



A Snapshot on the Albanian Power System Flexibility for RES

Shkelqim Bozgo & Abaz Aliko
SEA Consulting

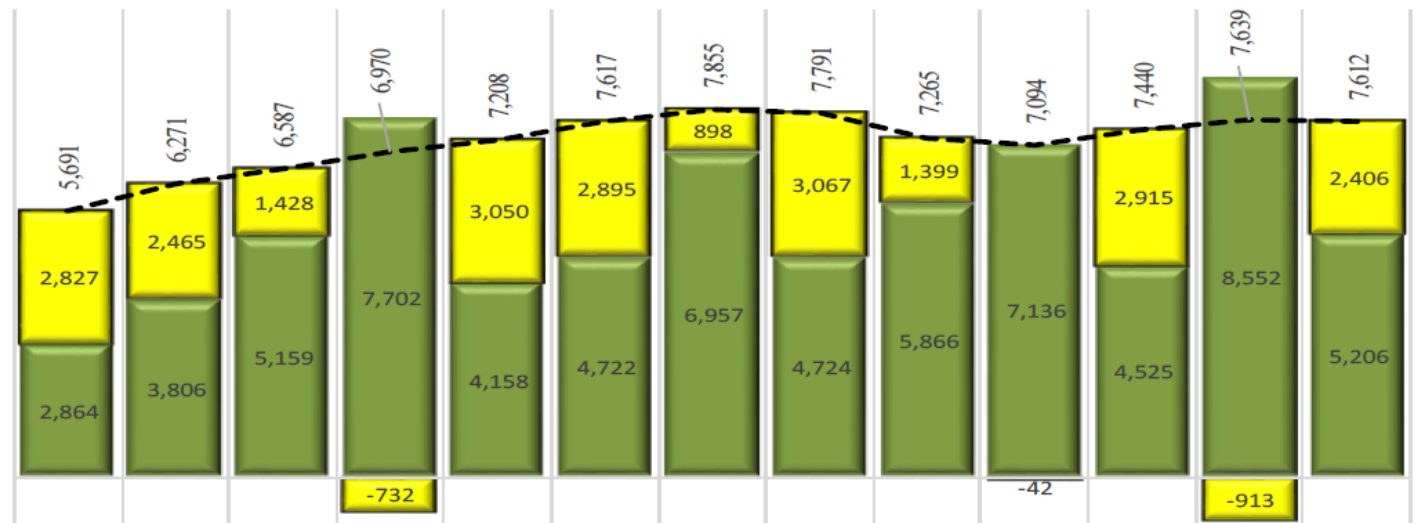
Content

- * Overview of the Albanian power sector situation
- * Need for flexibility of the power system to accommodate future significant RES development
- * A high level assessment of the Albanian power sector flexibility
- * Conclusions

