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Research on demand

Renewable Energy in SEE Develops, Nuclear Projects Brought to a Halt

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Contents

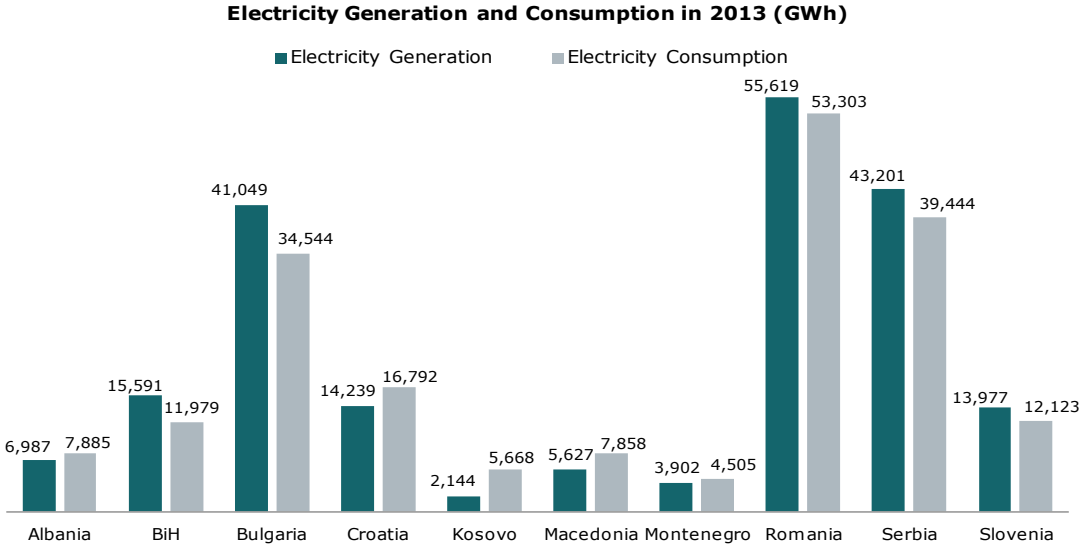
INTRODUCTION

Any debate over the phasing out of operational nuclear reactors in Southeast Europe (SEE), which produce 14.7% of the region's energy, is off the agenda for now even in the aftermath of the disaster at Japan's Fukushima nuclear power plant (NPP) in 2011. However, nuclear power projects in Bulgaria, Romania and Slovenia did not make progress due to lack of interest, investors' withdrawal or governments' incapability of developing a sustainable concept on the energy system.

The region will perhaps choose a course of development for its energy industry that will avoid a clash between nuclear and renewable energy interests and the SEE countries will instead focus on ensuring the safety and reliability of power generation. However, the conflict in eastern Ukraine and the annexation of Crimea by Russia draw the attention on the need of securing the electricity supply in a region where countries are dependent on import of fossil fuels.

SEE ELECTRICITY MARKET

In 2013, electricity consumption in SEE remained almost flat amounting to 194.1 terawatt hours (TWh), up 0.9% on the year, while generation increased by 4.2% to 202.3 TWh. The average increase in electricity generation across the countries in the region stood at 14.3%. It was highest in Albania and Montenegro due to extremely favourable hydrological conditions, while Kosovo, Macedonia, and Bulgaria reported a decrease in their production.



Source: National Statistical Offices, SeeNews Power Market, ENTSO-E

Trying to keep electricity generation higher than demand is crucial for the countries in SEE, as most of them are net importers of petroleum and natural gas. In 2013, electricity output of the local power plants exceeded domestic demand in Albania, Croatia, Kosovo, Macedonia, and Montenegro, while Bosnia and Herzegovina, Bulgaria, Romania, Serbia, and Slovenia covered their domestic needs and exported to foreign markets. Bosnia and Herzegovina produced 3.6 TWh above the demand in 2013. Slovenia generated 1.8 TWh more electric power than its annual energy consumption.

The electricity balance in SEE is delicate, with electricity demand seen rising by 2.5% to 3.0% per year, according to the Institute of Energy for South-East Europe (IENE). Back in 2008, consultancy firm KPMG and German research institute European Stability Initiative warned that unless SEE countries invest in new power plants, the region would become increasingly dependent on electricity imports in the following years.

