



ENLARGING TO REGIONAL AND INTERNATIONAL MARKET - TO INCREASE SECURITY OF POWER SUPPLY FOR THE COUNTRY: ALBANIAN CASE

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Abstract

Albania is now facing international competition in the power sector opening to regional and international power market, being in the same time importer and exporter of electric energy seasonally. It experienced a rapid growth of power consumption on the years 2005-2008 and started with the power sector reforming since 2004-2007 with the first phase of unbundling, from KESH to KESH-OST-OSSH as well, opening this way to international power market and its main goal was providing security of supply to all national economy without limitations in quantity, quality, and time. Even several steps, were taken to improve the power supply sector, still our economy lacks the guaranty of sustained supply, and the system remains still inflexible. The market is highly regulated, the tariffs of electricity are defined by ERE (energy regulatory agency) and the security of supply is mostly related to the responsibility of the public operators in the power sector. The accession and adhering to EnC, IEC and other power sector EU and international organizations and treaties, have made it possible that Albania could increase the security of electricity supply to the economy, by adopting to international market developments, especially to EU and WB6 market. This approach has been in favour of internationalization, vs being domestically focused on power production, distribution, and supply of the economy in order to provide for



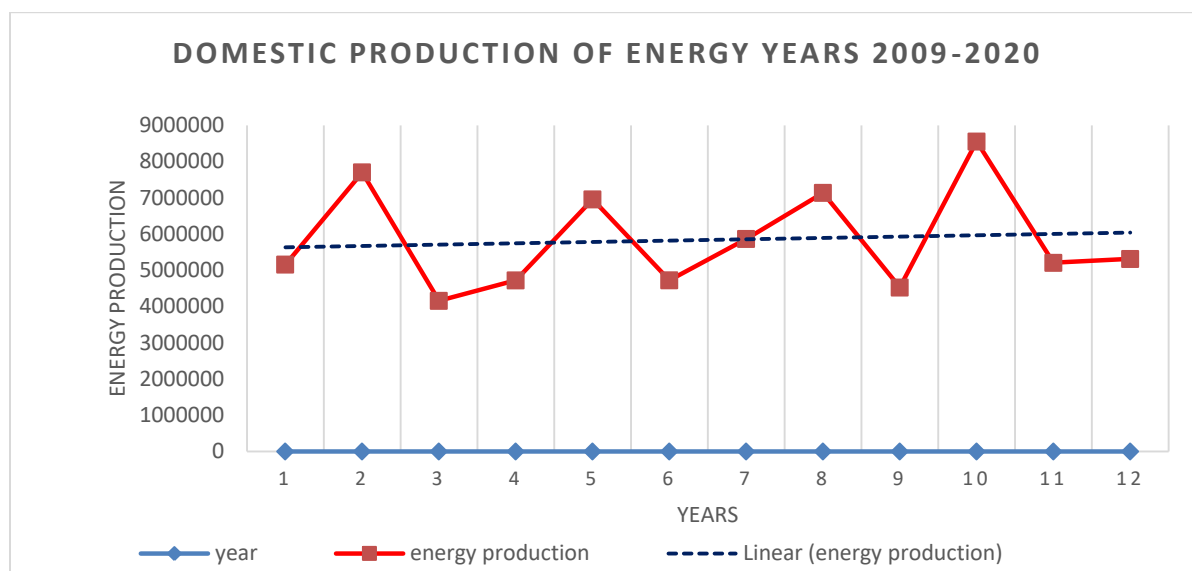
security of supply. This paper is focused on the challenge of how to develop a steady and sustainable power supply energy sector model ensuring higher security of supply considering internationalization of the domestic economy and integration of the country into multinational communities – should it be regional or larger? This paper reveals the need for increasing investment in the sector, the diversification of the supply, and the enlargement of the market coupling with other region's countries in order to increase the power security supply of the country.

