

# Bulgarian Green Energy: A Contradictive Choice of Future and Finance

Igbal Guliev<sup>1\*</sup>, Alisa Khubaeva<sup>1</sup>, Ester Markelova<sup>1</sup>, Andrey Matveev<sup>2</sup> and Valery Kleshchev<sup>2</sup>

<sup>1</sup>International Institute of Energy Policy and Diplomacy, MGIMO University, Russia; [guliyevia@bk.ru](mailto:guliyevia@bk.ru)

<sup>2</sup>Department of Physical Education, Financial University under the Government of the Russian Federation, Russia

## Abstract

The Bulgarian economy is one of the industrial economies of Western Europe, at the same time, the country is one of the poorest in the EU. The high influence on the economy of Bulgaria comes from tourism, hence it's very important for the country's development. The energy transition taking all the mentioned into account is very important for the country. The country needs a special model, which takes into account the tourist specifics of the economy of the country. The two major directions of energy transition include green energy transition and the development of nuclear energy. Both have issues and need significant financial resources, while in the case of green energy, support is provided by the EU, and nuclear energy is developed without such support. Moreover, nuclear energy development is under pressure from the European Commission due to its non-green character of it. The article aims at resolving the issue of the interconnection of green energy and nuclear energy. The authors prove that the laissez-faire approach in case the two energy sources provide significant benefits, but have serious negative impacts on the economy of the country is the non-adherence to any of the strategies of the energy system development (neither nuclear nor green) is in the interests of Bulgaria. The major findings include the proof of the here above hypothesis, the development of the least financially-intense strategy for energy system modernization and the proof that green energy will not contribute to the economic growth of the country.

**Keywords:** Bulgaria, Energy System, EU Green Deal, Green Energy, Nuclear Energy, Strategy

## 1.0 Introduction

The European green deal has established the framework for future cooperation between the countries of the EU in the sphere of green energy and green economic transition<sup>1</sup>. This document has dubious effects on the economies of the developing economies of Eastern Europe because of their lower economic development and potential along with the requirement to invest in green energy and high volumes of financial resources.

Bulgaria is one of these countries. It has quite a serious part of the economy, based on tourism and its future highly depends on the ability to provide stable energy

for tourist facilities. In this regard, it's necessary to figure out the major energy sources of the country today, and the potential of the use of nuclear energy in the country, although, the debate is on whether to count it green or not<sup>2</sup>, just as the potential of the energy transit country to use its revenues from gas transit from Russia to keep up with the pace of the green transition in Europe<sup>3</sup>.

In addition, to the mentioned, Bulgaria has quite a difficult financial situation, especially during the COVID-2019 aftermath<sup>4</sup>, which limits its financial resources, used for the green energy transition. The other side of this issue is the potential of the private resources' mobilization for the small or household use of green energy facilities. The

\*Author for correspondence

interconnection between the first and the second is to be discussed in this article. The authors put forward the hypothesis, that the laissez-faire approach to the energy industry in Bulgaria is the best choice for the country from an economic point of view. The main findings include the proof of the hypothesis, the development of the system of the low financially intense recommendations for the development of the energy sphere of the country and the proof that neither green energy nor nuclear energy itself, not nuclear energy in combination with green energy development in the country suits the economic interests of Bulgaria.

## 2.0 Literature Review

One of the most important works, conducted on the theme of the Bulgarian energy industry is the work by T. Peneva<sup>5</sup>, which poses the most important issues for the Bulgarian energy sector: high-stake energy transition in the framework of the EU Green Deal and the energy poverty of the population in the country, which is to bear the main costs of this transition. The author concludes, that the EU Green Deal can significantly increase poverty in Bulgaria. The other article, supporting this position<sup>6</sup> puts forward the idea that the country has lignite, which is the only reliable source of energy, which isn't imported, hence, the future of Bulgaria in case this source of energy is excluded from use will solely depend on energy imports, even if green energy is developed very rapidly. The contradiction between EU energy policies and the nuclear energy in Bulgaria, based on Russian technologies and depending on them is described<sup>7</sup>, where the authors put forward an issue of national sovereignty of the country, depending on foreign technologies for the supply of national economy with energy to such an extent, as Bulgaria. Similar issues are observed in numerous countries in Western Europe in<sup>8</sup>, which indicates the wider nature of these issues and the non-adequacy of the EU Green Deal for these countries.