Overview of the Albanian Power Situation

- * Growing demand
- * A net importer of electricity

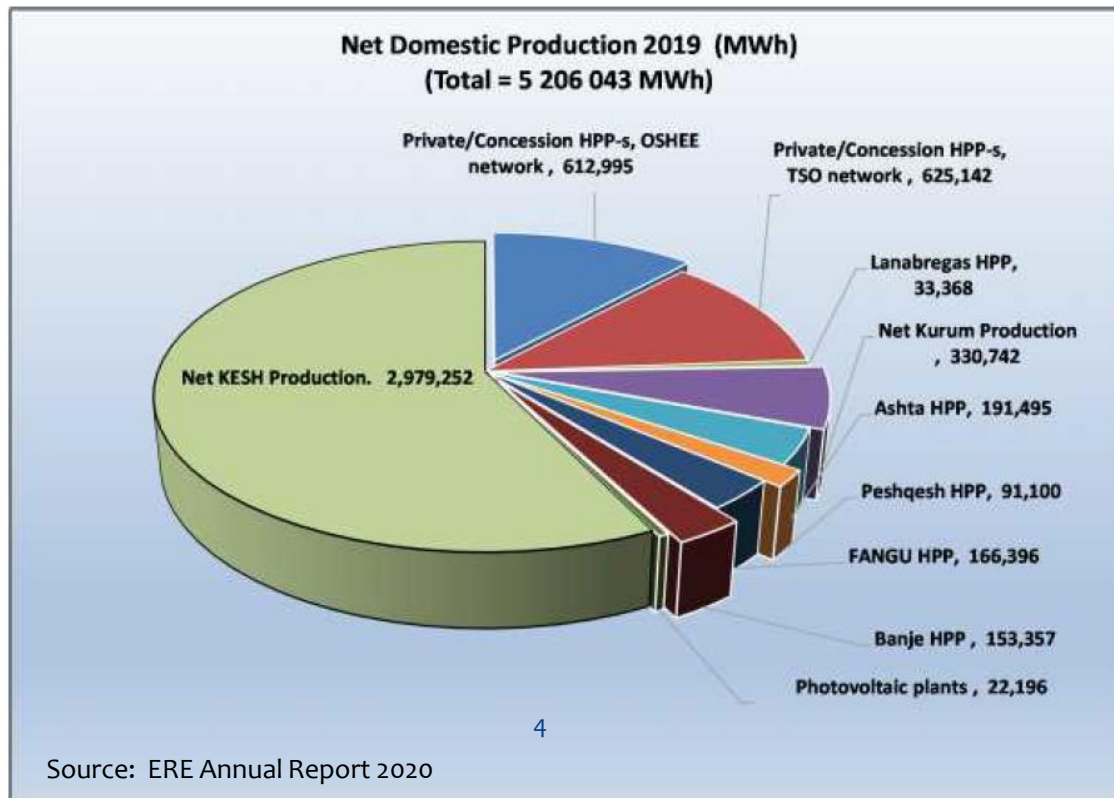
Consumption, domestic production & import/export balance during 2007-2019



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Import / Export Balance	2,827	2,465	1,428	-732	3,050	2,895	898	3,067	1,399	-42	2,915	-913	2,406
Domestic Production	2,864	3,806	5,159	7,702	4,158	4,722	6,957	4,724	5,866	7,136	4,525	8,552	5,206
Total Consumption	5,691	6,271	6,587	6,970	7,208	7,617	7,855	7,791	7,265	7,094	7,440	7,639	7,612

Share of Power Generation (2019)

- * Total domestic production for year 2019 = 5,206,043 MWh
- * Total installed capacity as of December 2019 = 2,275 MW
- * 71 MW or 3% were added during 2019



Power Domestic Production is 100% Dependent on Hydro and a minor contribution from PV

Gross electricity production

Albania

GWh	2013	2014	2015	2016	2017	2018	2019P
Total	6 959	4 724	5 895	7 782	4 526	8 553	5 228 P

Solid fossil fuels (coal), Peat, Oil shale and oil sands

Sub-total	0	0	0	0	0	0	0 P
-----------	---	---	---	---	---	---	-----

Natural gas and manufactured gases

Sub-total	0	0	0	0	0	0	0 P
-----------	---	---	---	---	---	---	-----

Renewables and biofuels

GWh	2013	2014	2015	2016	2017	2018	2019P
Hydro	6 959	4 724	5 895	7 782	4 525	8 552	5 206 P
Geothermal	0	0	0	0	0	0	0 P
Wind	0	0	0	0	0	0	0 P
Solar thermal	0	0	0	0	0	0	0 P
Solar photovoltaic	0	0	0	0	1	1	22 P
Tide, wave, ocean	0	0	0	0	0	0	0 P
Solid biofuels	0	0	0	0	0	0	0 P
Liquid biofuels	0	0	0	0	0	0	0 P
Biogases	0	0	0	0	0	0	0 P
Renewable municipal waste	0	0	0	0	0	0	0 P
Sub-total	6 959	4 724	5 895	7 782	4 526	8 553	5 228 P

