INSTITUTE OF ENERGY
FOR SOUTH-EAST EUROPE

Working Paper No 22

Albania's Electricity Sector and the Role of Hydropower

ATHENS, MAY 2017

ALBANIA'S ELECTRICITY SECTOR AND THE ROLE OF HYDROPOWER

WORKIGN PAPER NO 22

MAY 2017

Contributing Authors:

Costis Stambolis, *Executive Director, IENE*

Dimitris Mezartasoglou, Research Associate, IENE

Institute of Energy for South East Europe (IENE)

3, Alexandrou Soutsou, 106 71 Athens, Greece

tel: 0030 210 36 28 457, 3640 278 fax: 0030 210 3646 144

website: www.iene.eu, e-mail: info@iene.gr

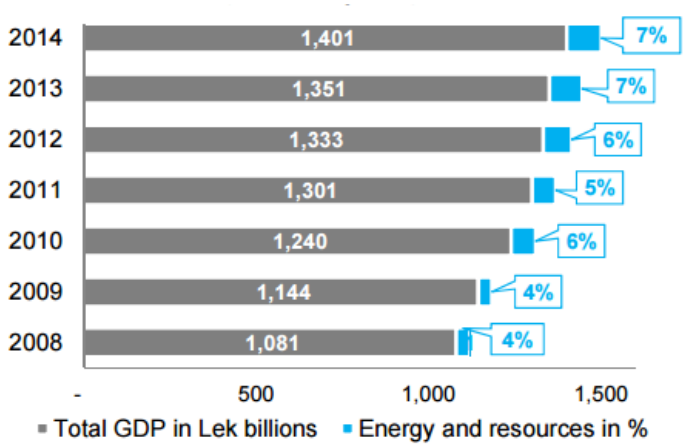
CONTENTS

1. ALBANIA'S ENERGY SECTOR

Albania is rich in terms of energy resources. These include oil, gas, coal, wood, peat, and hydro energy, with hydroelectricity contributing a large segment of primary energy production.

Based on data published by the Albanian Institute of Statistics (INSTAT), the energy and resources industry accounted for 7% of the GDP in 2013 and 2014 (see Figure 1), while the oil and mining sector accounted 5% of the country's GDP and with the power sector comprising roughly 2% of the GDP.

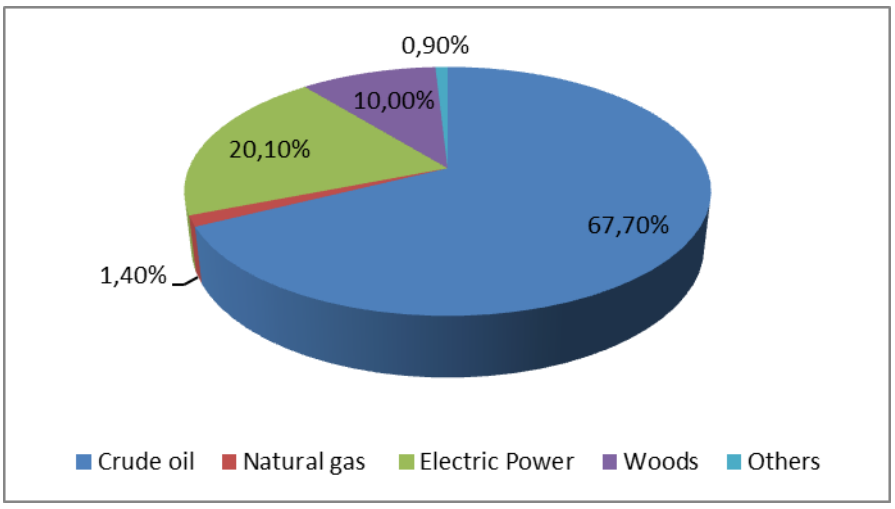
Figure 1: Contribution of energy and resources to GDP (at current prices)



Source: INSTAT (2015), Deloitte (2015)

Albania is an oil producing country with crude oil representing 67.7% of primary energy production in 2014, followed by the power sector with roughly 20% contribution (see Figure 2). Currently (2015), Albania produces about 30,000 bbl/d, the majority of which is exported.

Figure 2: Primary energy production in Albania (2014)

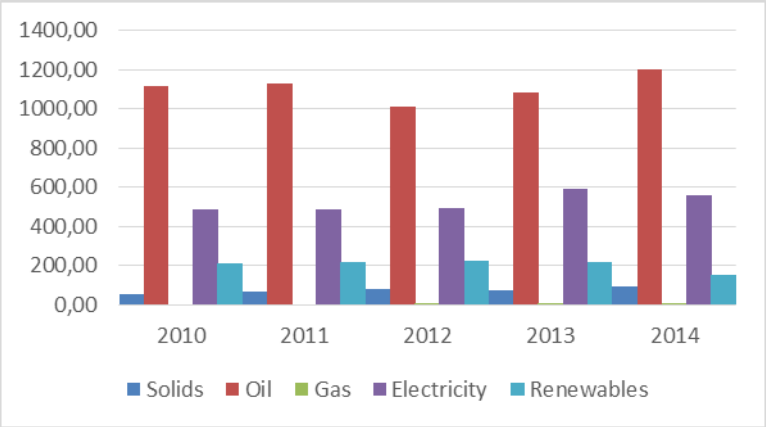


Source: INSTAT (2015), Deloitte (2015)

Oil products have increased their contribution in the final energy consumption from 59.5% in 2010, to 59.6% in 2014. This has happened since the consumption of firewood, coal and natural gas has decreased and the development of the transport sector brought about a considerable increase of the oil products (diesel and gasoline).

Despite the natural gas market drop, the long-term development of the energy sector should take into consideration the possible development of the natural gas industry in Albania. The development of such a scenario for Albania is mainly based on the supply with imported gas and the use of local gas in case of a future find. The anticipated input of gas is expected to influence considerably the future energy mix.

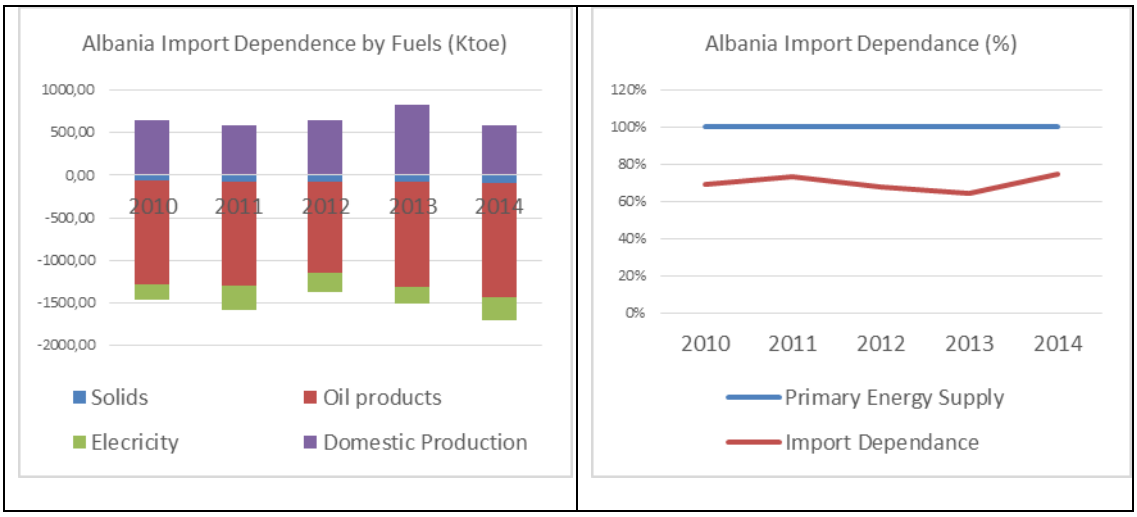
Figure 3: Albania's energy mix by fuels (ktoe) over 2010-2014



Source: National Agency of Natural Resources (2015)

Albania is a net importer for energy. For 2010, the import share referred primary to energy supply has been 69% for 2010 and 75% for 2014. In 2014, oil products held a dominant position in Albanian's energy market imports with 58.4%, followed by electricity with 12.1% and coal with 4%.

