.

Enhancing institutional capacities and local human resources

To implement Albania's commitment to a higher share of renewable energy deployment, a skilled workforce is required. The ministries in charge of energy, training and education should collectively work towards the introduction of renewable energy training curricula, prioritising solar PV installers and energy auditors in the immediate term. In particular, the MIE, together with the Energy Efficiency Agency – the certifying body for energy auditors – should work on expediting the licencing of accredited energy auditors.

INSTAT, as the central body accumulating and processing statistical data, should work with AKBN (the energy data provider) and other international partners that receive statistical information (such as EUROSTAT and the World Bank) to further strengthen their institutional capacities for energy data processing and reporting.

Strengthening communication and co-operation among stakeholders

Co-operation and communication among all relevant actors can be further strengthened to ensure the exchange of updated information regarding the renewable energy sector's evolution. This could ensure that challenges facing individual stakeholders are clearly communicated and collectively addressed.

The Albanian Renewable Energy Association, due to the country's history of hydropower production, has a stronger focus on hydro than non-hydro renewables. Non-hydro enterprises therefore need to take a more assertive role in communicating their operational challenges and, through the association, voice these challenges to relevant authorities who could take action to alleviate or resolve them. This can avoid information asymmetries and ensure better communication between the private and public sectors.

1. INTRODUCTION

1.1 COUNTRY OVERVIEW

The Republic of Albania is a coastal country in South East Europe, bordering Montenegro and Kosovo[*] to the north, North Macedonia to the east, Greece to the south, and the Adriatic and Ionian Seas to the west. Its capital, Tirana, is the largest city and the political and economic centre of the country. The second largest city is the port city of Durrës.

The country is predominantly mountainous, with the more densely populated lowland coastal region spanning the western part of the country. Albania's climate is typically Mediterranean with warm, dry summers and mild, wet winters. Average rainfall varies seasonally and across the country with about 95% of the annual precipitation occurring in the winter season, predominantly in the North Albanian Alps, while the southwestern part of the country commonly experiences droughts in the summer (Encyclopedia Britannica, 2020). According to a World Bank study, Albania is one of South East Europe's most vulnerable countries to climate change. Changing weather patterns have already resulted in increased temperatures, decreased precipitation and more frequent extreme events such as floods and droughts (World Bank, 2013).

Albania has a population of approximately 2.9 million (INSTAT, 2019a). Tirana's population of around 896 000 has doubled in the past three decades and amounts to almost a third of the country's population. Durrës accommodates about 10% of the population (INSTAT, 2019b). More than 98% of the population aged 15 years and older is literate (UNESCO, 2018). In 2018, unemployment rates stood at just over 12% and were highest among young people (15-29 years; 23%) (INSTAT, 2019c).

Albania has made significant economic progress during the past three decades, moving from a low-income economy to a middle-income country in Europe, with gross domestic product (GDP) per capita increasing from its lowest point of USD 200 (US dollars) in 1991 to USD 5 268 in 2018 (World Bank and OECD, 2018a). The real annual GDP growth rate in 2018 was 4.15%, one of the highest in the South East European region (INSTAT, 2019d).

The structure of the Albanian economy has remained relatively unchanged over the past decade, with the services sector dominating, contributing to over half (54.1%) of the country's gross value added in 2019. The industrial and agricultural sectors contributed 21.7% and 24.2%,

* *The designation of Kosovo is without prejudice to positions on status and the United Nations Security Council Resolution 1244 (1999).*

respectively, in the same year (UNdata, 2020). Albania is a net importer of goods and services, although exports continue to rise and support economic growth. In 2018, Albania exported almost one-third (31.7%) of its GDP in goods and services (World Bank, 2019).

However, energy imports place a considerable weight on economic growth and the country's trade deficit, specifically in the energy sector. A drought in 2017 exposed the electricity sector's over-reliance on hydropower and resulted in electricity imports that cost the country USD 240 million and put public utilities in the power sector into severe financial difficulty. This expenditure reportedly forced the government to revise its budget to financially assist the imports and use emergency loans for power imports (Tirana Times, 2017).

Strong and sustained economic growth is a main component of the country's sustainable economic and social development agenda, and in nurturing this growth the energy sector plays an increasingly critical role. Establishing energy security, energy sector sustainability and an ensured energy supply at cost-competitive prices are some of the key challenges for the country to address in the near term.

1.2 RENEWABLES READINESS ASSESSMENT

In comparison with neighbouring countries in the South East Europe region, Albania's energy mix has one of the highest shares of renewable energy. Ensuring a cost-competitive, secure energy supply in Albania can be achieved by further increasing the renewable energy share and diversifying the country's electricity sector.

The diversification of the country's electricity sector is critical, as the current system is almost entirely hydro-based and thus susceptible to climatic variations. In recent years, the Albanian government has taken commendable steps for the promotion of non-hydro renewable energy use, and the Renewables Readiness Assessment (RRA) aims to further support the country on this path.

The RRA is a tool developed by the International Renewable Energy Agency (IRENA) to comprehensively evaluate the conditions for accelerated renewable energy deployment in a country. It is a country-led, multi-stakeholder consultative process which allows for the identification of existing challenges for renewable energy deployment and recommends short- to medium-term actions to guide decision makers and other stakeholders in addressing these challenges.

The RRA for Albania was initiated by the Ministry of Infrastructure and Energy (MIE) in technical co-operation with the International Renewable Energy Agency (IRENA) and has greatly benefitted from stakeholder inputs. Stakeholders in the RRA process included officials from ministries, transmission and distribution utilities, power project developers, development partners, financial institutions, civil society, and academia.

As a first step, a background report on Albania's energy sector was developed along with an issue paper preliminarily highlighting challenges for renewable energy deployment. On this basis, an initial multi-stakeholder consultative workshop was organised by IRENA and the MIE in January 2020 that facilitated further discussions on the challenges in renewable energy deployment and the identification of recommended actions in overcoming these challenges. The outcomes of the consultation workshop, along with insights gained from bilateral meetings with key stakeholders, constituted the basis for this RRA report.

The RRA, with its recommended short- to medium-term actions, was validated in November 2020 at a virtual multi-stakeholder validation workshop attended by over 60 representatives from the energy sector in Albania.

This report calls for an accelerated diversification of the electricity sector in Albania and a focus on more non-hydro renewable energy development. In addition, end-use sectors are called on to incorporate more renewable-based energy supply and thereby take full advantage of the country's renewable energy potential. In the immediate term, the RRA aims to inform the development of the National Energy and Climate Plan for 2021-2030 and guide subsequent energy sector development to be conducive for renewables, energy security, environmental safeguarding and socio-economic benefits for all citizens.

Stakeholders in the RRA process included officials from ministries, transmission and distribution utilities, power project developers, development partners, financial institutions, civil society, and academia.

RRA Albania Consultative Workshop in Tirana, 29-30 January 2020

Photograph: Zoheir Hamedi

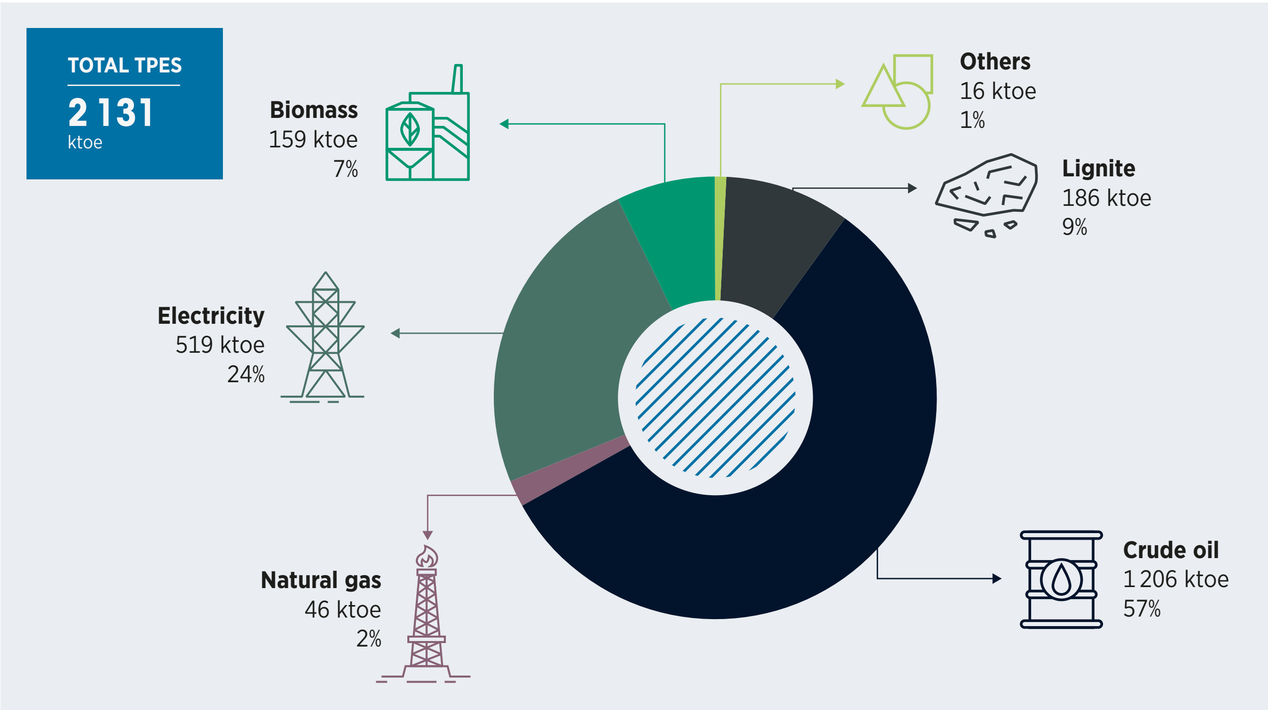
2. ENERGY SECTOR CONTEXT

2.1 ENERGY BALANCE

Albania's primary energy production is dominated by fossil fuels – mainly crude oil – whose share has ranged between 46% and 68% over the last five years. Hydropower is the second largest contributor, with a share ranging from 20% to almost 40%, depending on annual rainfall (INSTAT, 2020a). This vulnerability to climatic externalities for electricity production creates notable fluctuations in domestic energy production. For example, for the last five-year period, the lowest primary energy production was recorded in 2017, which was a particularly drought-stricken year, whereas the highest primary energy production was recorded in 2015 – a year of considerable rainfall. Other domestic energy sources for primary energy production include biomass (including wastes, residues, non-food cellulosic material, and lignocellulosic material), lignite and natural gas. Because domestic energy production is not able to meet demand, Albania is on average a net energy importer.

In 2018, Albania's total primary energy supply (TPES)[1] amounted to 2 131 kilotonnes of oil equivalent (ktoe). Its share by energy source is represented in Figure 1. It remains predominantly fossil fuel based (68% composed of natural gas, oil and lignite), followed by electricity (24%), which is both produced from hydropower domestically and imported. Biomass and other energy sources (such as solar thermal) account for 8% of the TPES.

Figure 1 TPES by energy source in 2018



Source: INSTAT (2020a)

1 The total primary energy supply (TPES) is the sum of domestic energy production and imports minus exports and storage changes.

2.2 ELECTRICITY BALANCE AND INSTALLED CAPACITIES

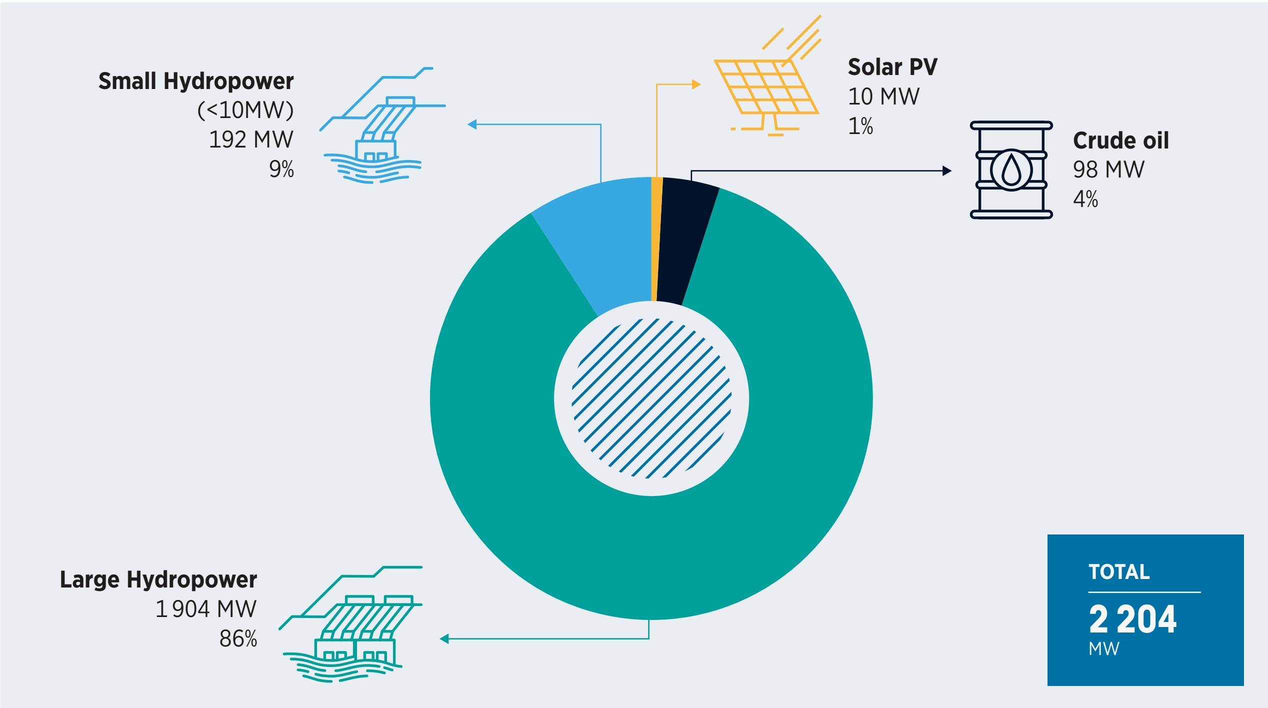
Albania's electricity demand grew rapidly in 1995-2000. This was due to demographic, economic and social trends, including rural-to-urban migration, increased use of electricity for space heating and cooling, and rising living standards (IRENA, 2019). To meet the growing electricity demand, the country has increased its installed electric capacity over the past decade from 1455 megawatts (MW) in 2007 to 2204 MW in 2018. The majority of the installed capacity (1448 MW) is owned by the Albanian Power Corporation (KESH), while private producers account for about a third of the installed capacity (755 MW) (ERE, 2019).

As shown in Figure 2, the Albanian power system is dominated by hydropower, representing 95% of the country's installed capacity with a total of 2096 MW installed. The installed hydropower capacity comprises mainly large hydropower installations (*i.e.*, above 10 MW in size) amounting to 1904 MW, while small hydropower installations amount to 192 MW. The Drin River in northern Albania is the largest river in the country. It hosts three of the largest hydropower stations owned by KESH: Fierzë (500 MW), Komani (600 MW) and Vau I Dejës (250 MW), which are also referred to as the Drin River cascade.

The country has a 98 MW fossil-fuel thermal power plant representing 4% of the total installed capacity that has not been put into use since its construction in 2011 due to a failure in its cooling system. In January 2019, the MIE issued a tender for a public-private partnership (PPP) for a concession contract to revive the power plant, potentially converting it to a natural gas-fuelled plant to be supplied with gas from the planned Trans Adriatic Pipeline. The remaining 1% (10 MW) of installed capacity in 2018 comprised small-scale (*i.e.*, each less than 2 MW) solar photovoltaic (PV) plants.