Keywords: Security of supply, international and regional market, standards of quality, interconnection, network, electric energy, power

INTRODUCTION

If we look on the recent years in the Albania's power sector development and consider in the meantime the world and EU developments in the energy sector, especially those related to a cleaner environment, efficient consumption and diversification of the energy sources generation, the future of energy supply in Albania seems difficult. This means that the country needs more generated energy, but without integration to the regional and international power market the market supply will still be a challenge. We have a high volatility in power generation due to the 100% dependency on weather conditions - water flows and rains, for the power production. This makes Albania a heavy importer during dry season and exporter in wet season of the year. Looking at this from a power generation balanced approach, exporting and then importing power with time differences during the year, it may seem financially balancing. But the reality shows high financial imbalances at the end of the year due to high differences in export and import prices during different seasons of the year. We export when the entire region can export, due to wet season in the region and with not high prices, this relates as well as to low demand for energy consuming periods, and we import in the rest of the year, when power prices are very high, corresponding to high electricity demand periods. Considering the weather volatility through years, this makes it more difficult to provide power security of supply domestically, without interconnections with regional or larger sources. It provides also for more competition, larger markets and power volumes and better alternatives to energy sources and lower energy costs. Figure 1 shows the situation during the last 12 years.

Figure 1. Domestic production of electric energy 2009-2020 compared to the average production for this period in Albania



Source: TSO annual report 2020

To better demonstrate the risk of weather volatility, we can consider a high production year like 2018, with 8.55 TWh of power generation. This year the production was 89% higher than the previous year 2017, but the consecutive year production dropped by 39%.

Analysing the 2018 data on monthly bases, it shows the seasonality of energy production. The table 1 below shows the electricity versus the real production. The table makes a comparison among real energy production in 2018 and the energy production of the years 2007-2018 for the same month period. At the same time, we have analysed the gap between demand and production as well. It is obvious that there is a significant power generation between two periods: Jan.-Jun. and Jul.-Dec., and then, realise from the figures the incompliance among high intensity consumption periods with the high generation ones.

Table 1. Electric energy demand for 2018¹ (GWh)

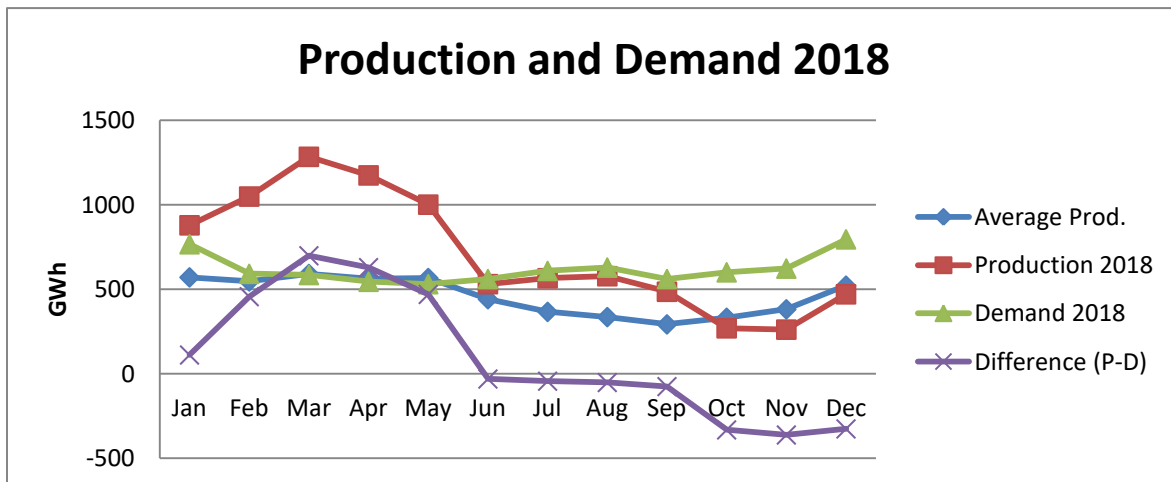
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Average Prod.</i>	571	547	591	563	567	442	367	336	293	332	382	522
<i>Production 2018</i>	879	1049	1284	1174	1001	531	566	578	486	270	262	471
<i>Demand 2018</i>	767	592	585	545	531	561	609	629	561	601	623	796
<i>Difference (P-D)</i>	112	457	699	629	470	-30	-43	-51	-75	-331	-361	-325