Figures 4 and 5: Albania's imports by fuel type (ktoe) and its import dependency (%) over 2010-2014



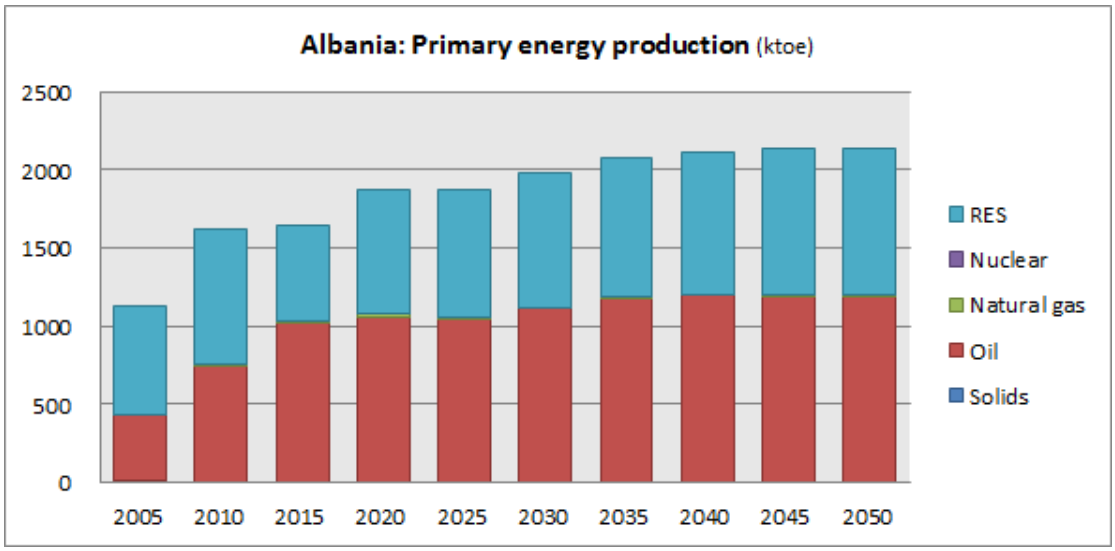
Source: National Agency of Natural Resources

2. ALBANIA'S ENERGY SECTOR (PROJECTIONS UP TO 2050)

The South East Europe Energy Outlook 2016 is a comprehensive study, prepared by IENE, which deals with the current energy situation in the SE European region but is also concerned with its "Outlook" from now until 2050. The study covers all 13 countries of the region. These countries include: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Slovenia, Cyprus, FYR of Macedonia, Greece, Kosovo, Montenegro, Romania, Serbia and Turkey. In this section and using as a source the aforementioned study, we present Albania's projections up to 2050, focusing on six main parameters, which are **(a)** primary energy production, **(b)** gross inland consumption, **(c)** net imports, **(d)** gross electricity generation by source, **(e)** net generation capacity and **(f)** share of renewable energy sources in gross final energy consumption.

More specifically, primary energy production indicates an upward trend over the projection period up to 2050 in Albania, but without any further diversification of energy sources, as Figure 6 shows. More specifically, oil production in Albania is projected to rise gradually, reaching 1,200 ktoe in 2040, up by 60% compared to 2010 levels. Production from renewable energy sources maintains its share in primary energy production over 40%, especially in the decade 2020-2030 when the annual growth is projected to be 0.8%.

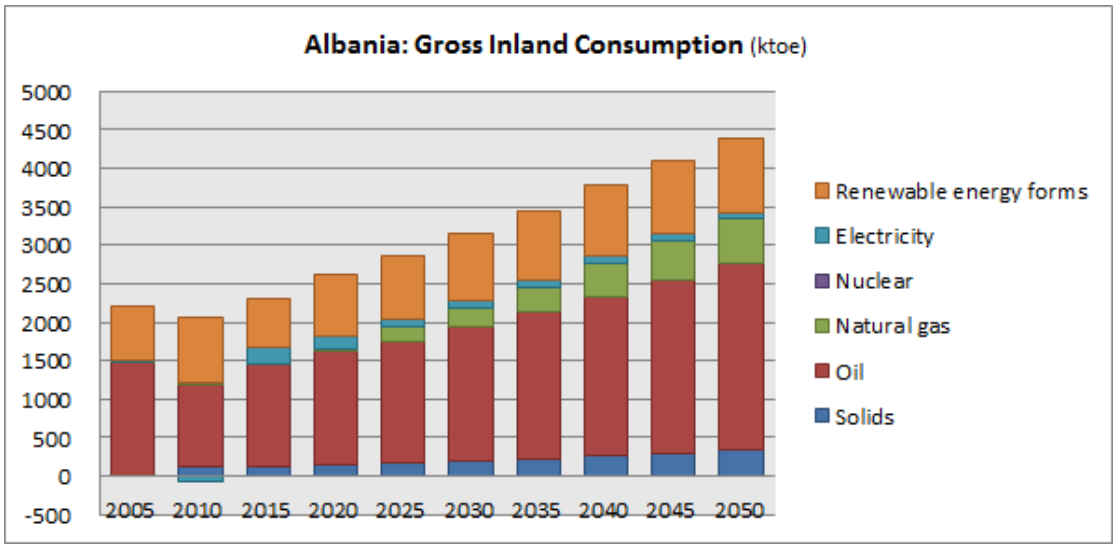
Figure 6: Primary energy production (ktoe) in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

At the same time, as figure 7 shows, gross inland consumption indicates a strong growth of 2% on an annual basis over the projection period, reaching finally 4,400 ktoe in 2050, up by 90%, compared to 2010 levels. Oil consumption shows a steady upward trend, reaching 2,500 ktoe in 2050 and permanently accounting for more than 50% of total consumption. Natural gas consumption is estimated to start in 2025, thereafter recording a dynamic growth by reaching 600 ktoe, or 14% of total consumption, in 2050.

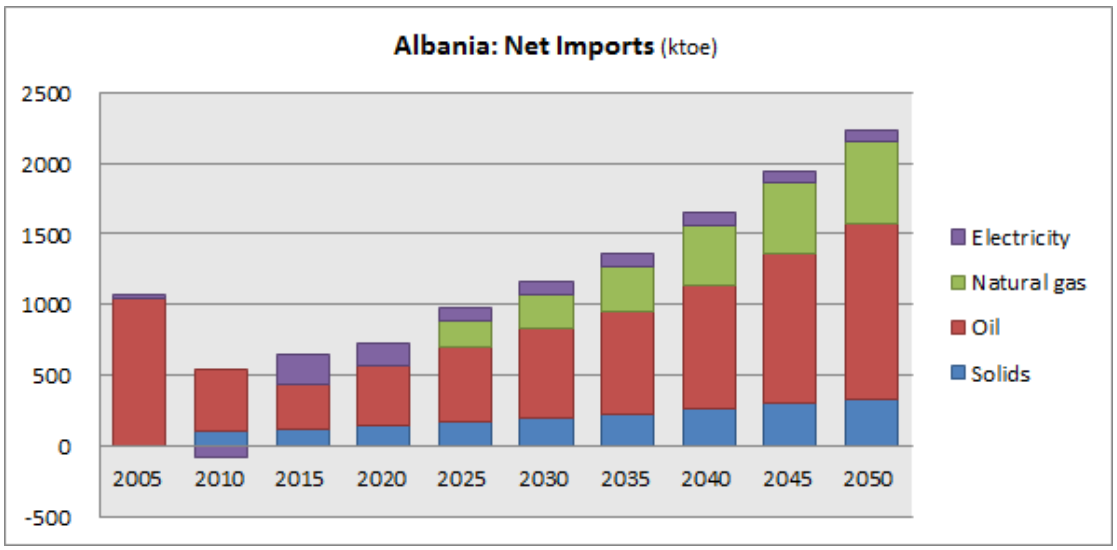
Figure 7: Gross Inland Consumption (ktoe) in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Net imports indicate a strong upward trend very similar to that of gross inland consumption with oil and natural gas accounting for the vast majority of the total imports on an annual basis for all years from 2030 and beyond. It is of interest at this point to notice that net imports account for up to 51% of the gross inland consumption.

