RENEWABLE ELECTRICITY IN WESTERN BALKANS: SUPPORT POLICIES AND CURRENT STATE

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The use of renewable energy sources for electricity generation in the Western Balkan countries is analyzed in this review paper. Since those countries are part of EU or intend to be, data for Western Balkan are also compared with data for EU-28. The first part of the paper presents a brief overview of main promotion mechanism for electricity generation from renewable energy sources. As a dominant support policy, the feed-in tariff is more elaborated as an incentive measure and a detailed overview of the amount of tariffs and quotas for dominant technologies in the Western Balkan countries is presented. Furthermore, the current state of installed capacities and annual productions of three particular renewable electricity technologies (small hydro power, wind power and solar photovoltaic) are analyzed in detailed. Based on presented data, there is a discussion and consideration of the impact of incentive measures on the electricity market and power production from renewable sources.

Key words*: small hydro power, wind power, solar PV, feed-in tariff, Western Balkan countries*

1. Introduction

There is no doubt that the world energy demand has recently witnessed a remarkable increase and is expected to reach a growth of 56% between 2010 and 2040. The energy market is facing much more challenges, such as limitation of fossil fuel reserves, population increase, lack of energy security, economic and urbanization growth [1]. Therefore, renewable energy sector started to attract investments and increased effort in the development of new technologies in order to become an attractive and viable alternative to replace conventional fossil fuel systems [2].

To overcome this future gap between energy supply and demand, as well as taking into consideration the risks from global climate change, a lot of attention is oriented to renewable energy sources (RES) intimately related with environmental preservation as well as to renewable electricity (RES-E) as their inseparable part. Support to RES-E is usually performed by the combination of several measures. Feed-in tariffs (FITs), feed-in premium tariffs (FIPs), tenders, quota obligations combined with tradable green certificates (TGCs) are usually applied as major support instruments, whilst investment grants, fiscal measures and financing are employed to provide an extra level of support [3]. A brief description of main promotion mechanism is provided below.

1.1 Feed-in tariff

FIT usually include three key provisions: (1) guaranteed access to the grid; (2) stable, long-term purchase agreements (typically, about 15–20 years); and (3) payment levels based on the costs of renewable energy generation. The FIT is also known as fixed-price policy as it grants a fixed payment for RES-E production [4]. So, the overall result of the tariff is flat price and tariff rate is usually differentiated on the basis of the source and the size of the project [5].

1.2 Premium tariff

The Premium tariffs or feed-in Premiums (FIPs) are a system of support for RES-E that establishes a premium on the existing market electricity price. Thus, FIP generates two sources of income for the producers: one with the sale of energy in the electrical market and the other with the receipt of the premium. In a similar way to the FIT, the premium differs based on the criteria applied in each country (energy source or technology used, size of the plant, electricity generation costs, etc.) [6].

1.3 Green certificate

The second widespread support mechanism for RES in Europe is TGC combined with a minimum quota obligation. In markets with enforced system of TGCs, electricity producers receive a certificate for every MWh of RES-E production [7]. The producers can sell the certificates at a market that functions based on supply and demand and therefore acquire additional revenue. At a market with TGCs, various parties (e.g., supplier, distributors, or consumers) may have a certificate quota obligation. The parties with an obligation need to show that a quota of their electricity comes from RES [8].

1.4 Tenders

In tendering support scheme, Government invites RES-E generators to compete for either a certain financial budget or a certain RES-E generation capacity. Defined technologically neutral or within a given technology band, the cheapest bids per kWh are awarded contracts and receive the subsidy. The operator pays the bid price per kWh [9].

1.5 Other support schemes

Other support schemes are mainly investment-focused strategies. Financial support is reflected in investment subsidies, favorable loans or tax reliefs, usually per unit of production capacity. These mechanisms are used in many countries to complement other types of incentive measures and policies for the promotion of RES-E. For this reason, it is difficult to estimate the results of these support schemes as an instrument for the promotion, but they have proved to have interesting cost-effectiveness characteristics [10].

2. Incentive policies in the Western Balkans

EU institutions have defined the "Western Balkans" as a southeastern European zone which includes countries that are not members of the Union, while the term can also refer to the geographical aspect. The Western Balkans (WB) is a neologism designed to describe countries of the former Yugoslavia without Slovenia, but with Albania. The region includes: Serbia, Bosnia and Herzegovina

(B&H), Montenegro, Kosovo* (UN 1244/99), Macedonia and Albania. Croatia, which is considered to be part of the WB, joined the EU in July 2013, but due to the relevance of the report entered into consideration. Among other things, as the only Member State, Croatia is important for comparing the results in the region. It is also important to note that all other countries have signed the Stabilization and Association Agreement and they are candidate countries, except Kosovo* and Bosnia and Herzegovina (B&H), which have the status of potential candidate countries [11].

Given that well-adapted tariff regime system is an effective scheme for promoting renewable electricity, fact that all countries of WB have adopted exactly this incentive system as a model for increasing production of RES-E should not be the surprise. FITs have consistently provided new renewable energy capacities efficiently and faster than alternative support mechanisms, although FITs have been left in many EU countries due to an unfeasible increase of the costs of the system [12]. As renewable technologies have matured and their costs have fallen, power projects have been increasingly supported by auctions, which can be designed to fulfill multiple policy objectives. While many countries have moved from feed-in policies with administratively set support towards competitively set tariffs through auctions, some countries have chosen to implement both.

In Table 1, systematized data presents a review of FITs at WB countries for the most common RES-E technologies established by governmental regulations of each individual country [13-20]. Data for Bosnia and Herzegovina (B&H) are presented in tow columns (Republic of Srpska and Federation of B&H) for each entity.