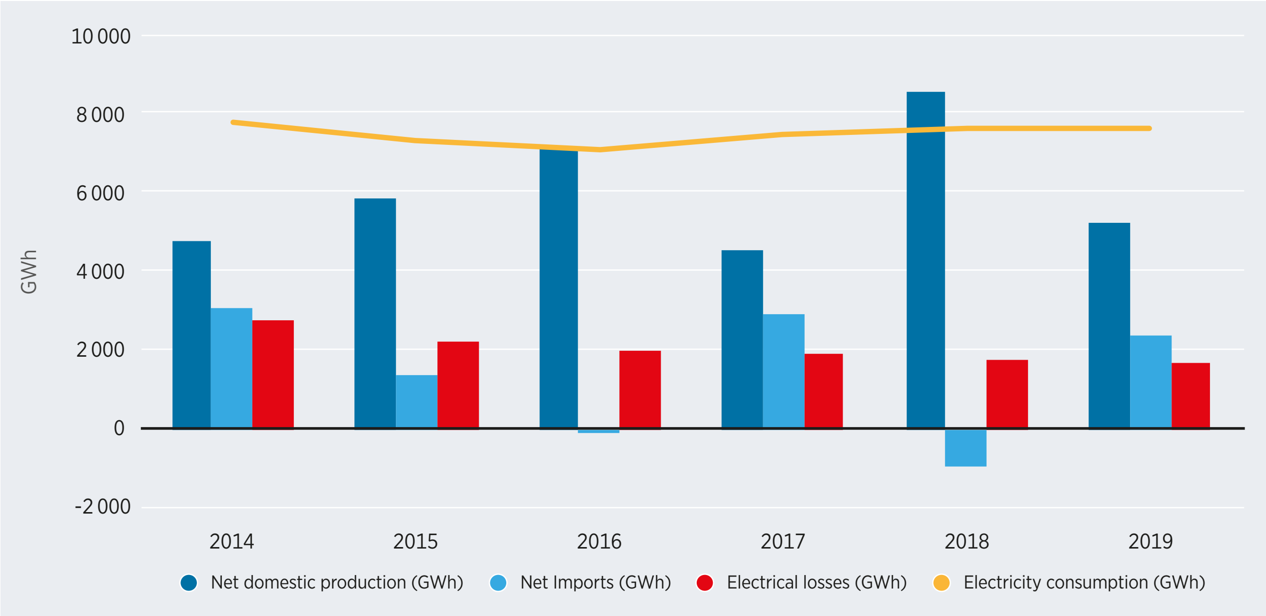
Albania's domestic electricity production has fluctuated in recent years due to the electricity sector's over-reliance on hydropower and annual precipitation. Figure 3 shows Albania's domestic electricity production, consumption and net imports from 2014 to 2019. Despite the steady capacity additions over the years, domestic electricity production during the drought of 2017 fell to 63% (4.5 terawatt hours [TWh]) of the previous year's production (7.1 TWh).

Figure 2 Installed power capacity in 2018 (MW)



Source: EnC (2019)

Figure 3 Electricity production, consumption and net imports (GWh), 2014-2019



Source: INSTAT (2020b)

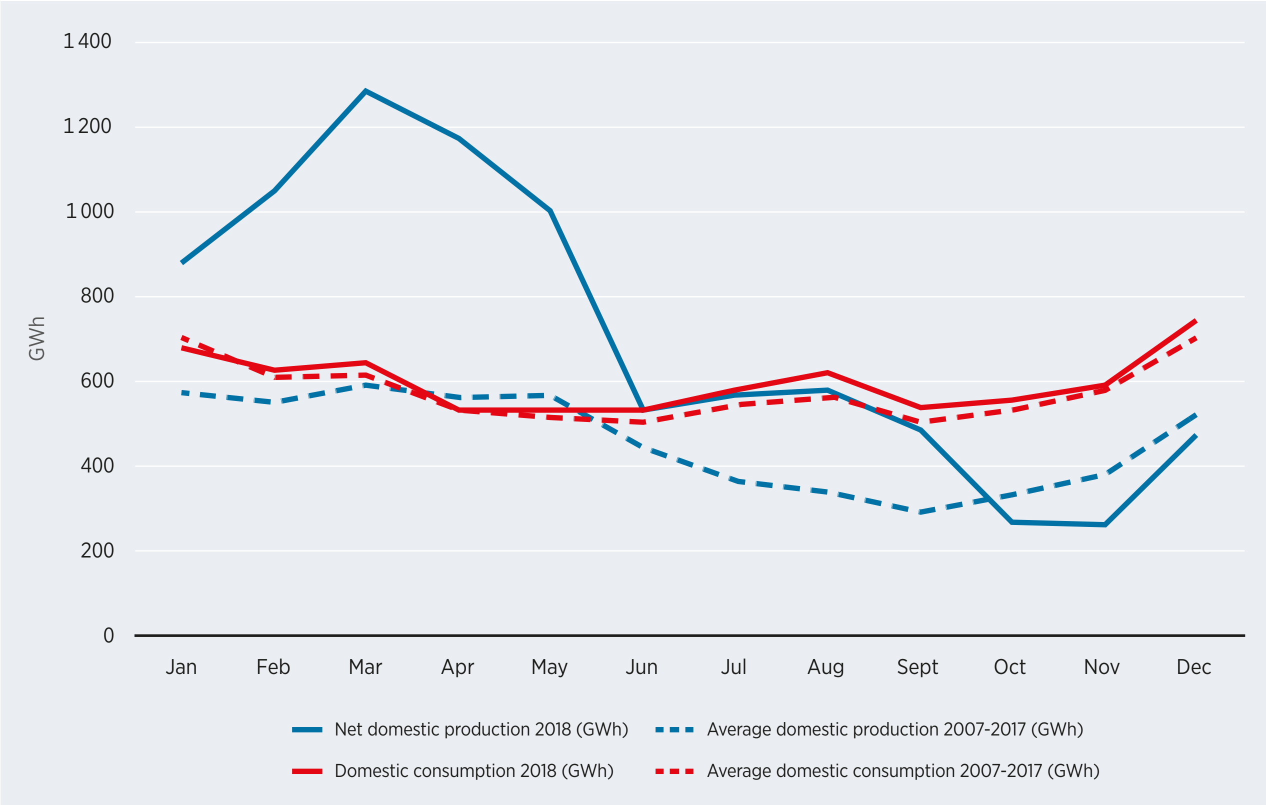
This forced the country to net import 39.2% of its electricity consumption in 2017 to meet demand. This signals the power sector's extreme vulnerability to climatic changes and the urgent need to diversify away from hydropower to ensure energy supply security. The electricity system in Albania is also suffering from high losses. Although the country has taken measures to gradually reduce these losses over the past few years, they accounted for around 21.7% of the total electricity consumption in 2019 (INSTAT, 2020b).

Figure 4a below shows net monthly domestic electricity production in 2018, compared to the average values for the same months over the ten-year period from 2007 to 2017. The difference between the months of lowest and highest electricity production, which in 2018 was three times the average difference of the ten years prior, is notable. This indicates increased seasonal variations of electricity production. Also notable is that, despite the additions in installed capacities, net domestic electricity production in October, November and December 2018 was below the ten-year average. This signals increasingly drier months of the last annual quarter and, despite additional hydropower capacities, an increasing inability to meet electricity demand in the second half of the year.

Figure 4b shows that, when monthly electricity consumption profiles in 2018 are compared with the ten-year average, peak consumption months tend to be during the hottest and coldest months of the year due to electricity demand for space cooling and heating, respectively. In 2018, compared to the ten-year average, higher electricity demand is evident in the summer months, particularly in July and August, largely due space cooling. This is further compounded by the fact that electricity production decreases significantly from June onwards and is unable to meet domestic demand in the second half of the year. Thus, partially offsetting electricity demand for heating and cooling would allow for domestic production to better meet demand from June to December.

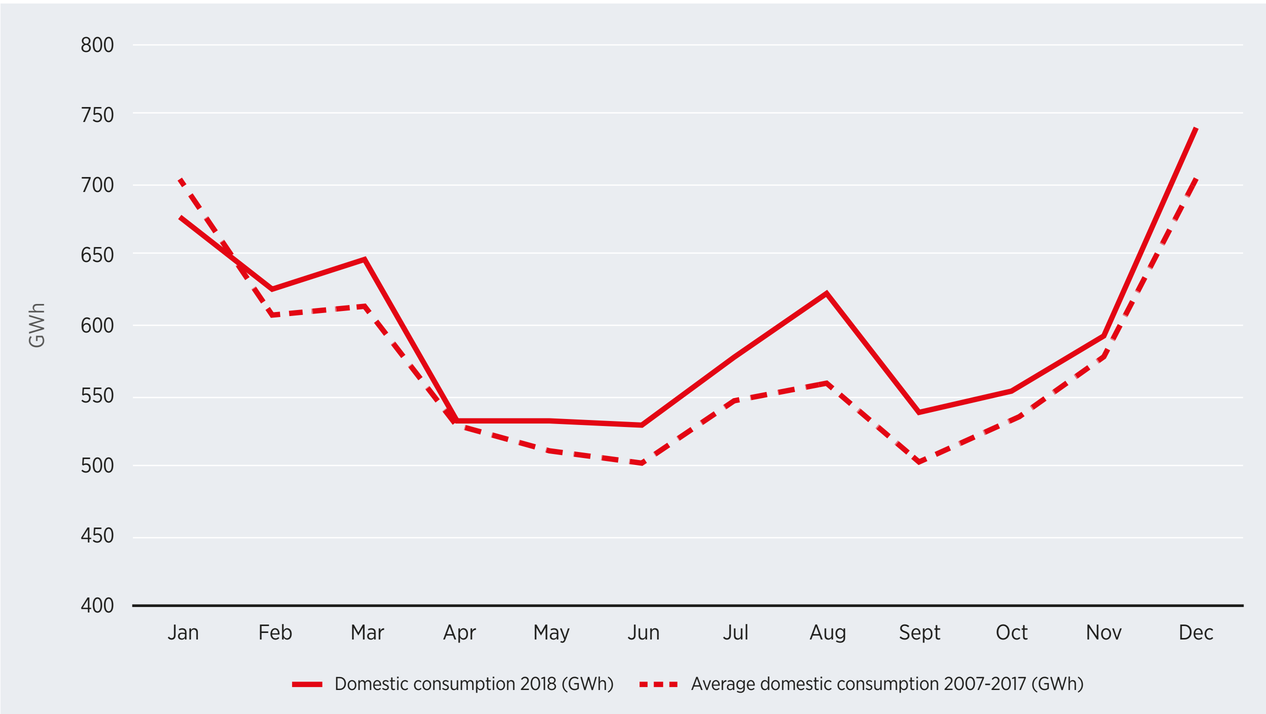
Domestic electricity production has fluctuated in recent years due to the electricity sector's over-reliance on hydropower and extreme vulnerability to climatic changes.

Figure 4a Net domestic electricity production and consumption (GWh)



Source: ERE (2019)

Figure 4a Net domestic electricity production and consumption (GWh)



Source: ERE (2019)

2.3 ENERGY IMPORTS AND EXPORTS

Albania is a net energy importer. Between 2014 and 2018, the amount of net energy imported ranged from a low of 12% of the TPES in 2015 to a high of 46% in 2017.

Net energy imports are directly correlated to annual rainfall, given that the electricity sector is almost entirely reliant on hydropower production. In 2017, a year of low rainfall, the country net imported 39.2% (2 915 GWh) of its electricity consumption.

A further contributor to net energy imports is the country's rising demand for petroleum products, largely fuelling the transport sector. Although Albania is the largest producer and exporter of oil in the South East Europe region, most oil extracted in Albania is exported as unrefined crude oil.

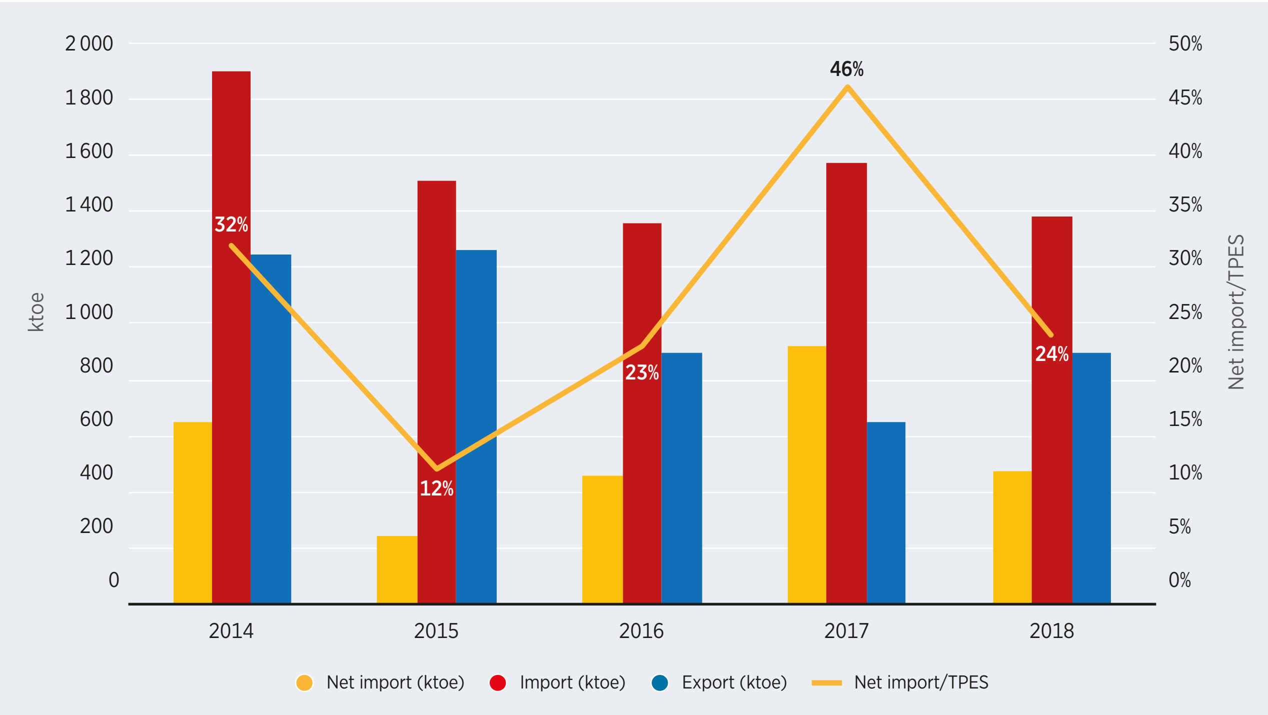
As such, the country imports all of its refined petroleum products to meet its transport energy demand, which inevitably widens the country's trade gap. Greening the transport sector by taking up biofuels blending and introducing electric mobility could lower the country's energy imports and positively contribute to the national economy.

2.4 ENERGY CONSUMPTION BY SECTOR

The largest energy consumer in Albania is the transport sector, whose share has almost quadrupled since 1990 and amounted to 40% of final energy consumption in 2018. The residential sector was the second largest (24%, 490 ktoe), followed by the industrial sector (20%, 418 ktoe) (EUROSTAT, 2019a) (INSTAT, 2020a).

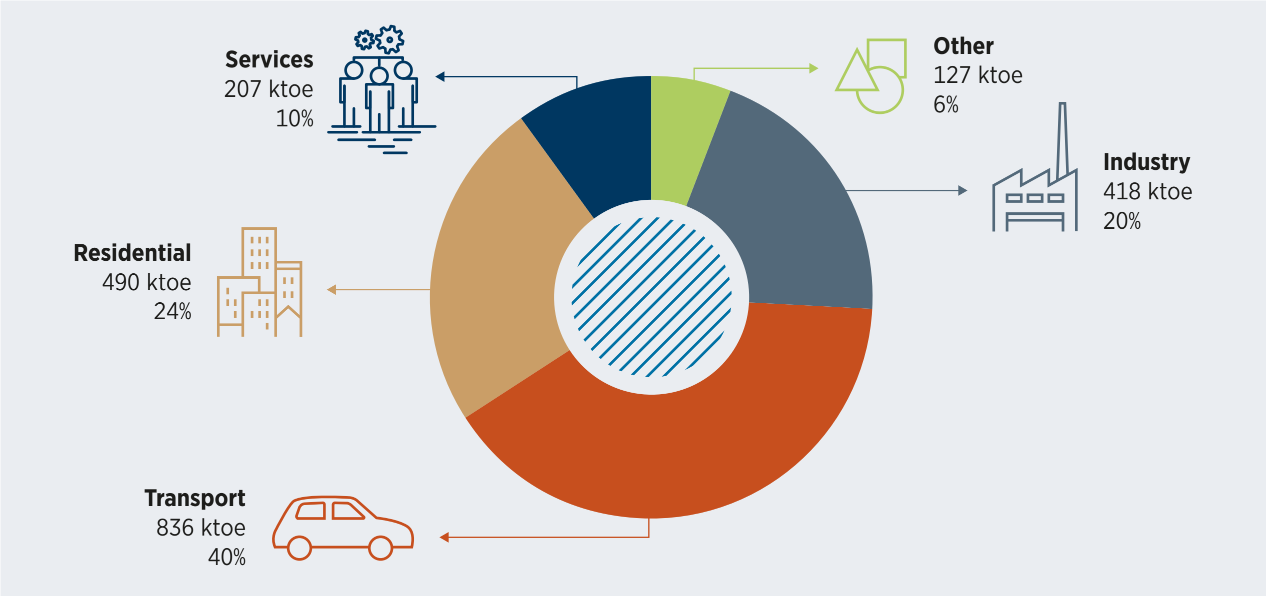
The transport sector's energy demands are mostly met by oil and to a lesser extent by biofuels (87.9 ktoe, 13.4% in 2017) (MIE, 2018a). However, no system is in place to guarantee the sustainability of the used biofuels (IRENA, 2019). The residential sector is the largest electricity-consuming sector, consuming 57% of total electricity consumption (excluding losses) in 2018 (MIE, 2019). As such, the residential sector's energy demands are predominantly met by electricity (51.2% in 2017) (EUROSTAT, 2019b), and to a lesser extent by biomass, solar thermal and petroleum products. A greater portion of this electricity consumption is due to high electricity demand for space heating and cooling and water heating. Almost half of space heating and water heating demand in the residential sector is met by electricity (43.6% and 49.7%, respectively) (EUROSTAT, 2019c).