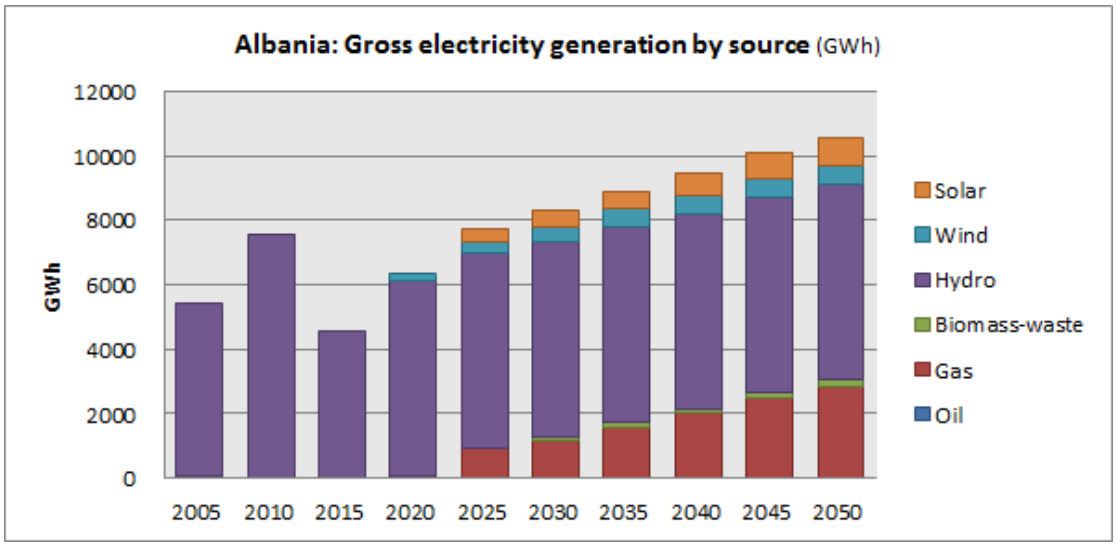
Figure 8: Net imports (ktoe) in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

In the power generation sector, hydro remains the major energy supplier in Albania throughout the years from 2015 to 2050. It accounts for almost 100% of the generation in 2015, 73% in 2030 and 57% in 2050, while additional energy sources are introduced starting in 2025 with the inclusion of gas, solar and wind in the mix. This trend continues until 2050 with the addition of small amounts of biomass which become apparent starting in 2030 and beyond.

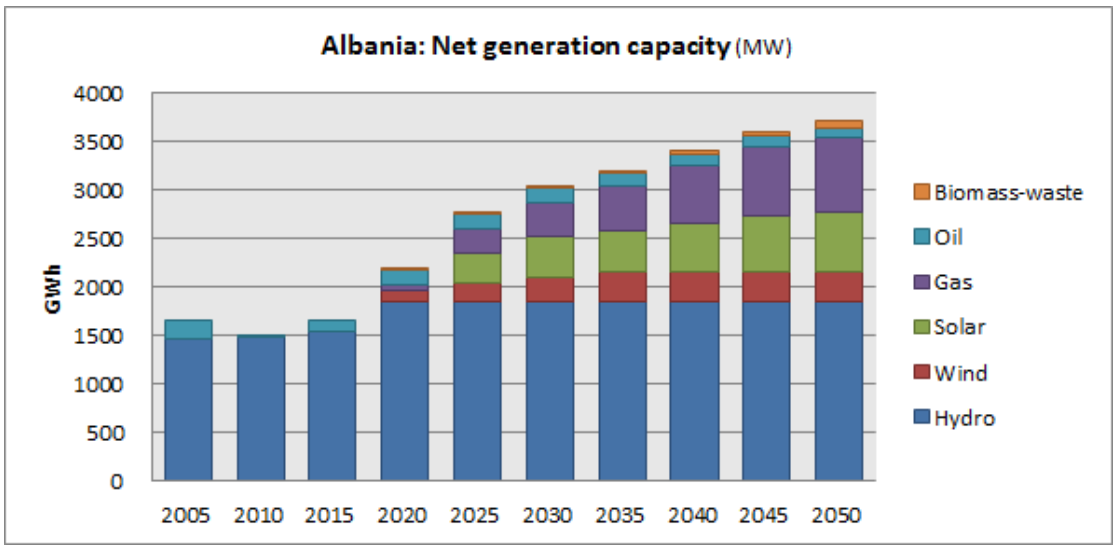
Figure 9: Gross electricity generation (GWh) by source in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

The installed net generation capacity mix starts showing some signs of diversification from 2020 and beyond, a trend similar to that of gross electricity generation. Up to that point hydro and oil-fueled plants are the only capacities installed. Starting from 2020 the installed capacity shows some diversification with the inclusion of gas, solar, wind and biomass.

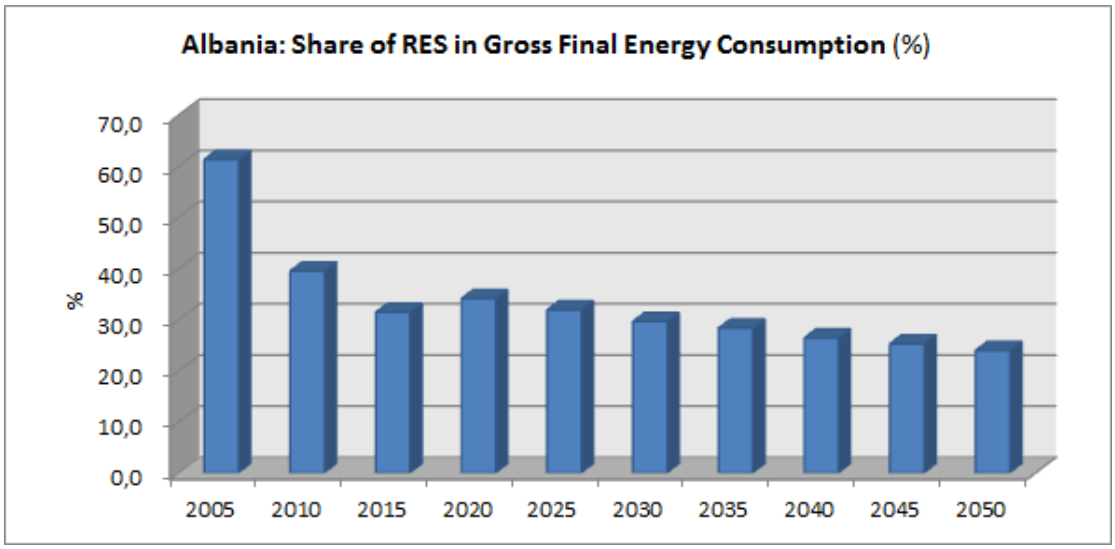
Figure 10: Net generation capacity (MW) in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook 2016", Athens, 2016

Finally, the share of RES in the gross final energy consumption appears to slowly decrease, from 39% in 2010 to 24% in 2050. Renewables cover on average the 29% of final demand over the projection period, which is slightly above the region's average (26.2%).