At the same time, when omitting the global scales of contradictions above, the use of green energy in households and SMEs is quite applicable in Bulgaria<sup>9</sup> states that the country can use green energy in small business in case the infrastructure and state regulation is improved, while the thesis of the better economic situation appears in most of the studies on green energy, and in this context

looks like the thesis on the limited financial sources for green energy development. The other article<sup>10</sup> points out, that the EU provides mechanisms and financial resources for the support of the development of SMEs in Bulgaria, which stick to the green energy transition. At the same time, the article puts forward a dilemma, that the control over the results in energy saving (green energy too) is hard to estimate and the EU still needs to develop a system of control over the green transition and improve it.

## 3.0 Methodology

The hypothesis, proposed by the authors to be proved needs to be put under several tests. The first step is to analyze the supply and demand for energy in the country. In case it doesn't demonstrate clear imbalances, or the rapid growth of any source of energy, we can conclude, that no clear framework is yet put into action on energy transformation in the country and the policy of laissez-faire can be applied.

The second test is the analysis of the most problematic energy sectors – in the case of Bulgaria these are nuclear energy and green energy, which are interconnected. The analysis of the current situation and the potential effect of the decisions made on the economy of the country allows us to depict a general situation and clarify whether there are any obvious solutions for the current issues. If there are no clear solutions, or there are contradictions, the policy of let-it-be can be applied.

The third test is the econometric test. It's based on the development of two similar econometric models for Bulgarian GDP with energy supply sources and energy consumption sources as the exogenous variables. The models should be econometrically adequate, one should include the prom areas of the energy mix, and the other shouldn't. If the one, that doesn't include these sectors demonstrates better growth for GDP, the laissez-faire approach is more adequate, as this model depicts the situation without the conflict areas, so it doesn't include the effect of the resolution of conflict. The econometric model in general looks the following way:

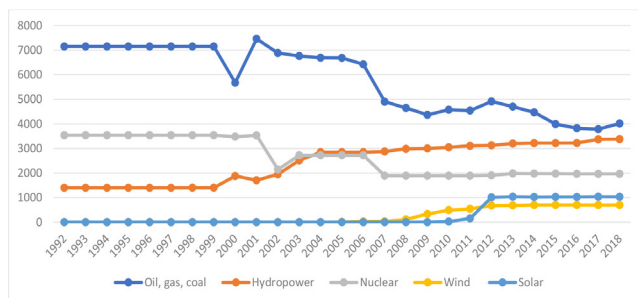
$$GDP \sim Thermo + Nuclear + Hydro + Wind + Solar + Industry + Transport + Services + Agriculture$$

Based on the results acquired and the proof or the rejection of the hypothesis, the authors give either financially intense (the rejection of the hypothesis) or

the financially-neutral recommendations for the future development of the Bulgarian energy industry.

## 4.0 Results

First of all, it's necessary to analyze the energy sources and the demand for energy resources in the country and figure out the major economic sectors, contributing to this demand. Figure 1 depicts the major sources of energy in the country.

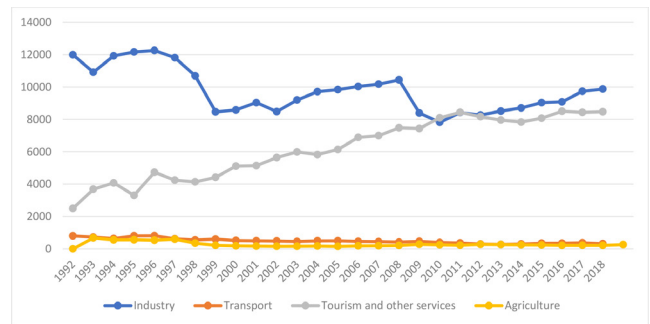


**Figure 1.** Energy generation by source, MWh (developed by the author, based on (UN data)<sup>11</sup>.

The results of the analysis of Figure 1 lead to the following conclusions:

