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Alternative energy generation and its economic impact on developing countries: A case study of Albania, Kosovo, Montenegro, and Northern Macedonia

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Abstract. Energy as a comprehensive source of economic development has undergone transformation and is evolving into alternatives. Due to the concerns about pollution, energy generation is constantly seeking an alternative that is friendly to the environment, or at least with substantial lower harmful effects. This effort involves costs of investment, especially in developing countries. Investment in alternative, cost efficient and friendly environment energy is no longer the sole isolated objective of a country, thus it may involve several countries, especially neighboring ones to coordinate their efforts. This paper looks into the state and prospects of alternative energy in four small developing countries in the Balkans: Albania, Kosovo, Montenegro, and Northern Macedonia by analyzing their current producers, shortage and/or surplus of energy, sources, environmental costs, and the impact on their national economies. All this in a relatively small area of over 72 000 km² and 7.4 million inhabitants of four countries. A particular emphasis will be placed on comparative analysis of hydro-power and solar energy.

Keywords: developing countries, alternative energy, environmental pollution, economic impact

Introduction

Alternative energy to fossil fuels is not necessarily related only to the environmental concerns but also to the problem that coal, oil and gas reserves are declining from exploitation. But alternative environmental friendly energy such as from the hydro power plants, wind, biomass and solar have also their limitations. Despite being aware, poor countries are faced with the limitation of investment in the capacities of alternative energy. Rich countries on the other hand, would be more active in filling this gap in investment, but they go after profit which often meet with various regulations. Power generation, electricity in particular, which is still heavily dependent on fossil fuel with increasing consequences to the climate change, is now becoming regional and global concern due to its toll on the environment. Even in actual conditions, many countries are still interdependent in power supply. And so are the four small countries in the Western Balkans in electricity consumption as they sometimes face shortages and surplus. Some three decades ago, three of them (Kosovo, Montenegro, and Northern Macedonia) were part of one state (former Yugoslavia) and had their own electricity production capacities which also covered part of each other, but after became independent states and increased demand for consumption, they realized that regional cooperation and interdependence is still necessary. This interdependence is likely to be continued and expanded especially in reducing the fossil fuel based in favor of alternative energy. The group now includes Albania which has got around

90% of her electricity generated from hydropower plants. Northern Macedonia has also got a considerable share of total electricity generated from renewable sources, of which 35% comes from hydropower plants. The situation with Montenegro is more different as 54% of total electricity is generated from coal thermo power plants, and much more different in Kosovo where this share is as high as 97%.

Apart from their own objective for alternative energy, the countries in question are required to meet the framework for energy and climate of the European Union Commission (2017) to reduce the greenhouse gas emissions by 40% along with increasing the share of renewable energy by up to 27% until 2030. The framework stipulates that it is no longer a policy but is a binding requirement that must become reality. Although none of the countries taken in this article are member of the EU, the energy policy applies to them as they have considerable reforms underway by the EU support to which they are expected to become members. Meeting that objective will

depend on the current state of power generation in these countries and their planned investment. The biggest challenge will be for Kosovo which is already a large pollutant and is planning to build a new thermo power plant to fulfil her needs for electricity supply and export to the neighboring countries. While the prospects for three other countries are favorable of reducing the coal burned electricity generation, especially for Albanian and Northern Macedonia, it is uncertain how Kosovo will have to make efficient use of large reserve quantities of lignite. This article will explore to what extent increased alternative renewable energy can keep up the current pace of economic growth while reducing power generation from the non-renewable sources.

Literature review

Alternative energy is gaining a sharp attention among the policy makers and scholars. It has been a subject of interest as early as beginning of the 20th century, e.g. in Bell (1906), but it entered into a more intensive research since 1970s. The necessity for renewable energy has emerged not simply as an alternative, but more from the concerns of climate change and environmental degradation. The world still relies heavily on the fossil fuel energy, which the International Energy Agency – IEA (2017) estimated at around 80% of total energy. How long it will take by the current trend to replace the fossil fuel based energy with alternative sources? It requires enormous collaboration between different player and even countries, such as producers, regulators, suppliers, distributors and consumers, thus the demand for it not one sided. When would alternative energy fuel be able to fuel the entire economy? Barreto (2018) developed an endogenous growth model of interaction between fossil fuel and alternative energy substitution. It showed that as the former drops or is depleted and the latter has not yet picked up, the economic collapse will not happen.