Figure 11: Share of RES (%) in Gross Final Energy Consumption in Albania over 2005-2050



Source: IENE study "South East Europe Energy Outlook", Athens, 2016

3. ELECTRICITY MARKET STRUCTURE IN ALBANIA

Electricity markets are usually standardized, with generation, transmission and distribution infrastructure supplemented by wholesale and retail trading and supply activities. As it happens with other developing countries of similar size, the Albanian electricity market is dominated by the public sector, with monopolies in each segment of the value chain. About 80% of generation and almost all of the other infrastructure and trading and supply activities are controlled by the Albanian government.

Figures 12 and 13 present a comparison of how electricity markets are usually structured and how the electricity market is structured in Albania. More specifically, all the *state-controlled generation units* are owned by **Albanian Electrical Power Corporation (KESh)**, which operates three large Hydro Electric Power Plants (HPPs). KESh also functions as a "wholesale public supplier" under the Power Sector Law and is appointed as supplier of last resort. The government also owns a combined-cycle gas turbine (CCGT) thermal power plant installed in the port city of Vlorë. Regarding, all the *private-owned generation units*, these are almost exclusively hydroelectric. There is also a part of KESh, which is called the **Wholesale Public Supplier (WPS)** unit, and it is responsible for buying electricity from the private sector, purchasing power from imports (if needed), pooling it with the electricity generated by KESh's own generation units and selling it to retailers.

KESh is the largest producer in Albania. With an installed capacity of 1,448 MW, the company contributed 87% of power output in 2013. This ratio declined to 72% in 2014 due to an increase in the activity of private hydro power plants and the ones that operate under concession licenses in the sector (Deloitte, 2015).

In the framework of *electricity transmission* and *distribution*, the government is the sole owner of Albania's transmission infrastructure assets through **Transmission System**

Operator (TSO) OST, which has also the functions of Dispatch System Operator and Market Operator. The distribution infrastructure company was formerly owned by the Albanian government and later sold to **Electricity Power Distribution Operator (OSHEE)**.

More specifically, in an attempt to optimize the distribution costs, decrease technical and financial network losses and secure a sustainable power supply for tariff customers, the Albanian government sold 76% of shares in the distribution infrastructure company priced at €102 million to the Czech electric utility ČEZ SA in March 2009. Privatization was conducted through an international tendering procedure whereby CEZ SA committed to fulfil the minimum technical conditions to improve the supply network and the financial situation of the Distribution System Operator (DSO). According to Deloitte (2015), CEZ SA operated in Albania from 2010 to 2012 and in July 2014, under Law No. 114/2014, the country's parliament approved the transfer of DSO's shares from CEZ AS to the Albanian government with a nominal value of €1, provided that the government should pay to CEZ AS liabilities for loans amounting to €95 million.

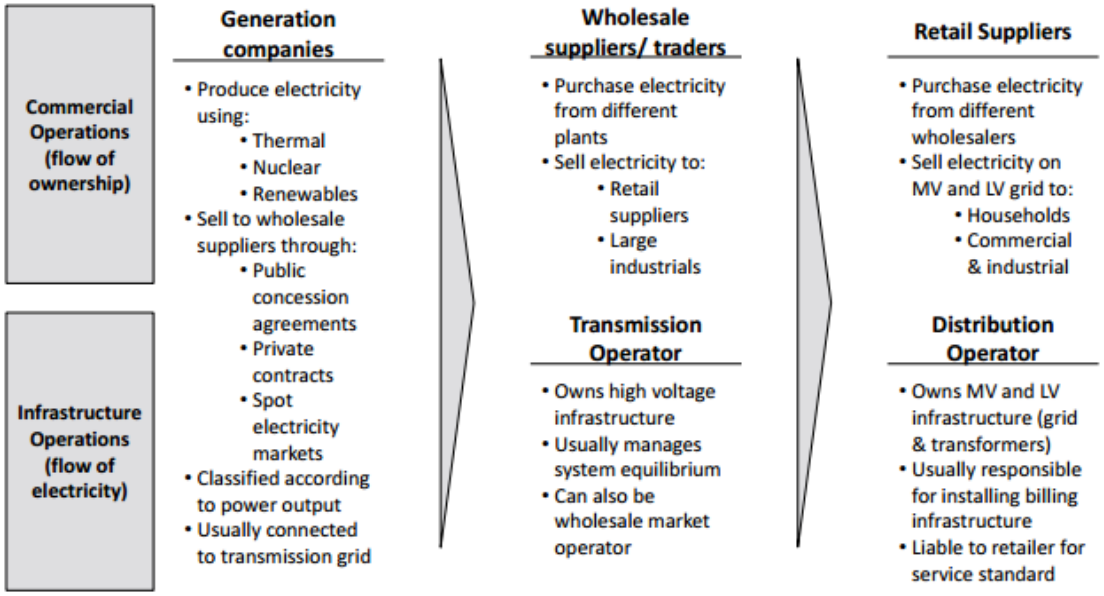
The **Retail Public Supplier (RPS)**, a unit inside OSHEE, is responsible for buying electricity from the WPS and importing electricity and selling it to all consumers on the low- and medium-voltage grids in Albania.

Regarding *consumers*, there are three categories:

- ***High-voltage consumers:*** these are connected directly to high-voltage (110kV) power lines and usually purchase a constant amount of power from private retailers.
- ***Medium-voltage consumers:*** these are connected to 6-10kV, 20kV or 35kV power lines and are currently supplied by OSHEE. Typically, these consumers have lower losses than low-voltage customers due to lower energy waste at higher voltage levels and the difficulty of stealing electricity from higher voltage lines (Ali, 2015).
- ***Low-voltage consumers:*** these are connected to 220V lines and are composed of households and small commercial and industrial consumers. Although metering systems in Albania cannot accurately measure losses at this level of the grid, simulations predict that greater than 80% of losses are concentrated in this segment (Ali, 2015).