Figure 5 Net energy imports (ktoe), 2014 2018



Source: INSTAT (2020a)

Figure 6 Distribution of primary energy supply by demand sector, 2018



Source: EUROSTAT (2019a), INSTAT (2020a)

Notably, over 70% of hot water demand in the household and services sector is supplied by electric boilers (UNDP, 2017). The demand for electricity for heating needs is especially high in times of low electricity production towards the end of the year (Figure 4a).

2.5 ENERGY DEMAND OUTLOOK

Within the National Energy Sector Strategy 2030, an analysis of energy development scenarios revealed that, given past growth trends and under a business-as-usual scenario, the annual energy demand in Albania is expected to increase by 77% in 2030 compared to 2018 levels (MIE, 2018b). The transport sector is forecast to continue to be the largest energy consumer over the next decade, contributing to continued net energy imports. The second-largest energy consumer will be the residential sector, followed by the industrial and services sectors. The highest increase in energy demand will be seen in the services sector.

Regarding the power sector, in part due to increasing climatic changes with more seasonal variations and rising temperatures in the summer months, electricity demand is forecast to increasingly spike in the hottest months as electricity demand for space cooling increases (ERE, 2019).

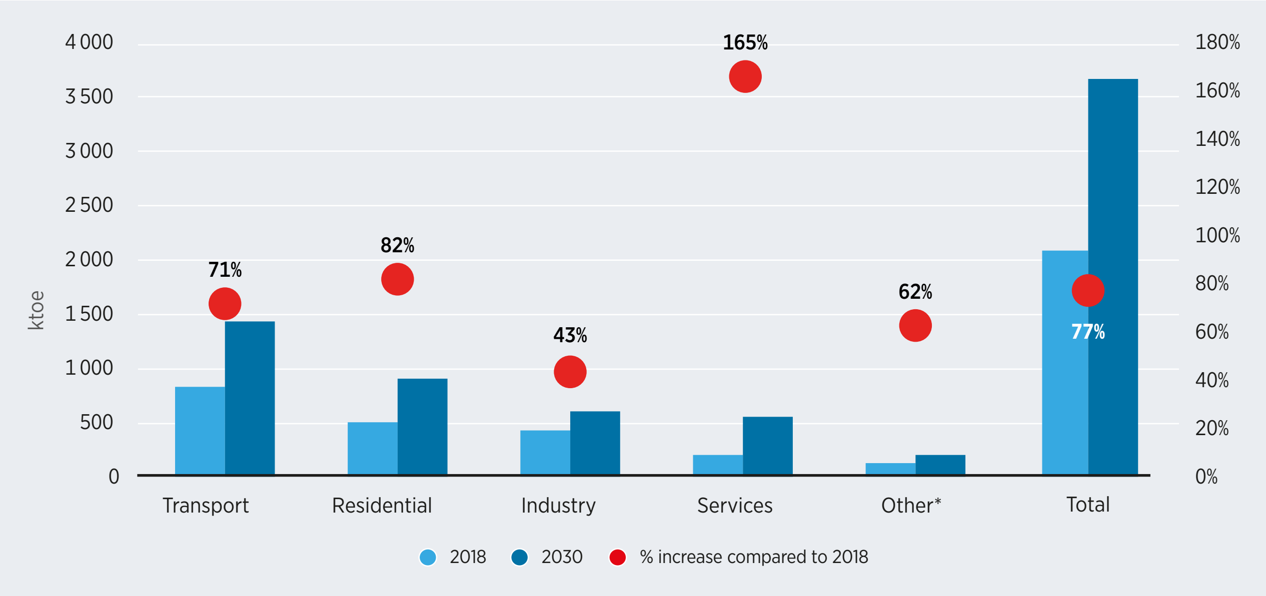
2.6 GRID INFRASTRUCTURE

The Albanian transmission grid is managed by the transmission system operator (OST) and is composed of 400 kilovolt (kV), 220 kV, 150 kV and 110 kV transmission lines and 15 substations of 4 096 megavolt amperes (MVA) installed capacity. Albania's electricity system is interconnected through six lines with neighbouring countries. The three 400 kV lines are interconnectors to neighbouring Greece (Zemblak – Kardia), Montenegro (Tirana 2 – Podgorica) and Kosovo* (Tirana 2 – Kosovo B). Two 220 kV lines connect to Montenegro (Koplik – Podgorica) and Kosovo* (Fierze – Pristina), and one 150 kV line connects to Greece (Bistrica 1 – Igumenice).

More than 70% (1 539 MW) of the country's installed power capacity – and the largest power plants, which are located on the Drin River cascade

* *The designation of Kosovo is without prejudice to positions on status and the United Nations Security Council Resolution 1244 (1999).*

Figure 7 Energy demand in 2018 compared to 2030 forecast (ktoe, %)



Source: EUROSTAT (2019a), INSTAT (2020a)

in northern Albania – are connected to the 220 kV network. This supplies the major demand centres of Tirana, Elbasan, Durrës and Fieri and connects to the 110 kV network, which is predominantly ringed and to a lesser extent radial, covering all urban centres of the country and supplying the distribution network. About 20% (411 MW) of the installed generation capacity is connected to the 110 kV network, whereas around 10% (237 MW) is connected to the distribution grid of 35 kV and less (ERE, 2019). The distribution network is operated by the distribution system operator (OSHEE).

Grid losses account for a large share of electricity consumed. In 2019, these stood at just over a fifth (21.7%) of final electricity consumption (INSTAT, 2020b). On the transmission network, losses stand at around 2% and are largely dependent on the performance of the hydropower plants (HPPs) on the Drin River cascade (OST, 2018). The majority of the losses are on the distribution network and largely include technical losses due to inadequate upgrading of the distribution infrastructure.

The 45 000 km of distribution network is aged, and 82% of the network is composed mostly of overhead cable lines, which contributes to electricity losses. Of the 178 substations, 40% have been in operation for more than 70 years. These are operated manually with limited real-time information and no forecasting demand. The distribution grid is overloaded, especially in high demand centres such as Tirana and Durrës (Lika, 2020).

Table 1 Total electricity system losses, 2014-2019

	2014	2015	2016	2017	2018	2019
Electrical losses (GWh)	2 783	2 196	1 986	1 876	1 783	1 653
Electricity consumption (GWh)	7 794	7 265	7 094	7 440	7 639	7 614
Losses/Consumption (%)	**35.7%**	**30.2%**	**28.0%**	**25.2%**	**23.3%**	**21.7%**

Source: INSTAT (2020b)

The injection of variable renewable energy poses major challenges in Albania, particularly to the distribution grid, as there is currently limited capacity for the distribution grid to accommodate this. According to a study done by OSHEE, the injection of small hydropower generation in the east of the country can increase distribution losses to as high as 40% (compared to 15% losses with no hydropower injection).

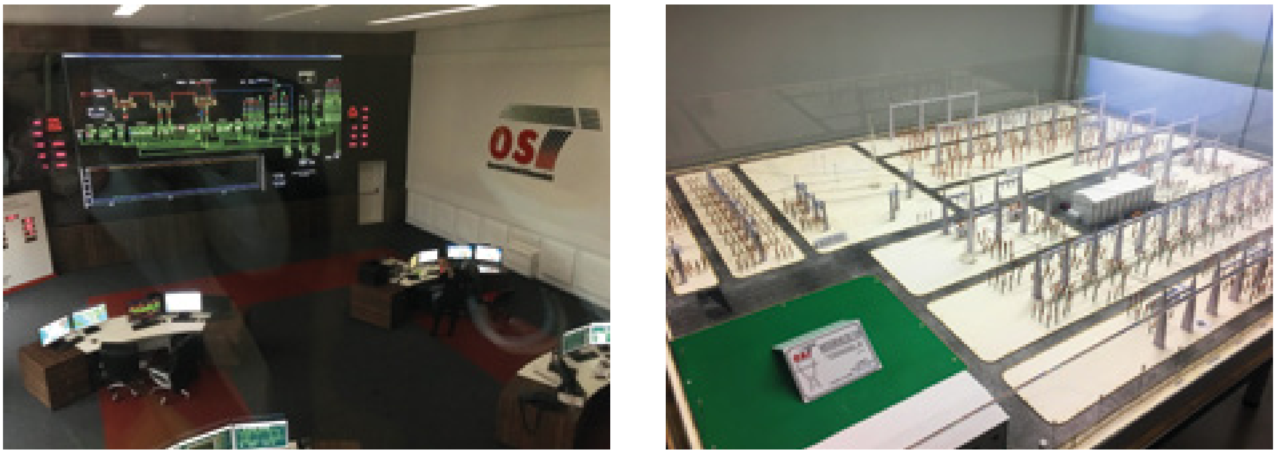
Most of Albania's electricity consumption occurs in the western part of the country. The eastern part consumes around 35% but nevertheless hosts most of the hydropower generation potential. Such power evacuation suffers losses and poses challenges to the current grid. A shift towards non-hydro-based renewable generation close to demand centres would be advantageous in continued power sector development.

An immediate priority of OSHEE is to plan for an active grid that can allow for electricity flow bidirectionally, accommodate renewable energy prosumers and focus on grid upgrades close to renewable energy generation zones. Furthermore, a priority for grid refurbishment is around Tirana and Durrës, which account for 50% of the country's electricity consumption. According to OSHEE's estimates, investments worth EUR 40 (Euros) million to EUR 80 million (about USD 48 million to USD 96 million) are required to refurbish the distribution network to better handle variable renewable energy injection in the immediate term (Lika, 2020).

Nevertheless, electricity losses, although still high, have decreased steadily over the last five years, with gradual and ongoing improvements in grid infrastructure.

A 400 kV interconnection line is planned to connect Albania to Northern Macedonia (Fier – Elbasan – Bitola), which is anticipated to further reduce transmission losses, improve network capacity to facilitate new generation connections, improve the reliability of the regional network and support the development of the regional market in South East Europe. The line is under construction and is expected to be in place by the end of 2021. Another crucial development to reduce transmission network losses and improve the supply of electricity of Durrës, Kavaja and the southern part of Albania is the anticipated 220 kV double circuit line between Tirana and Rrashbull. A new 400/110 kV substation in Tirana, planned to be constructed by the end of 2021, will also ensure a more reliable supply of power for the Tirana area, which is the largest demand centre in the country.

According to OSHEE's estimates, investments worth EUR 40 million to EUR 80 million are required



OST control and monitoring (left) and model of the Tirana 2 substation (right)

Photograph: Tijana Radojičić

2.7 INSTITUTIONAL STRUCTURE

The energy sector in Albania has a well-defined set of institutions with clear responsibilities in governing, regulating, operating and participating in the sector.

The **Ministry of Infrastructure and Energy (MIE)** is responsible for the energy sector and is designated to prepare, periodically review and update the National Energy Strategy; develop energy policies and mid-term and long-term strategies for the energy sector; develop market reforms in the sector to meet the national objectives and comply with European Union (EU) directives; formulate adequate legal framework; and promote energy efficiency, renewable energy resources and investments in the sector through enabling investment environments.

MIE is also responsible for granting authorisation and concession rights for the construction of power plants in Albania. Concessions are approved by the Council of Ministers and undersigned by the energy minister on behalf of the contracting authority.

The **National Agency of Natural Resources (AKBN)** is under the supervision of MIE, and is designated for the development and supervision of rational use of natural resources, according to the policies of the government. The agency monitors the sustainable use and rehabilitation of natural resources in mines, hydrocarbons and energy. In addition, AKBN carries out analytical and technical examinations of studies and projects; monitors the implementation and operation of projects, such as concessionary contracts for hydropower; and compiles and publishes annual energy balance sheets at the national and regional levels in compliance with Eurostat and international energy agency formats. AKBN provides energy data to the National Institute of Statistics (INSTAT).

The **Energy Efficiency Agency** is state-funded, reports to the MIE and is responsible for the preparation and monitoring of the implementation of the National Action Plan for Energy Efficiency, along with monitoring the implementation of energy efficiency programmes in residential and institutional building sectors, transport, industry, and agriculture. The agency also undertakes energy audits, provides certifications for energy auditors and advises on the preparation of bylaws that promote energy efficiency.

The **Ministry of Tourism and Environment** is responsible for environmental protection; safeguarding of protected areas, forests and biodiversity; and climate change. The ministry is responsible for approving the strategic environmental assessments for any territorial or sector-based plan approved under the law on planning and development.

The ministry is the co-ordinator of the inter-ministerial body on climate change and nationally determined contributions (NDCs) and the focal point for the implementation of the United Nations Framework Convention on Climate Change.

The **National Environmental Agency** functions under the institutional framework of the Ministry of Tourism and Environment and is responsible for reviewing the environmental impact assessment (EIA) process for projects under Law No. 10 440 on "Environmental impact assessment". According to this law, all power projects including transmission and distribution require an EIA prior to being granted a construction permit. However, small renewable power plants are only initially subjected to a preliminary EIA which, upon review, the agency may decide to further subject to an in-depth EIA.

The **Ministry of Agriculture, Rural Development and Water Administration** includes a national Directorate for Administration of Water Resources that oversees the sustainable management of irrigation, drainage and flood protection; improvement of the efficiency of water resources; reduction of the risks of dam destructions; and management of river and sea flooding. The ministry issues all water use permits for hydropower generation projects.

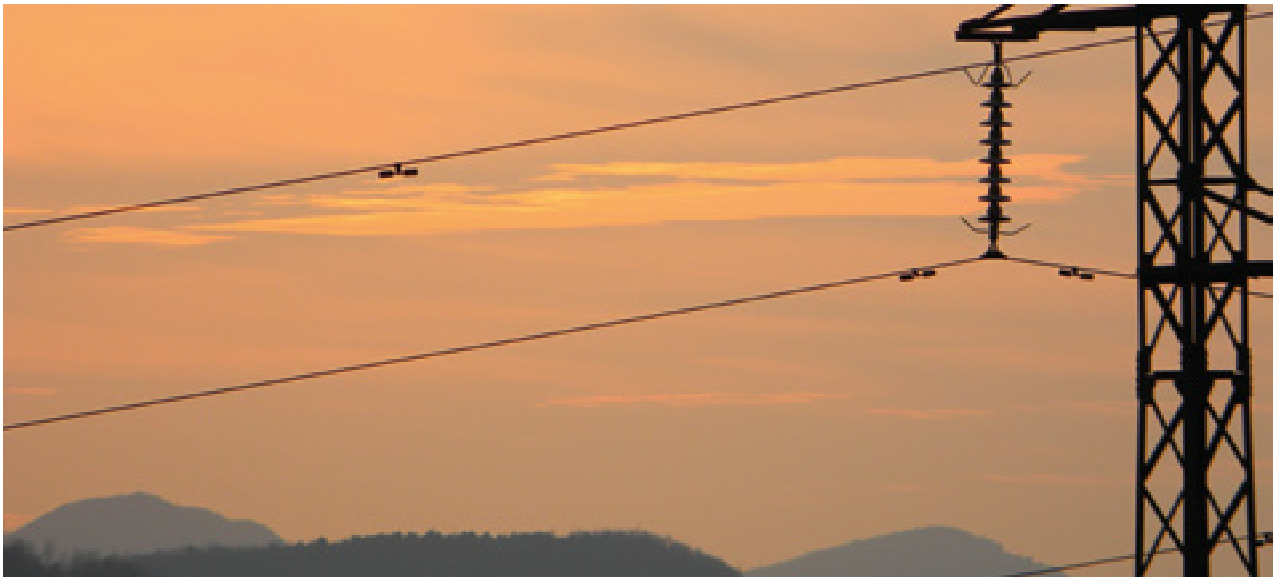
The **Energy Regulatory Authority (ERE)** is an independent public body whose responsibilities include regulating activities in the electricity and natural gas sectors, developing and adopting electricity market rules while also monitoring all electricity market operations in Albania. ERE issues licenses for electricity generation, transmission, distribution, supply and trade. Electricity producers in Albania receive their approval of the grid codes by ERE for their operations and connections to the transmission and distribution networks. The authority adopts electricity tariffs, including feed-in tariffs (FiTs), to all eligible electricity producers from renewable sources. ERE also defines the standard purchase agreements of these producers.