Non-renewable wastes

Sub-total	0	0	0	0	0	0	0 P
-----------	---	---	---	---	---	---	-----

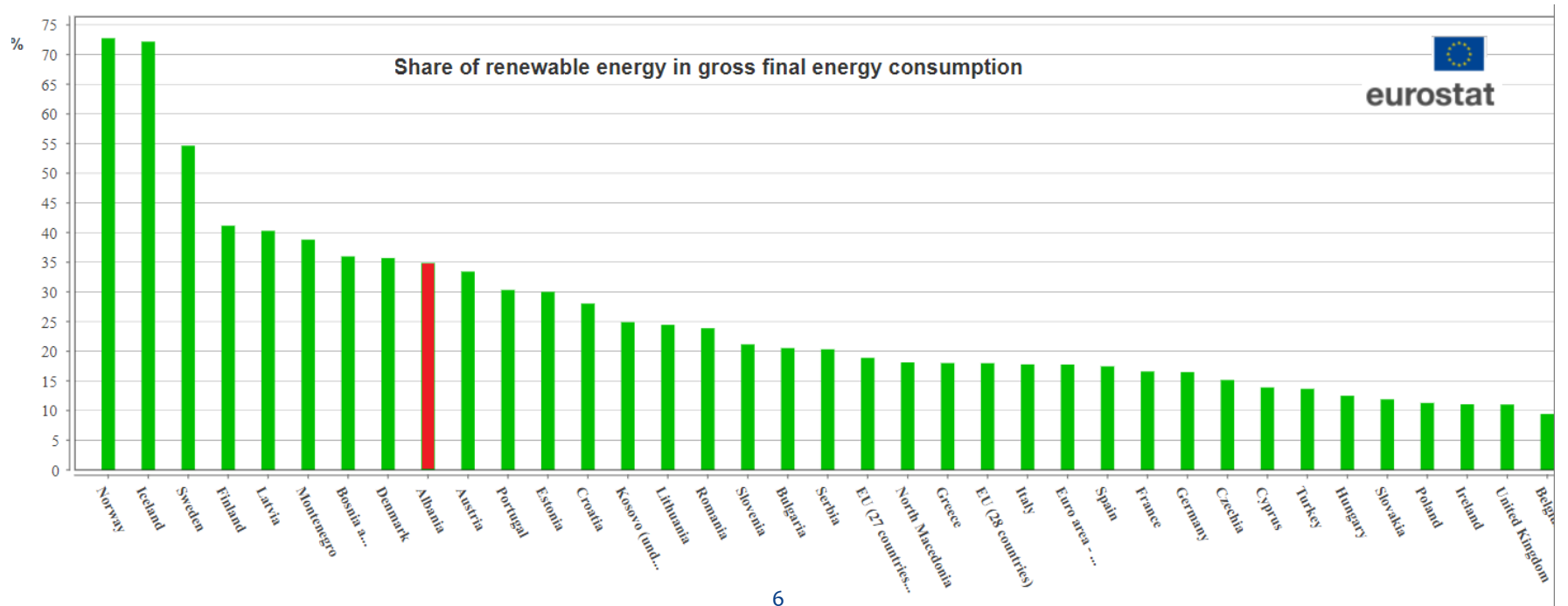
Other sources

GWh	2013	2014	2015	2016	2017	2018	2019P
Nuclear	0	0	0	0	0	0	0 P
Heat from chemical sources	0	0	0	0	0	0	0 P
Other fuels not elsewhere specified	0	0	0	0	0	0	0 P
Sub-total	0	0	0	0	0	0	0 P

Source: Eurostat (nrg_ind_pehmf)