Table 1. Review of feed-in tariffs and amounts per kWh

<table>
<tr><th>Feed in</th><th>Serbia</th><th>Republic of Srpska</th><th>Federation of B&H</th><th>Croatia</th><th>Macedonia</th><th>Montenegro</th><th>Kosovo*</th><th>Albania</th></tr>
<tr><td rowspan="5">Small hydro power</td><td>Up to 0.2 MW: €ct12.60</td><td>Up to 1 MW: €ct7.87</td><td>2 – 23 kW: €ct14.84</td><td>Up to 0.3 MW: €ct13,94</td><td>≤ 85,000 kWh: €ct12.00</td><td>Up to 3 MW: €ct 10.44</td><td rowspan="5">€ct6.74</td><td rowspan="5">€ct5.00</td></tr>
<tr><td>0.2 - 0.5 MW: €ct13.933-6.667* P</td><td>1 - 5 MW: €ct6.78</td><td>0.023 – 0.15 MW €ct9.30</td><td>0.3 – 2 MW: €ct12.11</td><td>85,000 kWh - 170,000 kWh: €ct8.00</td><td>3 - 5 MW: €ct 8.87</td></tr>
<tr><td>0.5 - 1 MW: €ct10.60</td><td>5 - 10 MW: €ct6.36</td><td>0.15 – 1 MW: €ct7.03</td><td>2 – 5 MW: €ct11.46</td><td>170,000 kWh - 350,000 kWh: €ct6.00</td><td>5 - 8 MW: €ct 8.35</td></tr>
<tr><td>1 - 10 MW: €ct10.944-0.344*P</td><td rowspan="2">/</td><td>1 – 10 MW: €ct6.33</td><td>Over 5 MW: €ct6.90*</td><td>350,000 kWh - 700,000 kWh: €ct5.00</td><td>8 - 10 MW: €ct6.80</td></tr>
<tr><td>10 - 30 MW: €ct7.50</td><td>/</td><td>/</td><td>> 700,000 kWh: €ct4.50</td><td>//</td></tr>
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<table>
<tr><td>Wind</td><td>€ct9.20</td><td>€ct8.45</td><td>€ct17.86 - €ct7.10</td><td>€ct6.90*</td><td>≤ 0.050 MW: €ct8.9</td><td>€ct9.61</td><td>€ct8.50</td><td>/</td></tr>
<tr><td rowspan="4">Solar power</td><td rowspan="2">Roof-mounted up to 0.03 MW: €ct14.60-80*P</td><td>Roof up to 0.05 MW: €ct15.06</td><td>2 – 23 kW: €ct27.70</td><td>Roof up to 0.01 MW: €ct24.88</td><td>≤ 0.050 MW: €ct16</td><td rowspan="4">€ct12</td><td rowspan="4">€ct13.64</td><td rowspan="4">/</td></tr>
<tr><td>Roof 0.05 – 0.25 MW: €ct12.95</td><td>0.023 – 0.15 MW: €ct18.31</td><td>Roof 0.01 – 0.03 MW: €ct22.15</td><td>> 0.050 MW: €ct12</td></tr>
<tr><td>Roof-mounted 0.03 - 0.5 MW: €ct12.404 - 6.809*P</td><td>Roof 0.25 – 1 MW: €ct10.30</td><td>0.15 – 1 MW: €ct15.78</td><td>Roof 0.03 - 0.3 MW: €ct20.06</td><td rowspan="2">/</td></tr>
<tr><td>Ground-mounted: €ct9</td><td>Ground up to 0.25 MW: €ct12.01</td><td>/</td><td>Ground €ct6.90*</td></tr>
</table>

In addition to the tariff rates, countries of WB have also set quotas for renewable energy as a part of the National Energy Action Plans. Quotas represent the available power ranges for installing the new capacities with FIT support for each source individually and are part of a broader commitment overtaken for harmonizing energy policies with the legislation and practices of EU. In the concrete case, quotas are set up to reach the previously set targets for the share of RES-E by 2020. For obtaining quota and status of privileged producer, each country has prescribed individual administrative procedures and conditions which applicant must fulfill in order to acquire necessary permits and to be registered as the mentioned producer. Table 2 gives a quota overview at the national level for all sources that have been included in further consideration of this paper.

Table 2. Quotas for RES-E in Western Balkans countries

Country	Wind [MW]	Solar PV [MW]	Small HPP [MW]	References
Serbia	500	10	856 locations	[21,22,23]
B&H	350	16.2	50	[21,24,25]
Croatia	400	52	100	[21,26,27]
Montenegro	150	10	90	[21,28]
Macedonia	100	18	402 locations	[21,29,30]
Albania	30	30	980	[21,31,32]

Kosovo*	**150**	**5**	**140**	**[21,33,34]**

3. State of renewable electricity in the Western Balkan

In order to give an implication how support for renewables translates into energy-related expenditures from a societal perspective, a closer look at the electricity sector should be subsequently taken and how support for RES-E may be transferred to an end user.

The latest available information for 2016 (from statistical data) shows that electricity generated from renewable energy sources contributed more than one quarter (29.6%) of the EU-28's gross electricity production (Figure 1). The growth in electricity generated from RES during the period 2011 to 2016 largely reflects an expansion of three sources across the EU; principally wind turbines, but also solar power and solid biofuels including renewable waste [35]. Although hydropower remained the single largest source for RES-E generation in the EU-28 in 2016 (36.9% of the total), the amount of electricity generated in this way was relatively similar to the level recorded a decade earlier. By contrast, the deployment of wind power almost doubled over the period 2011-2016 and accounted for around one third of renewable electricity in 2016. The growth in electricity from solar power was even more dramatic. The contribution of solar power to all electricity generated in the EU-28 from RES rapidly rose from 0.3% to 11.6% in 2016, over the ten year period [36].