The **Transmission System Operator (OST)** performs the roles of the transmission network operator, power system operator and market operator. OST's role is to provide the necessary transmission capacities for uninterrupted supply of electricity to end users, for the transmission of electricity generated from domestic sources, as well as for the transit and exchanges with other countries in the region through the European Network Transmission System Operators for Electricity (ENTSO-E). It also co-ordinates the development of network interconnections with neighbouring countries, dispatches power system facilities, manages power flows, acquires and utilises ancillary services if necessary, and co-ordinates parallel operation with other systems.

In accordance with the 2019 Electricity Sector Law, OST has taken gradual steps in the creation of a competitive free market for electricity in Albania, in compliance with Energy Community Secretariat (EnC) obligations and EU Energy Acquis. As such, it has spun-off the electricity market operator, Albania Power Exchange (ALPEX), which was registered on 23 October 2020. ALPEX is a stand-alone independent company owned by OST and the Kosovo* transmission system operator, KOSST (57.25% and 42.75%, respectively). It will operate the Day-Ahead and Intra-Day markets of both Albania and Kosovo.*

The **Albanian Power Corporation (KESH)** is both a public electricity generation company and the largest producer of electricity in Albania. KESH administers and controls the Drin River cascade of HPPs (Fierzë, Komani and Vau I Dejës) with total installed power of 1 350 MW. The corporation is undergoing a progressive transformation from a monopoly into one of the country's largest power generation companies operating in a liberalised market.

The **Electricity Distribution System Operator (OSHEE)** is responsible for the maintenance and operation of the distribution system below 35 kV and provides electricity supply to all consumers connected to its network. The operator is obliged to connect all consumers and/or producers to the distribution system in a transparent and non-discriminatory way. In March 2018, OSHEE was unbundled, establishing three new companies: the Universal Service Supplier, the Free Market Supplier and the Distribution System Operator. Distributed power producers sell their power to the Free Market Supplier.



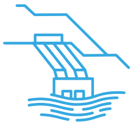
* *The designation of Kosovo is without prejudice to positions on status and the United Nations Security Council Resolution 1244 (1999).*

3. RENEWABLE ENERGY SECTOR OVERVIEW

3.1 RESOURCE POTENTIAL AND MARKET DEVELOPMENT

Albania is endowed with valuable natural resources, including abundant renewable energy potential.

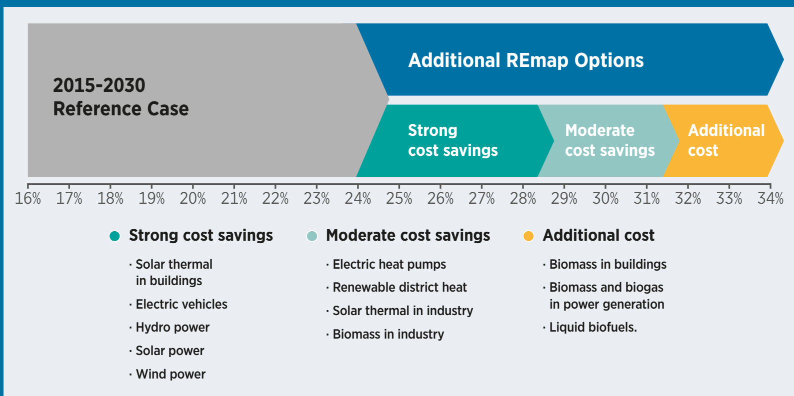
Hydro



Hydropower dominates Albania's electricity sector with 2 096 MW of installed capacity at the end of 2018, representing 95% of total installed power generation capacity.

The River Drin alone generates about 90% of Albania's domestic electricity supply. Of the total installed hydro capacity, large hydro power plants (more than 10 MW) account for 1 904 MW, while small hydro power plants (less than 10 MW) account for 192 MW (EnC, 2019).

As of 2018, the total installed capacity of hydropower amounted to just under half (47%) of estimated hydro potential capacity. According to AKBN's estimates, total hydro potential capacity is estimated at 4 500 MW, with an estimated annual output potential of up to 18 TWh (National Agency of Natural Resources of Albania, 2019). However, climate change is already having an adverse effect on hydropower production, which is likely to continue in the future. By 2050, annual average electricity output from Albania's large HPPs could decrease by about 15% and from small HPPs by around 20% compared to 2010 levels (Ebiger, 2010). IRENA's 2020 study for the South East Europe region, *Renewable energy prospects for Central and South-Eastern Europe energy connectivity (CESEC)*, estimates that in fulfilling an overall 48% renewable energy share of the



IRENA's ***Renewable energy prospects for Central and South-Eastern Europe energy connectivity (CESEC)*** estimates the potential for an accelerated renewable energy scenario beyond current trends and policies, by 2030. The analysis covers all aspects of the energy system, including energy supply (both power and district heat generation) as well as energy supply in key sectors such as residential, industry and transport. It focuses on possible technology pathways, assessing technology, sector and system costs; investment needs; externalities relating to air pollution and climate; carbon dioxide (CO_2) emissions; and economic indicators such as employment and economic growth to derive a scenario of renewable energy options, per technology, which could be deployed by 2030.

gross final energy consumption, the total installed capacity of hydro by 2030 is targeted at 2 150 MW. In other words, no further hydropower capacities are proposed by 2030 in addition to existing plans.

However, by the end of 2018, a total of 185 concession contracts were signed for the construction of 525 small HPPs nationwide. Of these, 165 are in production, 316 are under construction and the rest are obtaining the necessary permits (MIE, 2019). By the end of 2020, 184 MW of hydropower capacity was added with the commissioning of the newly constructed Moglica HPP. This is the largest independent power producer plant in Albania (Cela, 2020).

Solar

At the end of 2018, 10 MW of solar PV was connected to the grid (EnC, 2019). According to the MIE, since the introduction of the solar FiT support scheme, 88 applications for the construction of solar PV plants of up to 2 MW have been received, and 12 of the applications have been authorised for construction, which amount to a total capacity of 24 MW.

Following the first auction for solar PV, in November 2018, 50 MW of solar PV was approved for construction under a Contract for Difference (CfD) support scheme. An additional 50 MW will be built by the same developer without a support measure (MIE, 2019). However, the power purchase agreement (PPA) for this project has not been signed. Following another auction round in January 2020, a further 140 MW of solar will be built in Karavasta, near the city of Fier, of which 70 MW will be supported through a PPA with the off-taker at EUR 24.89/MWh (USD 29.37/MWh),[2] while the rest will be sold at market price. Subsequently, the PPA for this project was signed in November 2020. The latest auction bidding round was launched at the end of 2020 for the construction of a 100 MW solar PV plant in Durrës with a price ceiling of EUR 55/MWh (USD 64.9/MWh).[2]

Estimated solar thermal installations in Albania amounted to 176 000 square metres (m^2) of solar water heating capacity, which is equivalent to 123 MW of nominal thermal capacity, by the end of 2015 (UNDP, 2017), the most recent official documentation of the installed capacities. Of this installed capacity, 90% are flat-plate collector systems, while 10% are evacuated tube collectors.

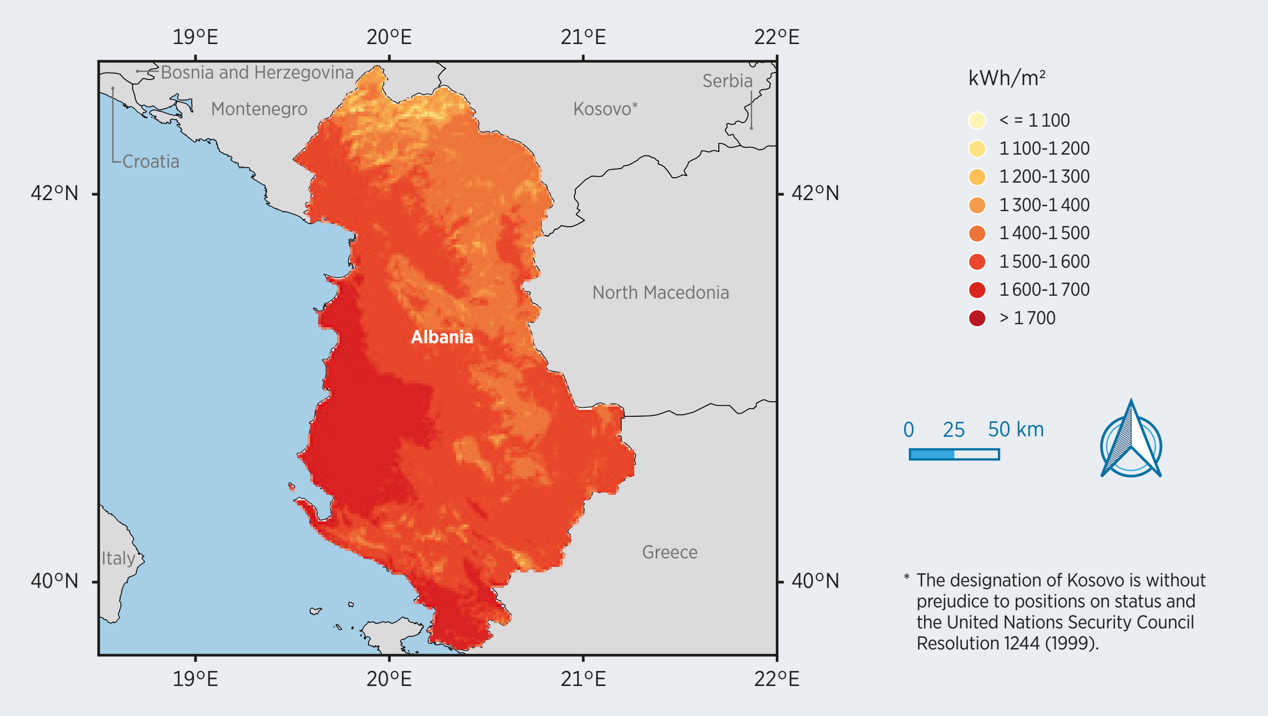
As shown in Figure 8a, Albania has outstanding solar insolation within most of its territory at more than 1 500 kWh/m^2 annually, with highs of 1 753 kWh/m^2 annually, particularly in the western part of the country. The country has some of Europe's highest number of sunshine hours per year, presenting significant potential for development of solar PV for power generation and solar thermal for heating purposes. On average, the country enjoys 220 sunshine days, or 2 700 hours of sunshine per year.

According to IRENA's study on the cost-competitive renewable energy potential in South East Europe, Albania's technical potential for the deployment of solar PV is estimated at 2 378 MW, with production of 3 706 GWh annually (IRENA, 2017a). IRENA's CESEC study proposes in its REmap scenario a solar PV installed capacity of 1 074 MW by 2030, with annual generation potential of 1 697 GWh. Figure 8b shows suitable areas for solar PV development and highlights zones of highest potential for development in Albania. These zones are assessed by combining resource potential with protected areas, land use, topography, population growth and proximity to transmission lines and are ranked by scores between 0% and 100% – identifying the degree of the feasibility of an area to host a utility-scale solar PV project.

With regard to solar thermal, a study undertaken by the United Nations Development Programme (UNDP)/Global Environmental Facility (GEF) Solar Water Heating (SWH) project estimated that the potential for installing SWH systems in public buildings alone amounts to 200 000 m^2 of collector area. Such installations would collectively correspond to some 100 GWh of electricity savings per year, which would otherwise have been used for the buildings' various sanitary hot water needs (UNDP, 2017). SWH systems have immense potential to alleviate increased electricity demand for water heating, especially in the peak summer months.

2 Average exchange rate in 2018: USD 1.18 per EUR (www.macrotrends.net/2548/euro-dollar-exchange-rate-historical-chart).

Figure 8a Albania's annual average Global Horizontal Irradiance

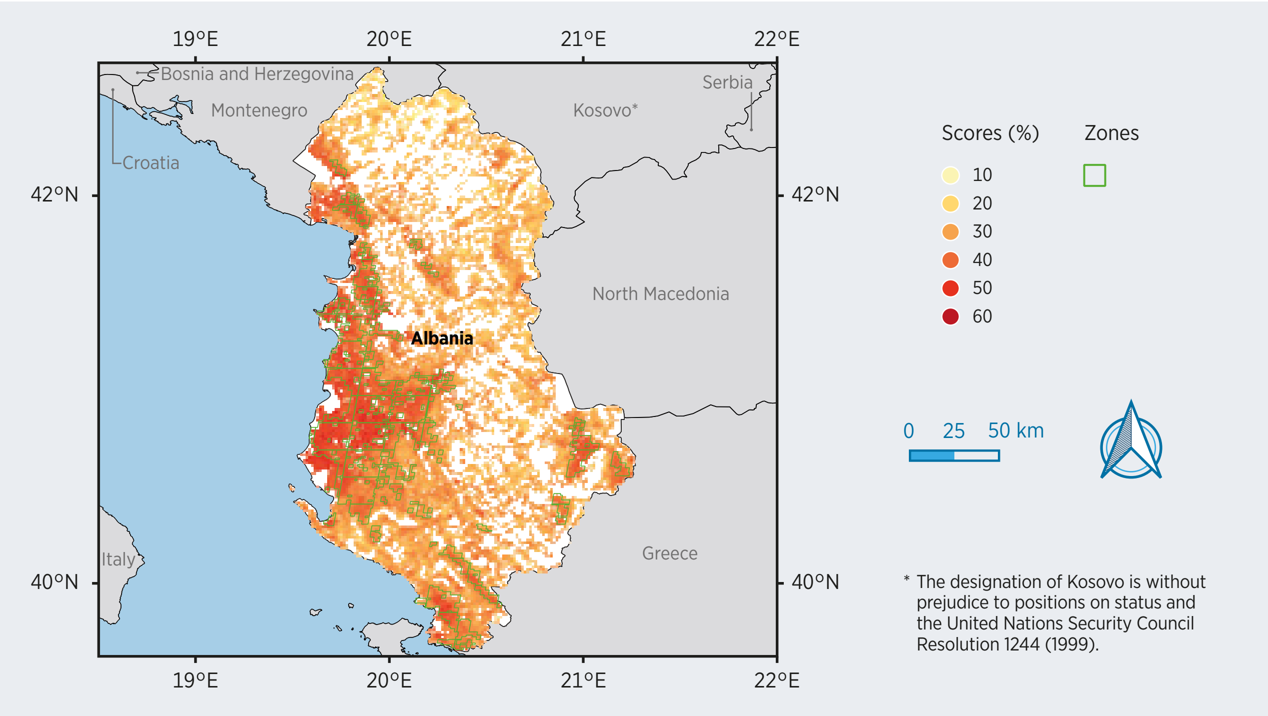


Source: Global Solar Atlas (ESMAP, 2017)

Note: Also available on the IRENA Global Atlas for Renewable Energy web platform.

Disclaimer: Boundaries and names shown on this map do not imply any endorsement or acceptance by IRENA

Figure 8b Suitable areas for solar PV development and zones with highest potential

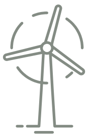


Source: Base map (OpenStreetMap); Suitability scoring and areas (IRENA)

Disclaimer: Boundaries and names shown on this map do not imply any endorsement or acceptance by IRENA

In 2017, IRENA, together with the Joanneum Research Institute in Graz and the Faculty of Engineering at the University of Ljubljana, undertook a study, ***Cost-competitive renewable power generation: Potential across South East Europe***. The study carried out a systematic assessment of the overall renewable power potential in the South East Europe countries that are Contracting Parties to the Energy Community Treaty. The assessment included the potential for hydropower, wind, solar PV, geothermal and biomass resources. The publication's aim is to inform the region regarding the potential and costs for developing renewable energy options.

