EDITORIAL

Can U.S. Economic Sanctions against the Petroleum Industry of Serbia (NIS JSC Novi Sad) Cause Blackouts of Electric Power Systems in the Western Balkan Countries?

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Abstract

U.S. Treasury Department's Office of Foreign Assets Control (OFAC) placed sanctions on Russian petroleum companies in January 2025, but for the petroleum industry of Serbia (NIS JSC Novi Sad), they were postponed repeatedly before finally took effect on October 9, 2025. In particular, PJSC Gazprom Neft owns 44.85% of NIS JSC Novi Sad, followed by Serbian government with 29.87%, JSC Intelligence with 11.3%, and small shareholders with 13.98%. Because of this, Pančevo Oil Refinery ran out of crude oil and stopped its operation on December 2, 2025. However, NIS JSC Novi Sad produces not only petroleum derivatives but also significant amounts of electricity. Part of this electricity is used by NIS JSC Novi Sad in various production processes, while the surplus is sold to the state-owned Joint Stock Company Electric Power Industry of Serbia (EPS JSC) and other foreign companies. In 2024, NIS JSC Novi Sad sold a total of 1124.864 GWh to EPS JSC and other companies. This is 3.53% of the total electricity generation of EPS JSC in the same year. In addition to the aforementioned OFAC sanctions, electricity blackouts (power outages) occurred in the Western Balkan countries (Albania, Montenegro, Bosnia and Herzegovina, and Croatia) on June 21, 2024, as well as in Spain and Portugal on April 28, 2025. It seems that the occurrence of such electricity blackouts is becoming a reality that European countries will face in the future. In this regard, it is obvious that OFAC sanctions affect the security of electricity supply in Serbia and may contribute to creating preconditions for an electricity blackout. Although the 2024 blackout did not spread to Serbia, under such circumstances, a subsequent electricity blackout could involve an even larger number of countries in the Western Balkans and beyond. Therefore, this editorial aims to encourage researchers to think and write about how economic sanctions on petroleum companies that generate electricity can affect the stability of electricity supply and cause blackouts.

Keywords: electric power system, electricity blackout,

Submitted: 11 October 2025
Accepted: 03 January 2026
Published: 08 January 2026

Vol. 2, **No.** 1, 2026.
10.62762/TEPNS.2026.765529

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Citation
Klimenta, D. (2026). Can U.S. Economic Sanctions against the Petroleum Industry of Serbia (NIS JSC Novi Sad) Cause Blackouts of Electric Power Systems in the Western Balkan Countries?. *ICCK Transactions on Electric Power Networks and Systems*, 2(1), 1–6.

electricity generation company, stability of electricity supply.

1 Introduction

The stability of electricity/energy supply, economy and social stability on a national, regional or global level can be affected by the fragility of old electric power systems based on fossil fuels, geopolitical and resource dependencies and often age of networks, components and equipment [1]. In addition, according to [1, 2], widespread electricity blackouts can be caused by unreasonable system structure, insufficient standby capacity at peak loads, unreasonable relay protection and safety control settings, improper system dispatching management and disposal, component or equipment failures, terrorist attacks on energy infrastructure, extreme weather conditions, natural disasters, instability of electricity/energy supply and political/military insecurity. All this can also be connected with the current state of electric power systems in the Western Balkan countries that were exposed to electricity blackouts, as well as with the global energy crisis that started at the end of the 20th century and is still going on. Specifically, the electric power systems of Albania, Montenegro, Bosnia and Herzegovina, and Croatia were exposed to an electricity blackout on June 21, 2024 [3], while the electric power system of Serbia was subject to successive and widespread blackouts many times during the 1990s, especially during the economic sanctions and the NATO bombing campaign [4]. Similar to the 1990s, on October 9, 2025, the U.S. Treasury Department's Office of Foreign Assets Control (OFAC) placed economic sanctions on the petroleum industry of Serbia (NIS JSC Novi Sad) and created the preconditions for total, partial or transient electricity blackouts to occur in Serbia and neighboring countries [5]. Such blackouts are possible because NIS JSC Novi Sad sells a significant amount of electricity generated from natural gas to the Joint Stock Company Electric Power Industry of Serbia (EPS JSC) and other foreign companies. The given events and circumstances have been used to motivate researchers to write about this and associated topics.

