International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2025, 15(5), 327-335.

Financial Stability and Prospects for the Development of Electricity Companies of the Russian Federation under Economic Uncertainty

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Received: 29 April 2025 **Accepted:** 20 July 2025 **DOI:** https://doi.org/10.32479/ijeep.20708

ABSTRACT

The electricity sector plays an important role in a country's economy due to its cross-sectoral importance. Economically, the industry is less vulnerable during the times of the economic uncertainty, as it is largely state supported. Electricity consumption and electricity generation have grown steadily over 1990-2023, with China, USA, India, Russia, Japan, Brazil, Canada, South Korea, Germany and France being the world market leaders. This article analyzes the current state and the main development trends of the electricity industry of the Russian Federation, as well as the financial stability of its companies. The analysis of the financial stability of PJSC Inter RAO and PJSC Rushydro, two electricity generating giants in the Russian Federation, has shown that they both remain financially healthy, however the increase of debt and the decrease of liquidity in the past five years have been of harm. Overall, electricity companies should not suffer much from the current economic uncertainty, as forecasts of the level of revenue show that Inter RAO should witness a 23.2% and 3.2% increase in 2025-2026, while Rushydro will have stable revenue levels by the end of 2026.

Keywords: Energy Sector, Electricity Industry, Economic and Financial Crisis, Economic Uncertainty, Low-carbon Economy, Financial Stability
JEL Classifications: G30, L94, Q43, Q48

1. INTRODUCTION

The importance of the financial stability of electricity companies has been highlighted by researchers in the past: there is a significant correlation between the leading economic indicators of such companies and GDP. So, the financial stability of energy companies has an impact on the financial stability of the country (Borisova et al., 2019). This is largely connected to the impact of such companies on the functioning of the entire economy in the context of the high dependence of an economy of energy supplies, as well as the needs of the population (Zając et al., 2023). It is also important to note that the role of the energy sector is always growing, as constant economic growth requires increasing energy consumption. On top of that, the deepening of the informatization of the society makes the electricity sector the important element in guaranteeing the functioning of the modern society (Gretchenko and Gretchenko, 2023).

Current initiatives on the transition to a "green" economy have also increased the relevance in assessing the financial soundness of the electricity industry: some highlight that the financial stability of entities in this sector could be at stake, as the investment in renewable energy often offsets the improved profitability of existing power stations (Safarzyńska and van den Bergh, 2017). Others note that it is necessary for governments to promote the transformation of electricity companies by launching green financial tools, as there is a positive relationship between climate change risks and the financial performance of electricity generation entities (Sun et al., 2023).

The Russian Federation ranks the 4th in the world in primary energy consumption, and the GDP energy intensity remains high. The current zone of high turbulence caused by COVID-19, ongoing sanctions, the increase of global competition, technological isolation and financial constraints leads to the need in developing a new strategy for the sector (Mitrova, 2022). Guaranteeing sustainable development of the Russian energy companies is becoming particularly relevant in difficult economic conditions (Borodin et al., 2023). This is the case not only for the Russian Federation, but for electricity markets worldwide: post-COVID-19 restrictions in 2021 and the natural gas supply interruptions in 2022 have challenged the functioning of the EU electricity market and its design (Jamasb et al., 2023).

Bankruptcy likelihood prediction models are often used as a tool to identify the financial stability of an entity. Their popularity is also confirmed by the implementation of modifications and new models that help better reflect the financial condition of companies in various sectors of the economy (Moskal et al., 2023). Research using bankruptcy likelihood prediction models has been conducted on the example of the Iranian electricity market (Mazhari and Monsef, 2012), the American electricity market (Özparlak, 2022), the Indian electricity market (Niazi, 2023) and the Indonesian electricity market (Djazuli et al., 2023). Although present, the research on the financial stability of companies of such an important sector of the economy is quite scarce, highlighting the relevance of this study.