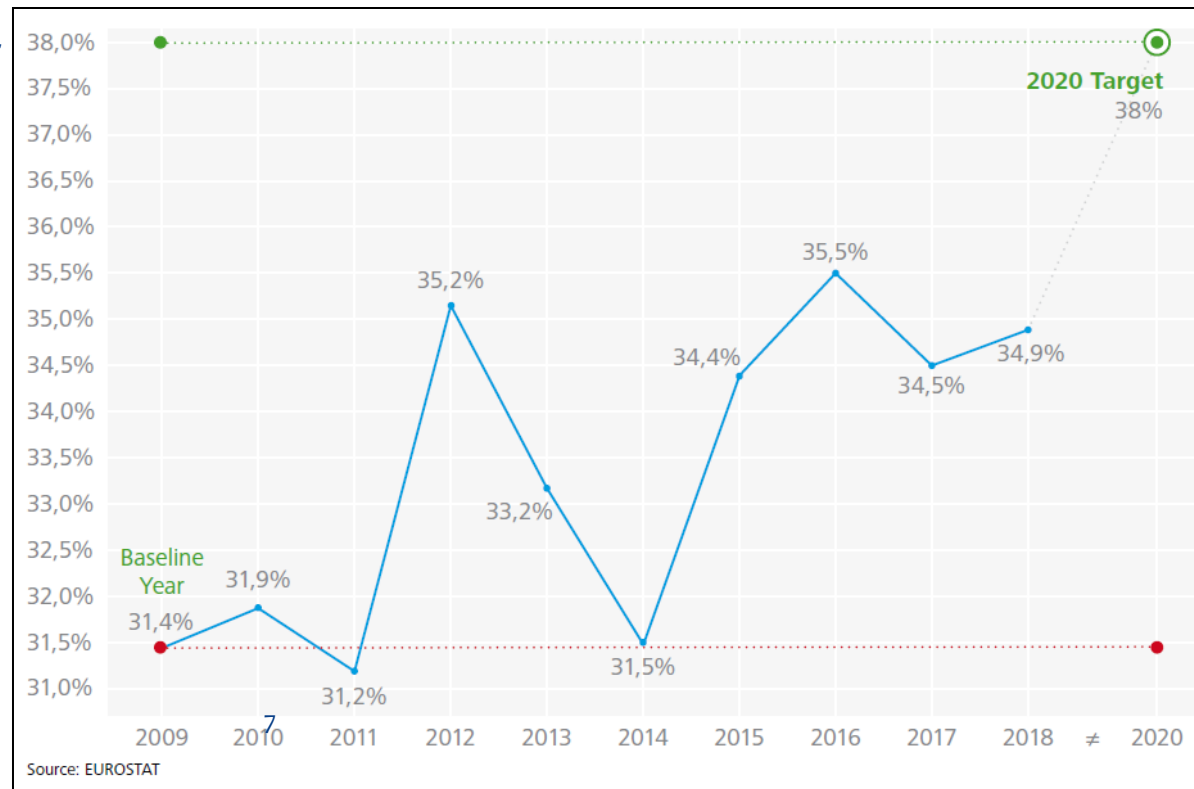
RES in Albania

RES contribution in the Albanian gross energy consumption for 2018 was at 34.9%



Albania's Targets of RES

- * Meeting Albania growing energy demand and achieving the 2050 climate objectives will require substantial RES contribution and also the power system to be sufficiently flexible
- * There is still high potential for RES development
- * Albania's 2020 target for renewables is 38%
- * According to the Albanian National Energy Strategy (2018-2030), the share of RES should reach a target of 42% of the total energy consumption in 2030.



Power System Flexibility

- * **Definition:** The flexibility of a power system refers to "the extent to which a power system can modify electricity production or consumption in response to variability, expected or otherwise" by International Energy Agency.
- * System flexibility needs to be build on the;
 - * Supply Side
 - * Conventional Power Plants
 - * Renewable Energy Power Plants
 - * Storage
 - * Interconnection
 - * Demand Side
 - * Other options; retrofit, smart grids, Market Measures like incentives for flexibility etc

Assessing Flexibility

- * **Numerous methods and indicators including;**
 - * **Computational models** (various programmes)
 - * **Basic approaches;**
 - * **Spider Flexibility Charts** share of VRES against the capacity of interconnections, CHP, CCGT, Pump and Hydro, Yasuda, Y. 2013 (*)
 - * **First-tier indicators: Methodology for analysing the flexibility of a system, Öko-Institut, Dierk Bauknecht, Christoph Heinemann, Moritz Vogel 2017 (**)**

(*) Yasuda, Y. 2013. "Flexibility Chart: Evaluation on Diversity of Flexibility in Various Areas." Wind Integration Workshop. London. 22 October

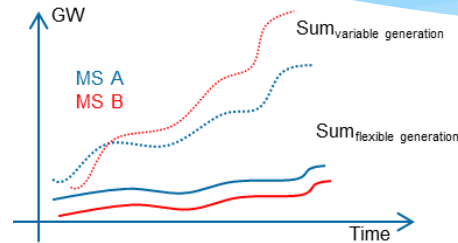
(**) "Study on the impact assessment for a new Directive mainstreaming deployment of renewable energy and ensuring that the EU meets its 2030 renewable energy target
Task 3.1: Historical assessment of progress made since 2005 in integration of renewable electricity in Europe and first-tier indicators for flexibility"