Wind

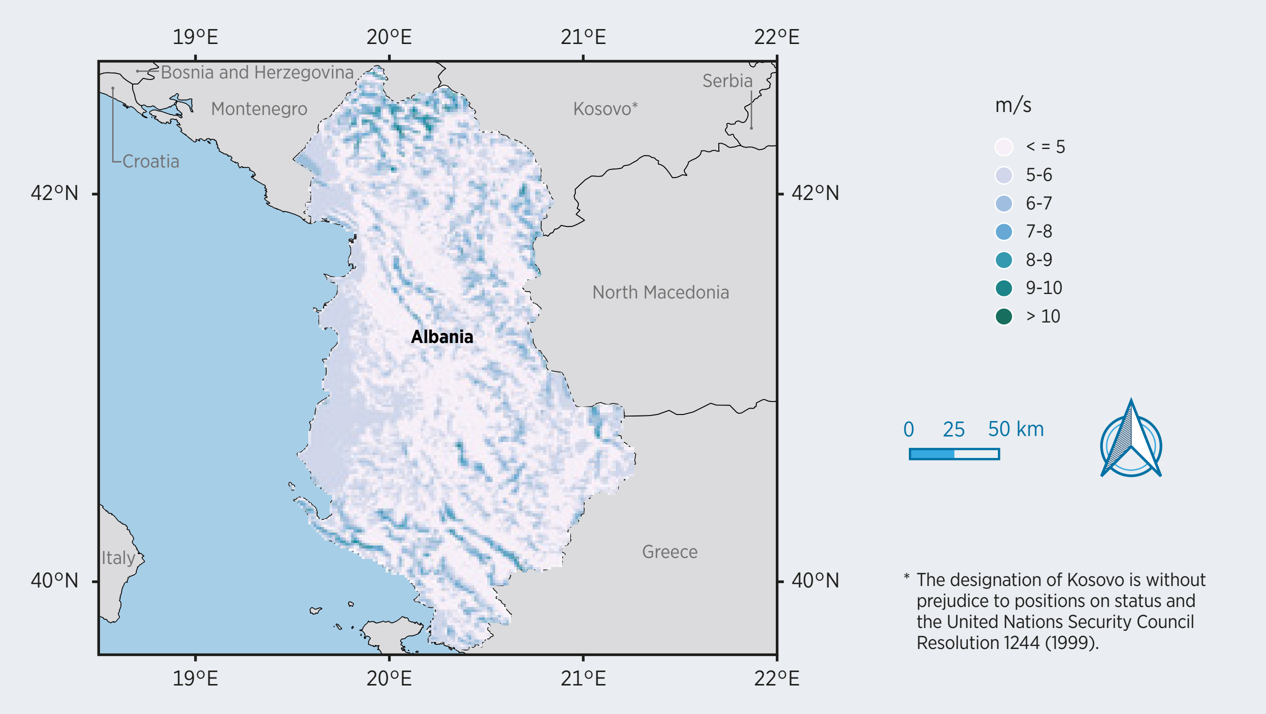


Albania currently has no installed wind power plants. However, according to the MIE, since the introduction of the wind FiT support scheme, 70 applications for the construction of wind plants up to 3 MW have been received. Of these, three have been authorised for construction with a total capacity of 9 MW which qualify for FiT support (MIE, 2019). At the end of 2020, a 150 MW wind tender was launched, restricted to projects with a minimum capacity of 30 MW and a maximum capacity of 75 MW. Each successful bidder will sign a 15-year PPA for the sale of 100% of electricity generated through the CfD support mechanism (MIE, 2020).

As shown in Figure 9a, annual average wind speeds in Albania range between 3.3 metres per second (m/s) and 9.6 m/s. The most suitable areas for wind power production, with capacity factors typically varying from 22% to 25%, have annual average values ranging between 5.8 m/s and 7 m/s. According to IRENA's estimates, Albania has a cost-competitive wind potential of up to 7 400 MW under the low-cost capital scenario[3] (IRENA, 2017a). IRENA's CESEC study proposes in its REmap scenario a wind installed capacity of 616 MW by 2030, with an annual generation potential of up to 1 794 GWh (IRENA, 2020a). Figure 9b shows suitable areas for wind development and highlights zones of highest potential for development in Albania. These zones are assessed by combining resource potential with protected areas, land use, topography, population growth and proximity to transmission lines and are ranked by scores between 0% and 100% – identifying the degree of the feasibility of an area to host a utility-scale wind plant project. According to IRENA's assessments, the highest potential zones for wind power development are in the south and north of the country.

3 The low-cost capital scenario is characterised by the weighted average cost of capital (WACC) at 8%.

Figure 9a Albania's annual average wind speeds at 100-metre hub-height

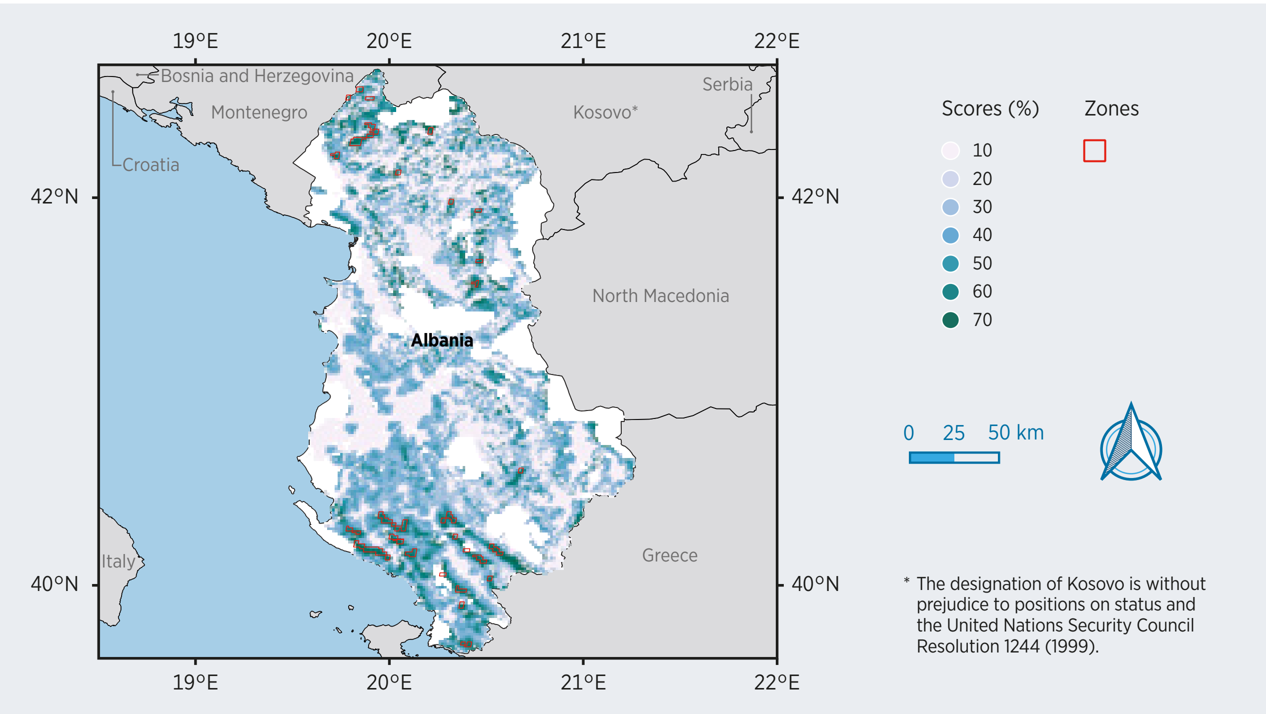


Source: Source: Global Wind Atlas 1.0 (DTU, 2015)

Note: Also available on the IRENA Global Atlas for Renewable Energy web platform.

Disclaimer: Boundaries and names shown on this map do not imply any endorsement or acceptance by IRENA

Figure 9b Suitable areas for wind power development and zones with highest potential



Source: Base map (OpenStreetMap); Suitability scoring and areas (IRENA)

Disclaimer: Boundaries and names shown on this map do not imply any endorsement or acceptance by IRENA.

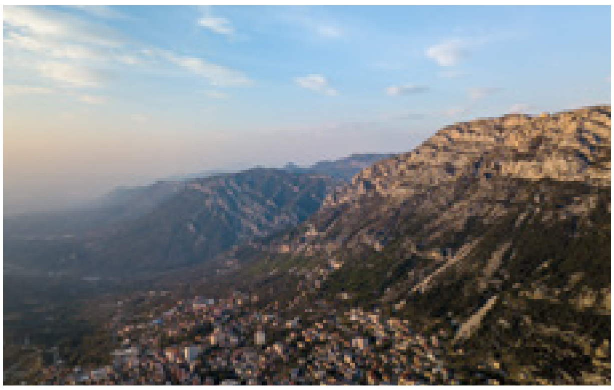
Geothermal

Albania is in the very early stages of geothermal assessment. However, similar to other South East European countries, low-enthalpy geothermal energy resources are available in Albania. Maximum temperatures of up to 80°C (degrees Celsius) can be found in the south of the country bordering Greece and in the northeast. The majority of Albania's geothermal resources are located in the Kruja Geothermal Area, which extends from the Adriatic Sea in the north of Albania and runs in a southeastern direction through the country towards the Konitza area in Greece. Within this zone in carbonate reservoirs lies an estimated geothermal energy potential of $5.9 \mathrm{x} 10^8$-$5.1 \mathrm{x} 10^9$ gigajoules (Frasheri, 2015). Due to the low-enthalpy resource, geothermal potential for power production is not likely and would mostly be exploited in heating applications.

Biomass

Albania's biomass use is largely firewood utilised for various heating applications. For the production of biofuels, Albania has an operating plant that has total capacity to produce 100 kilotonnes (approximately 112 million litres) of biofuels annually. According to some estimates, this plant can produce close to the 10% biofuel blending targets by volume if operated at full capacity. However, this plant operates at 10-15% of full capacity on average (Karakaci, 2016).

According to IRENA's CESEC study, biogas and biomass power production could reach 86 MW (495 GWh annually) by 2030, while liquid biofuels are estimated to be able to meet 8% (4 petajoules) of the transport fuel demands by 2030 (IRENA, 2020a).



3.2 POLICIES AND REGULATION

As a Contracting Party of the Energy Community Treaty, Albania is obligated to transpose and implement the EU Directive 2009/28/EC "On the promotion of the use of energy from renewable sources". In 2017, Albania adopted Law 7/2017 on Renewable Energy, partially transposing the EU directive. The law sets out the adoption of the National Renewable Energy Action Plan (NREAP), which, among others, sets forth the targets for the share of renewable energy in the total energy consumption of the country, including electricity, transport, and heating and cooling. Furthermore, it stipulates policies and support measures for the achievement of such targets. NREAPs are updated every two years, and the latest was adopted in September 2019 as a consolidated Action Plan for the years 2019-2020. This action plan superseded the previous NREAP for 2018-2020 by reducing the targets for hydropower production and increasing targets for solar and wind in an effort to diversify the energy mix through penetration of wider renewable energy technologies. Going forward, the NREAP will be superseded by the National Energy and Climate Plan (NECP), which is still to be developed, and will set out renewable energy targets to 2030.

The NREAP 2019-2020 set an overall target of 38% for the renewable energy share of final energy consumption by 2020. This overall target was forecast to be achieved with a total additional installed renewable power capacity of 738 MW, with the following technology-specific targets: 57 MW of hydropower, 490 MW of solar PV, 150 MW of wind and 41 MW of waste-to-power, which have not been achieved entirely. In the heating and cooling sector, no renewable energy deployment targets were set. In the transport sector, the NREAP aimed for 3% of energy consumption to be supplied by locally sourced biofuels, amounting to 20 ktoe in 2020 (Government of Albania, 2019).

In relation to the transport sector's energy supply, a law was introduced for the production, transportation and trade of biofuels and other renewable fuels for transport (Law 9876/2008). A law was also introduced to establish a binding biofuel blending target of 10% by volume of fuel oil consumed. This target is imposed on wholesale companies that trade oil by-products. The NREAP target thus falls short of the targets set out in legislation. Furthermore, sustainability criteria for the use of biomass and biofuel are still not in place.

In 2018, Albania adopted its National Energy Sector Strategy, which examined various energy development scenarios and set forth a series of key indicators and objectives that will shape Albanian's energy sector over the period from 2018 to 2030 (Table 2). Most notably, the strategy stipulated a 42% share of renewable energy in the TPES by 2030.

In Albania, renewable energy sources are supported through the following support mechanisms (RES Legal, 2020).

► Feed-in tariffs

FiTs are provided to eligible small-scale renewable energy power plants which include wind energy plants up to 3 MW, HPPs up to 15 MW, and solar PV plants up to 2 MW. The unbundled subsidiary of the distribution system operator, OSHEE/free market supplier (*i.e.*, off-taker) is obliged to purchase renewable energy power generated by eligible power plants at a tariff set by the regulator and is granted for 15 years. The tariff is defined by the regulator by assuming a reasonable return on investment.

After technical and economic evaluation of the proposed power plants, EIAs, water usage permission (in case of hydro), and permissions from the transmission system operator and distribution system operator, the regulator grants the licence for power production. Once licenced, the renewable energy producer draws up a PPA with the off-taker.

As discussed in Chapter 3, Section 1, since the introduction of the FiT schemes, 12 of 88 applications for the construction of solar PV up to 2 MW have been authorised for construction, while 3 of 70 applications have been authorised for the construction of wind plants up to 3 MW (MIE, 2019). The main reason for the low success of applications is due to inadequate supporting documentation, such as insufficient technical and economic feasibility assessments.

Table 2 Overview of 2030 energy strategy objectives

Description	Baseline in 2015	Objective target by 2030
Losses in the electricity distribution network	31.4%	10%
Losses in the electricity transmission network	2.2%	1.7%
Electricity payment collections	90%	98%
Share of domestic primary energy sources in the TPES	47.5%	52.4%
Share of renewable energy sources in the TPES	32.5%	42%
Share of biofuels in total energy consumption in transport	3.5%	10%

Source: MIE (2018b)

Table 3 FiT per MWh production in 2017

Technology	FiT
FiT hydropower up to 15 MW	ALL* 7 448/MWh (~EUR 55.51/MWh; USD 65.5/MWh)
FiT solar PV up to 2 MW	EUR 100/MWh (~USD 118/MWh)
FiT wind up to 3 MW	EUR 76/MWh (~USD 89.68/MWh)

**ALL = Albanian lek*
Source: ERE (2019)

► Premium tariff/CfD

Larger renewable energy power plants whose installation capacities are above those set for FiT eligibility are eligible for a premium tariff or CfD. The tariff is determined through competitive bidding/auction. The auction terms and conditions are approved by the Council of Ministers, who may choose to limit certain technologies in the tender due to criteria such as network connection costs or resource diversification. According to the 2017 renewable energy law, the CfD is foreseen to have a duration of 15 years. Producers will be able to sell the electricity in the market and receive the variable difference between the auction price and the electricity market price (currently based on the Hungarian power exchange price) as a support measure. An important detail to underline is that if prices in the electricity market go up and are higher than the auction price, renewable power producers will be obliged to bear the difference. Albania was one of the first countries in the South East European region to hold an auction for renewable energy producers. As discussed in Chapter 3, Section 1, the first auction bidding round was launched in 2018 whereby the winning bidder was to construct a 100 MW solar PV plant. Half of the plant's generation would be eligible for a 15-year CfD tariff of EUR 59.9 per MWh (~USD 70.68 per MWh), and the other half would be sold at market price. The second auction bidding round was launched in 2020 for a 140 MW solar PV plant in Karavasta, whereby half of the installed capacity would be eligible for a CfD tariff of EUR 24.89 per MWh (~USD 29.37 per MWh), as determined by the winning bidder, and the rest would be sold at market price (PV Magazine, 2020). The latest auction bidding round was launched at the end of 2020 for the construction of a 100 MW solar PV plant in Durrës, of which 70 MW will be eligible for CfD with a price ceiling of EUR 55 per MWh (~USD 64.9 per MWh).

► Net-metering scheme

Private households and small and medium-sized enterprises with wind and solar installations of up to 500 kW are eligible to net-meter their renewable energy production with their electricity consumption. The metering is done on a monthly basis and surplus electricity can be sold to the service provider and remunerated according to a price set by the regulator. The Albanian government expects this programme to enable the deployment of 200 MW of PV over an unspecified period of time (PV Magazine, 2019).

► Customs and excise tax exemptions

Machinery and equipment used for the construction of energy power plants (non-renewable and renewable energy technologies) are exempted from custom duties. The fuels used by electricity producers are also eligible for excise tax exemption. However, a tax exemption does not apply for solar thermal systems or for renewable energy measuring equipment such as wind masts. Furthermore, a 20% value-added tax (VAT) is applied on all equipment, machinery and fuels, except in cases of imported solar PV machinery and equipment valued above ALL 50 million (Albanian lek; USD 487 000) and for project capacities above 500 kW (Deloitte, 2018).