RENEWABLES

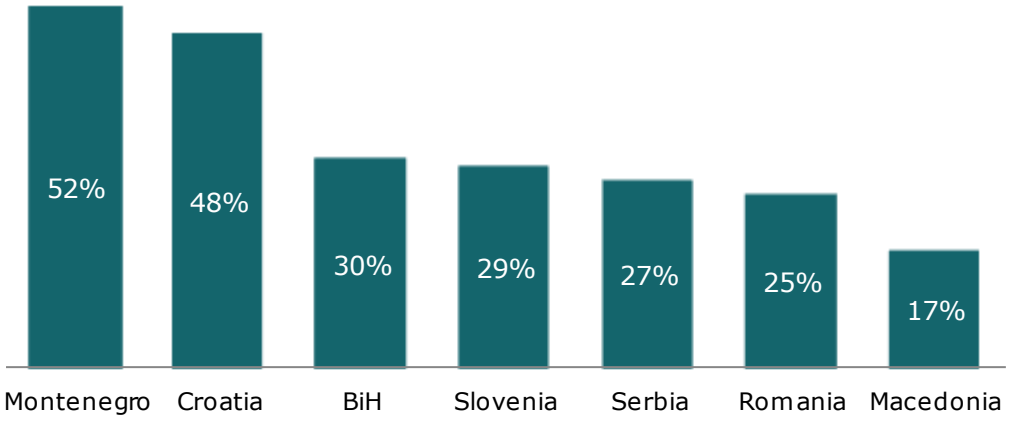
The power of wind across the region exceeds 7.0 - 8.0 metres per second, with Bosnia and Herzegovina, Bulgaria, Croatia, and especially Romania, benefiting the most from their location and relief. Bosnia's wind potential is estimated at 2,000 megawatts (MW). Bulgaria could develop wind projects of up to 3,400 MW, according to the Bulgarian Academy of Sciences. In the last few years, the country has announced 23 renewable energy projects, with total wind power capacity of more than 2,300 MW, according to the BNEF database.

In 2013, the highest annual growth rates on the wind market in SEE were seen in Croatia (68%), as well as in Romania (36.5%), which also ranked in the top 10 countries in the world by newly added wind capacity in 2013, by data from the international organisation Renewable Energy Policy Network for the 21st Century (REN21). Slovenia installed wind power capacity for the first time.

Electricity production from photovoltaic installations in the region is also considered to have potential. Several areas in Albania enjoy over 2,000 hours of solar irradiation a year, Bosnia's capacity for solar power is estimated at some 1,900 TWh, Macedonia has untapped resources to produce 10 GWh of solar energy per year. Montenegro has outstanding solar irradiation levels, gathering nearly 50% of all possible sun rays for a year. Serbia offers almost 40% higher annual levels of solar irradiation that the average in Europe. Romania's total installed capacity of solar power amounted to 1.2 GW in 2013.

Hydropower is vital for SEE electricity generation since it is the most widely used resource, apart from fossil fuels and nuclear energy. More than 50 large rivers flow in the region, delivering some 19,344 MW of installed hydro capacity, according to KPMG's Central and Eastern European Hydro Power Outlook. Unfortunately, the countries utilise less than half of their technical potential. Although water is a renewable resource, only the small hydro power plants (SHPPs) with an installed capacity of 10 MW or less are recognised as truly renewable. KPMG's Hydro Power Outlook shows that SHPPs account for 8.4% of the total installed hydro capacity in SEE.

Share of Renewable Energy Sources in Electricity Generation in SEE Countries in 2012



Source: Renewables 2014, Global Status Report

The hydro resources in the region continue to be utilised and developed. Using the local water resources for electricity generation, would reduce countries' reliance on imports from their neighbours, particularly in Croatia, Macedonia, Montenegro and Kosovo.

In 2012, the share of renewable energy sources (RES) in Romania's total energy consumption stood at 22.9% The country's target, set in the Europe 2020 strategy, defines the RES share of 24%. The country's electricity production from RES already meets the demand. Slovenia reported a RES share of 20.2%, with a 25% target. Reportedly, Bulgaria already exceeded its target of 16% renewable energy consumption in 2012.

Given the favourable climate, it would be natural for the local governments to make more effort to promote green energy across SEE. Adequate legislative measures may also be instrumental in pouring capital into the local energy sector. However, in some SEE countries, which previously supported renewable

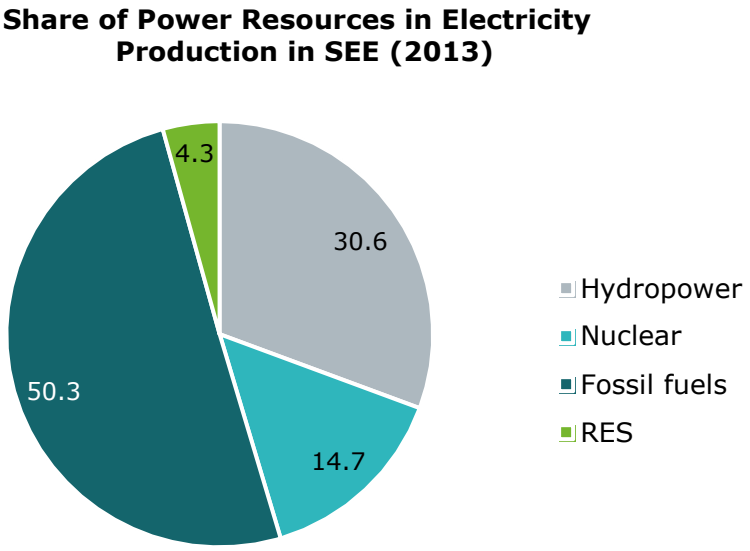
technologies, introduced retroactive taxes and fees on green energy in 2013 and early 2014. Bulgaria imposed a 20% tax on revenues from solar PV and wind installations in December 2013.