Öko-Institut: Dierk Bauknecht, Christoph Heinemann, Moritz Vogel

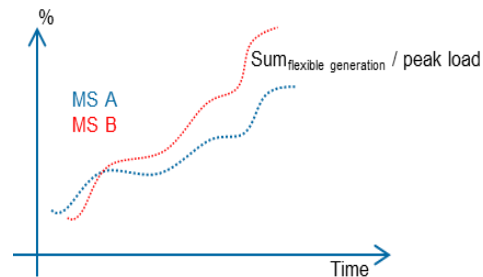
First-tier indicators

(Oeko-Institut: Dierk Bauknecht, Christoph Heinemann, Moritz Vogel)

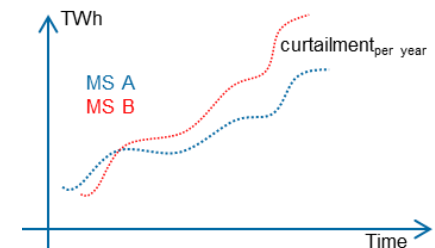
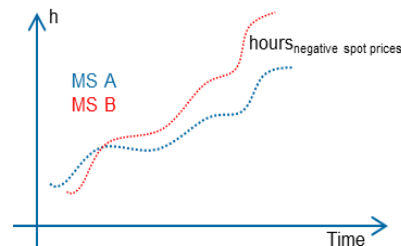
- * Variable versus flexible **capacity**



- * Comparison of flexible **capacity in relation to peak load** between MS



- * Flexibility Gap (that can be observed in the system)



Source: “Study on the impact assessment for a new Directive mainstreaming deployment of renewable energy and ensuring that the EU meets its 2030 renewable energy target
Task 3.1: Historical assessment of progress made since 2005 in integration of renewable electricity in Europe and first-tier indicators for flexibility”

Oeko-Institut: Dierk Bauknecht, Christoph Heinemann, Moritz Vogel

Albania's Flexible Generation Capacities (2019)

- * **Currently;**

- * The AGC (Automatic Generation Control) is done through 5 large hydropower plants; Fierze (500MW), Koman (600MW), Vau Dejes (250MW), Banja (73MW), and Fangu (74.6MW) (ERE Annual Report 2020)
- * TOTAL Flexible capacity: 1,498 MW

- * **Future developments;**

- * Completion of Moglice HPP (183 MW) and other medium size HPP have the potential to increase the Flexible Capacity
- * Skavice HPP (October 5, 2020, MoU signed between Min of Energy and Bechtel) represents another significant development and important increase of flexible generation capacity.
- * Vlora CCGT power plant connected to gas network and other potential gas PP associated with CCUS

Albania Variable Generation Capacities

VRES (2019)

* **Small Hydro Power Plans**

- * 194 operational SHPP's with total capacity of 777 MW (34 % of the total installed capacity)
- * More than 200 SHPP permits have already been approved and many of them are under construction