- Bulgaria is decreasing its least ecological energy generation – coal electric plants.
- The role of hydropower in the country is growing, majorly as a result of the growing energy demand.
- The rapid development of green energy sources, namely wind and solar power is a result of the substitution of coal energy plants and the EU subsidy to Bulgaria for the named project<sup>12, 13</sup>.
- Nuclear power in the country seems to be a constant, determined by the state of being on the local nuclear energy plants<sup>14</sup>.
- Bulgaria aims at the growth of green energy, but strives to protect its nuclear industry, as it provides the cheapest energy in the country<sup>15, 16</sup>.

When speaking of energy consumption, we need to point out the fact, that Bulgaria has to import electric energy, just the energy resources in general, as it doesn't have enough of them, neither it can generate enough electricity to satisfy the national demand for it. Figure 2 depicts the dynamic of the electricity demand in the country by economic sector.



**Figure 2.** Energy consumption by source, KWh (created by authors, based on (UN data)<sup>11</sup>.

The major conclusions from Figure 2 are that the industrial sector consumes generally less energy, but remains the main consumer of it, the service sector grows rapidly and today consumes nearly the same amount of energy as the industrial sector, while transport and agriculture consume very little energy. The growth of demand for energy in general, just as the growth of demand of small and medium enterprises, which are the majority of the services sector enterprises<sup>17</sup> leads to lower control over CO<sub>2</sub> emissions and ecological standards, as the big companies have higher obligations in this sphere and are more strictly controlled.

As we have already stated here above, the two major issues in Bulgaria's energy sphere are the future of nuclear energy and the future of green energy development in the country. These two issues are interconnected, in this regard, it's necessary to discuss both themes.

### 4.1. Nuclear Energy

It's a common position of the majority of the EU countries – 16 out of 27, that nuclear energy is potentially dangerous and isn't a clean source of energy due to the potential threat in case of a technogenic catastrophe and the absence of a solution for the issue of nuclear waste storage and disposal<sup>18</sup>. Bulgaria, on the other hand, is more dedicated to the development of nuclear energy because of several reasons:

- Nuclear energy in the country is the cheapest source of energy, the investments needed to substitute it in the framework of the European green deal are too high for the economy of Bulgaria to bear it without significant borrowed resources<sup>19</sup>.
- Bulgaria has several industrial regions, which depend on the stable supply of energy, which requires

additional power generating facilities installed, if green energy, according to the classification of the European Commission is used, while in the case of nuclear energy, this issue doesn't appear.

- Nuclear energy cooperation with the American Westinghouse or Russia Rosatom appears to be of potential use for the economy of the country, which tries to diversify its exports<sup>20</sup>, for example through energy cooperation.
- Nuclear energy development along with gas transit allows the country to reach a long-term energy development strategy.

All the mentioned appeals to the nuclear energy development, which today is developing around the issues of the Kozloduy nuclear power plant. The major question is whether to expand and reconstruct the existing plant or to build a new one, meaning to significantly increase the nuclear energy generating capacity in the country<sup>21</sup>.

## 4.2. Green Energy

The potential of Bulgaria for generating green energy is based on its potential in solar energy first of all<sup>22</sup>. The current plans to construct solar parks around the industrial regions of Pernik, for instance, appear to be an idea of supplying heavy industries with green energy. As it was mentioned earlier, green energy suits this goal badly, especially taking into account the current energy mix in the country – the stable energy sources dominate it, moreover, the energy grid isn't ready for the massive oversupply or unsatisfied demand for electricity from the industrial sector, just as the capacities for energy storage aren't developed and constructed.