2. DYNAMICS OF THE WORLD ELECTRICITY MARKET AND THE POSITION OF THE RUSSIAN FEDERATION IN IT IN 1990-2023

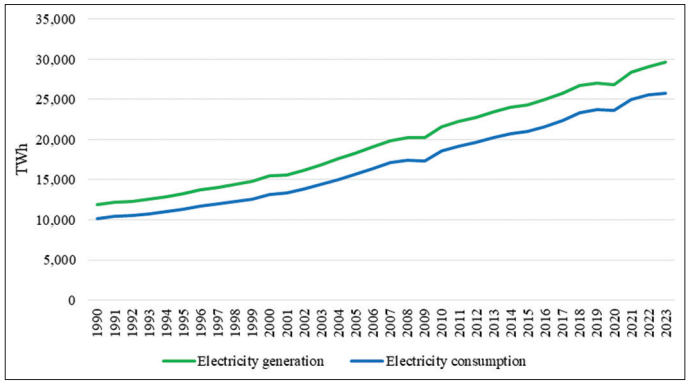
The compound annual growth rate (CAGR) of the world electricity consumption in 1990-2023 was higher than the CAGR of the world electricity generation by 0.1% points: for this period, electricity consumption had grown at a rate of 2.9% yearly, while electricity generation settled at 2.8% annually (Figure 1). Both electricity consumption and electricity generation had witnessed negative chain growth rates only twice since 1990 – the first being during the global financial crisis in 2009, where electricity consumption and electricity generation decreased by 0.5% and 0.4%, accordingly. The second occasion was during the COVID-19 pandemic in 2020: electricity generation was 0.8% lower than in 2019, while electricity consumption was 0.3% less than the year before. It is important to note that the fall in the electricity consumption and generation was less than the fall of the global economy during both crises: in 2009, the global GDP growth rate had amounted to −1.4%, while in 2020 – to −2.9% (The World Bank, 2024). This indicates that the electricity industry is less vulnerable to economic downfalls. After both the global financial crisis and the COVID-19 pandemic crisis, the industry recovered to pre-crisis levels: for example, by 2021, electricity generation was 4.9% higher than it was in 2019, electricity consumption – 5.5% higher.

The Top 10 leading countries in electricity consumption over the past 30 years have significantly changed: in 1990, it consisted of (in specific order) the United States, Russia, Japan, China, Germany, Canada, France, the United Kingdom, Ukraine and Italy. By 2023, the United States had lost 1 position and now holds the 2nd place, Russia – down 2 positions and now holds the 4th place, Japan – 2 positions loss and now holds the 5th place, Germany – 4 positions down, holding the 9th place, France – 3 positions loss, holding the 10th place. Canada has fallen by 1 position and holds the 7th place, while countries such as the United Kingdom, Ukraine and Italy lost 4, 4 and 1 position, accordingly, and are now outside the Top-10. On the contrary, China, India, Brazil and South Korea all witnessed growth in their positions on the market – rising by 3, 9, 6 and 5 positions, accordingly, they now hold the 1st, 3rd, 6th and 8th places (Figure 2).

China, India and South Korea had the highest CAGRs during 1990-2023 in electricity consumption: the indicator for these countries grew by 8.9%, 5.9% and 5.5% annually, accordingly. This is about 2 to 3 times faster than the market on average. Ukraine, the United Kingdom and Germany had the lowest CAGRs during this time – electricity consumption for these countries totaled to −3.0%, −0.2% and −0.1%, accordingly, which is much lower than the industry average.

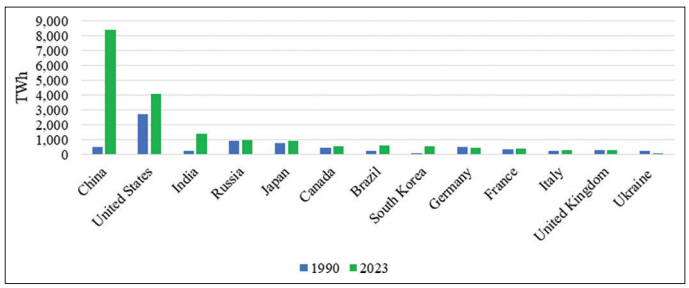
Similar trends can be highlighted when analyzing electricity generation: in 1990, the Top-10 leading countries were the same for this indicator as they were for electricity consumption, the exception being that the 10th place was held by India instead of Italy. In 2022, 8 countries had worsened their positions amongst the Top-10: the United States and Canada fell one position and

Figure 1: World electricity consumption and generation in 1990-2023, TWh



Source: Compiled by the authors according to Enerdata www.enerdata.net

Figure 2: Top-10 countries in electricity consumption in 1990 and 2023, TWh



Source: Compiled by the authors according to Enerdata www.enerdata.net

currently hold the 2nd and 7th places, Russia and Japan moved down 2 positions and now hold the 4th and 5th positions, France and Germany lost 2 and 5 positions, accordingly, and now hold the 9th and 10th places. The United Kingdom and Ukraine fell by 3 positions and are now outside of the Top-10 (Figure 3).