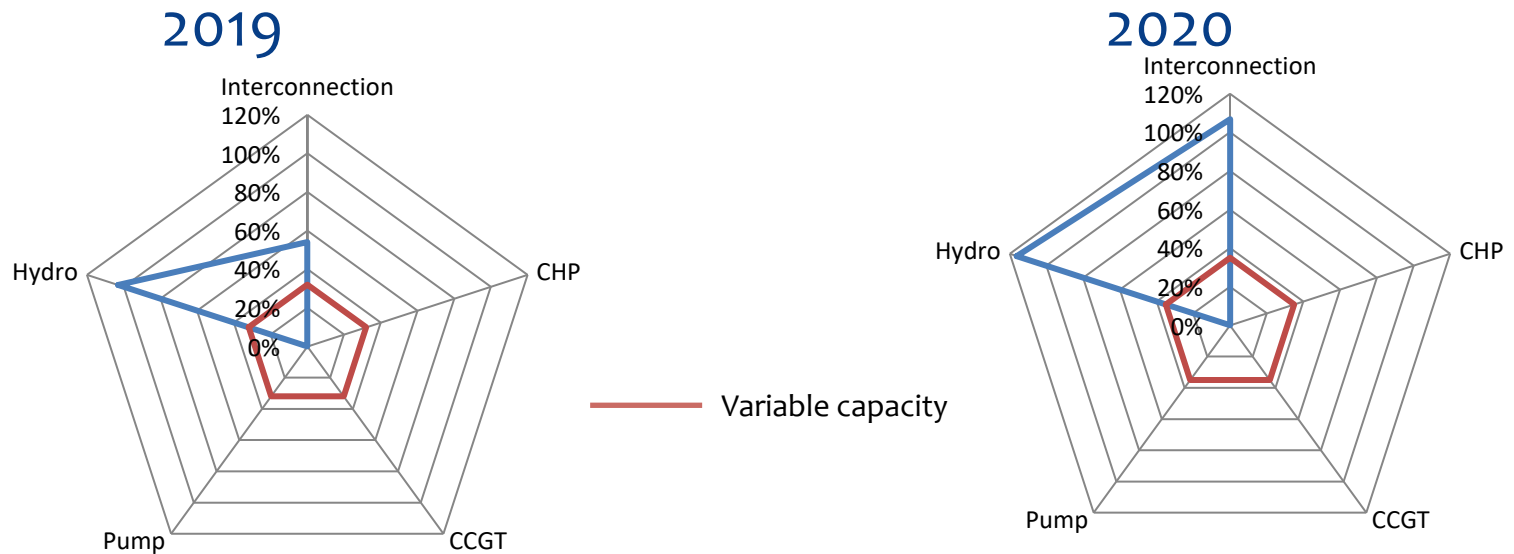
* **PV:**

- * small scale: 8 PV **operational** plants (~2MW/each) with a total capacity of 15MW. Contributed 0,4% of power production for 2019.
- * Large projects to join soon but none is operational yet;
 - * Akerni 50MW PPA + 50MW, India Power Corporation, November 2018 (?),
 - * Karavasta 70 MW PPA+70 MW, Voltalia, May 2020
 - * Sheq, Fier 50 MW private investors "BLESSED INVESTMENT" sh.p.k & "MATRIX KONSTRUKSION, November 2020.
 - * Open call for bids; Spitalle 70 MW PPA+30 MW,
 - * Total **upcoming PV capacity around 400 MW**
- * Growing interest for new large and small scale PV

* **Wind:**

- * 11 licenses issued until 2020
- * 5 wind parks (102 MW) have obtained agreements to connect to the grid during 2019
- * 4 wind farms of 62 MWp progressing towards implementation
- * **No wind park is operational yet** as of December 2020
- * Estimation go to 1850 MW of wind capacity for 2030 target achievement (Malka, et al.: An Approach to the Large-scale Integration of Wind Energy in Albania)

