

Slovenian Alternative Energy Sector: Problems, Prospects and Economic Aspects

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Abstract—Slovenia is one of the leading countries in the sphere of alternative energy production in the EU. Consequently, developing this sector is one of the best tracks for economy development of the country. There are several issues in the process of alternative energy transformation in Slovenia, mainly connected with the technical and financial limits. The article is devoted to revealing these limits and to forecasting the future development of the industry in Slovenia. The key findings of the paper include the problems of the Slovenian green energy development and the economy of the country and the ways of helping to solve them through the energy market and the forecast up to 2025 for the alternative energy market of Slovenia.

Keywords—Slovenia; alternative energy; economy; problems; forecast

I. INTRODUCTION

Slovenia is one of the most economically developed countries of the Balkan peninsula. The infrastructure of the country is well-developed and provides numerous opportunities for corporate sector development in the sphere of alternative energy generation and supply. In addition, Slovenia has no hydrocarbons or any other sustainable reserves of the fuels on its territory; therefore, it depends on imports of energy from other countries [1]. As a member of the EU Slovenia supports the initiative for alternative energy development and the increase in the effectiveness of national power grid system. Moreover, Slovenia has a good ecology compared to the industrial countries of the EU (Germany, France, Poland etc.), so the preservation of natural resources allows the country to attract tourists and to produce ecological goods, especially in the sphere of food and drinks and pharmaceuticals [2].

Still, the territory of the country is relatively small and the technical abilities for the green energy generation are very limited. What is more, Slovenia does not have LNG terminals and cannot receive gas directly from the producer, so it is forced to stick to the services of the neighbor countries in order to acquire the blue fuel.

All the mentioned factors lead to the willingness of Slovenia to participate in the development of the energy sources, which contribute to its financial well-being (cutting down the costs of energy imports) and to the better ecological situation in the country. However, despite the mentioned facts, Slovenia is in need of energy resources, and its demand for them is gradually rising. The study is devoted to assessing

whether the country can comply with the goal of self-sufficiency in energy sphere by 2025, and if yes, how it can use its potential for alternative energy generation in the most effective way, especially taking into account the specific factors of its economic development. The article also covers the opportunities of cooperation with the EU authorities in the sphere of green energy and their potential in this sphere.

II. METHODOLOGY

This article is devoted to the research of the alternative energy generation, distribution and regulations and strategies. In order to avoid the major misunderstandings, we have to specify how we understand the notion of “alternative energy”. It includes solar, wind, flowing water energy, energy from different types of inflammable gases (including biomass degradation gases), biofuels and nuclear energy. The latter is the most discussed one, as it cannot be considered ecologically safe; nevertheless, in the context of Slovenia, this type of energy can be missed out.

The research is based on the estimation of the future prospects of alternative energy development in Slovenia and its interconnection with the economy of the country. In order to conduct this research, the authors have revealed the strong and weak points of alternative energy in Slovenia and the drawbacks of its economy, in order to develop a number of measures needed to improve the situation on the energy market of the country and to find the source for the sustainable development of the sphere.

The authors have conducted a regression analysis of the trends on the alternative energy market in Slovenia and developed a forecast for the two main sectors of alternative energy generation in Slovenia – heat and cool production and electricity generation compared to the linear smoothing-based forecast of the country's GDP. The independent variable for both regression analyses is the GDP. The authors give several recommendations for the Slovenian energy market development based on the developed forecasts.

III. RESULTS

Slovenia began its transition to the alternative energy in 2009, when its renewable support scheme was established [3]. It was one of the first countries in the EU that formed a strategic long-run approach to alternative energy generation. In this context, it is remarkable that Slovenian strategy is

aimed mainly at power plants producing energy from wind, sun and flowing water with the generating power of not more than 50MW, which have proved their high efficiency [4]. The described approach contributes to the formation of the large and decentralized network of little energy generating facilities, which has a number of positive and negative effects on the national energy system. The main positive effects are the following:

- The transitional losses are lower, as the average distance from the generating facility to the customer is lower.
- The efficiency of the regional and municipal energy grids is higher, as they can contact the producers and consumers of electric energy directly and correct their activity in compliance with the needs of both sides.
- The reliability of the regional and municipal grids is higher, as in case of malfunction of one of the suppliers, the others can temporarily provide additional supply.
- The energy price and the competitiveness of the energy manufacturers are higher, as the transactional costs (due to the second point of the list) and the transitional costs (due to the first point of the list) are lower.
- The energy market in general is more transparent and allows more opportunities for entrepreneurs and has lower entrance barriers – the significant number of suppliers and the highly elastic price contribute to the formation of the ideal competition market.
- The energy market and the financial system of the country are deeply integrated, as energy suppliers get significant financial support both from the country and from the private banks.