The countries with the highest CAGRs in electricity generation include China, India and South Korea. The annual growth rates of these countries amounted to 8.6%, 5.8% and 5.5% in 1990-2022, accordingly. The countries with the lowest CAGRs are Ukraine, the United Kingdom and Germany: −2.9%, −0.4% and −0.2%, accordingly.

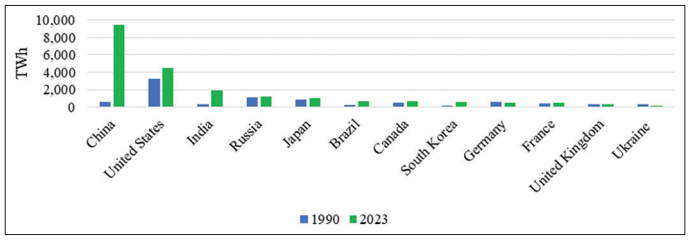
When looking at the structure of electricity generation in 2022 in comparison to 1990, we can see a major shift towards renewable energy sources: the share of sources such as hydro, wind and solar amounted to 27.0% in 2022, which is 8.5 p.p. higher than it was in 1990. Electricity generation from sources such as natural gas, wind, solar PV, biofuels, and waste witnessed the highest growth in their shares – by 7.6 p.p., 7.2 p.p., 4.4 p.p., 1.3 p.p. and 0.2 p.p., accordingly (Figure 4). According to data from the International Energy Agency, renewable energy sources are set to provide more than one-third of total electricity generation globally in 2025 (International Energy Agency, 2024).

The balance of the world electricity imports and exports allows us to conclude that on average, electricity imports are 0.2% higher than electricity exports – indicating that more countries import electricity sources than export them (Figure 5). This means that many countries around the world are faced with the problem of energy dependency. According to the data from Eurostat, the energy imports dependency rate for the EU countries remains high – 63% in 2022 (Eurostat, 2024). Despite the EU sanctions imposed on the Russian Federation, it remains one the main suppliers of electricity resources.

As mentioned previously, the Russian Federation has consistently held the Top-5 position in terms of both electricity generation and consumption. The compound annual growth of Russia's electricity consumption in 1990-2023 was slightly lower than that of its electricity generation – by 0.01 percentage points (Figure 6). Electricity consumption and electricity generation in the Russian Federation have witnessed negative chain growth rates multiple times since 1990 – apart from 1999, both indicators had negative dynamics in the nineties, so, for the total of 8 years the electricity market was met with difficulties. Such difficulties occurred three more times during the analysed period – in 2009, 2013 and 2020. However, the XXI century crises did not have longevity: in 2010, electricity generation and consumption of the Russian Federation jumped back by 4.6% and 5.3%, accordingly; in 2014, these indicators grew by 0.5% and 0.6%, accordingly (Savchina et al., 2017). Finally, after the COVID-19 pandemic, electricity generation increased by 6.3% in 2021, while electricity consumption witnessed a 5.5% growth rate.

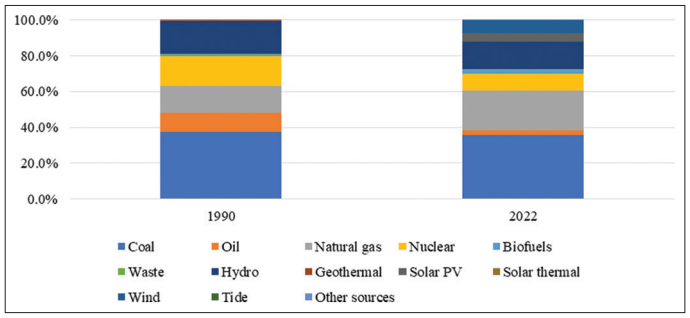
When looking at the energy mix of the Russian Federation in dynamics, we can see that it has not gone through the same drastic changes as the world as a whole: non-renewable sources