Alternative energy has different implications for the environment from producer, consumer and individual consequences. The producer has its own objectives that are egoistic, i.e. to make profit or reap the benefits, the consumers value the nature, while perceptions by individuals depend on egoistic behavior by the producers – the stronger egoistic values, the greater individual consequences for energy alternatives (Perlaviciute and Steg, 2015). Apart from energy alternatives, many explore the alternatives in terms of existing non-renewable resources or their so-called optimal exploitation. Hart (2016) examined a model which showed that the prices of extracting the resources declines while the productivity increases in the medium run due to technological development. An intense and rapid exploitation of non-renewable resources leading to their depletion would then cause the prices of both resources and the energy to rise in the longer run. Sustainability in the long run is volatile to the challenge with renewable diversified energy. Berntsen and Trutnevyte (2017) by using multi-model showed that between

2035 and 2050 the Swiss electricity supply scenarios lack to predict the rise in demand for new renewable energy such as wind, biomass, geothermal and solar. Alternative energy growth is subject to social, economic and structural conditions. In order to better preserve environmental cause or diminish harmful effects from energy production, Gunderson *et al* (2018) propose collective-owned systems rather than individual whose combined hazard effect can be greater. However, this proposal would raise the costs of distribution, thus higher prices. Higher prices in turn become a signaling as an incentive for more power generation with renewable sources, among others, the producers will seek alternative ways to reduce the costs in order to become more competitive. The diversification through renewable supplies is mostly coming from already thermal generators which control majority, if not all, renewable supplies. Given this situation, the rising governmental policies to reduce non-renewable and increase renewable based energy, makes the companies to lower the price of the first and increase of the latter source when the demand is high in an oligopolistic market. However, as the diversification of energy portfolio lowers harmful effects to environment, it may be associated with welfare reducing (Acemoglu *et al* (2017).

Despite appreciation and the heavy focus of attention on renewable energy, a more recent study by Harjannea and Korhonenc (2019) warns about over ambitions of renewable and alternative energy. Apart from conceptual definition which may include a variety of renewable energy, sustainability is not guaranteed as it should take into account social, environmental and economic domains. Hydro power plants for example, can lead soil degradation, displacement of local population while economic benefits go and are accounted elsewhere. In any case, alternative energy to fossil fuels, in particular oil and coal, is expected to rise both in volume and share of total energy. The question is who would be investing in it, and does innovation play a crucial role. Private corporations run after profit, which implies that whatever source of energy to be sold to consumers, can be generated. An increased trend towards alternative energy makes the producers find the ways become competitive in the market. This depends on how innovative they are in

innovation, research and development. A study by Lin and Chen (2019) for a ten year period (2006- 2016) in China found that the price of electricity does not play a role in technological innovation for renewable energy in the short run, but it does so in the long run. Furthermore, investment in research and development in renewable energy has positive impact on economic growth, both in short and long run.

The bulk of the studies on renewable and friendly environment energy highlight the pressure from climate change as an alternative to alleviate the harmful effects of fossil fuels. The future of alternative energy will depend not only on available sources, but more on technological innovation which drives the competition to its generation and consumption. But the current trend of energy consumption on a global scale suggests that traditional or brown energy will still dominate over alternative green for the next few decades.

The case of Albania, Kosovo, Montenegro, and Northern Macedonia

As mentioned in introductory part, the four countries concerned have got a mix of electricity generation and consumption between coal thermo and hydro power plants. A report by the European Environmental Agency (2010) indicated that the Western Balkans as a whole had a higher share (21%) of renewable electricity than the EU-27 (14%). Yet, the hydropower electricity was insufficient and vulnerable to climate conditions which dictated it ups and downs. An update of the figures as of 2017, showed the following state of electricity generation and their main sources:

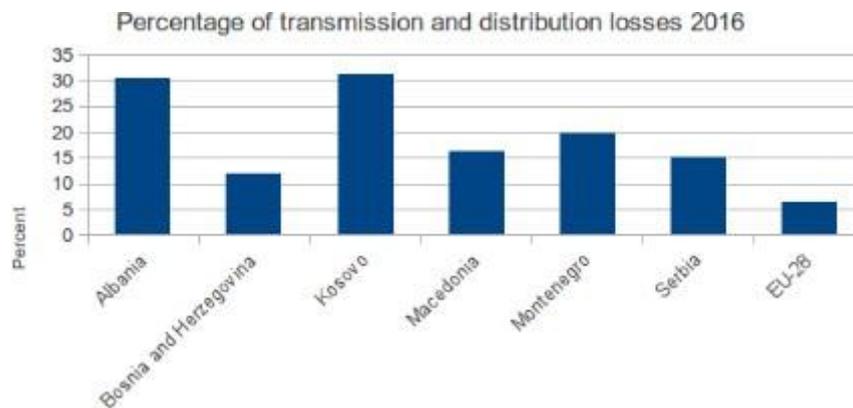
Table 1: Electricity generation in MW

Countries	Non-renewable	Fossil/Lignite	Renewable	Wind	Fossil gas	Fossil oil	Solar	Hydro	Total
Albania	97	97	1 835	-	-	-	-	1835	1932
Kosovo	800	800	35	-	-	-	-	35	835
Montenegro	880	880	72	72	-	-	-	-	952
Northern Macedonia	1 157	1157	733	36	-	-	17	567	1 890
Total	1777	2934	840	108	-	-	17	2437	3719

Source: European Network of Transmission System Operators for Electricity – ENTSOE (2018), “Statistical Factsheet 2017: Provisional values as of 4 May 2018”, Brussels: ENTSOE, p.4-6.