The other important fact on green energy in Bulgaria is the willingness of the local population to use and generate it (as it follows from the perception of renewable energy as green<sup>23</sup>, just as the contradictive economic effect. First of all, it's necessary to mention, that the development of green energy in Bulgaria and many EU countries is a response to the COVID-19 pandemic. The idea is to boost economic growth with the introduction of stimulus for green energy development<sup>24</sup>. At the same time, with the growth of the world economy and the step-by-step decrease of the economic harm from coronavirus, the international markets tend to heat and green energy is becoming more expensive for consumers, even taking into account the overall growth of the energy resources

price<sup>25</sup>. This contradiction along with the EU policy of green energy proliferation in Eastern Europe and the EU in general contributes to the growth of costs of the massive green energy transition in Bulgaria.

The development of green energy in any country can be divided into two major sectors – private and industrial (Table 1).

**Table 1.** The classification of private and industrial green energy sectors (developed by authors)

Characteristic	Private	Industrial
The volume of energy generated	<15 MWt for a facility in general	>15 MWt
Public-private partnership	Via the national energy company through special tariffs	Via direct control over the facility or by direct contract
Need for investments	Low, majorly indirect	Medium to high, majorly direct, but with long-term indirect support
Source of green energy	Majorly solar, wind and small hydro – rare to very rare	Hydro, solar, wind – majorly, other sources according to the possibilities of energy generation in a specific country/region

Table 1 is to explain the further results of the study. The support of the private green energy sector in Bulgaria appears to be of a significant economic result. The willingness of the population to use green energy technologies, the high impact of green energy on the economy of the seashore cities, which benefit from green energy due to the climatic conditions and the interconnection of green energy and tourism.

Tourism, as an industry today is based on attractiveness points – every group of tourists have their preferences, hence the attractiveness points for them are different, still due to the development of green tourism and the overall popularity of the green economy theme the attitude towards the touristic facilities, running on green energy is better, than to those, ignoring this sphere.

The Bulgarian touristic sphere is a significant part of the economy of the country<sup>26</sup>, it is majorly dependent on the volume of tourists from the countries of CIS, which are the major clients of the country's tourism industry<sup>27</sup>. The modernization of industry and the transition to

the focus on green tourism is a part of the development strategy for this economic sphere in Bulgaria. It's needed to diversify the client base for the tourism industry in the country and green energy promotion as an instrument for the sustainable tourism industry in Bulgaria.

This track of energy development requires support for the private green energy sector, as majorly the local small and medium enterprises are the base for the tourism industry in Bulgaria.

On the other hand, the development of the country's industrial green energy sector in the context of the country's energy import substitution is very important. Despite the fact, that Bulgaria is a regional energy exporter, the country imports quite a significant amount of energy, majorly for the needs of energy system balancing and

supplying energy to the regions, far away from the major industrial regions (Figure 3).

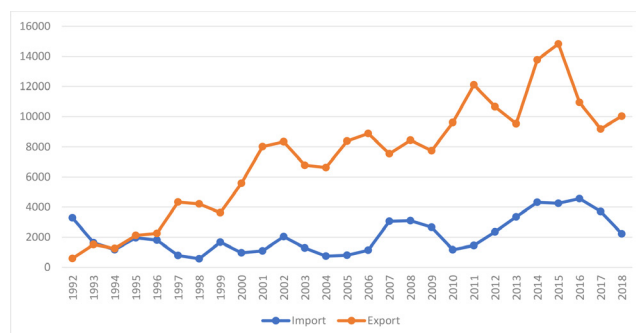


Figure 3. Energy export and import in Bulgaria (developed by the author, based on (UN data)<sup>11</sup>.