Figure 3: Top-10 countries in electricity generation in 1990 and 2023, TWh



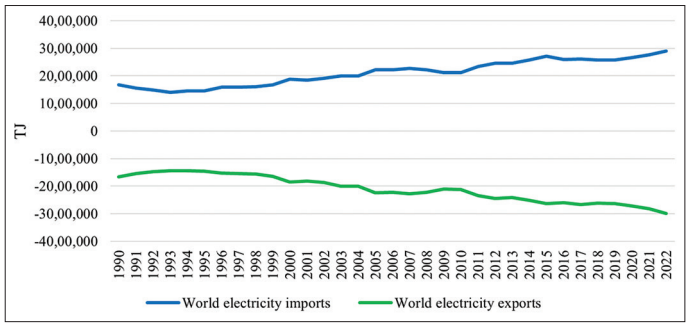
Source: Compiled by the authors according to Enerdata www.enerdata.net

Figure 4: Structure of electricity generation by sources in 1990 and 2022, %



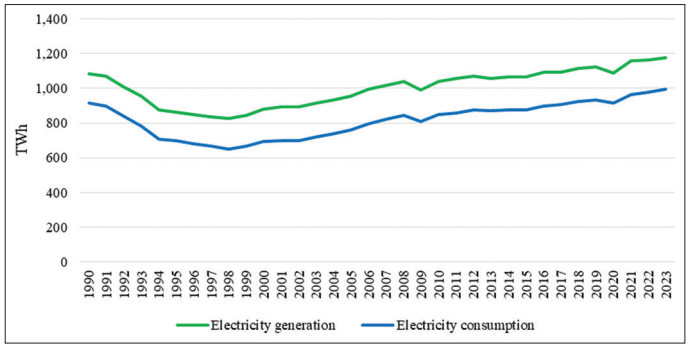
Source: Compiled by the authors according to the International Energy Agency (IEA) www.iea.org

Figure 5: World electricity exports and imports in 1990-2022, TJ



Source: Compiled by the authors according to the International Energy Agency (IEA) www.iea.org

Figure 6: World electricity consumption and generation in the Russian Federation in 1990-2023, TWh



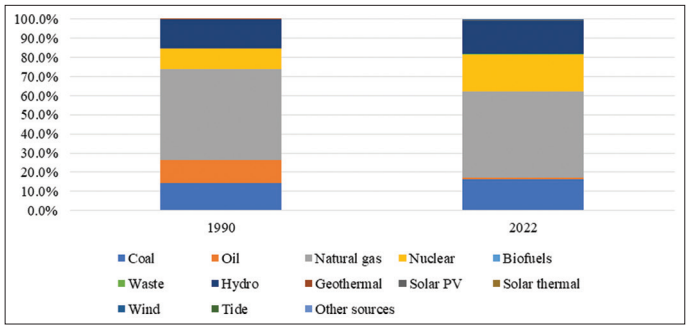
Source: Compiled by the authors according to Enerdata www.enerdata.net

remain dominant, while renewable sources such as wind and solar remain low (only 0.7% of electricity generation in the

Russian Federation is generated from such sources). Electricity generated from nuclear, hydro, coal, waste, wind and solar PV sources have increased their shares in the structure – by 8.5 p.p., 2.0 p.p., 1.8 p.p., 0.3 p.p., 0.5 p.p. and 0.2 p.p accordingly. On the contrary, electricity generated from natural gas and oil sources have decreased their shares by 2.2 p.p. and 11.1 p.p., accordingly (Figure 7). Although the move to a renewable energy economy is not as evident when looking at the electricity generation structure by source, it is important to note that significant efforts have been taken to increase the share of renewables: in 2020 alone 1GW of solar and wind energy facilities were installed, which was 60% of new installed capacities for that year (Proskuryakova, 2022).