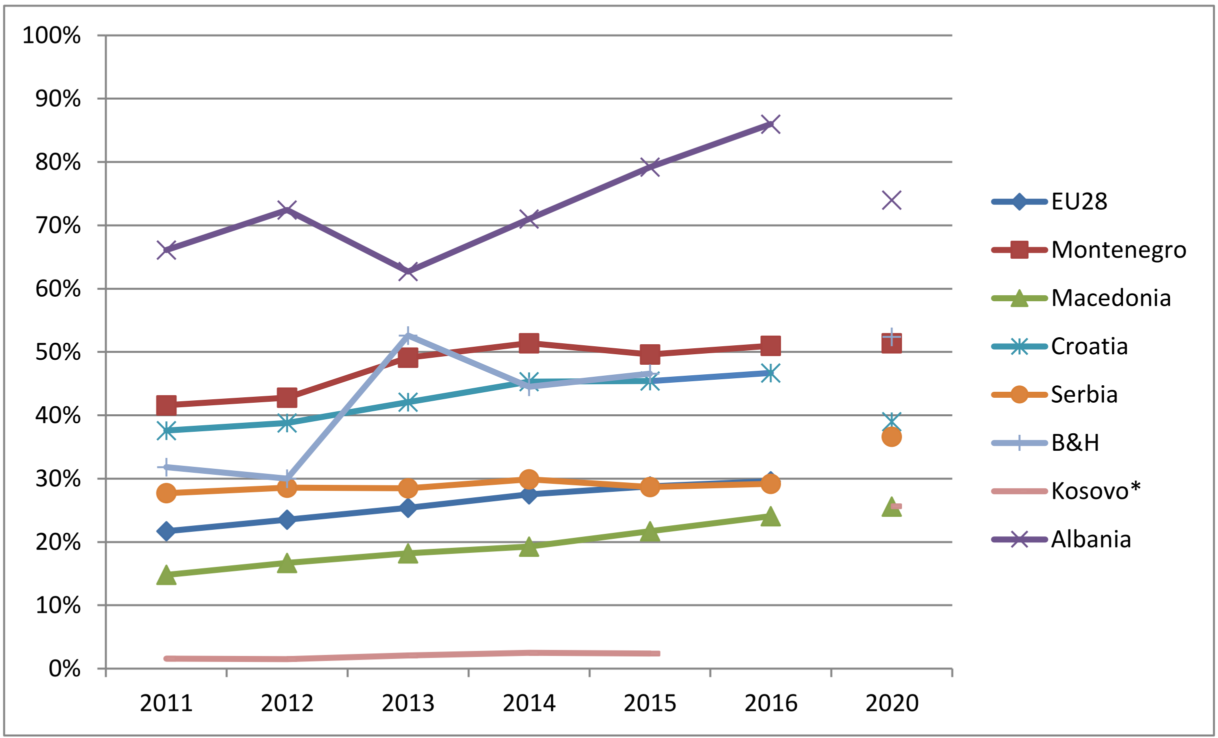

Figure 1. The share of renewable electricity and targets for 2020 [37-43]

Analyzing trends in RES-E production in WB, it can be concluded that all countries are close to or near their goals. Croatia achieved 46.7% in 2016, which is even more than proclaimed 39% by 2020. Montenegro is 0.4% and Serbia around 7% below projection, while Macedonia under the new 2015 Action Plan is at 1.5% points from its goal, in 2016. B&H is in a slightly unfavorable situation and it should increase participation in renewable sources by 6% in order to achieve 2020 target comparing to 2015. Albania, according to the Renewable Energy Action Plan from 2017 set its target high at 74%, but it should be considered that Albania already had almost two thirds of share in 2011. Apart from hydrological unfavorable 2013, Albania steadily improves. Kosovo* with 2.5% in 2015 will certainly not achieve planned 25.6% for 2020.

Figure 2 gives an overview of specific ECO2 indicators that in the given case represent electro energetic intensity. The FCE / GDP indicates the final amount of electricity consumed for the production of a national product unit, while RES-E / GDP is the case with electricity generated from renewable sources. They give a link between the use of energy and economic development, which is very important when it comes to assessing the progress towards sustainable development. The amount of electricity consumed per unit of GDP depends on many factors, ranging from the general living standard, economics, energy efficiency of buildings and electrical appliances, etc. The value of this indicator in the countries of WB is much higher than in the EU-28, according to the obtained data 3 - 4 times, while only Croatia is in a somewhat better position.

This situation is mainly due to the degraded state of energy infrastructure, high losses in transformation, transmission and distribution of energy, and there is inefficiency in the end-user sector, especially in the building sector. Economic activity is still very bad, and high electricity consumption implies that it is used irrational for non-industrial purposes, and thus does not contribute to GDP growth.

In addition to this, low electricity prices give poor incentives for increasing energy efficiency. For these countries, as developing countries, it is very important to apply energy efficiency measures to as many sectors as possible. It is necessary to focus, above all, on the same level of production or services with less energy consumed.