Identifying the causes of widespread electricity blackouts is based on reviews, analyses and researches of blackouts that occurred in the past around the world. In this regard, Reference [2] collected and compared 160 influential widespread electricity blackouts from 1960 to 2019, summarized and analyzed the main causes and common issues, and proposed appropriate countermeasures. The causes of these blackouts were listed in the previous paragraph. Thousands of other blackouts and cascading events recorded in different parts of the world from 2008 to 2018 were reviewed and analyzed in [6]. The majority of causes of these blackouts were related to transmission system operation, protection and control [6]. Nine major blackouts that occurred between 2005 and 2016, some of which are themselves the largest electricity transmission blackouts of all times, were studied in [7]. In addition, several blackouts caused by extreme weather were analyzed in [8]. A systematic review of electricity blackouts in North America to attain understanding of their social impacts was conducted in [9]. Major electricity blackouts that occurred in 2019 in Venezuela, Argentina and London were considered in [10]. Extreme weather, equipment and protection failures, cyber-attacks, unreasonable energy structure and inter-connection of a large electric power system were summarized in [10] as the main causes of these three blackouts. Significant blackouts that occurred between 2002 and 2022, as well as their root causes, were reviewed in [11]. The known facts regarding the major disturbance in the Continental European transmission system on April 28, 2025, and the subsequent system restoration were provided in [12]. This disturbance caused blackouts in Spain and Portugal. Obviously, in this specific case, an overlap of various stability phenomena led to the separation of the Iberian Peninsula's transmission network from the rest of the European synchronous system [12]. On that day, abnormal fluctuations in the frequency were detected in the Iberian electricity transmission network by Phasor Measurement Units [13]. In order to reduce the risk of blackouts of this type, a segmentation of the European electric power system with high-voltage direct current lines was proposed in [14].

Based on this review of literature, the blackouts that occurred in the Western Balkans have not been scientifically studied in detail, and economic sanctions against an electricity generation company have not been correlated with the occurrence of any total, partial or transient electricity blackout. These research gaps belong to the field of energy policy and come within the scope of *ICCK Transactions on Electric Power Networks and Systems*, and researchers are encouraged to address them. Finally, this editorial provides all interested authors with some general and important details on the EPS JSC and NIS JSC Novi Sad companies, as well as several potential topics in the concluding section.

2 Electricity Generation in EPS JSC

EPS JSC is the largest electricity generation company in Serbia and represents one of the main factors of its energy stability. The core activities of EPS JSC are electricity generation, supply and trading [15, 16]. As a market-oriented company, EPS JSC regularly, safely and reliably supplies electricity to about 3.6 million customers [15]. Since January 1, 2014, EPS JSC performs business activities of supplier of all electricity customers [15, 16]. In 2024, EPS JSC generated a total of 31861 GWh in its coal-fired power plants (CPPs) with a total capacity of 4360 MW, hydro power plants (HPPs) with a total capacity of 3026 MW, and natural gas-fired power plants (NGPPs) with a total capacity of 297 MW [15]. In [15, 16], except for large HPPs, there is no data on the capacities for generation of electricity from renewables owned by EPS JSC in 2024 [15–17].

However, the first photovoltaic power plant (PVPP) of 0.948 MW was put into operation (on a trial basis) by EPS JSC on February 3, 2025 [18]. This power plant consists of over 1400 PV panels installed on several facilities of CPP Nikola Tesla A and accompanying railway transport, having expected annual production of 1 GWh [18]. Then, on July 14, 2025, EPS JSC brought into operation on a trial basis the second PVPP of 9.95 MW (PVPP Petka) at the locations of closed mines and landfills in Kostolac [19]. Moreover, on November 27, 2025, EPS JSC brought into operation on a trial basis its first 66 MW wind farm with 20 turbines (wind farm Kostolac) at the locations Drmno, Petka, Ćirikovac and Klenovnik [20], and so on.

As a guaranteed supplier, applying the Serbian feed-in tariffs for the generation of electricity from renewables, EPS JSC is obliged to buy electricity from independent electricity producers, under equal trading conditions. In 2024, according to [15], the feed-in tariff electricity generation amounted to 1841.0791 GWh, while its structure was as follows: wind power – 56%, hydropower – 11%, Biomass and biogas energy – 16%, natural gas energy – 11%, solar energy – 1%, and waste-to-energy plants – 6%. Specifically, the amounts of electricity that NIS JSC Novi Sad sold EPS JSC might structurally fall into 11% of electricity from NGPPs and the like. Since 2009, when the feed-in tariffs were introduced in Serbia, although natural gas is a fossil fuel, electricity from NGPPs was purchased by EPS JSC as electricity from renewables, but only if the NGPPs are designed as combined heat and power (CHP) plants [21, 22]. The old feed-in tariff, which was used by producers of electricity from natural gas, was abolished on November 23, 2024 by the Decree on Market Premium and Feed-in Tariff: 90/2024-3 [23].

3 Electricity Generation in NIS JSC Novi Sad

The current ownership structure of NIS JSC Novi Sad is [24]: PJSC Gazprom Neft – 44.85%, Serbian government – 29.87%, JSC Intelligence – 11.3%, and small shareholders – 13.98%. According to [25, 26], in February 2025, PJSC Gazprom Neft reduced its ownership stake in NIS JSC Novi Sad to 44.85% in order to avoid OFAC economic sanctions. However, JSC Intelligence (Joint-Stock Company Intelligence) is a Russian company located in St. Petersburg and managed by Gazprom Capital LLC [26]. Accordingly, the ownership stake of Russian companies in NIS JSC Novi Sad is 56.15%. This was the main reason for OFAC economic sanctions against NIS JSC Novi Sad to come into effect on October 9, 2025.

Currently, NIS JSC Novi Sad is licensed to trade in electricity with Montenegro, Romania, Bosnia and Hercegovina, Slovenia, Hungary and Bulgaria [25]. In addition, NIS JSC Novi Sad can trade in electricity within Serbia and Romania [25].