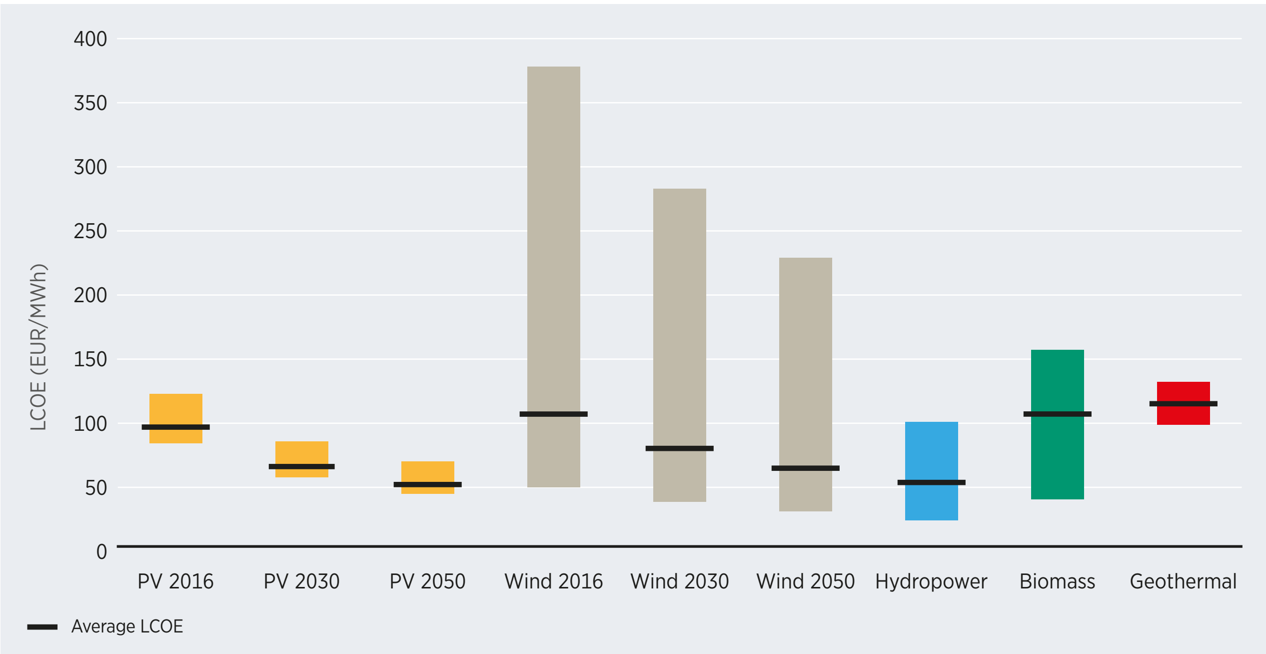
3.3 ECONOMICS OF RENEWABLES

In Albania, renewable energy incentives such as the fixed tariffs for renewable electricity sale (*i.e.*, the difference between the market price and FiT or the CfD) are borne by electricity consumers through a renewable energy levy within the consumer electricity tariff. Notably, this obligation is borne exclusively by consumers connected to the distribution grid. As such, end-consumers connected directly to the transmission system, such as large industries, do not contribute. Tax breaks on renewable energy equipment are borne directly by the state.

Albania offers one of the lowest levelised cost of electricity (LCOE) of hydropower in the South East Europe region, starting from an average of EUR 35/MWh (USD 41.3/MWh) (IRENA, 2017a). The LCOE for non-hydro renewable energy power generation is highly sensitive to the cost of capital, specifically the weighted average cost of capital (WACC). This depends on factors such as type of technology, place of investment, type of investor, whether concessional instead of commercial loans are used, risk profile and general economic conditions in the country. The role of financial institutions that provide preferential loans is effectively important in

renewable investments and driving down the cost of capital. Nonetheless, in a relatively conservative scenario with a 10% WACC, Albania's solar PV generation potential is one of the region's most cost-effective. According to IRENA's 2017 study *Cost-competitive renewable power generation: Potential across South East Europe*, the average LCOE for solar PV in Albania was estimated to reach less than EUR 50/MWh (USD 59/MWh) by 2050 (IRENA, 2017a). The accelerated decrease in PV technology costs is already apparent, with the latest auction round bidding in Albania at EUR 24.89/MWh (USD 29.37/MWh). Similarly, for wind, and as depicted in Figure 10 below, LCOE can reach well below EUR 50/MWh (USD 59/MWh) by 2030. Due to Albania's limited biomass and geothermal potential for power generation, these technologies are not considered cost-effective for power development and would be more suitable for thermal applications.

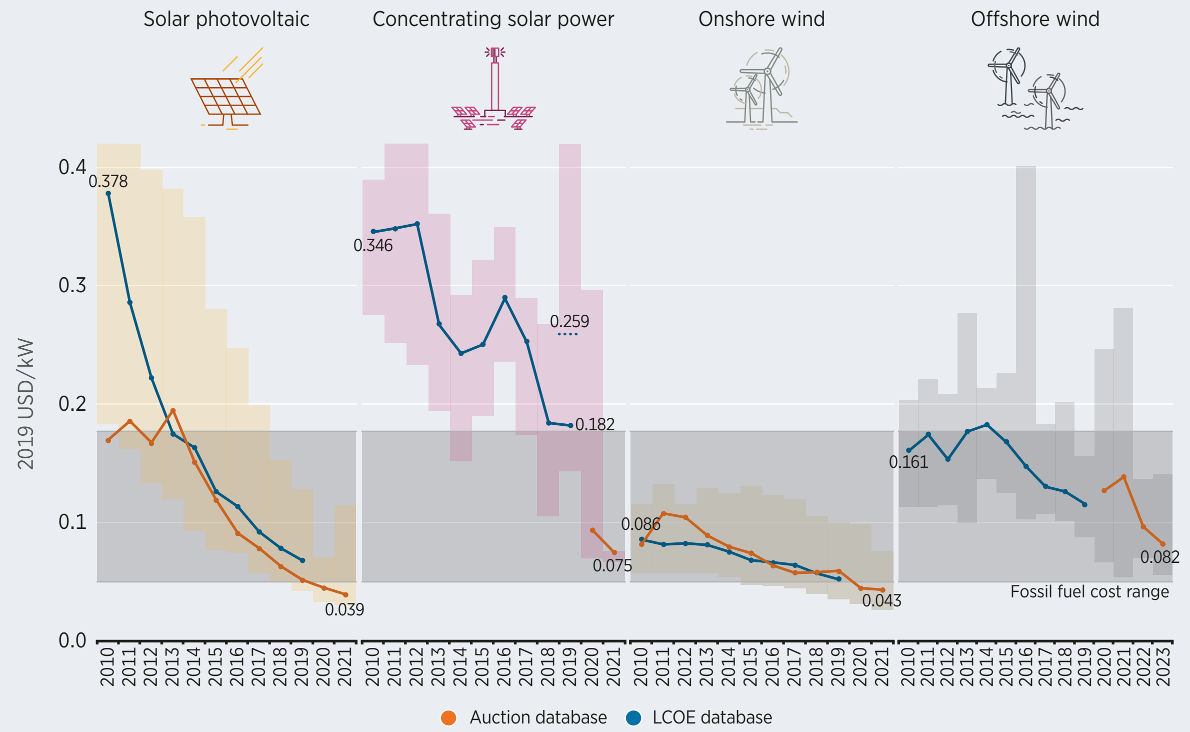
Figure 10 LCOE ranges of renewable energy technologies in Albania (using "medium" cost of capital: 10% WACC)



Source: IRENA (2017a)

Box 1 Global weighted average LCOE and auction/PPA prices for renewable energy technologies, 2010 to 2021/2023

Data in the IRENA Auction and PPA Database indicate that solar PV projects that have won recent auction and PPA processes – and that will be commissioned in 2021 – could have an average price of around USD 0.039/kWh globally. This represents a 42% reduction compared to the global weighted-average LCOE of solar PV in 2019 and is more than one-fifth less than the cheapest fossil-fuel competitor, namely coal-fired plants. The auction and PPA data indicate the average global price of electricity from onshore wind could fall to USD 0.043/kWh by 2021, down 18% from 2019. Offshore wind and concentrating solar power projects, meanwhile, are set for a step change, with their global average auction prices set to fall 29% and 59% from 2019 values, respectively. With its longer lead times, offshore wind is expected to fall to a global average of USD 0.082/kWh in 2023 (IRENA, 2020b).



Note: For CSP, the dashed blue bar in 2019 shows the weighted average value including projects in Israel.

Note: The thick lines are the global weighted average LCOE, or auction values, by year. The grey bands that vary by year are cost/price range for the 5th and 95th percentiles of projects. For the LCOE data, the real WACC is 7.5% for OECD countries and China, and 10% for the rest of the world. The band that crosses the entire chart represents the fossil fuel-fired power generation cost range.

4. RATIONALE FOR RENEWABLE ENERGY DEVELOPMENT

4.1 THE IMPACT OF CLIMATE CHANGE

Albania is one of the most vulnerable countries to climate change in the South East European region. Changing weather patterns have already resulted in increased temperatures, decreased precipitation, and more frequent extreme events such as floods and droughts (World Bank, 2013). Compared to 2019 levels, a decrease in annual precipitation of 2.6% to 3.4% is expected by 2025 and of up to 6.3% by 2050. The greatest decrease in precipitation is expected during summer, with a 11.5% decrease by 2025 and a 23.2% decrease by 2050 (World Bank, 2020a). Given that Albania's electricity system is largely reliant on hydropower production, decreased precipitation levels will adversely affect the generation output of existing HPP installed capacities, especially in the summer months. Compared to 2010 levels, by 2050 a 15% decrease may be expected in the average annual electricity generation from existing large HPPs, while small HPPs are expected to have a 20% decrease in generation output (Ebiger, 2010).

Furthermore, compared to current levels, mean annual temperatures across the country are expected to rise by 1°C by 2025 and by 2.5°C by 2050. In the summer months, the number of very hot days (over 35°C) is expected to increase by up to two days per year by 2025 (World Bank, 2020a). As discussed in Chapter 2, due to current rising temperatures, increasing demand for cooling during the hottest summer months is already increasing power demand, and this trend is expected to continue. Given that hydropower production in the summer months significantly declines, the potential role of non-hydro power renewable energy technologies is critical – especially that of solar PV, which benefits from the greatest production in summer months and during the times of day when the greatest demand for cooling occurs. Thus, investing in climate-resilient renewable energy technologies for power production is imperative in sustainably meeting the demand of the energy sector. Moreover, the adoption of renewable energy use, both in the energy as well as the transport sector, is a crucial component in achieving the targets of Albania's NDCs, particularly as the transport sector is one of the country's largest contributors to greenhouse gas emissions. Under the NDCs, the country has committed to reducing CO_2 emissions by 11.5%, compared to the baseline scenario,[4] in the period 2016 to 2030. This amounts to 708 kilotonnes of CO_2 emission reduction in 2030.

4.2 SEASONAL VARIATION IN HYDROPOWER GENERATION

Hydropower generation in Albania is highly seasonally variable. The highest amounts of production occur in the winter season, when over 90% of the annual precipitation falls. During this period, on a monthly average, the country produces a surplus of electricity, which is exported. However, as of June, hydropower production drops significantly and struggles to meet demand, resulting in the need for electricity imports. In 2018, the highest power production month, March, produced five times more hydroelectricity than the lowest production month, November. This discrepancy has significantly increased over the past decade, when on average the highest production month was just over double the lowest production month. Furthermore, despite the additions of installed hydropower capacity, the electricity system is still not able to meet demand in the second half of the year, and the production level during the last quarter of the year in 2018

4 The baseline scenario of emissions projections is based on economic growth in the absence of climate change policies, starting from 2016.

was well below the average of the ten-year prior period. Thus, further hydropower installations without better hydro reservoir management and hydro risk-mitigation measures will not effectively meet Albania's energy security objectives.

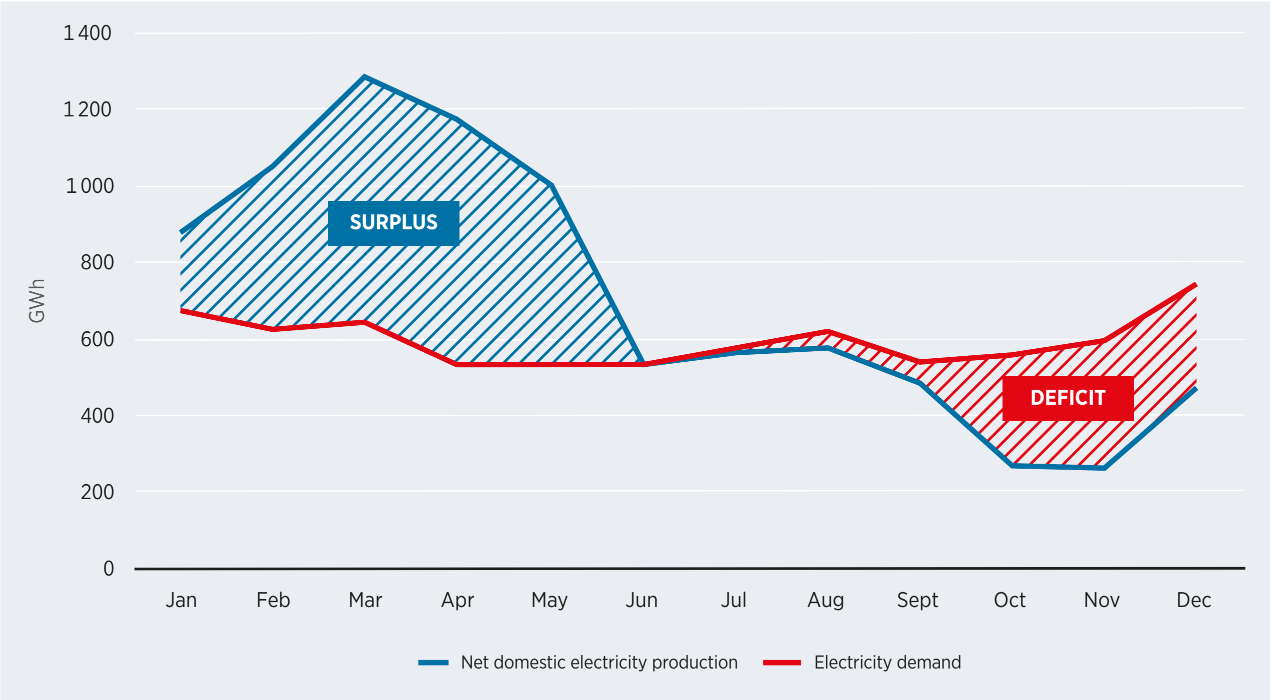
To significantly reduce this seasonal variation of power supply and reduce the need for imports in the future, non-hydro renewables such as wind and solar PV should be prioritised. This would enhance security of energy supply and reduce the electricity deficit, especially in the undersupplied second half of the year.

4.3 RISING DOMESTIC DEMAND AND FUEL IMPORTS

Albania's biggest energy imports are fossil fuels fuelling the transport sector's energy demand. In 2018, imported petroleum fuel was the single biggest import expense, worth USD 190 290 million, making it a significant contributor to the country's trade deficit (World Bank, 2020b). The transport sector's energy demands have been rising, and the sector is projected to continue to be the largest energy consumer over the coming decades. With this rising demand, given fluctuating oil prices and strong import dependence, a move towards greening the transport sector would provide a more economical and environmentally sound way to meet the sector's energy demands. This could be achieved by incentivising the use of electric vehicles and enforcing mandatory biofuel blending. A prerequisite for biofuel blending is an established sustainability criteria that would ensure an environmentally sound use of biomass for energy.

Furthermore, given that 41% of agricultural land in Albania lies fallow (Cela, 2018), inland potential for sustainable local production of biofuels is worth assessing. Developing this would benefit the local economy and reduce the need for imports. Additionally, electric mobility can support the electricity sector's development through load peak shaving or load shifting, which offsets peak loads to off-peak hours and alleviates overloading of the grid. This in turn can reduce distribution power losses, increase distribution power quality and extend the lifetime of the power infrastructure, while also reducing power generation costs (Erdogan, Erden and Kisacikoglu, 2018).