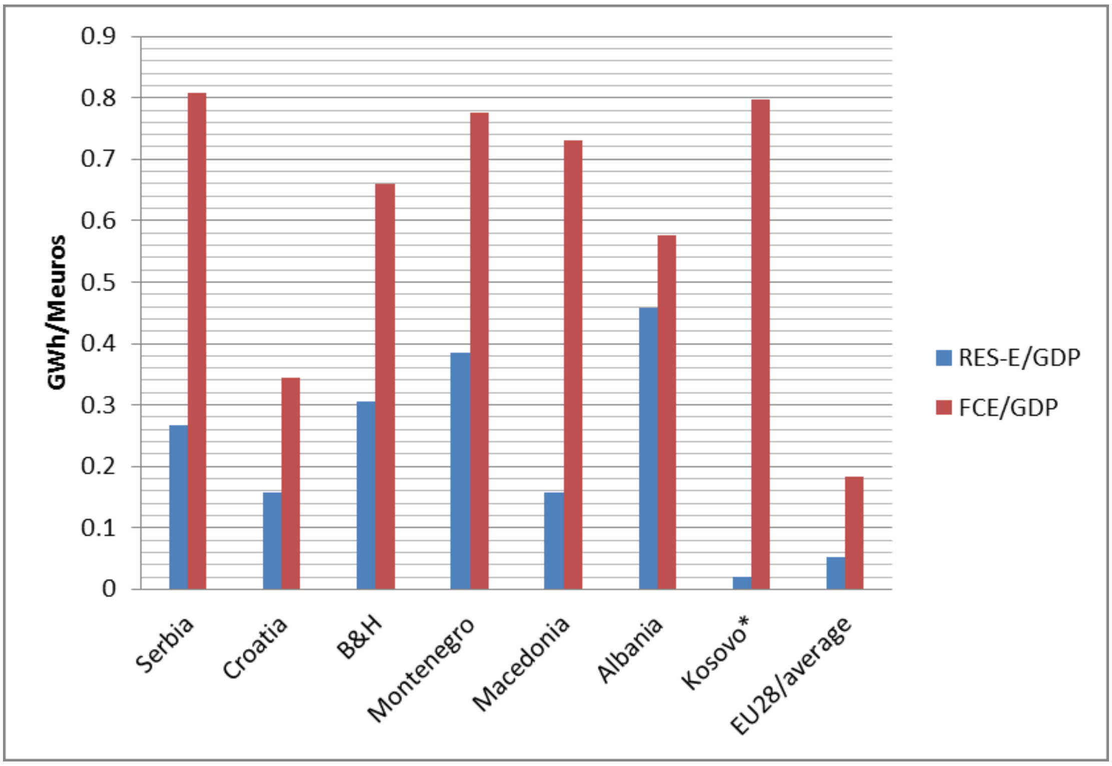

Figure 2. Specific ECO2 indicators for 2015 [44]

Figure 3 represents the share of hydro capacity in total installed capacities for production of RES-E. The capacities for all WB countries at the end of 2015 are in the range from 97% to 100% except Croatia (81%) and Macedonia (92%). These capacities predominantly are large hydro power plants built over the second half of 20th century in the time of expansive development. Therefore remaining big hydro power potential is very limited in all WB countries and practically there is no space for the construction of large hydro power plants. In order to achieve sustainable development of electric power system, it is necessary to invest in less profitable but alternative solutions, such as small hydro power plants, wind generators and photovoltaic cells.

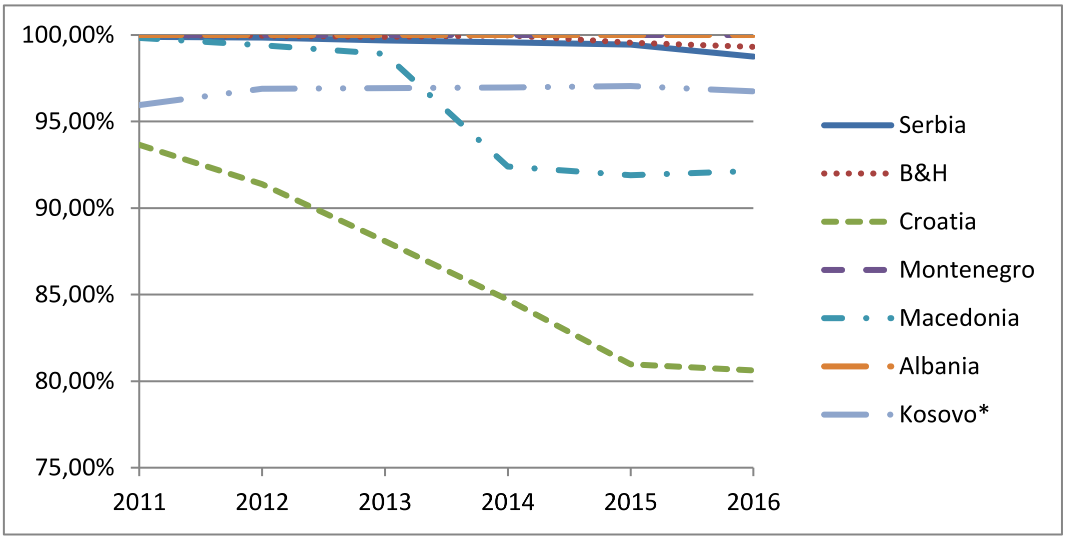

Figure 3. The share of hydro capacity in total renewable capacities

3.1. Small hydro power

When it comes to the capacities of small hydropower (sHP) up to 10 MW, practically all countries except Croatia records a significant and constant increase. The total installed sHP capacity in 2016 amounted to 37 MW overall in Croatia. The Energy Strategy by the Croatian Ministry of Economy, Labor and Entrepreneurship (2009) set a goal to build at least 100 MW of sHP by 2020 and currently only six plants are operational in the FIT system. From 100 MW of sHP ongoing projects, 96% is to be achieved, 3% are under Power Purchase Agreement with contractors and 1% is operational [45].

In Serbia, installed capacity of sHP up to 10 MW is 79 MW, while the potential is estimated to be 409.3 MW indicating that 20 percent has been developed [46]. So far, 88 sHP plants up to 10 MW have been built on the rivers of Serbia. Out of that number, 50 (4 built in 2015) with a total capacity of 71.3 MW and an annual electricity production of approximately 200 GWh are operational and 38 facilities with a total capacity of 8.67 MW are out of use [47]. According to the National Action Plan for Renewable Energy Sources [48], in the past two years, the state government has offered to investors 450 locations for the construction of sHP plants.

Montenegro has grown more than three times in small hydro capacities at the end of the observed cycle (Table 3). The additional installed capacity of 7 sHP plants amounts to 17 MW with an average annual production of about 21.4 GWh [49]. The remaining technical sHP potential on 70 locations (excluding locations on rivers of Tara, Ćehotina and Ibar) is estimated at 231 MW and 644

GWh/year [50]. In June 2014, the Government of Montenegro awarded concession contracts for the construction of 10 sHP on 6 watercourses in Montenegro with a total installed power of 23.3 MW and a projected annual production of 86.3 GWh [51].

Macedonia and B&H With have achieved constant multi-year growth. The total installed capacity of sHP plants in B&H was 97 MW in 2016 while the total potential is estimated to 1,000 MW [52]. In 2015, a 5.2 MW hydroelectric power plant was put into operation in Rogatica in RS entity. Another project of three sHP plants with a total of 9.6 MW power on Sutjeska River and its tributary Jabušnica is in the final phase. The planned total annual production is 33 GWh and the work on the first of three plants is completed. The start of production was at the end of 2016, and the construction of two remaining sHP plant is expected till the end of 2017 [53].