Table 2. Econometric criteria of the presented models (developed by authors)

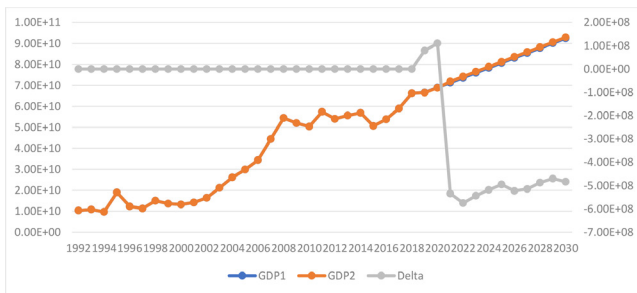
Model 1					
	Coefficient	Std. error	t-ratio	P-value	
Hydro	1,11425e+07	1,59719e+06	6,976	<0,0001	***
Nuclear	-7,87754e+06	2,04416e+06	-3,854	0,0009	***
Wind	3,82626e+07	8,74810e+06	4,374	0,0002	***
Industry	2,18370e+06	765038	2,854	0,0092	***
Solar	-1,01134e+07	4,84133e+06	-2,089	0,0485	**
Mean dep. Var.	3,38e+10		S.D. of dependent var.	2,00e+10	
Sum squared resid.	4,58e+20		S.E. of the model	4,56e+09	
R-squared	0,988904		Adjusted R square	0,956136	
F(5, 22)	392,1376		P-value (F)	9,97e-21	
Log. likelihood	-636,0562		Akaike criterion	1282,112	
Schwarz criterion	1288,592		Hannan-Quinn criterion	1284,039	
rho	0,300525		DW criterion	1,337336	
Model 2					
	Coefficient	Std. error	t-ratio	P-value	
Hydro	9,63064e+06	3,80157e+06	2,533	0,0186	**
Thermo	-4,23669e+06	473296	-8,951	<0,0001	***
Services	4,54484e+06	1,55257e+06	2,927	0,0076	***
Agriculture	2,29440e+07	6,52027e+06	3,519	0,0018	***
Mean dep. Var.	3,38e+10		S.D. of dependent var.	2,00e+10	
Sum squared resid.	5,07e+20		S.E. of the model	4,70e+09	
R-squared	0,987715		Adjusted R square	0,951436	
F(4, 23)	462,3004		P-value (F)	1,32e-21	
Log. likelihood	-637,4304		Akaike criterion	1282,861	
Schwarz criterion	1288,044		Hannan-Quinn criterion	1284,402	
rho	-0,089188		DW criterion	2,091061	



The industrial green energy sector is to substitute coal energy plants, which are one of the most widespread in the country. The idea of green energy as the substitution for the coal industry appears effective only at first sight, but when the impact on the GDP of the country is considered, coal energy generation is cheaper, just as the gas imports, especially taking into account the existing gas pipe infrastructure in Bulgaria<sup>28</sup>.

Figure 4 demonstrates the results of the econometric modelling of GDP, with different exogenous variables. In the first case, the model involves exogenous variables, such as nuclear energy, wind and solar energy, while the economic sector consumption includes only the industrial sector. The second model omits nuclear, wind and solar energy while introducing the services sector and agriculture. The results of econometric modelling and the main criteria for both models are reflected in Table 2.

According to the results, acquired and presented in Figure 4, the results for the second scenario appear to be slightly better, than for the first scenario, especially, when considering a long-term effect.



**Figure 4.** The results of the two GDP models (developed by authors).

The results of the econometric analysis demonstrate, that the economy of Bulgaria won't win from a simple decision of energy source to develop – the first scenario is quite close, and the gap between the two models closes in long-run, but still in the researched period this gap closes just slightly – from 0,8% of GDP to 0,6%. Consequently, the impact of nuclear energy on the industrial sector, combined with the impact of green energy on it makes the sector less effective, that the impact of traditional energy sources on services and agricultural industry for the GDP. As a result, the analysis hereabove proves the fact, that the services industry along with agriculture and the presumption of the status quo in the energy sector are more contributing to GDP, than the industry with the use of green and nuclear energy. This paradox determines the

best choice for Bulgaria in energy: the presumption of the current energy balance mix, with slight and low, stimulated by the government development of green energy, with the best possible use of nuclear energy capacity, but with the least investments in it from the government.

## 5.0 Discussion

As the results of the study lead to the proof of the hypothesis, further recommendations will require little investment from the government of Bulgaria.