At the same time, there is a number of weak sides of such a system:

- The energy grids become too difficult to operate and control, causing additional costs for the national grids' operator.
- The probability of regional energy cut-offs is higher because of the instability of weather and high reliance on the regional energy suppliers.
- The costs of the energy system modernization are growing fast and are significant.
- The highly competitive market with low state regulation may provide serious damage to the most attractive sites for energy generation causing the decline of touristic revenues for the state budget [5, 6].
- The high volume of stimulation measures contributes to the fragility of the industry in case of a crisis.

The named specific characteristics of the Slovenian alternative energy market force the authorities of the country to speed up the development of the industry in order to make it sustainable and independent from the external financial resources sector.

Fig. 1 illustrates the dynamics of the energy sector development in Slovenia and allows to reveal some tendencies.

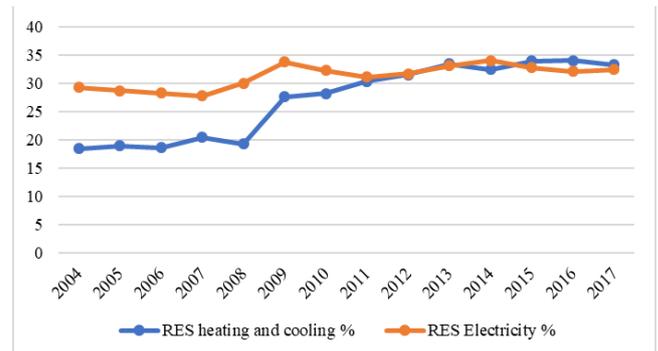


Fig. 1. Alternative energy generation in Slovenia.

Source: created by the authors, based on [7].

Firstly, the major growth in the alternative energy generation was achieved in the sphere of heating and cooling, not in the sphere of electricity generation, as the technical and financial potential of Slovenia in this sphere is limited due to the factors described above.

Secondly, heating and cooling are a vital part of the energy independence strategy pursued by Slovenia – until recently Russia was the main supplier of natural gas to Slovenia. Still, with the introduction of the third energy package, the long-term contracts do not comply with the regulations and the country is forced to buy gas from Austria, Italy and a minor part of it from Croatia on a short-term basis, so the long-term contracts' discounts do not work anymore [8].

Thirdly, Slovenia provides the main support to the efficient power plants, which today are mainly cogeneration plants (producing heat and electricity) – because of technical limits, the generation of heat is much easier for solar and biomass, biogas and biofuels plants, which receive the majority of funding (Fig. 2).

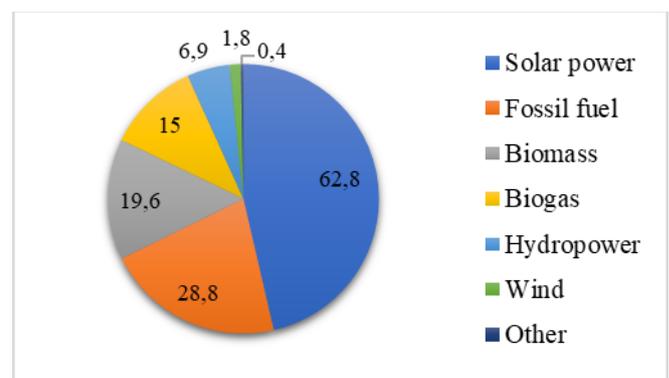


Fig. 2. Amount of subsidies in 2018 by the alternative energy source (in million EUR).

Source: created by the authors, based on [9].

Fig. 2 illustrates the situation with dominance of heating and cooling growth, still the same source states that the most efficient source of energy in Slovenia is fossil fuel (it accounts for 34% of total energy generation, when solar plants produced 27%). The presented data leads to a clear conclusion that the situation with alternative energy generation in Slovenia is not that positive, as it is depicted by the energy authorities of the country [10].

The authors have created a forecast on the development of the alternative energy industry in the country by two main sectors – heat and cool production and electricity production (Fig.3).

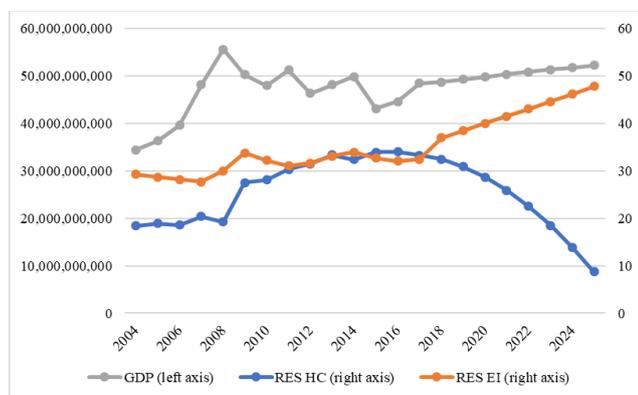


Fig. 3. Heat and cool and electricity production in Slovenia (in %), compared to the GDP growth (in US \$).