In 2024, NIS JSC Novi Sad generated a total of 1124.864 GWh of electricity, namely [4, 25]: 1000.6181 GWh in CHP Pančevo with a total capacity of 192 MW, 83.3 GWh in 14 small NGPPs with a total capacity of 13.859 MW, 38.7 GWh in its own facility for the generation of electricity and steam Pančevo, and 2.2459 GWh in its own small PVPPs. In the same year, the electricity consumption in the Republic of Serbia supplied by EPS JSC was 35646 GWh [15]. Regarding this consumption, the total electricity generation in NIS JSC Novi Sad could cover 3.16% of it, or about 11.5 days a year (in particular, for 2024). Therefore, if NIS JSC Novi Sad would be forced in certain circumstances to stop its electricity generation, it could certainly contribute to creating the preconditions for some widespread blackouts in the Western Balkan countries.

With respect to the total generation of electricity in NIS JSC Novi Sad, CHP Pančevo provided 88.95%. Construction of this power plant began on March 7, 2019 and was completed in the fall of 2022. Due to the COVID-19 pandemic and some other reasons, the commissioning of CHP Pančevo was postponed for nearly two years compared to the original plans [4]. In addition, CHP Pančevo generates electricity from November 14, 2022 and uses natural gas to power its two gas turbines and one steam turbine. According to [25, 27], the ownership stakes of Centrenergoholding PJSC and NIS JSC Novi Sad

in CHP Pančevo are 51% and 49%, respectively. Furthermore, Centrenergoholding PJSC is a Russian company that participates in the development of the Gazprom Energoholding strategies in the electric power industry, but it is not on the list of companies sanctioned by OFAC [28]. Therefore, CHP Pančevo is majority-owned by Russian companies and might be subject to certain economic sanctions. Based on [4], electricity generation in CHP Pančevo can also be affected by imposing sanctions on import of natural gas from some delivery points and the like.

Regarding renewables, that is, PVPPs, NIS JSC Novi Sad implemented 4 projects in 2024 and initiated a significant number of similar projects. The projects implemented in 2024 are [25, 29]: (1) 20 new PVPPs were put into operation at owned petrol stations, which means that the number of such power plants is increased from 25 to 45. (2) Another PVPP was put into operation at the end of September 2024 at the drinking water production plant "Jazak" with a total installed capacity of 0.62 MW (0.37 MW on the roof and 0.25 MW on the ground). (3) A 0.1 MW PVPP was installed on the roof of an office building in Arse Teodorovića Street in Novi Sad and put into operation at the end of July 2025. (4) A 0.4 MW part of a rooftop PVPP of 0.6 MW was put into operation in December 2024 in Pančevo Oil Refinery. In 2025, NIS JSC Novi Sad continued with the installation of renewable energy-based electricity generation capacities. The projects implemented in 2025 are [29]: (1) Until July 2025, the number of PVPPs at owned petrol stations was increased from 45 to 60. (2) A rooftop PVPP of 0.585 MW was put into operation at Petroleum Products Warehouse Novi Sad. (3) It is also planned to put into operation additional 18 PVPPs at owned petrol stations, and so on.

4 Conclusion

Some general conclusions and potential topics that can be drawn from the previous sections are as follows:

- Any research or analysis done on possible impacts of economic sanctions against individual electricity generation companies could be a challenge for all interested authors. In addition, this specific topic falls within the field of energy policy and fits within the scope of *ICCK Transactions on Electric Power Networks and Systems*.
- Results of any research or analysis of causes, consequences, prevention possibilities and necessary actions in connection with electricity blackouts caused by economic sanctions against an electricity generation company can be of crucial importance for responsible persons in that company and governments of the countries in which it operates.
- As a consequence of economic sanctions against an electricity generation company, the occurrence of total, partial or transient electricity blackouts can be regarded as a novelty and a challenge for research.
- Age of components and equipment in any electric power system can significantly increase possible negative impacts of electricity blackouts caused by economic sanctions. This represents another challenge for all interested researchers.
- Since economic sanctions against an electricity generation company may last for a long period of time, it would be interesting to consider possible impacts of a combination of some extreme weather conditions and age of components and equipment on electricity blackouts.
- Aggressive competition between a national electric power industry (with old power plants) and a new player (with new power plants) to increase their own renewable energy-based capacities could additionally contribute to possible negative impacts of electricity blackouts (caused by economic sanctions). This is also a topic which can be considered globally by interested authors.
- If some existing power plants were built longer than expected or some projects related to the construction of planned power plants remained unimplemented, then the essential reasons for current economic sanctions against an electricity generation company may be sought in the past. This certainly affects the average age of generation capacities and system reliability, and therefore may be associated with possible electricity blackouts in a future study.

Data Availability Statement

Not applicable.

Funding

This work was supported without any funding.

Conflicts of Interest

The author declares no conflicts of interest.

AI Use Statement

The author declares that no generative AI was used in the preparation of this manuscript.

Ethical Approval and Consent to Participate

Not applicable.

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