¹ Data collected from ERE annual Reports 2017 and 2018

The exported amounts of energy resulted to be about 2367 GWh and the imported amount is about 1216 GWh. The first figure seems to be positive with a strong advantage favouring exports. But considering the high difference between export and import prices, the value of exported energy is about 47 million Euro, and the value of the imported energy is about 73 million Euro. The overall balance results with a net negative difference of about 26 million Euro. We had almost the same picture during 2016 and the expectations are same for 2021. It is evident that even in “good” electric energy years the security of supply is threatened during different months of the year (we produce less than the domestic demand) and we are obliged to import to provide for all the demand without time limitations. If we count the intraday imbalances, as well as the imbalances in consumption forecasting and their deviated nomination during the day (volumes of production vs. volumes demanded), the challenge of providing security of supply becomes more difficult and with higher costs.

Other elements increasing this challenge are related to the transmission network and distribution grid in the country. The first must provide the high voltage network, domestic and international (interconnection), to provide for total volume demand of electric energy (total security of supply in national level) and the second must provide for customer security of supply. This is resolved through the correlated systems of operation, transmission system operation and distribution system operation. These are the controllable and manageable part of the security of demand as it is deeply technical and plannable. The only random factor to be calculated statistically is the defects incidence.

Figure 3. The deviations among production and demand for electricity on 2018



Source: Strategy of Energy of Albania 2018

EnC and EU insist that we should invest to increase power generation to be less vulnerable to the random demand for electric energy. But they insist also in increasing diversification in generation, both domestically and regionally, as well as increasing efficiency of energy by reducing consumption through better insulation and better transformation of the electric energy into other forms of movement and benefits. They emphasize that security of supply is a must to all energy market but providing it, cooperation and collaboration becomes a must and indispensable prerogative as well. Countries contributing internally to providing their security of supply with domestic sources, contribute to the regional and international security of supply too. But market integration and integrated use of the energy sources regionally or broader, increases the security of supply and the efficiency as well. Cooperating and joining sources covering regional consumption is an easier challenge than doing it separated with the concern of “guaranteeing their national sovereignty”. This is not only a national political issue, rather than a request of the market and of the regional integrated development of our countries in a more effective and efficient way, optimizing our sources to foster the progress of all the countries. Albania has a lot of evidence from the communist past where being “independent” for the sake of sovereignty, brought it to total economic collapse and political failure.

Another element to be considered while providing for security of supply recently, is the reduction of the conventional sources of energy, due to targets of environment recovering and sustainable development of our countries. The recent transit energy policies around the world, call for a reduction of carbon and other polluting gases emission. The near future calls for strong and rapid actions in this direction from all the countries in the Balkan region and in EU. So, discovering other sustainable and eco-friendly sources to produce energy is also a constant challenge to security of supply.

SECURITY OF SUPPLY AS A PUBLIC GOOD

Almost all the time the large debate stands for who’s responsible to provide the security of supply for the respective market demands for energy? Why shouldn’t it be independently provided by the consumers? Why important part of the energy markets, especially power markets should be public owned or operated by public organizations? Why the energy systems are highly vertically integrated and operated at large scale? Why states still maintain the monopoly of the sources of energy in terms of property?

There are several points of view to this regard. One is to shift from total monopoly of the state toward total deregulated responsibility to provide energy from private and free market initiative. Most encountered ones are hybrid systems, where the responsibility to

provide the energy is shared among state/governments and the market operators. But, in all the cases, the security of supply *per se* is considered a public good, where the responsibility falls on state to provide it in any case to the end users. The ways to fulfil this are different. In Albania it is granted by law and provided through the Universal Supplier. Even being in a deregulated power market, any end-user who can't find a supplier in the market, can address to the Universal Supplier (FSHU) for two consecutive months, and then back to the free market. As it may be still the same case, OSHEE has created the free trade supplier (FTL) to provide always electric energy in the deregulated power market with liberalized market prices.