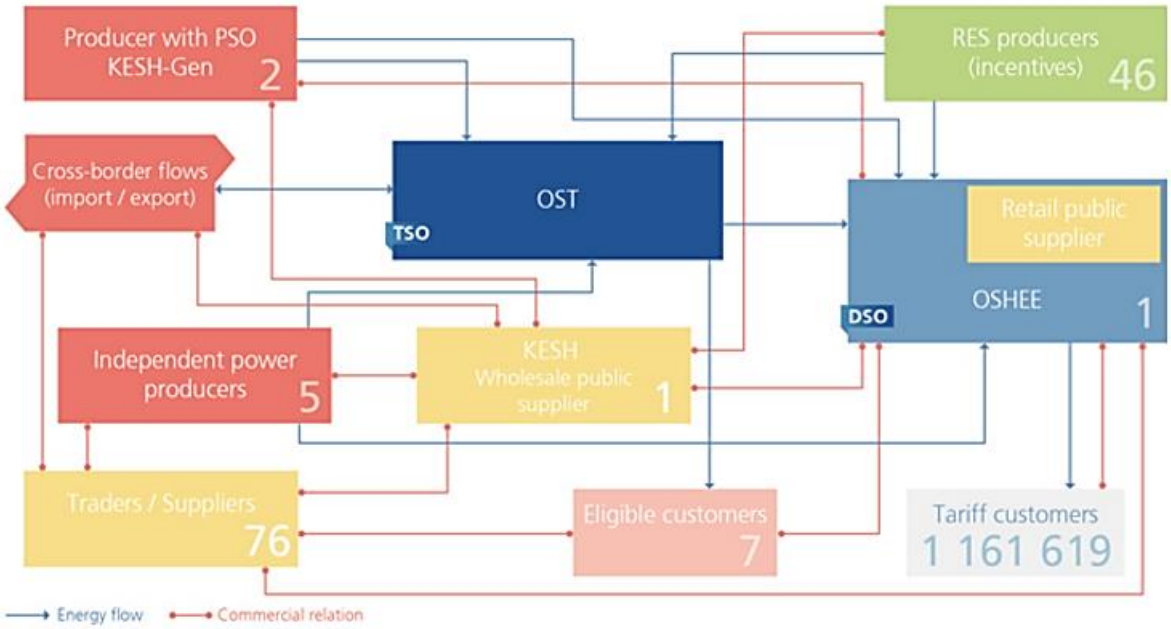
The **Albanian Energy Regulator Authority (ERE)** is a public legal entity, independent from energy industry interests and from other government institutions. The main responsibilities of ERE are **(a)** to ensure a sustainable and secure electricity supply to the customers through the establishment of an operational and competitive electricity market and **(b)** to regulate the generation, transmission, distribution and electricity supply activities. In 2014, ERE reported domestic hydropower output of 4,726 GWh.

Figure 12: Structure of a regular electricity market



Source: Ali (2015).

Figure 13: Albania's electricity market structure



Source: Energy Community Secretariat (2015)

The electricity sector in Albania is facing a number of systemic and increasingly difficult challenges that leave the country vulnerable to supply disruptions.

The following factors have led to a power sector unable as yet to be financially self-sustaining:

- High, unfunded, sectoral deficit of about $550 million
- extremely high level of distribution losses
- poor collection practices
- vulnerability to weather patterns due to the system's total dependence on hydropower generation
- need for significant power imports over the next three years
- growing lack of self-generation capacity
- tariffs that do not reflect the cost structure

The World Bank and the government successfully completed negotiations for a $150 million Power Sector Recovery Project, which was approved by the Bank's Board of Directors on September 29, 2014. The project is a necessary first step in supporting Albania's power sector reforms, particularly efforts to improve the reliability of the electricity supply and the financial viability of the sector. The project consists of four components: **(a)** providing short-term complimentary power import support, **(b)** upgrading the distribution infrastructure, **(c)** upgrading the transmission meter/data center, and **(d)** supporting power sector reforms and project implementation.

Between 1990 and 2000, Albania's electricity sector has experienced a high growth rate of electricity consumption; averaging 8% per annum. The majority of this growth has been artificially stimulated by extra high rates of electricity theft, nonpayment and avoidance of electricity bills and tariff rates which are well below cost (Kamberi, 2014). From 1985 to 2012, the average annual increase of electricity consumption has been 183 GWh per year or 4% yearly increase on average. The power consumption increase has been accompanied from a peak load rise of 420 MW in 1985 to 1,436 MW in 2012. The household consumption in Albania correspond to 54% of the total billed consumption for tariff customers in 2012, while 75.4% of all households fall to the category of first consumption scale (up to 300 kWh/month), according to ERE (2013).

4. ELECTRICITY MARKET LEGISLATION IN ALBANIA

Since 2006, Albania is a member of the Regional Energy Community, part of the EU initiative for the establishment of the European energy market. Albania is among the first Contracting Parties of Energy Community Treaty, with tangible progress in transposition of the Third Energy Package. A draft of the new Power Sector Law was proposed by the Energy Community Secretariat at the beginning of 2014 and later developed by the Albanian authorities. The Law was adopted by the Parliament on 30 April 2015.

The new Law transposes the principle provisions of Directive 2009/72/EC and addresses the liberalization of the electricity market, treatment of public service obligations, unbundling of the transmission system operation, powers of the national regulatory authority, supply of electricity and customer protection.

5. OVERVIEW OF THE HYDROPOWER SECTOR IN ALBANIA

The Albanian power system is mainly based on hydropower plants and thus it is fully dependent on hydrological conditions. According to the country's energy strategy[1], total annual potential production from hydropower plants (HPPs) in Albania is estimated at 10,000 GWh. This can be derived from an installed capacity of 3,000 MW. Based on this data, at the end of 2014 exploited opportunities represent 58% of the hydro-power potential with a total installed capacity of 1,725 MW (Deloitte, 2015).

History of the sector development

During the period of 1945-1951, power production amounted to an average of 10 KWh per capita. The sector started to develop after 1952, when the 5 MW Selita HPP began operation. Since then, medium-sized HPPs were built in Ulza, Shkopet in north Albania and Bistrica 1 & 2 in south Albania, with total installed capacity of 78 MW. In addition about 90 small HPPs, with a total installed capacity of 14MW varying from 5 to 1,200 KW were built to fulfill energy needs in the mountain areas all over the country. These small HPPs had a life span of 25 years and generated an average of 200 GWh in normal years (Deloitte, 2015).

Three large hydropower plants at Fierza, Koman and Vau i Dejes (see Table 1) were built on Drin River from 1971 to 1985, with an installed capacity of 1,350 MW. The sector marked no further development from 1985 up to 2007. Drin, crossing north Albania, is the largest river in the country. According to a Deloitte study (2015), further hydropower potential can be exploited on the Drin River, such as Skavica in the upstream and Bushati in the downstream of the existing development. Vjosa and Devoll are the second and third largest rivers in Albania. Studies in these rivers indicate several hydropower opportunities for small and medium HPPs.

Table 1: Technical data of HPPs on Drin River

Technical data of HPP	Fierza	Koman	Vau I Dejes
Utilization start year	1978	1985	1971
Number of aggregates	4	4	5
Installed power per aggregate	125MW	150MW	50MW
Installed power	500MW	600MW	250MW
Type of turbines	Francis	Francis	Francis
Total volume capacity in the lake	2.7 bcm	450 mcm	560 mcm
Maximum height of the lake (Above Sea Level)	296 m	176 m	76 m
Nominal falling	118 m	96 m	52 m
Average annual output	1,800 GWh	2,060 GWh	1,000 GWh

Source: KESh (2015)

New concessions on medium-sized HPP projects

According to Albania's Agency of Natural Resources (AKBN), the government signed concession agreements during 2008-2011 for the construction of six large HPPs, including 48

[1] National Energy Strategy, adopted in July 2003 can be found on the website of AKBN - www.akbn.gov.al.

MW Ashta 1 and 2 on Drin River, three 319 MW HPPs on Devoll River and 100 MW Kalivaç on Vrosa River.

More specifically, the Albanian government awarded a 35-year concession for the construction of Ashta 1 and 2 HPP that would utilize residual water released from Vau i Dejes HPP. Both HPPs completed their construction and started production in 2013. Investment of the project partners EVN AG and Verbund AG amount to €200 million (Deloitte, 2015). The technical characteristics of Ashta HPPs are presented in Table 2.