Table 3. Installed sHP capacities

MW	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Serbia	**31.00**	**33.00**	**37.00**	**54.20**	**63.20**	**79.00**
B&H	**39.19**	**60.00**	**72.00**	**79.00**	**95.50**	**97.00**
Croatia	**28.00**	**28.00**	**28.00**	**30.00**	**36.00**	**37.00**
Montenegro	**8.00**	**8.00**	**9.00**	**9.00**	**18.80**	**25.00**
Macedonia	**30.89**	**35.60**	**45.80**	**59.50**	**95.60**	**141.00**
Albania	**42.00**	**195.00**	**200.00**	**134.00**	**177.00**	**231.00**
Kosovo*	**10.07**	**10.07**	**10.58**	**12.80**	**17.40**	**31.30**

New installations in Macedonia have marked a significant leap forward – almost five time increase in installed capacities over a six-year period. Five cascade sHP plants with a total power of 10.9 MW (each in 1.4 - 2.8 MW power range) located in Kavadarci in Tikveš region were officially opened in 2015 [54]. During the tender launched in February 2014, Government announced that Macedonia has 30 projects in national sHP Cadaster, 16 of which are already operational and remaining 14 which have to be completed in the next few years [55]. Concessions are offered at 23 years. According to an assessment prepared by the International Finance Corporation technically feasible potential for sHP includes 200 sites with a possible capacity of 230 MW and annual production of about 990 GWh with a total required investment of about 460 million euros.

Albania is the region's leader in the overall strength of sHP with capacity increased around six times. The overall hydropower potential in Albania is estimated to be 17 TWh/year. One of the most important projects in Albania is Cerruja Hydropower Cascade. The project consists of two sHP, Cerruja 1 & 2 and is being developed on the Bejni torrent, located in the district of Mat in central Albania. The current total capacity of Cerruja Hydropower Cascade is 5.2 MW with an expected aggregated production of 14,763 GWh/year and estimated CO2 emission reduction of 9,537 t/year [56]. Also, one of the completed projects is Ternoves sHP plant located in northeast part of Albania, in the district of Bulqize, which has a design capacity of 8.3 MW. Based on the expected annual electricity generation of 43.1 GWh, the project also contributes to a CO_2 emission reduction of 27,830 t/year.

Kosovo* currently relies almost exclusively on two coal power plants for over 97 percent of its power generation, and the system is marred by high technical and commercial losses. With the planned closure of one of the coal power plants in 2017 country faces peak capacity gaps which are required to be met through expensive imports. There are plans, however, to augment power supply through the construction of aggregated 63 MW small-scale run-of-river projects over the country, while the Energy Regulatory Office of Kosovo* plans some 140 MW by 2020 [57].

3.2. Wind power

Based on the actual conditions of Albania it is foreseen that until 2025, around 4% of the total amount of electric energy (around 400 GWh/year) will be produced from wind [58]. In Albania, during the analyzed six-year period, there was no capacity installed in this sector. In June 2015, Albanian Government announced that it will establish a wind turbine complex in Kurbin area, aiming the construction of the first eolic park in the country. Facility will contain 12 windmills, each one 92 m of altitude at total cost investment of 54 million euros. The wind park will have an installed energy capacity of 36 MW and it is expected to be active for 30 upcoming years [59]. The Kryevidhi Wind Farm is another under - construction wind power project in Albania. It should have 75 individual wind turbines with a nominal output of around 2 MW each, enough to supply over 100,000 homes with a capital investment required of approximately 270 million euros [60].

In Montenegro, the production was not recorded until 2015, but the construction of Krnovo wind farm in the amount of about 120 million euros has started in May 2015 [61]. At the beginning of 2017, the construction of Krnovo was completed and its operation has begun. The first Montenegrin 72 MW wind farm is expected to generate 200 - 230 GWh of electricity annually, with a price of not less than 95.99 euros/MWh for the first 12 years of operation. Its implementation should contribute to the achievement of Montenegrin energy recovery goals, which implies that 33% of the total energy consumption will be produced from renewable energy sources by 2020 [62]. Also, the implementation of a similar investment in Možur near Bar, in the south of the country was launched in 2015. Project with 23 wind turbines and capacity of 40 million euros [63] should be completed by 2018 with 46 MW in total.

In 2013, Serbia has adopted a new Energy Law which presents a good framework for the development of renewable electricity. Nevertheless, investors were not satisfied with the model of electricity purchase contract for wind generators, so the capacity building was slow [64]. Work began on the first wind energy project in the country, the wind farm of 102 MW Plandište in the northeast part of Serbia in 2014. Project with costs of about 160 million euros and 34 wind turbines, each capacity of 3 MW, is planned to have an annual production of 212 GWh [65], but the plant is not yet completed. However, the Ministry of Mining and Energy announced in April 2016 that quota of 500 MW for wind power plants is fulfilled [66].

The Government of B&H has given its consent to accept a loan in the amount of 71 million euros for financing the construction of Mesihovina Wind Park in 2010. The planned location of the project is in the municipality of Tomislavgrad on the northern ridge of the Midena Mountain, with an assumed capacity of 44 - 66 MW and production of 128 - 146 GWh of electricity annually. The state-owned energy company in 2011 asked for investors for three more wind farms - 32 MW Velika Vlajna, 72 MW Poklečani and 52 MW Borova Glava. In addition, the regional authorities of B&H issued a permit for construction of 60 MW Mućevača wind park, 2.9 km east of Livno in the west of the country [67].

The only project in the course, Mesihovina is planned to be completely built at the end of spring 2017 with a commissioning in early 2018, as the first commercial wind farm in B&H. The government also agreed to provide a 65 million euros loan for another project - 48 MW wind farm Podveležje, and negotiates for a loan of 60 million euros for the 48 MW wind turbine Hrgud, developed by the Republika Srpska Electric Power Company in Berković municipality, but the contract has not yet been signed. B&H gives incentives for the wind, although this is not regulated at the national level but at the level of the two entities. In April 2016, the country finally adopted a long-awaited National Renewable Energy Plan outlining the target of 350MW of wind capacity by 2020 [68].