Figure 11 Electricity production vs. demand, 2018



Source: IRENA (2017a)

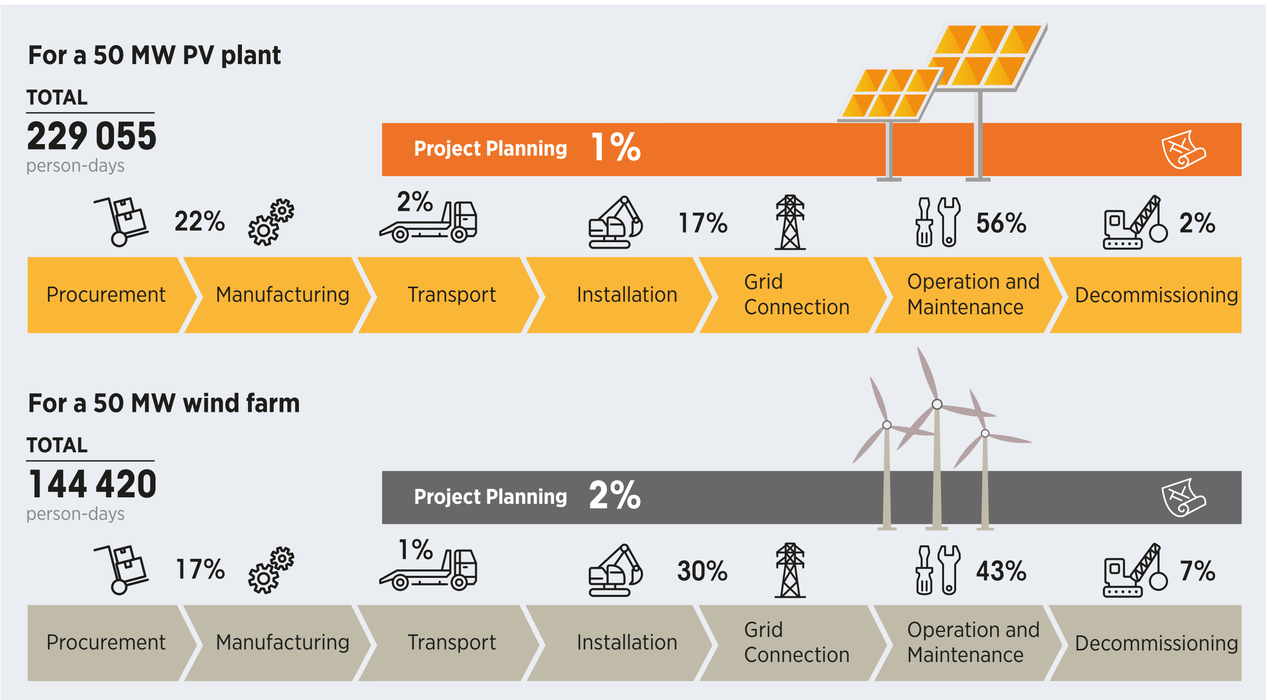
Electric vehicles as taxis in Tirana
Photograph: Lorenc Gordani

4.4 SOCIO-ECONOMIC BENEFITS OF RENEWABLE ENERGY

The deployment of renewable energy contributes to numerous socio-economic benefits for communities and countries, including employment, income generation, decreased air pollution, welfare improvements and local industrial development leading to increased GDP. According to IRENA's analysis, a typical 50 MW solar PV project requires some 230 000 person days along the value chain, as shown in Figure 12 (IRENA, 2017b). Although some parts of the value chain are sourced from outside of the country or require a renewables-specific trained and certified workforce, much of the workload – especially in transport and construction – can be filled locally by the workforce of existing industries, which can immediately contribute to local employment and income generation. With skilled local labour, specifically in operation and maintenance as well as installation, over 70% of the workforce can be sourced locally, further enhancing local economies. Similarly, a 50 MW onshore wind farm requires 43% of its workforce for operation and maintenance, which can largely be locally sourced.

While manufacturing of solar PV and wind energy technology is concentrated in a limited number of countries, solar thermal technology manufacturing has gained momentum in Albania, with several companies manufacturing system components locally. Furthermore, such systems can have direct economic benefits on individual users as they offset their electricity consumption and reduce monthly electricity bills.

Figure 12 Employment impacts in the solar PV and wind value chain



Source: IRENA (2017b)

Box 2 **Cost-effectiveness of solar water heating**

In Albania, a typical solar water heating (SWH) system with a collector area of 3-4m^2, a 150-200 litre water tank and minimum operational lifetime of 15 years costs approximately USD 1 000, including installation. With 50% annual efficiency, such a system could provide up to 2 640 kWh/year in mountainous regions such as Peshkopia and up to 3 600 kWh/year on the coastline in Saranda. An average household of four persons requires between 2 500 kWh and 3 000 kWh for hot water annually. This demand could be fully supplied by the solar water system for seven to eight months of the year, especially in the summer season, and may require minimal backup in colder months. Based on RETScreen* analysis for such a system, and provided it is well-dimensioned and installed, an approximate three-year payback period can be achieved based on electricity savings alone (UNDP, 2017).

According to a market study undertaken by UNDP/GEF, close to 8 000 public buildings, including hospitals, schools, dormitories and others, have the potential to install SWH systems for various sanitary hot water needs. The potential for SWH installation in public buildings alone amounts to a collector area of approximately 200 000 m^2, corresponding to 100 GWh of electricity savings and some EUR 8 million (USD 9.6 million) annually (Rutanen, 2014).

* RETScreen is a Clean Energy Management Software system for energy efficiency, renewable energy, and cogeneration project feasibility and energy performance analysis.

5. CHALLENGES AND RECOMMENDATIONS

5.1 RENEWABLE ENERGY POTENTIALS AND PLANNING

Harnessing renewable energy resources for the development of the energy sector presents economic, social and environmental benefits, but it also poses various challenges for integration. These challenges stem chiefly from the spatial localisation to the sub-hourly, daily and seasonal variations of the resource. These specificities of renewable energy resource availability need to be well understood and assessed so that they can be adequately harnessed and integrated into the energy system.

Based on this resource assessment, appropriate planning is required prior to renewable resource exploitation and integration to allow for the continued optimal operation of the highly dynamic energy sector. In other words, particularly in the power sector, a well-assessed resource potential and timely planning for variable renewable power generation and grid infrastructure can minimise technical disturbances to the grid and increase the quality of energy supply while ensuring economic viability for the power producer, the system operators and the final consumers. Proactive planning, based on techno-economic resource potential, thus plays a crucial role in the development of a robust energy sector.

Action 1: Developing renewable energy zones

The availability of renewable energy resources in Albania for some renewable energy technologies is less studied than for others. Given the country's hydropower history, hydropower potential has been the most analysed resource; however, only the main rivers have been studied to a greater degree. With the increasing climatic changes that have caused erratic hydropower generation in recent years, many of the studies that have been carried out are now outdated, and future projections of hydropower generation potential remain understudied. For solar and wind resources in Albania, economic potential analysis and zoning are lacking. This hinders policy development in setting achievable targets, the appropriate sizing of solar and wind auctions, and least-cost power system planning.

Renewable energy zones can be defined as areas of high-quality resource potential for power development whose exploitation is environmentally sound and technically and economically viable, and which can be prioritised for development. These areas are also those that satisfy various criteria – such as proximity to existing or planned grid infrastructure, load centres, road networks, and other existing and planned generation projects – while avoiding environmentally protected areas or areas which for other reasons may not be acceptable for development. Such zones would inform policy makers in setting technology generation targets or auction sizing, and guide co-ordinated planning of generation and transmission infrastructure. Furthermore, renewable energy zones help to attract investments by guiding potential project developers to prioritised development areas, thus providing more visibility into and certainty about the development of the sector. This in turn reduces risks in project development, pre-development transaction costs and timeframes, and thereby the project costs.

As Albania focuses efforts on a more diversified power generation mix, zoning for solar PV and wind generation projects should be prioritised. Each zone's attributes, such as annual generation potential and estimated LCOE production, can directly assist policy makers in the development of the national energy and climate plans. As a first step towards a complete zoning assessment, IRENA's potential suitability analysis in Chapter 3, Section 1 of this report can be used as a basis. AKBN, as the institution in charge of gathering resource potential data, should lead the development of a renewable energy zoning study for solar and wind, in co-operation with the MIE and development partners.

Box 3 IRENA's tools and methodology for renewable energy zoning

Resource mapping is the first phase in formulating a cost-effective and renewable energy development. The subsequent phase is the identification of renewable energy resource areas, commonly known as zoning, with high potential for renewable energy development, reasonable proximity to the necessary infrastructure, and low environmental and social impacts. Such identification would enable generation and transmission expansion planning, which can reduce the risk of investing in renewable projects, support countries in making strategic decisions, and secure sustainable sources of electricity generation.

The suitability assessment is a geographic information system (GIS)-based multi-criteria decision-making process that aims to find highly suitable areas for a utility-scale power plant deployment in a country. These areas are assessed by combining renewable resources with protected areas, land use, topography, population growth, and proximity to transmission lines. The output of this assessment is a suitability index map – comprising scores between 0% and 100% – identifying the degree of the feasibility of an area to host a solar or wind project.

For each resulting zone, potential capacity, annual energy generation and storage capacity are calculated. These zones are then ranked based on their corresponding surface, capacity factor, annual generation and distance to the grid to identify the most favourable zones for project development.

www.irena.org/globalatlas

Action 2: Developing a comprehensive least-cost energy master plan

Effective energy planning is a way of aggregating various data pertaining to the energy sector and beyond, such as renewable energy zoning, energy resource potentials and historic statistical trends, along with other qualitative and quantitative information, into a clearly formulated and evidence-based energy development pathway. A comprehensive plan allows for decision-making processes as well as guiding of the sector's development in a coherent way. Furthermore, energy planning offers clarity and visibility for various energy stakeholders, including investors and development partners who then can focus their investments or programmes more effectively. Planning is thus crucial in avoiding piecemeal development approaches, ad-hoc decision making, and contradictory investments and development support.

Albania's energy sector is guided by its National Energy Sector Strategy 2030, along with the National Renewable Energy Action Plan 2018-2020 and the Gas Master Plan. As much as these documents set out a framework with overall goals along with quantitative scenarios and targets for the energy mix, a holistic least-cost plan must be developed to aggregate subsectoral plans and assess the accompanying infrastructure needed to reach overall goals. Specifically, this plan should guide when, where and how investments in the energy sector should be made.

These investments should include power generation capacities, co-ordinated distribution and transmission grid infrastructure developments, and other related developments such as electric mobility infrastructure or local biofuel production. This can then also allow for decisions made at the subsectoral level to be coherent with the overall system plans and ensure an integrated approach for energy sector development, which accounts for supply and demand of energy through a least-cost principle, and without endangering system stability or security.

Furthermore, such an integrated plan will provide foresight into any accompanying policy and regulatory measures that need to be put in place or adapted to achieve the proposed plans according to timelines. The planning department of the MIE, along with the AKBN, are therefore encouraged to take the lead on development of a least-cost master plan for the Albanian energy sector.

Action 3: Strengthening the distribution network

As Albania moves towards a more diversified renewable energy mix in its power system, the distribution network will increasingly be the backbone and determining factor of the scale at which renewables are injected into the power system. The current state of the distribution network is not conducive for increased variable renewable energy generation injection. The grid suffers from overloading in high-demand centres, such as in Tirana, posing serious obstacles to the injection of distributed generation such as, for example, solar PV net-metering systems. Further plaguing the distribution grid are electricity losses, which amounted to 23.3% of electricity supply in 2018. According to distribution grid flexibility studies carried out by OSHEE, the injection of small hydropower alone can increase losses on the current system up to 40%. As the power sector works towards a more diversified generation mix, further injection of renewables will place an even greater strain on the grid unless immediate efforts are mobilised to fortify the distribution grid.

An immediate priority for OSHEE is the refurbishment of the distribution grid around the main load centres of Tirana and Durrës, which account for 50% of electricity consumption. Equally pertinent is planning for an active grid that can allow for electricity flow bidirectionally, accommodating renewable energy prosumers, and focusing on grid upgrades close to planned renewable energy generation zones so that power can be effectively evacuated to the demand centres.

This upgrading should also include the provision of new equipment to ensure the safety of data, distributed monitoring equipment to collect information, and communication system overlay to deliver the operations data to OSHEE (Mantooth, 2011). Carrying out further grid flexibility studies, particularly based on renewable energy zones and planned distributed generation projects, would additionally guide further prioritised grid strengthening needs in line with generation expansion. According to preliminary estimates, about EUR 40-80 million (USD 48-96 million) in investments is required to refurbish the distribution network to better handle variable renewable energy injection in the immediate term. Therefore, development partners active in the development of the energy sector in Albania are advised to focus available technical and financial resources to support OSHEE in its ongoing efforts in strengthening the distribution grid, particularly with regard to priority areas in the immediate term.

5.2 LEGISLATIVE AND REGULATORY FRAMEWORKS

The Renewable Energy Law in Albania has set out the legal framework to facilitate the wider use and deployment of renewables within the country's energy system, thereby striving to achieve national targets for the share of renewables. This has seen the deployment of various renewable energy projects, increased investments and the setting up of various enterprises offering related services. In the immediate term, the development of renewable energy targets beyond 2020 is needed. Plans are already underway to develop the NECP, in which such targets will be defined up to 2030. Apart from target-setting, existing support mechanisms for renewable energy deployment are to be further strengthened, approval processes need to be streamlined, and a dedicated renewable energy agency should be established. Furthermore, legislative and regulatory frameworks must be reliable, transparent and credible, with changes announced in a timely manner for future projects, no unannounced changes for future projects and no retroactive changes.

Action 4: Strengthening support mechanisms for renewable energy deployment

Fiscal incentives – such as tax breaks, FiTs and premiums – comprise one of the main supporting mechanisms for attracting renewable energy investments. Although Albania has made progressive efforts in establishing various support incentives for the greater uptake of renewables, as discussed in Chapter 3, Section 3, these could be further strengthened. Namely, although import duties are waived for renewable energy equipment, VAT could be reduced to incentivise deployment. VAT is exempted in cases of imported solar PV machinery and equipment valued above

ALL 50 million (USD 487 000) and for project capacities above 500 kW (Deloitte, 2018). However, in the domestic sale of equipment, especially for systems below 500 kW, which are mainly used for residential and institutional power production and for all other renewable energy technologies, a full 20% VAT is applied. In reducing overall project costs for renewable energy investors, and indirectly the costs of electricity production and incentivised tariffs, a VAT reduction could be applied on all machinery and equipment related to all renewable energy technologies, including measurement equipment for assessing renewable energy potentials such as wind masts.

There is a need for an improved methodology for FiT calculation. Currently the support tariffs are calculated based on the Hungarian power exchange (HUPEX) prices with added coefficients. However, in ensuring the optimal amount of incentivisation, a methodology is needed that would ensure market approach under the Albanian context and enable renewable power producers to steadily enter into the market in competitive terms at the end of the incentive scheme.

Furthermore, because final electricity consumers contribute towards the financing of the FiT and CfD support schemes, only customers connected to the distribution system grid and who pay for their electricity consumption to the distribution system operator finance this contribution. Some 10-12% of electricity consumers are bypassed from the renewable energy obligation, as they receive their electricity through bilateral contracts with the transmission system operator.

In advancing the development of the sector, the renewable energy obligation would have to be embedded into electricity pricing for non-tariff consumers connected to the transmission system.

Additionally, there is a need for various permitting and approval processes for the generation of renewable power to be streamlined to shorten development timeframes, provide clarity and further incentivise investments. The private sector entities installing distributed renewable power systems in Albania often report that improvements should be made in the standardisation of application forms for grid connection approval, and that the duration for such approvals should be considerably shortened. Given that the private sector bears the risk of connection approval, prolonged duration times for approval affect the operations and finances of enterprises. Therefore, standardising approval processes for interconnection is particularly important for distributed generation, as this ensures that all systems that meet certain technical and safety requirements can connect to the distribution grid without unnecessary delay.

Action 5: Establishing a dedicated renewable energy agency

Although envisaged in the Renewable Energy Law, Albania lacks a dedicated renewable energy agency to inform the co-ordinated development of renewables in line with national and international obligations. Furthermore, given the dynamic and fast-evolving renewable energy sector, such an entity could be tasked with informing the development of the energy sector based on evidence-based tracking of resource potentials, market trends and global best practices. The overall objective should aim at informing timely development of new infrastructure, human resources and legislation with a view to meeting future energy demands in a sustainable and least-cost development pathway for the country.

The establishment of such an agency would be an important step given the country's aspirations to develop the energy sector to include a greater share of renewables. In fact, given the strong inter-linkages between energy efficiency and renewables, and to ensure operational cost effectiveness, such an agency could be merged with the existing Energy Efficiency Agency.

The activities of the renewable energy agency should be based on the envisaged mandate as stipulated within Article 7 of the Renewable Energy Law, and further include the following non-exhaustive list of duties:

- keeping an updated registry of renewable power producers and service providers, including certified human resources such as certified solar PV installers and energy auditors
- collaborating with vocational training centres and international partners on designing training, certifications and capacity building programmes in building a strong local human resource

- tracking the energy balance contributions of all energy stakeholders, including power generation of power producers, numbers of installed distributed systems such as solar PV and solar thermal, disaggregated energy consumption data from all economic sectors such as households, transport, industry and agriculture, etc.
- drafting timely assessments of the share of renewables in the electricity, heating and cooling, and transport sectors to be shared with MIE, INSTAT and other international organisations
- monitoring the effectiveness and timely implementation of the NREAPs and potential energy sector master plans
- assessing gaps and challenges in the continued development of the sector and identifying priority areas of support in a timely manner
- studying market trends of renewables, global best practices and the effectiveness of implemented incentives and informing further regulatory and policy measures accordingly
- carrying out resource potential analysis and pre-feasibility studies for renewable energy resource development
- providing transparent information on renewable energy data, incentives and support measures, energy sector development plans, permitting procedures and other relevant information for the public and private sector.

In ensuring operational efficiencies, a funding stream must be developed for the agency, allowing for the bulk of the operational costs to be unconstrained by national treasury limitations or MIE budget allocation. For example, initial funding for the establishment and the first years of operation could be covered by development funds, while subsequent funding could potentially be provided from renewable energy contributions in consumer energy tariffs, taxes on fossil fuel use, as well as activities carried out within the entity's competence, such as field measurements for pre-feasibility studies.