Source: created by the authors, based on [7, 11].

In addition, the steady GDP growth will inevitably lead to the growth of electricity demand, still, the current dynamics allow to suppose that the electricity generation by alternative energy sources will grow faster, so the EU's aim of 20% more ecologically efficient energy sector will be fulfilled.

IV. DISCUSSION

The situation in Slovenian alternative energy sector is relatively good, if the main aim of the country is to comply with the EU alternative energy program. At the same time, if the aim is to achieve sustainable economic development and to stimulate the economic growth, the strategy of alternative energy development in the country should be revised. Today Slovenia is a small open economy and has to use its benefits of being the connection between the most developed EU countries and the Balkan region. The key economic and financial problems that Slovenia faces are the following:

- Undiversified by added value export – Slovenian economy exports mainly components for further manufacturing (except for agricultural products and medicines).
- Lack of qualified labor force – today Slovenia searches for the specialists in all the spheres, as despite the unemployment rate of 9.5%, Slovenia seeks for labor force with higher qualification [12].
- The extreme dependence on the EU – the financial system of the country is specialized in the cooperation with the Austrian and Italian banks, while the current state of the European integration requires a better and

a more stable financial system to survive, especially in the context of search for new investments in the green energy.

The described problems contribute to the formation of the general issues in the sphere of green energy, described hereabove, especially those of the financial character – strict limits of profitability of alternative energy generation [13]. On the other hand, green energy is one of the fast-developing spheres and it has the potential to boost the little economies. In this aspect, Slovenia can become an alternative energy driver on the Balkans. In order to achieve that, we offer a number of measures based on the analysis above.

Firstly, the development of energy grid in the country is necessary, as it cannot satisfy the ever-growing need of the local producers for the logistics of the energy they produce. The current energy grid [14] does not have enough potential for export and import of energy – the transition of energy through Slovenia to the Balkan peninsula requires a higher number of interconnections with Croatia and Austria, as the main neighbors. This will allow the country to diversify its export by energy resources.

Secondly, the legislative base for the green energy generation for now is specialized in the growth of the industry through high volumes of subsidies, and such kind of situation harms the industry, as it gradually loses stimulus for the rise of competitiveness. In order to overcome this issue, it is necessary to offer tax cuts for the alternative energy consumers, consequently rising the demand for alternative energy and making it more affordable to buy for higher prices than to produce cheaper. This approach will allow the energy companies to get higher profits without harm to the overall dynamics of the country transition to the alternative energy. In addition, spare financial resources will be used by the energy producers to expand their energy facilities and grids, so the budget will receive more profits and the electric grids will develop – the same for heat and cool transmission in the country. This measure boosts the development of the economy in general, but also allows the country to develop its human capital on the additional financial resources.

Thirdly, it is important to develop the cooperation with the new suppliers of natural gas. Alternative energy is just an option of energy system development, it does not mean that it is the only variant for the development of energy system. These suppliers are the USA with its LNG and shale gas, Russia, which exports gas to Europe despite the numerous barriers for its exports and the Middle East countries, which can transfer their gas through the Balkan peninsula or by sea through the Mediterranean [15]. Unfortunately, this point has sense only in case of the full exploitation of alternative energy sources in Slovenia, as it is much cheaper in the long run to construct national energy generation facilities than to buy gas in the long term. This step allows Slovenia to reduce its dependence on the EU energy market and on the EU in general.

Finally, it is important to develop the international cooperation of financial institutions. The financial system of Slovenia is weaker than the Austrian or Italian ones, but the development of the financial sector will contribute to the better and more effective regulation of the financial flows between the customers and the producers of energy in the country. The other aspect of the same recommendation is the

tight cooperation with the international financial institutions, such as the European reconstruction and development bank, or the World bank group in order to gain access to the best financial practices and vast financial resources provided by these institutions.

V. CONCLUSION

The energy market of Slovenia is developing at a high pace. The main contributor to such fast growth is the alternative energy sector, which receives extensive financing from the Slovenian and foreign energy authorities. The pace of the Slovenian energy sector development is fast enough to comply with the EU alternative energy development program, but such a high tempo is reached by the financial support of the industry.

The energy sector of Slovenia cannot compete on the international level, and its main customers are the citizens of Slovenia. In this regard, it is necessary to improve its competitiveness through a bundle of measures, such as stimulation of energy demand in the country, developing international trade in energy with Slovenia, attracting international financial institutions to provide financial resources for the sector. All these measures will allow Slovenia to boost the development of its alternative energy, but in turn will contribute to the solution to the country's economic problems.

The development of alternative energy in Slovenia is an expensive, difficult and long process, but it leads to the transformation of the Slovenian economy into one of the key players of the Balkan energy market and one of drivers of alternative energy transition in the EU.

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