First and foremost, the interconnection between green energy and tourism is very strong. In this regard, it's necessary to introduce a special taxation procedure, which involves the estimation of the volume of green energy and energy from conventional sources, consumed by a specific facility. To do that, the legal framework should be changed: the taxation of the touristic facilities, which applies to the special tax regime should be based on the installed by the owner of the facility two-way electric counter. The production and certification of these counters can become a new profitable business in the country, especially if the mechanism of trustworthiness of these counters is based on their demounting and mounting, which can alternatively be changed for the installation of the new counter. The costs for the budget are indirect and limited:

$$\text{Costs} = \text{TTDrop} - \text{PTRise} - \text{GIRise}$$

Where TT drop is the drop of taxes from touristic facilities, PTRise is the rise of tax from the manufacturing industry, acquired from the production of counters and their maintenance, GIRise is the rise in green energy investments, caused by the better performance of the green energy industry in the country.

Secondly, the enterprises, which run totally on green energy should be included in a special list, which should be available on the Internet. This list should be subject to changes and is aimed to inform the population of the country of the achievements of these companies. This, in turn, will form goodwill bonuses for those enterprises on the list<sup>29</sup>. The cost of this measure for the budget is limited to the maintenance of such a platform.

Thirdly, the creation of a special framework for nuclear energy development is a good step for the industry of Bulgaria in general. The cooperation with Rosatom or with Westinghouse is the breaking point for the start of the cooperation of the two companies – at

the same time, the non-availability of extensive financing of the nuclear power plant construction (despite the fact that today Bulgaria has found \$810 million for the construction of Belene NPP<sup>30</sup> and hasn't yet decided on the investments in Kozloduy NPP reconstruction) leads to the application of the mechanism of international credit to the country. It's quite clear, that the other 10 EU countries, standing for nuclear energy in the framework of the Green Deal will support the Bulgarian initiative, moreover, the development institutions, such as the Black Sea Development Bank, where Russia plays a significant role, will support the Russian export of nuclear construction services via Rosatom to Bulgaria. The costs of such financial resources' attraction are lower than the costs of the direct budget expenditures on nuclear energy financing.

The fourth recommendation is to promote and prioritize the development and modernization of the electricity grid. One of the key issues of the energy system modernization in Bulgaria is the poor state of the energy grid, which isn't prepared for the massive green energy introduction and distribution along with the growth of energy consumption in general<sup>31</sup>. Modernization of the electric grid is solely the task of the Electric System Operator, a state-owned company and the state itself. The use of the international development banks' mechanisms, for instance, the credit line from the International Bank for Reconstruction and Development is a good way to cut down the costs and avoid such risks as corruption and opportunistic behaviour of the involved parties and persons.

The Bulgarian agricultural sector tends to rely more on traditional energy sources, so the special taxation for the rural households, involved in agricultural business, meaning the support to the SMEs is a good idea for the proliferation of green energy in the country. The costs of such measures are quite low, especially taking into account the structure of the agriculture industry in Bulgaria.

All the proposed measures should be taken in complex, coordinated with the financial support of the EU and in tight coordination with the EU Green Deal goals.

## 6.0 Conclusion

The authors have proved the hypothesis of the preferred laissez-faire approach to the development of the energy sphere in Bulgaria. This conclusion is based on the following findings.

First of all, neither green energy nor nuclear energy is sufficient for the supply of the country with energy. Both energy sources have significant limitations in use and can be used effectively respectively in the services industry, tourism firstly, and in industrial regions. The massive green transition without nuclear energy development, as it's posed in the EU Green Deal, doesn't suit the interests of the Bulgarian economy.

Secondly, the industrial economic sector along with the simultaneous development of nuclear energy and green energy won't overrun the development pace of the services sector and agricultural sector with the use of conventional energy sources. As a result, the resolution of the dilemma of nuclear energy versus green energy won't give any economic benefits to Bulgaria.