Before 2004, when all the power market was centralised, KESH was responsible for the security of supply. They should guarantee this only through domestic power production and help meeting the demand through some random imports. The consumption also was oriented to round 5 TWh of electric energy per year. These demand volumes were not real as those did not reflect the increased consumption of electricity in the country by 2000' and on. The low coverage of the transmission and distribution network at national level, didn't allow large use of electricity for any purpose by the end-users. Starting by 2005 the power market situation started to change importantly and in 2008 the domestic demand for electricity was more than 7 TWh². KESH was unbundled in KESH (power generation), TSO and DSO (this last was privatized on the same year by CEZ). The transmission and distribution network were larger and with a wider coverage, and consumption had started to increase. Generation capacities started to increase too, but, still, Albania was a heavy importer of electric energy. Still, the weather volatility was an important factor to threat the security of supply for the domestic demand. The alternatives to this situation were found: first, increase in interconnection transmission capacities and, second, the increase in power production using other hydro sources. Albania was evaluated to invest more than 5 TWh of additional power production annually³. Consequently, in today's view of the second alternative, environment was under serious threat, especially forestry and agriculture, not to mention the wild fauna and flora. Today, on 2021, the expected generation capacities to electricity by hydro sources do not exceed 4 GW installed capacity, with an expected average of annual generation about 10 TWh (not all of the projects are completed). It is expected that such production can be achieved by the end of 2023. Starting from 2020 Albania is committed to provide more supply security through the development of other renewable power production from solar (PV) and wind (WF) power sources. The expectation

² TSO (OST) annual consumption report on 2008

³ Strategy of Energy of Albania 2018

is that we increase production potentially based on PV and WF by 5 TWh/year by 2030⁴. Actually, the installed capacity in PV is 22 MW⁵ and WF has not started with the production (under construction 14 MW). Albania has already signed two large thermopower instalments contracts of PV, Karavastaja 140 MW and Spitala 100 MW⁶. The process continues and these investments will seriously contribute to the security of supply. All these investments are private, concessionary agreements. Even the capacities are going to exceed the 4 GW installed capacities and will produce in average more than 10 TWh/year, the security of supply is still threatened from the weather conditions, as those are all sources depending on the weather. Balancing through months and seasons is still difficult to impossible and the first alternative becomes the most important one. It provides for more routes of providing electric energy from the region or larger. Investments done till now in transmission network mount for 1.25 GW of power, covering more than 83% of the actual domestic demand. The instalment of the 400 KV interconnector with North Macedonia, the future construction of two more 400 KV interconnectors with Monte Negro and Greece, as well as other interconnection lines of 110 KV and 220 KV with our neighbour countries, will increase our interconnection capacities to more than 1.8 GW of power capacity⁷. These cover more than 100% of our demand and contribute to larger opportunities for new generation capacity investments in the country to export our seasonally and annual power production. Both the alternatives developed in parallel provide for full security of supply and for efficiency and effectiveness of supply as well.

Under such future development what is needed is liberalization of the national power market and the integration to the regional and larger power market through market coupling projects to be developed with neighbour countries.

Mechanisms and tools like AIPEX (Albanian Power Exchange), market couplings, deregulation and liberalization of the power markets domestically and regionally will simplify this very important public good, the security of supply, to be largely provided all around the territory and fully during the day and year.

For each of the questions listed in the beginning of this point (subtitle) we can run separated analyses and come to a large list of variables to be estimated and still we shall not find complete clear answers and make clean systemic choices. But, being focused on the two main alternatives analysed here above and increasing energy efficiency can always provide for more and higher security of power supply for our domestic markets.