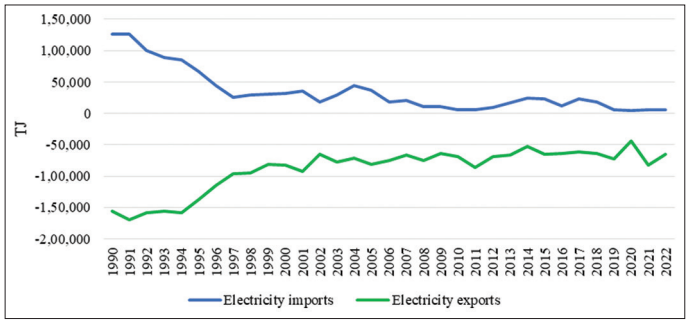
When looking at electricity exports and imports of the Russian Federation, it is evident that it is an absolute net exporter: on average, electricity exports of the Russian Federation were 5 times higher than its electricity imports (Figure 8). The main destinations of exports in 2022 were to Finland, Latvia, Kazakhstan and Lithuania (The Observatory of Economic Complexity, 2023). However, exports in 2023 witnessed a significant decrease, mainly due to constraints in the Far East of the Russian Federation, driven by power consumption growth, the low water level and the high failure rate of generating equipment (TASS, 2024). Despite this, there have recently been conversations between Russia and China on the topic of mutual integration and recognition of systems for certifying the origin of electric power (Interfax, 2024).

Figure 7: Structure of electricity generation of the Russian Federation by sources in 1990 and 2022, %



Source: Compiled by the authors according to the International Energy Agency (IEA) www.iea.org

Figure 8: World electricity exports and imports in the Russian Federation in 1990-2022, TJ



Source: Compiled by the authors according to the International Energy Agency (IEA) www.iea.org

This article aims to assess the financial stability of two representatives of the electricity generation sector of the Russian Federation: the first being PJSC Inter RAO, which focuses on electricity generation from non-renewable sources, and the second being PJSC Rushydro, which focuses on electricity generation from a renewable source – hydro.

3. METHODOLOGICAL APPROACH OF THE ASSESSMENT OF THE FINANCIAL STABILITY OF ELECTIRICTY COMPANIES

The assessment of the financial stability of electricity companies will be done by using bankruptcy likelihood models. For more than 50 years now, bankruptcy likelihood models have been evolving as significant interest in them amongst researchers increases, especially in periods of economic uncertainty. The breakthrough bankruptcy prediction model was introduced by Altman back in 1968. Since then, a lot of research has been dedicated to predicting corporate financial failure (Shi and Li, 2019).

In this article, bankruptcy likelihood will be used partially not for their initial purpose, as the companies to be assessed have significant government control, so the actual likelihood of them becoming bankrupt is practically minimal. However, the base for these models requires to calculate the key financial indicators. These coefficients help to identify the current level of financial stability of a company and highlight its' main weak sports (Savchina et al., 2022).

A total of 4 bankruptcy prediction models will be used to assess the financial stability of Inter RAO and Rushydro: these models are the Altman's Z-score model, Taffler's Z-score model, Zmijewski's X-score model and Grover's G-score model.

Altman's Z-score models have had many modifications and different types of this models are used depending on the companies that are being assessed. In the case of Inter RAO and Rushydro, both companies function in the Russian Federation, which is classified as an emerging market country. So, we will be using the EM Z-score that was developed by Altman et al. in 1995. The formula for this model is as follows (Altman et al., 1995):

$$\text{Z-score} = 6.56 \times X_1 + 3.26 \times X_2 + 6.72 \times X_3 + 1.05 \times X_4 + 3.25 \quad (1)$$

Where:
X_1 – working capital/total assets
X_2 – retained earnings/total assets
X_3 – operating income/total assets
X_4 – book value of equity/total liabilities

A Z-score that is larger than 2.60 means that the likelihood of bankruptcy is low, meaning that the company is financially stable. If the value of the score lies between 1.10 and 2.60, we cannot make a concrete conclusion of the financial state of a company. Finally, if the Z-score is lower than 1.10, the situation of a company can be seen as critical, with a high chance of bankruptcy within the next couple of years.