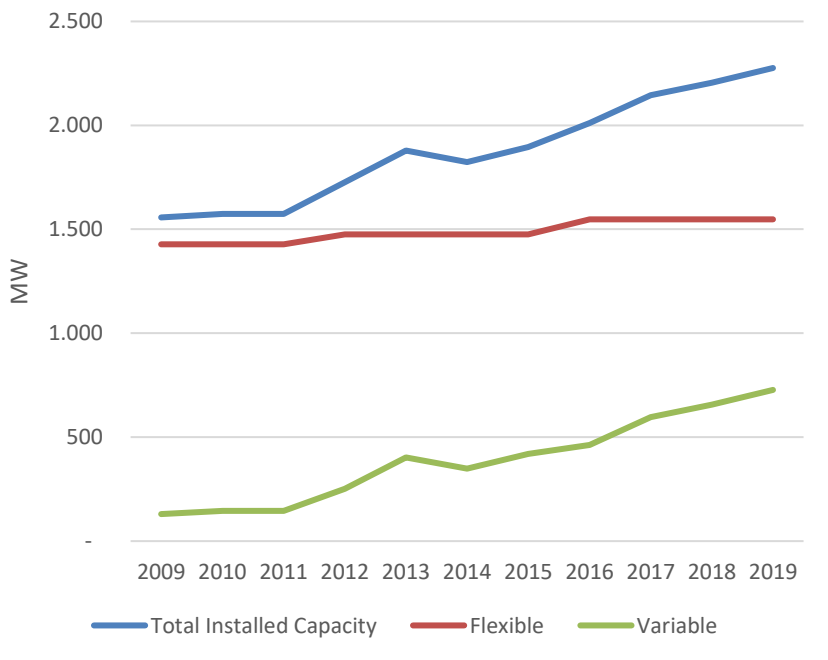
Spider Flexibility Chart



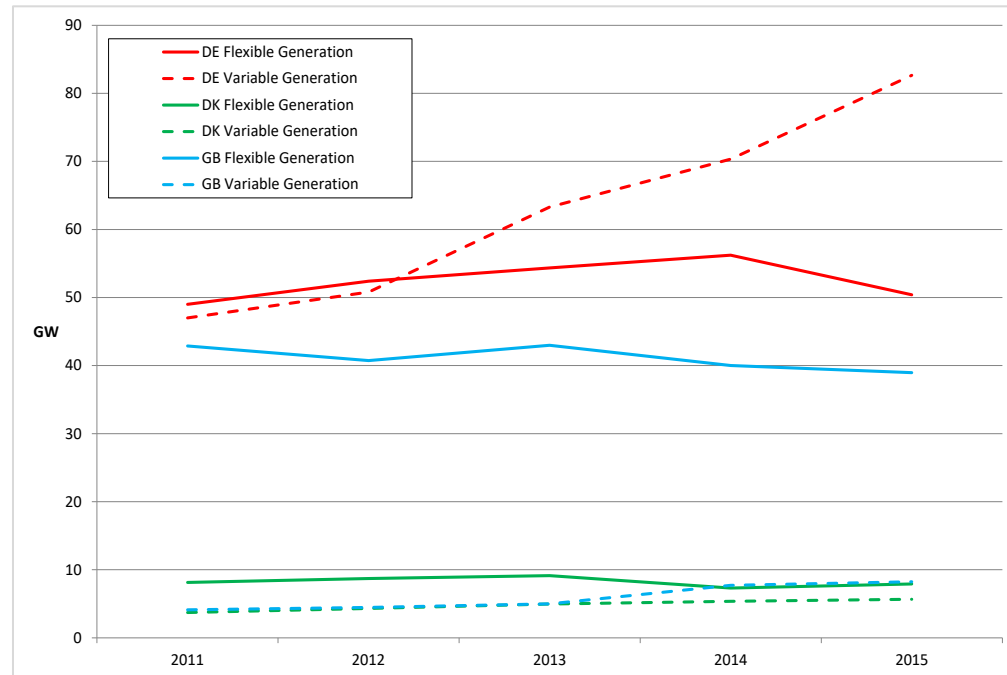
The expansion of interconnection capacities (KS +290 MW, NM + 500 MW) and construction of large hydro (Moglice HPP 183 MW) contribute to the increase of power system flexibility and accommodate more RES

Albania's Variable versus Flexible Generation Capacity

- * Albania's flexible capacity is larger than variable capacity
- * The gap between flexible and variable capacity is quickly narrowing