According to the Regulatory Office for Energy, Kosovo* has one active wind power plant of 1.4 MW which is clearly not operational and five unresolved wind projects (179 MW) [69]. Kosovo* could indeed become a wind energy producer through a 45 MW wind project in the village of Zatrić. Kosovo* stepped in 2013 on the path of realization of this venture, while the project was to enter the construction phase in 2014. Windmills of 48 MW in Budakovo and 51 MW near Vučitrn were also planned [70]. However, none of these projects have been achieved yet.

Leading countries in the region in wind electricity generation are Macedonia and Croatia. Macedonia has not shown any activity in this field until 2014, when the newly built capacity of 36.8 MW occurs on the field and records production of 71 GWh. It is the very first wind farm Bogdanci which construction was completed in February 2014 and it is expected to generate more than 100 GWh/year, enough to meet the needs of 60,000 households [71]. The power plant consists of 16 wind generators and the value of the project is 55 million euros [72]. But the Government's decision to set a quota for the total installed power of wind turbines at just 100 MW by the end of this decade leaves little space for growth in this sector.

Croatia has the sharpest increase in wind power capacity not only in the region of WB, but in the entire region of southeastern Europe. Croatia had progressed from year to year with an almost linear rise from 180 MW in 2012, over 339 MW in 2014 to 418 MW in 2016 [73]. Croatia has realized 19 wind facilities fully operational so far. By the end of September 2016 country added 34 MW of wind power just in that year, according to Windpower Intelligence. Also, a new contract was awarded for the implementation of 44.2 MW project in northwestern Croatia with 13 wind turbines on 79.5 m high towers. Delivery is expected to be in the first half of 2017 with the deadline for completing the project in the summer [74]. The wind and solar power quotas are fulfilled in Croatia, while a little more space has left for the construction of sHP.

3.3. Solar PV

When usage of solar energy for the production of electricity is concerned, there are WB countries in which there is a shift in terms of capacity building and those that have still not been significantly affected by this issue.

Solar power in Albania is widely available, but PV market in the country is not yet developed. Most of all Albania's electricity is renewable and comes from hydropower. The only program incentivizing solar energy was intended to solar thermal generation. The renewable energy Law passed in Albania in July 2013 paid specific attention to requirements for promoting solar energy in the country but didn’t give any actual results. Albanian Parliament in February 2017 approved new one which already had an impact on the development of the PV sector. Ministry of Energy and Industry has received an application for a 1.7 MW PV project which is planned to be located in Fier, in the Homonym province, and built at a cost of 2 million euros. This is not the first project proposal for PV which is currently under examination by the Government. In November 2016, a consortium formed by local companies had proposed to build a 50 MW PV plant in Malik, a municipality in Korçë County of eastern Albania. Under the new Law, named Law on Promotion of the Use of Energy from Renewable Sources, State Power Utility will be obliged to pay a 15-year regulated tariff to renewable energy power producers. In near future tender scheme could replace the FIT scheme which was never been applied to solar and wind plants due to the lack of a secondary legislation [75].

Kosovo* reports only 0.1 MW in 2015, so will not enter into more detailed consideration. Kosovo* has not yet set a tariff for solar energy, which implied poor development in PV sector [76]. First PV power plant in Kosovo* is in Đurđevik, Municipality of Klina. It was launched in November 2015 with an initial production capacity of 102 kW, with a plan to triple it, as Energy Regulatory Office claims.

B&H records a shift when the capacities are in question and reaches 14 MW in 2016 (Figure 4). The illogicality that occurs in 2014, when the installed power drops to zero whereas there are 2 MW in 2013, is difficult to explain and could be attributed to a statistical error in energy reports. It's hard to imagine that existing plants were shut down in 2014 and then rebuilt in 2015 due to fact that PV plants are at the very beginning of their life cycle, so there is no real explanation why they would be put out of service.

The Federal Ministry of Energy, Mining and Industry of B&H announced this year that 14 companies have applied for energy permits for PV installations. Several projects are already operational. The first PV system in B&H was put into operation in March 2012. The power of this system is 120 kW and the annual production of 140 MWh of electricity is forecasted [77]. In May 2016, production in 150 kW solar farm in Brankovica near Žepče started. The largest PV facility is in the south of the country around Bileća with 340 MWh of production annually. Also, five power plants were launched in 2015 and there are four other applications waiting to be approved by B&H energy regulatory body [78]. According to data published by the Renewable Energy and Cogeneration Operator, all solar energy quotas have been filled, which means that investors who plan to build solar power plants in B&H will have to wait until 2020 [79].

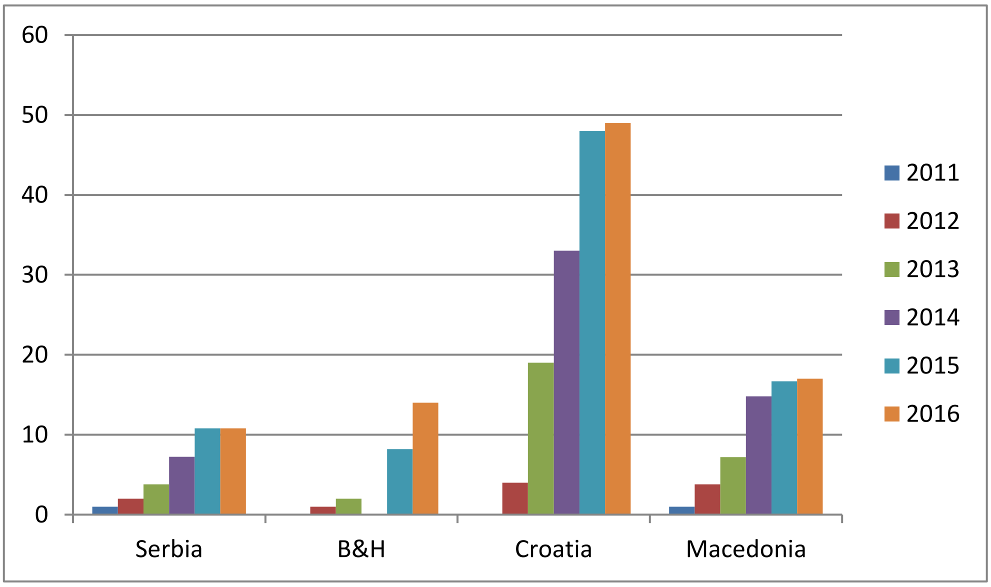

Figure 4. Installed capacities of solar PV [80-83]