Table 2: Technical data of Ashta HPPs

Type of power plant:	**Run-of-river power plant with matrix turbines**
Commissioning:	September 2012
Average annual power production (Ashta 1 and Ashta 2):	240 million kWh
Turbines: number/type of turbine:	2 x 45 / matrix turbines
Total capacity (Ashta 1 and Ashta 2):	53 MW
Head Ashta 1:	4.98 m
Head Ashta 2:	7.5 m

Source: Energji Ashta website (2016)

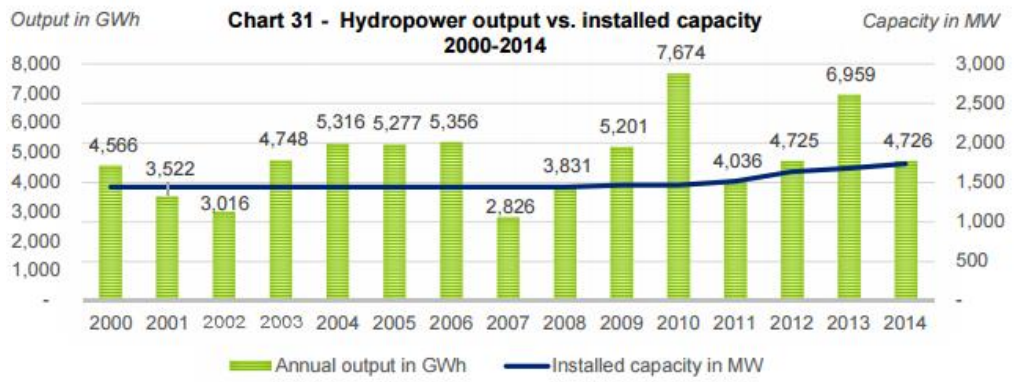
Furthermore, the government of Albania awarded in 2009 the right to build three HPPs on Devoll River through a concession agreement with Devolli Hydropower Sh.a. Currently, the project consists of building two HPPs (i.e. Banja and Moglice) in the valley of Devoll, with an installed capacity of 256 MW. The power plants are anticipated to produce an annual output of 729 GWh, which represent a rise of 15%, compared to domestic output in 2014. Banja and Moglice HPPs are expected to be completed in 2016 and 2018 respectively and the total investment cost for both plants is estimated at €535 million. Upon their successful completion, Devolli Hydropower will consider investing in a third HPP on Devoll River, known as Kokel HPP.

Regarding Kalivaç HPP, the Albanian state granted a 30-year concession in 1997 to the Becchetti Energy Group for its construction on Vrosa River. The specific HPP would have a capacity of 100 MW and would generate an annual output of 350 GWh. Its construction was expected to be completed in 2000, but it is currently suspended due to delayed investments.

6. HYDROPOWER GENERATION AND THE POWER BALANCE 2000-2014

Annual domestic output varies largely on hydrological cycles. In the last 15 years, the annual power output reached its highest peak in 2010 with 7,674 GWh and lowest peak in 2007 with 2,826 GWh, as shown in Figure 14.

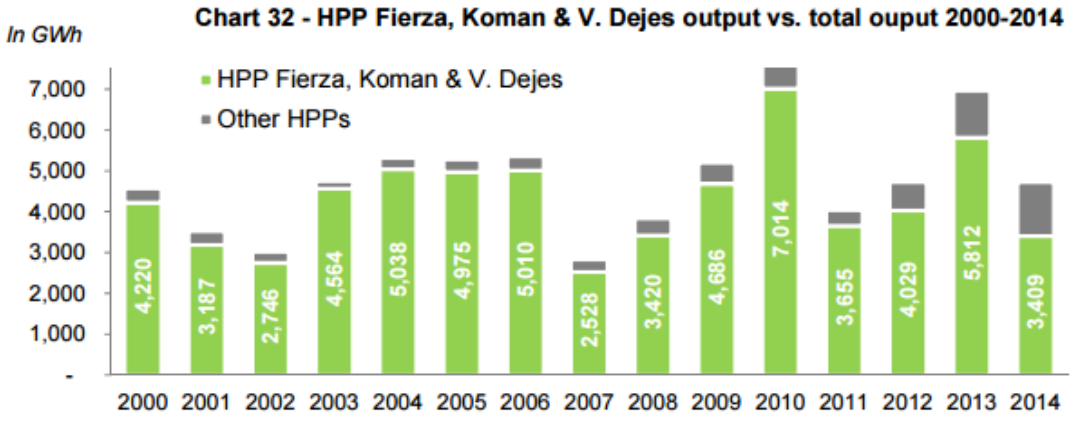
Figure 14: Hydropower output vs. installed capacity 2000-2014



Source: INSTAT (2015), ERE (2015), Deloitte (2015)

The HPPs of Fierza, Koman and Vau i Dejes on Drin River generated about 90% of the hydropower in the last 15 years with an average annual output of 4,286 GWh. The net domestic output rose slightly in the last 4 years as a result of private and concession HPPs starting production (ERE, 2015).

Figure 15: HPP Fierza, Koman & V. Dejes output vs. total ouput 2000-2014

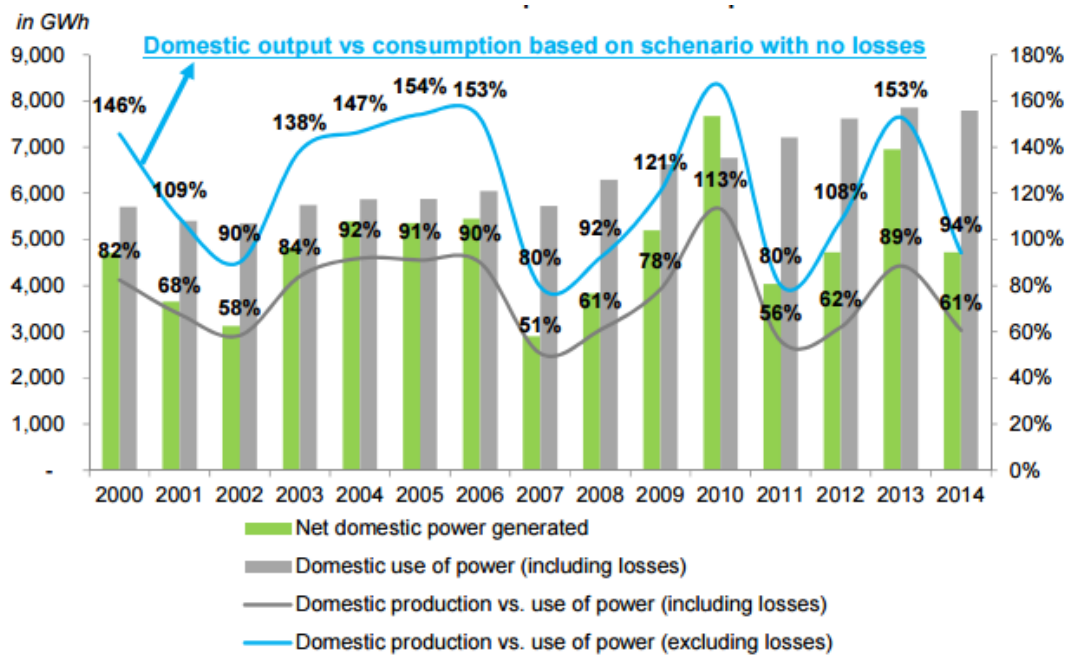


Source: INSTAT (2015), ERE (2015), Deloitte (2015)