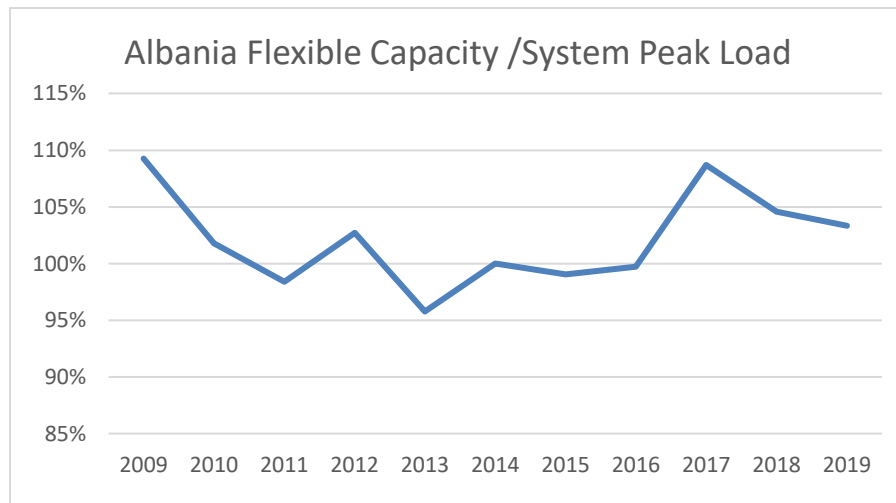


Development of variable and flexible generation in Albania from 2009 to 2015

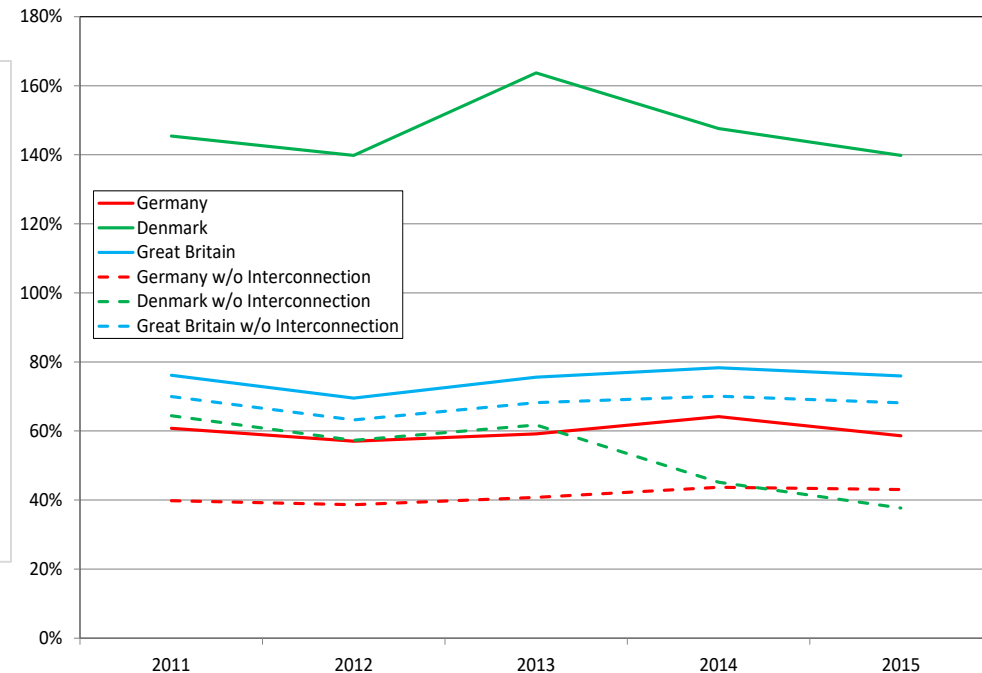


Development of variable and flexible generation in Germany, Denmark and Great Britain from 2011 to 2015

Albania's flexible generation/flexible capacity in relation to peak load



Development of the share of flexible generation in relation to peak demand in Albania from 2009 to 2019



15 Development of the share of flexible generation in relation to peak demand in Germany, Denmark and Great Britain from 2011 to 2015

Conclusions and Future Steps

- * Albanian Power System indicates a high level of flexibility
- * The latest and fast development of RES generation (variable) capacities tend to narrow the difference with the power system flexibility.
- * Expected future developments shall contribute in the increase of both flexible capacity (Moglica HPP + interconnectors) and variable capacity (4 large PV + wind) with the second ones at a higher pace.
- * More in depth analysis by use of computational models is needed for a more detailed assessment in order to adjust the energy strategy with RES ambitious target for year 2030 (42%).
- * Areas to take into consideration;
 - * Potential for green and blue Hydrogen production taking advantage of RES & TAP
 - * APEX Albania Power Market Exchange established and under development
 - * Further integration with the regional power system

Thank You

Contact:

Shkelqim Bozgo

Managing Partner

Mobile: + 355 69 40 27 999

Email: shkelqim.bozgo@sea-consulting.co

Website: www.sea-consulting.co

SEA-Consulting

Sustainable Energy Advisors