Thirdly, the country is limited in financial resources and requires support in its initiatives in the energy sphere. Taking into account the priority for the electric grid development and the limitation of external financial resources investments in nuclear energy and green energy are limited to the commercial sector investments and the proposed strategy is based on the least financially intense measures.

## 7.0 References

1. Catuti, M. Kustova, I. Egenhofer C. Delivering the European Green Deal for southeast Europe: Do we need a regional approach? 2020; 1:1-31.
2. Rochedo PRR, Fragkos P, Garaffa R, Couto LC, Baptista, LB Cunha, BSL Schaeffer, R Szklo A. Is Green Recovery Enough? Analyzing the Impacts of Post-COVID-19 Economic Packages. *Energies*. 2021; 14:5567. <https://doi.org/10.3390/en14175567>
3. Center for the study of the democracy. Lost in transition: Bulgaria and the European Green Deal. Policy Brief. 2020; 92:1-12.
4. Sterev N. Economic impact of COVID-19 pandemic: case of Bulgaria. *SHS Web of Conferences*. 2021; 120:02005. <https://doi.org/10.1051/shsconf/202112002005>
5. Peneva T. Green deal's impact on energy poverty in Bulgaria. 2021; 30(6):90-105.
6. Vitkov N. European Policy on Air Pollutants and Basic Thermal Power Plants in Bulgaria. 12th Electrical Engineering Faculty Conference, Bulef N. 2020; 9326030. <https://doi.org/10.1109/Bulef51036.2020.9326030>
7. Tchalakov I, Hristov I. The Bulgarian nuclear sector in transition: Adopted Russian technology, state sovereignty and accession to the EU. *Environmental Innovation*