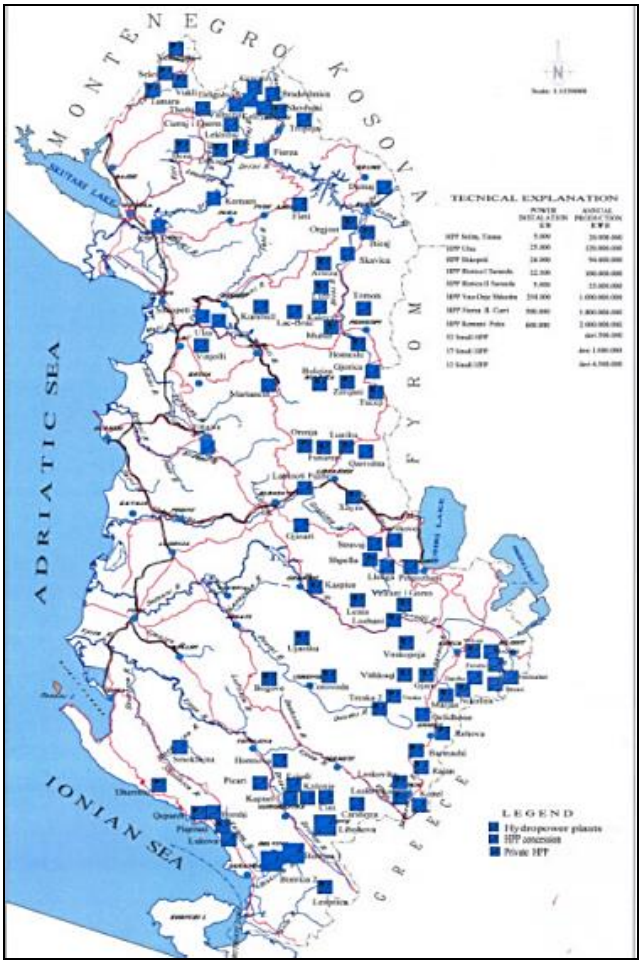
Despite its abundant hydropower potential, Albania has been a net importer of electricity to compensate for its negative power balance in the last 15 years. The negative power balance resulted mainly due to high level of losses in the distribution network. Based on INSTAT data, the annual average power output over 2000-2014 comprised about 76% of the domestic annual average of energy needs (including losses). Figure 16 depicts a positive power balance throughout the period, with the exception of years 2002, 2007, 2008 and 2011

when production could not meet total energy needs. This resulted due to the unfavourable meteorological conditions and underutilization of the energy potential of the country (Deloitte, 2015). The following map presents the existing hydropower plants in Albania.

Figure 16: Production and consumption of electrical power 2000 – 2014



Source: INSTAT (2015), ERE (2015), Deloitte (2015)



Source: Deloitte (2015)

7. ALBANIA'S HYDROPOWER POTENTIAL

As it has already been stated, Albania is almost fully dependent on hydropower for electricity generation. This mountainous nation is home to eight major river systems. The Drin River, located in northern Albania, is the largest river in the country and hosts three hydropower stations: Fierzë, Komani and Vau I Dejës. This 1,350 MW cascade represents more than 75% of the country's total electricity capacity and 70% of domestic electricity generation.

Recently, Albania was forced to import electricity due to rising demand and a stagnation of new capacity installations since the transition from a centrally planned economy to an open market in the late 1980s. This led in 2011 to power shortages during dry periods and even blackouts during prolonged droughts. Lorenc Gordani, Director of Legal Office at Albanian Renewable Energy Association (AREA), recently stated that energy demand is expected to rise by 60% in 2020, and there is a clear need for the country to strengthen its energy security.

Although there are strong efforts for the development of new thermal, solar and wind capacity, hydropower continues to be the country's energy mainstay. According to Gordani,

estimates show that only 30-35% of Albania's hydropower potential has been developed so far. Delays due to social and environmental concerns have been a deterrent to major projects. The Albanian government has focused on constructing smaller HPPs and passing fiscal incentives. For instance, investments in renewable energy sources are exempt from customs duties on imported machinery and equipment. Due to these favourable legal and regulatory frameworks, Albania's hydropower sector is attractive to foreign and private investors.

In 2013, FDI in privatizations across the country's hydropower sector made up almost 9% of its GDP, and accounted for roughly half of the capacity under construction. Most of the new capacity installations are aimed at strengthening power supply in the south of the country, and to complete the planned cascade of projects on the Drin River.

Albania's mid-term target is to become once again a net exporter of electricity by developing further its substantial hydropower potential. In this way, Albania could increase its influence in the regional energy market while in parallel enhancing its domestic energy security. For instance, in 2014, Albania and Kosovo signed an agreement to build a 400 kV transmission line linking their energy grids. This interconnection could help maximise Albania's hydropower and Kosovo's coal-fired power generation. In July 2015, the EU announced funding for another 400 kV interconnection line between Albania and FYR of Macedonia. Albania is also exploring options for an undersea electricity interconnection to export excess power to Italy (Gordani, 2016).

Table 3: Indicative summary of current situation in Albania's hydropower sector and its potential

Actual situation	6 big HPP in operation	1421.5 MW
	37 small HPP in operation	34.5 MW
Main generation base	Cascade on Drin River	1350 MW
	Cascade on Mati River	49 MW
	Cascade on Bistrica River	27.5 MW
Potential and existing utilization	Potential capacity	4500 MW
	Exploited potential	1461 MW

Source: Albanian Small Hydropower Association (2015)

8. ELECTRICITY TRADE IN ALBANIA

The electricity system of Albania is interconnected with the neighbouring systems of Greece, Montenegro and Kosovo (on 220 kV). In April 2014, the European Network of Transmission System Operators for Electricity (ENTSO-E) decided for permanent synchronous operation of the Albanian electricity transmission system with the continental European system. In 2014, OST signed the agreement for participation in the Coordinated Auction Office in Southeast Europe (SEE CAO). On May 1, 2015, monthly and daily auctions commenced within the CAO platform on the border with Montenegro. OST will join the annual auctions with this border in 2016, according to Energy Community Secretariat (2015).

KESh exports daily power surpluses in excess of the needs for public use. When generated domestic power cannot meet the public demand for power and network losses, KESh, WPS and RPS import power from the European market. Serbia and Switzerland were the main import and export partners in the global power market with above 70% of imports and exports during the period from 2011 to 2014, according to Deloitte (2015).

Table 4: Exports and imports of power during 2011-2014

	2011	2012	2013	2014
Exports				
Power exported in GWh	1,225	288	938	84
Value of power exported (in Lek million)	6,672	1,972	4,123	595
Average export price in Lek/KWh	5.45	6.85	4.39	7.06
Imports				
Power imported in GWh	3,003	3,394	1,674	3,219
Value of power imported (in Lek million)	22,575	30,105	11,310	23,010
Average import price in Lek/KWh	7.52	8.87	6.76	7.15

Source: Albanian Custom Administrate (2015)

9. Key issues in Albania's electricity sector

The electricity sector in Albania is facing a number of serious challenges as the country is vulnerable to supply disruptions and mounting contingent liabilities:

- Full dependence on hydropower generation and its vulnerability to weather patterns
- Lack of adequate self-generation capacity
- High level of distribution losses that require significant power imports is adding financial stress to the sector and the economy. By the end of 2014, the Albanian government had initiated a vigorous and ongoing outreach and enforcement programme to reduce the theft of electricity and improve revenue collections. As a result, the situation improved and in 2014, losses reached 38%, compared to 45% in previous years.
- The retail tariffs do not fully reflect the sector cost structure, which, combined with low collection rates and high arrears, has meant that the power sector is not able to be financially self-sustaining.
- Albania's energy sector is currently suffering annual losses estimated at EUR160-200 million (World Bank estimates) creating an urgent need for energy efficiency improvements.
- Small and large hydropower facilitate the penetration of RES and contribute to reducing greenhouse gas emissions in the electricity sector
- Appropriate mix with other renewables and proper development of the hydropower potential is recommended. The World Bank has presented a study, which identified a large solar power potential in the country.