5.3 RENEWABLES IN END-USES

Albania's path towards a more diversified energy mix requires an accelerated uptake of renewable energy in end-use sectors such as transport, and heating and cooling. The transport sector is the country's largest energy consumer, consuming 40% of the country's primary energy supply, while heating and cooling demand constitutes a large share of the energy needs in the residential and service sectors. Currently, the transport sector is largely supplied with fossil fuels, while space heating and cooling, as well as water heating, are largely supplied with electricity and biomass. In ensuring further adoption of renewables in the end-use sectors beyond the 2020 horizon, actions are required in the formulation of coherent end-use strategies and achievable target-setting based on locally available resources.

Action 6: Developing a strategy for a greener transport sector

Greening the transport sector constitutes the uptake of biofuels blending and the introduction of electric mobility, both of which have the potential to offset the otherwise heavy fossil fuel use in the transport sector.

E-mobility has the potential to positively contribute to the balancing of the power system through peak-load shaving, reducing distribution losses and reducing air pollution. Nevertheless, the uptake of electric vehicles in Albania is very low apart from a small number of privately owned electric vehicles and some electric fleets (taxis) in Tirana. This is likely due to the fact that there are currently no incentives or regulations that support their uptake. Another impeding factor is that the critical charging infrastructure for e-transport is scarcely available, and charging stations are mainly found in some places of central Tirana. There is therefore a need to incentivise the uptake of electric vehicles through import duty and tax exemptions, for example. There is also an urgent need to improve the charging infrastructure through the incentivisation of private sector investments. In reaping the full benefits of emobility, however, incentives are needed for active demand-side management, whereby the charging of vehicles is encouraged during low-peak hours of the day.

An overall energy strategy aiming at the diversification of the transport sector should be developed as a cross-sectoral collaborative effort between the relevant public authority, which foresees a collaboration between MIE and ERE, to ensure a co-ordinated and coherent development pathway for both the energy and transport sectors.

Biofuels are transport fuels that include biodiesel (which can be blended with conventional diesel to be used in diesel vehicles), bioethanol (which can be blended with petrol) and bio-methane (which can be used in vehicles fuelled by natural gas). Locally produced biofuels have the potential to reduce Albania's current dependence on oil imports while improving air quality in urban centres and diversifying agriculture and rural economies (BioNETT, n.d.).

In Albania, due to the lack of sustainability criteria for biofuels and fuel quality requirements, the current use of biofuels in the transport sector cannot be considered as a renewable energy source. Furthermore, local production of biofuels in Albania is extremely low. This is despite a biofuel law on mandatory blending and tax exemptions for locally produced biofuels and raw materials. Local biofuel production in Albania is currently done by one plant that has the capacity to produce approximately 112 million litres of biofuel, which amounts to almost 10% of the fuel use in transport by volume in 2015. Nevertheless, the plant produces 10-15% of its capacity annually and imports the vegetable oil raw material. Most of the biofuel produced is exported to Italy. Uptake in the domestic market is lagging due to a lack of enforcement of the biofuel blending obligation and the lack of sanctions for noncompliance on biofuel blending on the part of fuel suppliers (MIE, 2016).

To advance the share of renewables in the transport sector, biofuels sustainability criteria and requirements on biofuel quality must be adopted. Thereafter, the compliance with the criteria, as well as compliance with mandatory biofuel blending, needs to be enforced by delegated institutional authorities.

Furthermore, to meet targets for more sustainable sourcing and production of biofuels locally, the country's biomass potential must be assessed for biofuel production. This is particularly essential as 41% of agricultural land in Albania lays fallow and unutilised. Nevertheless, such assessments must be conducted in co-operation with the Ministry of Agriculture and Rural Development. If local production proves economically viable, accompanying support incentives must be put in place to stimulate investments while ensuring demand through the implementation of mandatory blending.

Action 7: Developing a heat bylaw

Albania has much untapped potential for direct renewable energy use in heating and cooling, particularly in the residential and services sectors. Unexploited renewable energy capacities lie in the use of heat pumps, which are inadequately accounted for in data reporting on the renewable energy share. In fact, the contribution of aerothermal, geothermal and hydrothermal heat pumps is completely omitted in national statistics and thereby also in the annual progress reports in compliance with EU directives. Methodologies must be introduced to account for the use of heat pumps and how much this use contributes to the renewable energy share in the heating and cooling sector.

The current renewable energy law stipulates that the NREAPs set out the measures to achieve the national targets for renewable energy shares in heating and cooling by 2020. However, a dedicated heat bylaw is required to provide for appropriate target-setting beyond 2020 for various technologies for heating and cooling (such as solar thermal, geothermal and heat pumps) across the residential, services and industrial sectors. Furthermore, the bylaw should provide guidance on the mechanisms for the deployment of heating technologies and methodologies for their contribution to the renewable energy share.

Data must be collected on sales and use of such technologies and reported regularly by AKBN and INSTAT. Notably, the Law on Energy Efficiency and the Law on Energy Efficiency in Buildings would have a direct linkage to the heat bylaw, in that energy efficiency measures play a complementary role of reducing heating and cooling demand and thus the sizing of systems.

5.4 RENEWABLE ENERGY FINANCING

The banking system in Albania is relatively liquid and offers competitive annual interest rates of around 5% in euros and somewhat higher in local currency. Nevertheless, the participation of the local financial sector in financing renewable energy projects is extremely low. The majority of energy investments in Albania have been through foreign direct investment. Because the local banking sector does not have a track record of financing non-hydro renewables, project proposals are appraised with much risk-aversion. Private developers report that collateral requirements in approving loans are oftentimes valued at 150% of the loan, while project assets are not valued as part of the collateral. In part, the reasoning for the limited involvement of the local banking system, and the increased perceived risk in funding renewable energy projects, is rooted in the recent bitter history of some hydropower generation projects that have not complied with various standards for environmental safeguarding. In fact, this has deterred even development finance institutions (DFIs) from further financing hydropower projects. Furthermore, this has provoked heightened scrutiny and increased the risk perception about renewable energy project proposals. The financing sector reports that the lack of bankable renewable energy project proposals is what is deterring financing in the sector.

Overall, the South East Europe market is quite fragmented, and the total amount of investment based on national developments and individual deals varies. Investors have been appealing to governments to stabilise policy and regulatory frameworks to boost the region's renewable energy investment. While private investors are slowly entering the region's renewable energy market, public finance institutions still play a key role in the investment landscape.

One of the key issues – the high cost of capital – is mainly due to two aspects of risk premiums that are at play. The first aspect is the perception that renewable energy projects are more capital intensive and riskier than conventional energy projects. The second is that investment risk is seen to be higher in the region than in the rest of Europe due to country-level political and off-taker risks, which contribute substantially to the higher cost of capital and add to the risk perception related to PPAs exposed to local currency fluctuations.

Increasing the use of PPPs between DFIs and foreign and local financiers through blended finance (on-lending, co-financing) and the issuance of innovative instruments (*e.g.*, green bonds) can be beneficial. Public finance should also focus on the provision of de-risking mechanisms as a tool to lower risk premiums and leverage private capital.

Scaling up renewable energy investments can be further encouraged through strengthening the quality of renewable energy project proposals as well as strengthening the capacities of local financial institutions to include renewable energy investments under existing asset lending. The increased participation of local financial institutions is needed for both the larger-scale and small-scale projects including end-use sectors and will be instrumental in supporting Albania's renewable energy development pathway.

Action 8: Facilitating financing of bankable project proposals

Along with the financial sector, public officials also report that many renewable energy project proposals received for FiT or during auction bidding rounds are not approved and discredited as "unbankable" due to the lack of thoroughly developed supporting documentation on technical and economic pre-feasibility assessments. The private sector is thus urged to utilise openly available tools and platforms, such as the Climate Investment Platform (CIP), for developing bankable project proposals and accessing financing.

In supporting the private sector to access financing, public institutions play a critical role in ensuring the streamlining of procedures; establishing safeguarding policies; and standardising project documentation, contracting and due diligence. Strict monitoring of project compliance with various standards and safeguards is crucial in reducing the perceived risk of investments. Therefore, thoroughly developed PPAs are a key element in de-risking

Box 4 IRENA's project facilitation through the Climate Investment Platform

The Climate Investment Platform (CIP) is a global initiative supported by IRENA, the United Nations Development Programme (UNDP) and Sustainable Energy for All (SE4All), in co-operation with the Green Climate Fund (GCF). The CIP's objective is to step up climate action and translate ambitious national climate targets into concrete investments on the ground. While initially focused on energy transition, the ultimate goal of the initiative is to accelerate investments in renewable energy and enable the success of the NDCs.

The platform offers an avenue to strengthen existing collaboration and presents an opportunity to consider new ways for more effectively bringing together stakeholders to catalyse action, all within existing institutional structures and in line with the respective mandates of the partner organisations. In this context, investment forums, a key element of IRENA's strategy to facilitate investments in renewable energy, offer an effective organising framework for the implementation of the CIP through a sub-regional approach.

The sub-regional forums have two main aims: to strengthen the ability of decision makers to build a strong enabling environment for renewable energy investments, and to support developers in preparing bankable projects and accessing finance. Post-forum project support is also provided. The South East Europe Investment Forum aims to scale up renewable energy investments in the region, supporting project development and implementation. Key forum activities include matchmaking between projects, project developers, and potential financiers and investors, as well as building human and institutional capacity for the energy transition and establishing conducive investment frameworks for renewable energy.

In operationalising the CIP, IRENA intends to works with multilateral, bilateral and local financial institutions; private companies and investors; and development partners who are prepared to provide financial and technical resources and support the realisation of projects.

investments in renewable energy projects. These agreements govern the sale and purchase of power between the private power producers and OSHEE, creating long-term clarity on roles, responsibilities, costs, revenues, standards and the associated risks of the projects. In Albania, standardising PPAs according to best practice for each renewable energy technology, and including specific clauses on safeguarding policy, can offset some of the perceived risk in project appraisal by financing institutions. IRENA and Terawatt Initiative's Open Solar Contracts platform provides support for streamlining project development and finance processes by offering simple and universally applicable legal agreements that make contracting much faster and less costly.

Apart from financing large-scale power projects, local financial institutions are expected to play an increasingly crucial role in financing smaller-scale distributed systems. The local banking sector is therefore required to build its capacities and better understand the technology and financial frameworks for deploying such systems and products, and design specific financing products accordingly.

The financing of such systems can frequently be incorporated under existing asset financing portfolios. For example, lending for electric vehicles can be incorporated under conventional vehicle loans, with minimal tailoring, albeit with increased loan tenors. Similarly, housing loans can incorporate rooftop solar PV systems, energy efficiency measures or efficient heat pumps. Nevertheless, such measures are most effectively encouraged through the establishment of on-lending credit lines from DFIs. An example of this is the EU's EUR 6 million (USD 7.2 million) in funding given to Albania's Union Bank to finance energy efficiency measures (EBRD, 2018). Such measures can strengthen the capacities of the local banking sector in financing renewables, and experiences of this need to be shared among members of the Albanian Association of Banks.

5.5 CAPACITIES, SKILLS AND AWARENESS

To maximise socio-economic development opportunities and spur transformational change, energy sector decision makers can strive to build up and use the local workforce for renewable energy equipment and projects. Human resources, adequately skilled and locally available to work on various parts of the renewable energy value chain, are crucial in supporting the expansion of the renewable energy sector. Both training institutions and human resources should be attuned to and follow the technology trends and market dynamics in the fast-evolving energy sector.

Along with qualified human resources, institutional stakeholders too need to ensure adequate co-operation among themselves and respond in a timely manner to the dynamics of the renewable energy sector. Institutions need to have adequate capacity to fulfil their mandates and contribute to renewable energy growth. This includes, among others, having adequate capacities in energy data collection and analysis and facilitating knowledge sharing with other institutions to inform coherent policy-making and planning.

Action 9: Raising public awareness on the benefits of renewable energy

From the perspective of energy consumers, high upfront investment costs in renewable energy and a lack of understanding of payback periods for such investments deter wider uptake of renewables in Albania. Furthermore, the public is not always aware of existing incentives, support mechanisms or plans for the deployment of renewable energy technologies. Although the private enterprises involved in installation of solar PV net-metering or SWH systems do make efforts in marketing their services to potential customers, government-backed efforts can be more impactful in reaching scale and wider audiences. As such, wider adoption of renewable energy in Albania, both utility scale and at the household level, requires government-backed, well-formulated awareness-raising strategies to sensitise the public on the direct benefits of renewable energy, both for individual citizens and the country as a whole.

As discussed in Chapter 4 of this report, such benefits include the economic benefits of using more cost-effective renewable energy technologies, enhancing energy security through increased domestic production during current times of energy imports, and creating a more climate-resilient energy system through a more diversified energy mix. As part of awareness-raising campaigns, incentives and support mechanisms for renewable energy uptake need to be clearly communicated so as to emphasise the country's commitment to and support for more environmentally friendly energy use. Additionally, coherently communicating the government's plans for the development of the sector can boost investors' confidence and thereby attract investment in the energy sector. Led by the MIE, awareness-raising campaigns can be designed and executed with various energy stakeholders, and through various platforms of communication. Ultimately, such strategies should have the objective of improving public knowledge of the economics and benefits of renewable energy technologies and the need for their wider deployment in order to enhance a more informed and responsible energy consumption behaviour, while attracting desired investments for the energy sector's development.

Action 10: Enhancing institutional capacities and local human resources

In line with Albania's commitment to a higher share of renewable energy deployment, a skilled workforce needs to be nurtured from the onset. Currently, Albania lacks dedicated renewable energy training curricula at vocational, tertiary and technical schools. This has created a lack of qualified human resources in the country to support the ongoing energy sector developments. The localisation of the value chain and nurturing a skilled local workforce is a precondition for maximising community benefits and ensuring that revenue streams support the local economy. As such, the ministries in charge of energy, training and education should collectively work towards the introduction of renewable energy training curricula, prioritising solar PV installers and energy auditors in the immediate term.

A lack of trained and locally available human resources is reported by the private sector as one of its main hinderances in business operation and seeking funding. For example, although there are many electricians, there is a shortage of qualified solar PV installers and energy auditors in the country. A lack of energy auditors is in particular stagnating the growth of solar PV net-metering systems in new buildings. According to law, before a net-metering system can be approved, the building's energy consumption for the past two years is needed. Alternatively, in place of the historic data for new buildings, an energy auditor is to estimate the building's energy consumption patterns. As licenced energy installers are largely unavailable to carry out the audits, the net-metering system installations cannot be approved. The MIE together with the Energy Efficiency Agency, who is the certifying body for energy auditors, should work together on expediting the licencing of accredited energy auditors and seek adequate funding for this purpose.

Furthermore, human resources in public institutions, and institutional capacities overall, play a crucial role in supporting effective policy-making, regulation and planning of renewable energy. As the sector is fast evolving, renewable energy technology costs are falling, new technologies and applications are being marketed, and new best practices in policy-making are emerging.

Up-to-date monitoring and analysis of this information is needed. For this, data information and its adequate analysis and interpretation are crucial, particularly in evidence-basing certain decisions or plans. As the most fundamental datasets, statistics on the country's energy sector need to be improved and methodologies of data gathering and processing need to be strengthened. Disaggregated data related to energy use and consumption at the subsector level are not easily accessible in Albania. In some instances, statistical data reported are regarded as inconsistent as, for example, was the issue on the share of cooking energy and fuels in the residential sector during the RRA consultative process.

INSTAT, as the central body accumulating and processing statistical data, should therefore work with AKBN (the energy data provider) and other partners that receive statistical information (such as EUROSTAT and the World Bank) to further strengthen their institutional capacities for energy data processing and reporting.

Action 11: Strengthening communication and co-operation among stakeholders

As discussed in Chapter 2 of this report, the energy sector involves multiple stakeholders, each with distinct responsibilities and contributions to the sector's operation and development. During the consultative process of this RRA, it has become apparent that co-operation and communication among all relevant actors can be further strengthened to ensure the exchange of updated information regarding the sector's evolution. Furthermore, this could ensure that challenges facing individual stakeholders are clearly communicated and collectively addressed.

The Albanian Renewable Energy Association, due to the country's history of hydropower production, has a stronger focus on hydro than non-hydro renewables. With the emergence of more non-hydro enterprises, these enterprises need to take a more assertive role in communicating their operational challenges and, through the association, voice these challenges to relevant authorities who could take action to alleviate or resolve them. This can avoid information asymmetries and ensure better communication between the private and public sectors.

As the sector is fast evolving, renewable energy technology costs are falling, new technologies and applications are being marketed, and new best practices in policy-making are emerging.

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