Taffler's Z-score was developed in 1982. The model is like Altman's Z-score as it also includes 4 parameters (Taffler, 1982):

$$Z\text{-score} = 0.53 \times X_1 + 0.13 \times X_2 + 0.18 \times X_3 + 0.16 \times X_4 \quad (2)$$

Where:
X_1 – profit before taxes/current liabilities
X_2 – current assets/total liabilities
X_3 – current liabilities/total assets
X_4 – total revenue/total assets.

A Z-score that is larger than 0.30 means that the company is financially sound. If a company's value lies between 0.20 and 0.30, its financial stability remains unidentified. Finally, if the Z-score is lower than 0.20, we can conclude that the risk of bankruptcy for a company is high.

Grover's model is a model created by conducting and reassessment towards Altman's Z-score model. Grover used samples that comply with Altman's Z-score model, adding 13 new financial ratios. The final model includes three parameters (Loppies et al., 2020):

$$G\text{-Score} = 1.650 \times X_1 + 3.404 \times X_2 - 0.016 \times X_3 + 0.057 \quad (3)$$

Where:
X_1 – working capital/total assets
X_2 – earnings before interest and taxes/total assets
X_3 – net income/total assets.

If the G-Score value of a company is lower than −0.02, it is classified as one with a high risk of bankruptcy. If the value is higher than 0.01, the bankruptcy likelihood of an organization is low. Values between −0.02 and 0.01 indicate that a company is in the "gray" zone, which means it is difficult to classify whether a company is of high or low risk of bankruptcy.

Zmijewski's model also includes three financial coefficients (Zmijewski, 1984):

$$X\text{-score} = -4.3 - 4.5 \times X_1 + 5.7 \times X_2 - 0.004 \times X_3 \quad (4)$$

Where:
X_1 – net income/total assets
X_2 – total debt/total assets
X_3 – current assets/current liabilities.

The cut-off value for Zmijewski's model is zero. So, if a company has a value greater than zero, it is classified as one with a high bankruptcy risk. On the contrary, if a company's X-score is lower than zero, it can be identified as a company with high financial health.

So, using bankruptcy likelihood prediction models, we will calculate over 10 financial indicators for Inter RAO and RusHydro from 2005 to 2024, which will give us an idea on the historical and current level of financial stability of the two major electricity generation companies of the Russian Federation. It is important to note that calculations for earlier years are done to compare whether the current values are higher or lower than they have been before. An in-depth analysis of the Z, X and G-scores will be conducted for the last 2 financial years – 2023 and 2024.

4. ASSESSMENT OF THE FINANCIAL STABILITY OF THE RUSSIAN ELECTIRICY COMPANIES IN 2005-2024

To assess the financial stability of the Russian electricity companies, a shorter period is considered due to the data availability. According to Table 1, we can see that the Z-score of Altman's model for Rushydro was always higher than 2.60, which means that the company was always characterized as one that is financially stable. However, since 2019, the score has witnessed a decrease, with the score of the last 2 financial years (2023-2024) being 4.3 points and 3.6 points lower than the median for 2005-2024. Through a more thorough analysis, we can see that this is largely a result of the decrease of the equity to debt ratio: in comparison to 2018 when the Z-score was close to the median score, the equity to debt ratio in 2024 was 66.3% lower. However, Rushydro's own equity is still significantly higher than their total liabilities: the value of the equity to debt ratio in 2024 totalled to 1.34.

Inter RAO's Z-score was lower than the cut-off value of 1.10 twice: in 2005 and during the global financial crisis in 2008. In both 2005 and 2008 this was a result of accumulative retained earnings having negative values – the retained earnings to total assets ratio witnessed values as low as −2.10 in 2008. Since 2008, the Z-score of the company indicates that it is financially sound, however, as with Rushydro, since 2018, Inter RAO's score has been decreasing, with the current values significantly less than the median value. The recent downward trend of the Z-score of Inter RAO is also explained by the dynamics of the equity to debt ratio: in 2018, it amounted to 6.16, whereas in 2024 it amounted to 1.39, which is a 77.3% decrease.

The results of Taffler's model for Rushydro are similar that of Altman's model: the company has had minimal risk of bankruptcy in all years from 2005 to 2023 (Table 2). However, the Z-score has been on a decline since 2018, and the current value indicates that financial risks have increased, as it is lower than 0.20. This is the result of a few negative tendencies, such as the decrease of the earnings before taxes to current liabilities ratio by 91.7% in 2024 in comparison to 2019 and of the current assets to total liabilities ratio by 46.6% in 2024 in comparison to 2019.