Serbia is constantly increasing capacities of solar PV panels and with initial 1 MW in 2011 reaches almost 11 MW at the end of the observed interval (Figure 4). It is noticed that in 2014 Serbia produced 6 GWh of electricity in solar power plants. Production statistics for the previous years are not available. For the sum of all solar installations in Serbia is not expected to go beyond the current one until 2020. It is a little strange because of the relatively high solar tariffs that country provides, but the barrier for the growth in this sector is very low quota foreseen for PV – 6 MW for ground plant and only 4 MW for onboard installations until 2020.

One of the first significant PV installations in Serbia is 260 kW power plant put into operation in 2013 near the town of Leskovac. The larger 2 MW PV facility Matarova was also put into operation in 2013 in the village of Merdare, municipality of Kuršumlija. Furthermore, 2 MW solar PV plant was opened in the eastern Serbian city of Kladovo in November 2014, costing 3 million euros and covering an area of 5 hectares. In addition, 1 MW solar farm near Beočin, in northern Serbia in September 2014 has begun with work. The plant covers over 1.2 hectares with construction costs of 1.8 million euros [84]. Some measurements for Bavanište region near town of Pančevo were conducted in 2015, also [85].

Macedonia has recorded the highest growth in installed PV equipment. With 1 MW at the beginning of the observed period, Macedonia reached 17 MW in 2016 in a total of 102 production units. Although Macedonia has the highest growth percentage, still isn't the region's leader in overall installed capacity. This place is, as in case of wind generators, reserved for Croatia. These two countries are practically overlapping only in 2012 when their installed capacities are around 4 MW. Afterward, Croatia moves into more intense growth and at the end of six-year period records 49 MW of PV panels. If we take into consideration that country started 2011 without installed capacity, this is the best achievement in the WB region.

4. Policy implications

The state of RES-E in WB is colorful but optimistic from the achieving of the set targets for 2020 point of view. The breakthrough in all mentioned renewable sources is not the same and is quite different from country to country, but it seems that entire WB is on the road that will not bring too much disagreement with plans. It seems that countries have decided, in terms of their own possibilities and natural resources to ensure fulfilling of their goals and objectives by expanding one, possible two renewable sources. Then states have set up a monopoly on them and set quotas very high, while others stay lower and being left to free demand. A rare case is one where state struggles for equal development of all areas that fall under the domain of renewable sources.

Albania plans to meet its 2020 target mainly by hydro power, which is in correspondence with FIT adopted only for sHP. It seems that due to a lack of investors Albania could have some troubles in achieving the high set goal. This means that far less than 800 MW of planned large and sHP would be built by 2020. Albania is substantially delayed in taking the support measures necessary to reach the targets and generally in the adaption of the legal framework required by the RES Directive. Not only the RES Law is not fully transposed to the EU Directive, but also the adoption of secondary legislation has been pending for a long time. New National Action Plan for Renewables from 2017 might change the situation.

Kosovo* is planning to expand small and large hydro power plants as well as wind, and to a lower extent solar and biomass electricity facilities. The largest hydropower plant Žur was supposed to start with implementation in 2010 but the process failed. Despite the existing legal framework providing FIT for RES production, there was no RES generated electricity on the basis of FIT support scheme until 2014 due to difficulties in securing the necessary financing. To combat this, Kosovo* has recently updated legislation introducing amendments aiming to provide a more stable investment environment. Because these amendments are very recent, it remains to be seen whether such initiatives will be enough to promote RES development. According to the current scheme, Power Purchase Agreements are duly signed only after the construction of RES plants at the time of their commissioning, which makes project funding difficult and needs to be changed.

In B&H only one wind park has been built so far, but several are in the pipeline despite a comparatively low level of the FIT. For sHP level of FIT seems sufficient for a strong expansion and both quotas for solar and hydro are filled out. B&H authorities could give more security to investors, particularly the provisions regarding the possibility of one side changing the agreement and jurisdiction clause, thus ensuring the increased security of investors. The obligations of the investors could be more clearly and precisely defined as well. The agreement between operator and investors also should be very precise about the costs and payments and should guarantee such status for the whole duration of the agreement.

Macedonia aims to meet 2020 target mainly by large and small hydro, wind and to lower extent solar electricity. So far only one wind park has been constructed by the state-owned utility. The Government tries to attract foreign investors by collecting more data on onshore wind potentials. Also, it is unlikely that country will be able to build planned large hydro capacities by 2020 suggesting the need for a revision of the NREAP plans. To meet the target, additional efforts beyond what is planned would be needed and in order to be achieved, result calls for an additional set of measures that will converge towards the supportive environment for additional use of solar power and biomass.

Montenegro plans to meet its 2020 RES target mainly by an additional deployment of hydro power and wind power technologies. One of two wind parks, Krnovo (72 MW) is already finished and other; Možur (46MW) is going to be completed by the end of the next year, meaning that the country seems to be on track to meet wind targets. However, the legal framework could be improved. Conditions for concluding a Power Purchase Agreement between investor and operator does not provide sufficient security for the investors. The agreement is signed after the construction of the plant is finalized and it also does not provide the security instruments for the payment of the purchased electricity.

Serbia plans to achieve 2020 RES targets mainly by large and sHP and wind. There is, however, no wind farm in Serbia so far witch obtained operational permit. According to stakeholders the FIT are sufficient in Serbia. The main barriers are administrative ones. One of them is fact that there is a temporary privileged producer status, which reserves the capacity and it may be lost if the project is not commenced or finalized within a time limit. It seems that securing of its duration and financing should be dealt with. The new Power Purchase Agreement should also deal with the issues such as instruments for securing of payments, amounts of FIT and changes of support measures during the probation period of operation of the plant, which is significant due attractiveness of the investments.