- and Societal Transitions. 2019; 32:107-121. <https://doi.org/10.1016/j.eist.2019.03.008>
8. Pakulska T. Green energy in central and eastern European (Cee) countries: New challenges on the path to sustainable development. *Energies*. 2021; 14(42):884. <https://doi.org/10.3390/en14040884>
  9. Chankov G, Hinov N. Testing the Applicability Of “ecologically Friendly”. *Energy Sources in Household Electricity Consumption in Bulgaria*. *TEM Journal*. 2021; 10(2):531-539. <https://doi.org/10.18421/TEM102-07>
  10. Nigohosyan D, Vutsova A, Vassileva I. Effectiveness and efficiency of the EU-supported energy efficiency measures for SMEs in Bulgaria in the period 2014–2020: programme design implications. *Energy Efficiency*. 2021; 14(2):24. <https://doi.org/10.1007/s12053-021-09933-4>
  11. UN data. 2021. Energy statistics database. [Online]. <https://unstats.un.org/unsd/energystats/data> (Accessed: 15.03.2022)
  12. Ruseva TB, Petrova MA. Implementing the European Union Renewable Energy Policy Targets in Bulgaria. In book: *Cases on Green Energy and Sustainable Development*. 2020. <https://doi.org/10.4018/978-1-5225-8559-6.ch002>
  13. Republic of Bulgaria Ministry of Energy. Integrated energy and climate plan of the Republic of Bulgaria. 2021–2030. P. 280.
  14. Boev B. 2020. Nuclear power and energy transition in Bulgaria. [Online]. <https://www.world-nuclear-news.org/Articles/Viewpoint-Nuclear-power-and-the-energy-transition> (Accessed: 15.03.2022)
  15. Todorova T. Bulgaria’s big energy challenge Opportunities and barriers to investment in renewable energy. 2011; pp.1-6.
  16. Stankova T, Toneva D. Renewable energy as an integral part of the Bulgarian energy mix. *E3S Web of Conferences*. 2021; 286:02011. <https://doi.org/10.1051/e3sconf/202128602011>
  17. Ganev Kaloyan, Simeonova-Ganeva R, Yordanova DI. Microcrediting of SMEs in Bulgaria. In book: *Microfinance for SMEs in the Black Sea Economic Cooperation Region* Chapter: Microcrediting of SMEs in Bulgaria Publisher: Organization of the Black Sea Economic Cooperation [BSEC] and Konrad-Adenauer-Stiftung [KAS]. 2014.
  18. Jianquan L, Wentai D. Overview of nuclear waste treatment and management. *E3S Web of Conferences*. 2019; 118(1):04037. <https://doi.org/10.1051/e3sconf/201911804037>
  19. Iankova EA, Tzenev AG. Determinants of Sovereign Investment Protectionism: the Case of Bulgaria’s Nuclear Energy Sector. *Organizations and Markets in Emerging Economies*. 2015; 6(2):35-66. <https://doi.org/10.15388/omee.2015.6.2.14221>
  20. Bechev D. 2018. Russia’s influence in Bulgaria. [Online]. <https://newdirection.online/2018-publications-pdf/ND-report-RussiasInfluenceInBulgaria-preview-lo-res.pdf> (Accessed: 15.03.2022)
  21. WNN. 2021. Energy crisis spurs Bulgaria’s nuclear debate. [Online]. <https://www.world-nuclear-news.org/Articles/Energy-crisis-spurs-Bulgaria-s-nuclear-debate> (Accessed: 15.03.2022)
  22. Markova, D. Platikanov, S. Konstantinoff, M. Tsankov. P. Opportunities for using renewable energy sources in Bulgaria. *Contemporary Materials*. 2011; 2(2). <https://doi.org/10.5767/anurs.cmat.110202.en.178M>
  23. Mavragani A, Popov R, Georgiev A, Kamenova C, Tsagarakis KP. ‘Clean’ vs. ‘Green’: Redefining renewable energy (evidence from Bulgaria). *Bulgarian Chemical Communications*. 2016; 48:254-259.
  24. 24. Badora A, Kud K, Wozniak M. Nuclear Energy Perception and Ecological Attitudes. *Energies*. 2021; 14:4322. <https://doi.org/10.3390/en14144322>
  25. Alvarez CF, Molnar G. 2021. What is behind soaring energy prices and what happens next? IEA. [Online]. <https://www.iea.org/commentaries/what-is-behind-soaring-energy-prices-and-what-happens-next> (Accessed: 15.03.2022)
  26. Velikova E, Tzvetkova S. Options for Overcoming Seasonality in Bulgarian Tourism. *European Journal of Economics and Business Studies*. 2018; 4(2):187-196. <https://doi.org/10.2478/ejes-2018-0051>
  27. Stankova M. Challenges ahead for Bulgarian’s competitiveness as a mountain tourism destination. *Tourism and Management Studies*. 2014; 10(Special Issue):180-185.
  28. Nies S. 2011. Oil and gas delivery to Europe. [Online]. [https://inis.iaea.org/collection/NCLCollectionStore/\\_Public/42/050/42050154.pdf](https://inis.iaea.org/collection/NCLCollectionStore/_Public/42/050/42050154.pdf) (Accessed: 15.03.2022)
  29. Dawid H, Hartl RF, Kort PM. Dynamic Models of the Firm with Green Energy and Goodwill with a Constant Size of the Output Market. In book: *Games in Management Science, Essays in Honor of Georges Zaccour*. 2019. [https://doi.org/10.1007/978-3-030-19107-8\\_8](https://doi.org/10.1007/978-3-030-19107-8_8)
  30. Aydin CI. The economics of nuclear power plants: The twin tales of Belene and Akkuyu. *Socio-Environmental Valuation and Liabilities: What Strategies for EJOs*. *EJOLT Report*. 2014; No. 13.
  31. Couture TD, Pavlov T, Stoyanova T. 2021. Scaling-up Distributed Solar PV in Bulgaria. Berlin: E3 Analytics. [Online]. [https://www.e3analytics.eu/wp-content/uploads/2021/06/E3A\\_Bulgaria\\_Analysis\\_of\\_Distributed\\_PV\\_ENG\\_FINAL.pdf](https://www.e3analytics.eu/wp-content/uploads/2021/06/E3A_Bulgaria_Analysis_of_Distributed_PV_ENG_FINAL.pdf) (Accessed: 15.03.2022)