NUCLEAR

The majority of the SEE countries have never relied on own nuclear sources. A quick reference to the energy profiles and strategies of the countries reveals that only Bulgaria, Romania, Slovenia, and Croatia have any tradition in nuclear power.

Bulgaria is the leader among the three countries in terms of installed nuclear capacity with the two 1,000 MW operational reactors of the nuclear power plant (NPP) AEC Kozloduy EAD. The country's ambitions for energy security and independence include the construction of a second 2,000 MW nuclear plant near Belene, in northern Bulgaria. The project is currently suspended due to the opacity of the investors and disagreement in the country around the need for a new NPP. There are different estimations on the final cost of the project ranging from EUR 4.0 bln to EUR 10 bln, which is crucial for the pricing of the electric power. In addition, the installation of new capacity would lead to a generation surplus of more than 12 TWh and Bulgaria will have to assure other markets to supply its production. In January 2013, Bulgaria held a referendum on the need for the construction of a new NPP. Although more than 60% of the voters backed the plant's construction, the turnout was below the voting threshold and the referendum was not recognized.

In April 2012, the Bulgarian government decided to add a new 1,000 MW unit at the Kozloduy NPP as an alternative to the construction of Belene NPP. Currently, the project is at initial stage of estimating the technical and financial details and construction is expected to begin in 2016. In August 2014, the Bulgarian government contracted U.S.-based Westinghouse, controlled by Toshiba Group, to construct the new nuclear reactor.



Source: ENTSO-E

Romania has two 700 MW operational units in Cernavoda NPP. The nuclear plans of the country envisage additional capacity of 1,440 MW. The project has been assessed at worth EUR 5.0 bln. The government has been searching for new investors in the project after previous strategic partners RWE, GDF Suez, CEZ and Iberdrola bowed out of the venture. The plant's operator Nuclearelectrica SA adopted a new strategy of establishing a joint venture with a private investor. Romanian officials are in talks with Chinese company China Nuclear Power Engineering Co. Ltd for its participation in the planned Cernavoda 3 and 4 units. In November 2013, Canada's energy company Candu Energy Inc. announced that it signed an agreement with China Nuclear Power Engineering Co. Ltd to participate in the development of the project. The commissioning of the second pair of reactors at Cernavoda NPP has been extended by two years to 2019.

After sharing Krsko NPP and its 696 MW capacity with Croatia for 30 years, Slovenia had to decide on a new wholly-owned 1,100-1,600 MW unit at Krsko. In January 2010, the owner of Krsko NPP - GEN Energija d.o.o., applied for a permit to build another reactor at the site, and the Slovenian Ministry ofEconomy was expected to return an answer by end-2011. There was no further development on the construction of the new unit.

In 2013, Slovenia's NPP generated 36% of the country's total electricity production, followed by Kozloduy NPP, which generated 33% of the electricity in

Bulgaria. Albania relied exceptionally on hydropower as the share of energy generated from hydropower plants amounted to more than 84% of the total production in 2013, while Montenegro's electricity production from hydropower plants was 67% in the same year. Serbia and Macedonia produced most of their energy from fossil fuels, 74% and 73% respectively. Romania was the leader in terms of renewable energy production which totalled to 10% of its electricity generation in 2013.

EUROPE 2020 NEW TARGETS

The commitment of the EU to cut greenhouse gases brought about the climate and energy package, which has set ambitious targets for at least 20% cut in emissions of greenhouse gases by 2020, compared with 1990 levels, a 20% cut in energy consumption, and a 20% increase in the share of renewables in the energy mix of the bloc. It was exactly the desire of the EU to tackle the climate issue and its deepening reliance on natural gas imports that gave stronger impetus to renewable energy across Europe through Directive 2009/28/EC. As the member states were in different stages of introducing green sources to their energy mix, the proposed RES target varied between countries.

On January 22, 2014, the Europe 2020 strategy's targets and time of implementation were modified. The revised energy strategy is expected to be fulfilled by 2030 and envisages a further reduction in greenhouse gas (GHG) emissions to 40% of the 1990 level. Another goal, set in the new energy framework, is the binding target for renewable energy of at least 27% at EU level.

SEE countries, which rely extensively on fossil fuels for electricity production, will have to meet relatively lower targets in recognition of their efforts to reduce carbon belching. Still, the region is lagging behind western European countries in harnessing the power of the sun, wind and water for electricity generation. EU-members Bulgaria, Romania, Slovenia and Croatia stand the best chance of meeting their goals through the adoption of legislative changes and investment incentives.

Wind and solar resource maps and assessments by the National Aeronautics and Space Administration (NASA) show that the region has good prospects for developing renewable sources - Albania, Macedonia and Serbia have high solar irradiation levels, while Bosnia and Herzegovina, Bulgaria, Croatia and Romania have potential to harness wind power. The plentiful water resources throughout SEE will also help the countries to attain their RES goals. In Albania more than 84% of the electricity comes from HPPs. However, the requirement for an HPP to be green is that its capacity is 10 MW or less, while the majority of HPPs operating presently in SEE exceed that limit.

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