Croatia ought to be one of the countries in Europe which easily could be transformed to an energy efficient, sustainable renewable based economy. With its small population, relatively low energy demand, ample sun and wind resources, large areas of forest and large existing hydropower plant capacity, state have a favorable starting point for renewable energy compared to some other countries [86-87]. The Croatian Energy Association warned that National Action Plan for Renewable Energy 2020 sends a very clear message to investors that the incentives for the construction of plants using RES are almost spent. According to the document, the scale of 1,200 MW wind power has been reduced to 400 MW by the year 2020 and quotas for wind and solar power have been completely used up. The new Action Plan shifts its focus away from encouraging mainly wind turbines and solar parks and concentrates more on stimulating the development of biomass, biogas and as well the development of sHP [88]. The Association believes that this should not discourage investors from continuing with development of renewable energy in the context of technical or market constraints. The produced energy can be used for their own use or for sale at the average market prices. The Association expects that soon a new Law on renewable energy sources and efficient cogeneration will be passed, which should open the path for further development of this sector in Croatia. Neither EU is raising this as an issue because Croatia is, even with its lackluster efforts, on track to meet its 2020 renewable target.

Also, one of the overall and main market obstacles concerning RES-E generation is the fact that the price of electricity in WB countries (except partly in Croatia) is subsidized by the Government (especially for households – Table 4). The price of electricity is not cost-reflective being set according to affordability and is currently the lowest in Europe. This has a negative impact on renewable energy investments reducing the demand for RES-E since investments out of FIT quotas are economically unfavorable.

Table 4. Average electricity prices in WB and EU

	Average electricity prices 2013-2015 [EUR/kWh]		**Ratio**
	households	**industry**	
	1	**2**	**(3)=(1)/(2)**
EU 28	**0.206**	**0.119**	**1.73**
Croatia	**0.133**	**0.093**	**1.43**
Serbia	**0.062**	**0.067**	**0.93**
Bosnia & Herzegovina	**0.081**	**0.063**	**1.29**
Montenegro	**0.099**	**0.075**	**1.32**
Macedonia	**0.081**	**0.078**	**1.04**
Albania	**0.104**	**n/a**	**-**
Kosovo*	**0.059**	**0.078**	**0.76**

Thus, a strengthening and fine-tuning of policy initiatives offering adequate support for all available RES-E technologies and a rapid removal of non-cost barriers that hinder a rapid takeoff of RES-E appear to be indispensable for achieving 2020 deployment plans and for meeting overall binding RES targets. Many factors are driving the rapid uptake of renewable energy, the growing global support for renewables and progressively more ambitious targets. Chief among these are mitigating climate change; reducing local air pollution; strengthening energy security and system resilience; maximizing investment revenues; creating local economic value and jobs; and increasing access to affordable, reliable and sustainable electricity [89]. Policy makers are enacting targets and policies to support renewables, while private companies are increasingly investing in RES-E and consumers are choosing to purchase renewable electricity and invest in renewables themselves. In the course of the transition to RES, key players have emerged, among them national, state and provincial governments; cities and local governments; large corporations; utilities and regulatory bodies, individuals and communities. Despite the powerful factors driving the global uptake of renewable energy and the number of players supporting the transition, multiple barriers inhibit further development in developed and developing country contexts. These vary based on specific markets and renewable energy technologies. Moreover, they can overlap, so that even if one is overcome, others may become apparent.

5. Conclusion

All countries of the Western Balkans have committed to increase the share of renewable sources in electricity production by 2020 and reach targets between 25% and 75% of their energy mix as part of broader commitments taken from the Energy Community Treaty. This is close to be achieved when the investment plans for new production capacities are being reviewed and the entire region is well on track to accomplish its goals. The numbers sound optimistic and the actual increase is above 10% in most of the countries when compared to base 2011 year. However, it is necessary to note that this is a thorny and complicated path.

The reasons for this are varied and range from illogical permitting procedures and undeveloped legislation to lack of political will to move the projects forward. Long-term planning and the will to change the status quo are currently missing in the countries' energy policies. It is often the case that draft energy strategies remain at this stage for years on while new projects are permitted without a clear assessment or vision. Finance for the projects does not appear to be lacking, but even for those projects which have managed to obtain the relevant permits, conservatively set quotas on grid connections mean that they may have to wait for several years to become operational. Procedures for land planning and obtaining construction permits are time-consuming and it seems to be a misperception that investment in renewables is all about acquisition an energy license and obtaining the feed-in tariff and status of privileged electricity producer. It also seems that a significant number of projects are announced for domestic policy purposes or published for marketing goals. Countries of Western Balkans have a breakthrough in specified sectors, however, progression is not uniform and certain irregularities are identified from which some conclusions could be drawn.

When it comes to small hydroelectric power, progress in production and construction of new capacities throughout the region is mildly slow but stable. The prescribed quotas are of moderate character, auctions for new locations are regularly maintained and investors are satisfactorily responding while having enough of them. It seems that this field has a steady growth for the entire Western Balkans. The situation with wind power is somewhat different. Although prescribed quotas are the highest of three analyzed sectors and even in most countries fully met, the progress is sluggish and slowed down. Many of the announced investments have not yet been started and buildings of construction plants are often faced with multiple extensions of deadlines and commissioning delays. It seems that this sector needs additional incentives and efforts for sustainable development, especially in terms of considering the amount of the prescribed tariff for this type of production. In the field of solar photovoltaic different circumstances prevail. Progress is generally not absent, even could be said that is not slowed down, which is probably conditioned by relatively high regulated tariffs throughout the region. What constitutes a problem in this area and limit further growth are modestly prescribed quotas. They are long overdue in most countries, so investors have to wait for 2020 and a new development strategy which should bring more than necessary space for the further development of this section. Until then, the production of renewable electricity from solar photovoltaic panels will be limited and in the shade of wind generators and small hydro power plants.

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