⁴ Strategy of Energy of Albania 2018

⁵ ERE annual Report 2020

⁶ MIE web page

⁷ TSO(OST) annual Report 2020

STATISTICAL EVALUATION

Considering all the above, we can list the following variables influencing on the security of supply: PP - Power production, TC - Transmission capacities, EEf - Energy efficiency, TeC - Territory energy covering, PDGC - Power distribution grid capacities, CEm - Carbon emission, RESDv - Renewable energy sources diversification, WV - Weather volatility, NDC - Network defects' coincidence, PRI - Political regulatory influences etc.

Security of power supply (SPS) is a function of all these variables. Running a multiple regression, based on the time series of most of the above-mentioned factors for the period 2003-2020, and on monthly data⁸, we can see a strong correlation of those with the security of supply. Under $n=204$ (monthly data), $k=7$ (PP, TC, EEf, PDGC, WV, NDC and PRI*) and $p=0.1$, the correlation is strong and $R=0.871$, $r^2=0.801$. All factors are significantly tested for t test and DW test. Reducing carbon emission (CEm) and weather volatility (high WV) we have a strong negative impact on SPS. The same can be verified for PRI too, even that the data are not monthly available. There is a correlation between the two variables CEm and PRI, as the last has increased emphasis on the carbon emission reduction and eco-friendly development of the power sector. But this does not have a strong effect considering multicollinearity and autocorrelation of the multiple regression. Estimating as an important variable in per se PRI* is related to the effects of the reforms in the power sector so far worldwide, since the Johannesburg Declaration of 2002 on the future sustainable development goals (SDG-s) of the world.

As for the other variables, those have a very strong effect on SPS increasing it through continuously improve and performance augmentation on defects adjustment. This last has a strong impact on the intraday security of supply, while avoiding defects and diminishing adjustment time of intervention.

CONCLUSIONS AND RECOMMENDATIONS

Based on the discussion and the analyses here above, by definition, security of power supply must be a public good. It is considered as such in most of the cases around the world, nevertheless it is verified that in some separated cases end-users must provide it on their own. SPS can't be provided based on only one alternative, rather then it must be an integrated effort, involving all possible influences according to the country or area specifications.

SPS is a dependent public good from other factors too, out of the power sector. Especially, politics have a strong impact while trying to provide for higher security of supply.

⁸ ERE annual reports 2003-2020

SPS is strongly connected to typical natural resources in every country/area/region. Those constitute the level of SPS, effectiveness and efficiency.

Better distribution of the sources of power vs. demand distribution, increases SPS. This is an optimizing effort. It reduces losses and redirects power production where the end-users are. This is the case of Albania, which is trying to achieve this through diversification of the power production. Until now the power generation is mainly established in the north and north-east, while the larger consumption is in the west and southwest of the territory. It increases losses and makes more difficult the balancing of the power market demand.

Larger markets can provide for higher security of supply through integration of the respective energy sources.

Under such conditions, we recommend that:

- Albania must continue the increase of investments in power generation.
- Diversification of the sources used for energy production is a must.
- Market deregulation shares the responsibility of supply with the entire power market, reducing this way the costs of providing it.
- Increasing energy efficiency is a very important source for Albania to provide for more security of supply, reducing the power consumption and the cost of the energy losses too.
- Having a cleaner environment, it provides for low carbon tax in the country. So, we must continue diversifying through development of RES to produce power.
- Continuing market coupling with Kosovo, Monte Negro and Italy, on-going projects must continue. This should be the national orientation with North Macedonia and Greece too. It will strongly influence in providing SPS with efficiency and effectiveness.

LIMITATIONS AND FURTHER STUDIES

Limitation to this study is the abstraction from the other public good related to power providing for the end-user, the quality of supply. It can impact on the limitation of the security of supply too as it can't be use in some cases for all the potential uses. To fill the existing gaps in the analyses of the sector and the enlargement needs as well as the diversification of the supply, it is important that in the future researchers should carry other complementary studies.

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