As the figures from the table above show, this part of the Western Balkans generates much of its electricity from non-renewable sources such as lignite, which accounts for as high as 96% in Kosovo. Yet, the perspective of this country in alternative energy in the face of rising demand for electricity consumption and prices remains limited as a new thermo power plant is planned to be constructed with a capacity of 2 100 MW through foreign investment. This is expected to make Kosovo self-sufficient in electricity generation and export a part of it, primarily to the neighboring countries which face shortages. Kosovo’s vast lignite reserves, which are amongst the largest in the world, has dictated the necessity to exploit this non-renewable resource. The environmental concern remains high. Montenegro too, has a similar situation with electricity generation like Kosovo as over 92% of its electricity come from thermo power plants with the remaining from wind. Coal fired plants remain with the largest share in total electricity production also in Northern Macedonia, but this country has got a larger share of renewable resources such as hydro power plants, wind, and solar energy which account for 39% of total. In terms of renewable resources, much of it or over 91% comes from hydro power plants. The hydro power plants which are free of greenhouse gas emissions are the primary and most dominant energy source in Albania. Only 5% of Albania’s electricity is generated by using the coal fired plants, or quite the opposite situation with Kosovo.

The countries in question consume more electricity than they are able to generate, thus facing a shortage for which it has to import. Import comes mainly from Bulgaria and Serbia, and sometimes between themselves when have larger capacities to produce. Before they go through the process of reducing the power generation from non-renewable sources such as coal, they first of all have to find alternatives how to eliminate shortages by increasing production capacities. This can be achieved by investing in new capacities, where non-renewable have more prospects of being used. It should be noted that shortage occurs more from the loss of electricity produced rather than underused capacities. The loss in transmission and distribution in 2016 reached as high as 32% in Kosovo and Albania.



Source: CEE Bankwatch Network (2018), “Western Balkans power sector future scenarios and and the EBRD”, Briefing 15 October, 2018, London: EBRD.

The loss in electricity during transmission and distribution is significantly higher than the average for the EU countries. While the necessity of focusing more on renewable resources and alternative energy is exaggerated, it appears that a more urgent task is to improve efficiency in transmission and distribution as this problem may be followed to alternative energy as well. Apart from the loss, a further concern is that not all electricity distributed is billed, thus a part of it though not significant, is theft. All these factors are causing the price of electricity to be relatively high. Therefore, these countries should first reduce the costs of distribution and better manage the current system of power generation rather than exaggerate the prospects of alternative energy, despite that on average, they stand with a better share (except Kosovo and Montenegro) of it than the EU. For instance, Albania is largely dependent on hydro power plants, but this is vulnerable during seasonal effects, especially during the hot days of summer when the level of water in power plants declines significantly and causes electricity shortages. In addition, this part of Balkans is currently rich in biodiversity and many species are listed as threatened at current stage. A more intensive use of available fresh water for power plants, is likely to lead some of the species to extinction.

In summary, as the literature maintains, non-renewable resources such as coal, which the four countries concerned rely for power generation, is harmful to the environment, while there is no much room for renewables to make any significant breakthrough and meet the demand for electricity consumption. Altogether, these countries depending on each other for import, are also importing from Bulgaria, and Serbia. The focus of attention to exploit more renewable resources without careful consideration for environment and biodiversity, can also have its negative effects in medium to long run. In the short run, this exploitation can have direct impact on local people and economy such as agriculture, livestock, irrigation, tourism, fishing, and sometimes even to the drinking water.

Conclusion and policy recommendation

The current state of energy for economic growth and development is largely based on fossil fuel. This is coming with direct harmful effects to the environment and climate change from gas emissions and with the concern that these non-renewable resources are being depleted. Renewable and alternative energy for economic growth that is being aggressively promoted and intensively researched is still far away from making a replacement to the current state of fossil

fuel on a global scale in the medium run. However, three out of four countries in this article will meet the target even before much of the EU countries, though this is not an assurance that environmental pollution on average will become smaller than elsewhere in Europe. The largest greenhouse gas emissions from thermo power plants remains in Kosovo which is planning to shut down one and build another plant, by which the fossil fuel such as lignite for electricity will further increase rather than decline. Montenegro also is also heavily dependent on non-renewable sources such as coal. Being largely, or may be entirely reliant on renewable sources of alternative energy like Albania from hydro power plants is far more better alternative if it is sufficient, but it is not. The four countries discussed in this article are complementary to each other with non-renewable (Kosovo and Montenegro) and renewable sources (Albania and Northern Macedonia), and that is why they both import and export electricity between them. During the summer Albania imports from Kosovo while in winter the other way around. However, that is still insufficient as they often have to import from elsewhere.

Alternative energy that is friendly to environment is promoted from the pressure of pollution arising from the thermo power plants relying on coal burning to generate electricity. Yet, this alternative is not without environmental consequences for the economy, especially for the biodiversity in this part of the Balkans which already has a lot to improve within the current state of energy generation. It is therefore recommended that these small countries focus more on

improving the transmission and distribution losses. This is more important and urgent rather than pursuing any policy for more radical development of alternative energy capacities without careful analysis on potential impact on the environment and the economy. In addition, the improvements in the current state of energy generation such as transmission and distribution, is the key also to future projects of alternative energy from renewable sources. The consumers may not care which source the electricity is coming from as they need it, as opposed to the government policies at the national level to reduce the share of non-renewable sources with renewable ones.

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