Table 5: SWOT analysis of Albania's energy sector

	Strengths (current)	Weaknesses (current)	Opportunities (future)	Threats (future)
Energy system strategy and energy outlook	• Increase in domestic electricity demand • Draft NREAP available	• Limited financial resources to support high upfront costs of large-scale RES deployment	• Technology and knowledge transfer can stimulate large scale RES deployment and lower marginal costs	• Energy demand may have an upward trend
RES Industry development	• Experience with solar heating	• Limited knowledge about grid integration of decentralized production	• Large wind and solar potential	• No incentives for non-hydro technologies
Energy security	• High domestic production and potentials for hydropower	• High reliance on hydroelectricity • electricity grids in need for improvement	• Transmission line to Kosovo to be built soon for cross-hedging of Albanian hydro with fossil electricity production in Kosovo	• Slow rehabilitation of old grids
Market structure of energy system	• Market opening required under the EnC treaty/EU third energy package • Electricity Market Model developed in 2008 to facilitate the establishment of PPAs	• Regulated price may be too low for investors • Power company is a quasi-monopolist	• Liberalization may ease emergence and entrance of new market participants	• Slow market opening in practice • Difficult balancing between liberalization on one side and the risk of energy poverty on the other side
Grid and Interconnections	• Recently new transmission lines built within the country • Good grid connection to Montenegro	• Transmission and distribution network is old despite some rehabilitation	• Possible new line to Italy • Transmission line to Kosovo to be built soon	• Slow development of grid infrastructure
RE Regulatory & Policy Framework	• FiTs and tax exemptions for hydropower	• Support only for hydropower • No support for renewable heat		• No policy framework for non-hydro technologies
Institutional Framework for RES deployment	• Good coordination among institutions • New national licensing centre to speed up permitting procedures • One-stop shop for permits	• Not all licenses part of the one-stop shop		
Financial risks and uncertainty	• IFIs provide loans for RE expansion which reduces capital costs	• High risk and uncertainty of the support framework		• Uncertainty and risk may remain over the next years
Investment facilitation	• Energy market liberalization initiated • Partly tax incentives for RE	• Opening of support systems for new technologies (wind, solar) • High cost of capital		• Lack of incentives for wind and solar power • Lack of access to capital • Lack of investors
RES capacity/potential/ available technology options	• High hydro, wind and solar potentials	• Insufficient knowledge on possible solar sites		
Public awareness/acceptance	• High acceptance for hydro • Opposition against planned fossil electricity generation	• Low acceptance of non-hydro technologies	• Increasing interest in non-hydro technologies	
Environmental effects	• No fossil electricity production	• Strong focus on large hydro	• High potential of non-hydro RES options	• Too strong focus on large hydro
Social effects		• Energy poverty		• Liberalization bares the risk of higher energy poverty due to increased power prices

Note: *Current:* Factors within the existing situation and *Future:* Factors with the possibility to change the current situation

Source: Intelligent Energy-Europe (2015)

10. PROSPECTS

Thanks to its geographical position and natural resources, Albania has a high development potential to exploit renewable energy sources. Currently, only hydropower makes a significant contribution to the country's electricity consumption, despite the fact that a significant potential for renewable energy in the form of biomass, geothermal, wind, and solar are available.

A European Commission (2016) study examined the potential of renewables in Albania and concluded that **(a)** almost 97% of the electricity generated in the country is produced by hydropower plants, **(b)** renewables are used as a resource for the households especially in the rural areas and partly in the urban areas for ambient heating and for domestic hot water, **(c)** the use of solar energy is a new tendency which is developing very slowly in the past years, mostly by individuals who construct new houses. The share of use of flat plate solar collectors, mainly for water heating, in the national energy balance is very small, **(d)** there is a lack of production of renewables in the agricultural sector, and **(e)** lack of using wind and geothermal energy. However, this EC study underlines, in line with the aforementioned World Bank study, that there is a considerable solar power potential in the country.

The concept of combined hydroelectric plant and pump storage in cascade mode or with an additional reservoir in high head should be exploited in Albania. As the European grid expands into the Balkans, renewable power from northeast Europe, which at times is in surplus, could be stored by an Albanian pumped storage system. The same system would allow Albania to pursue domestic solar projects to power its own economy and to export to neighbors in need of clean energy.

Albanian oil sources, which are distributed in the western and southwestern part of the country, are to be found in mainly two structures: sandstone and limestone. Currently, these sources have considerable reserves but their full potential extraction needs advanced extraction methods. Damian Gjiknuri, Minister of Energy and Industry in Albania, said last year that the country still holds great potential for oil and gas based on the geological historical data. He also declared that oil and gas sector needs investment and in this case, several legislation improvements were made and better contract terms were set in order to avoid any grievance of mismanagement in the future. Furthermore, he stated that the tax regime in Albania is favourable and the government intends to involve independent international companies in auditing oil and gas contracts; otherwise doubts may arise as to how these contracts are administered.

Following the adoption of the Power Sector Law in 2015, the development of secondary legislation needs to commence soon and be a first priority. The electricity market structure is not defined in detail. All aspects and elements of the market (including day-ahead, intra-day, balancing and ancillary services markets and a financial settlement mechanism) need to be defined and transposed in the set of market rules. Unbundling of distribution in OSHEE requires to take place as a matter of priority. Deregulation of the KESh generation is also a precondition for competition.

Finally, the Trans Adriatic Pipeline (TAP) segment through Albania is considered to be the most important project of the country, in national and international terms. TAP's route through Albania is approximately 215 km onshore and 37 km offshore in the Albanian section of the Adriatic Sea. It starts at Bilisht Qendër in the Korça region at the Albanian border with Greece, and arrives at the Adriatic coast 17 km north-west of Fier, 400 metres inland from the shoreline (TAP-AG, 2016). TAP will transport natural gas from the Turkish-Greek border through Albania to its tie-in point near Lecce in Italy. This project will enhance the energy security in Europe by increasing the diversity of gas supply. Albania's Prime Minister Edi Rama said in June 2015 when the construction of the TAP pipeline started to take place in the country's territory that the Albanian GDP is expected to increase by about €160 million a year in the next three years and the economy in the next 20 years will benefit €1 billion.

11. REFERENCES

1. Ali, O. (2015), "Revitalizing the Albanian Electricity Sector", http://growthlab.cid.harvard.edu/files/growthlab/files/ali_ozair_electricity_sector_albania_2015_final.pdf?m=1455301812
2. Energy Community Secretariat (2015), "Annual Implementation Report", https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3872267/23B450386A075E64E053C92FA8C0F69F.PDF
3. Deloitte (2015), "Extractive Industries Transparency Initiative in Albania", https://eiti.org/files/albania_eiti_report-2013-2014_final.pdf
4. Kamberi, Z. (2014), "Albania Energy Sector Reform", Conference: The European Perspective of Western Balkan Countries, Sofia, Bulgaria
5. ERE's Annual Report (2013), "Power Sector Situation and ERE's Activity for 2012"
6. Deloitte (2015), "Extractive Industries Transparency Initiative in Albania - Report for the year 2013 and 2014", https://eiti.org/files/albania_eiti_report-2013-2014_final.pdf
7. Intelligent Energy-Europe (2015), "Bringing Europe and Third countries closer together through renewable Energies", http://better-project.net/sites/default/files/SWOT_Western_Balkan_Countries.pdf
8. TAP-AG (2016), "Pipeline construction in Albania", http://www.tap-ag.com/the-pipeline/building-the-pipeline/in-albania
9. Albanian Small Hydropower Association (2015), "Hydro Energy History in Albania", http://albania-smallhydropower.org/services.php
10. European Commission (2016), "Renewable energy potentials of Albania", http://cordis.europa.eu/news/rcn/130474_en.html
11. IENE (2016), "South East Europe Energy Outlook", Athens, 2016