The results for Inter RAO for Taffler's Z-score differ from the results of Altman's Z-score: up until 2013, the company was in the high-risk zone 5 times and in the "gray" zone twice. Low scores in the beginning of the analyzed period were a result of negative values of earnings before taxes. Inter RAO, like Rushydro, has witnessed a downward trend in Taffler's Z-score since 2017. However, as the values in 2005-2013 of Inter RAO's Z-score were low, the current value is equal to the median value.

The calculations of the G-Score of Grover's model show that in 2005-2024, Rushydro was always of financial soundness, while

Table 1: Results of calculating the Z-Score of Altman's model for Rushydro and Inter RAO in 2005-2024[1]

Year/Company	Rushydro	Inter RAO
2005	144.25	−0.96
2006	13.81	44.87
2007	16.63	9.06
2008	19.23	1.05
2009	21.26	5.61
2010	18.00	5.21
2011	10.70	7.91
2012	9.85	9.38
2013	9.63	22.89
2014	11.16	17.80
2015	10.61	19.82
2016	11.64	62.21
2017	11.21	15.99
2018	10.13	10.67
2019	6.79	7.70
2020	7.62	6.57
2021	8.77	6.00
2022	7.99	5.73
2023	7.06	5.68
2024	6.35	6.35
Median (2005-2024)	10.65	7.81

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro and PJSC Inter RAO

Table 2: Results of calculating the Z-Score of Taffler's model for Rushydro and Inter RAO in 2005-2024

Year/Company	Rushydro	Inter RAO
2005	0.60	0.17
2006	0.74	0.49
2007	4.40	0.21
2008	1.38	0.35
2009	1.53	0.09
2010	2.16	0.25
2011	0.68	−13.69
2012	0.42	0.09
2013	0.55	−2.44
2014	0.87	0.39
2015	0.86	0.64
2016	1.28	8.21
2017	0.64	0.60
2018	0.95	0.48
2019	0.77	0.35
2020	0.62	0.31
2021	0.45	0.32
2022	0.34	0.31
2023	0.32	0.31
2024	0.18	0.31
Median (2005-2024)	0.71	0.31

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro and PJSC Inter RAO

Inter RAO had high risks of bankruptcy twice – in 2011 and 2013 (Table 3). During these years, Inter RAO had recorded net losses, with the net income ratio amounting to −40.1% in 2011 and -15.5% in 2013. However, it managed to gradually recover since 2014 – the average net income ratio in 2014-2024 totaled to 5.0%. Research has previously highlighted that the Inter RAO's weak spot in terms of financial stability lies within low profitability rates (Savchina et al., 2021).

The current value of the Grover's G-score for Rushydro is lower than the median value – this is the result of the company having net losses in 2024. For Inter RAO, this value is even higher – by 112%, which is the result of increasing profitability.

Finally, the calculations of Zmijewski's X-score show that in 2005-2024 (except for 2005 for Inter RAO), both Rushydro and Inter RAO had a minimal bankruptcy risk (Table 4). However, just as with Altman's and Taffler's model, there has been in a downward trend in the values of the X-score for both companies. For Rushydro, this is a result of the increase in the share of debt-to-total assets ratio: in 2024, the value of this coefficient totaled to 43%, which is the maximum value for the period analyzed. The same can be seen for Inter RAO: the debt-to-total assets ratio in 2024 amounted to 41%, which is also the maximum value for the company in 2005-2024.

Liquidity ratios have also suffered: the current ratio for Inter RAO was equal to 1.28 in 2024. This value lies within the normative values for the indicator; however, it is the lowest it has been since 2008. The same can be said for Rushydro: the 2024 value of 2.64

Table 3: Results of calculating the G-score of Grover's model for Rushydro and Inter RAO in 2005-2024

Year/Company	Rushydro	Inter RAO
2005	0.09	0.18
2006	0.39	0.20
2007	0.80	0.38
2008	0.61	0.70
2009	0.71	0.46
2010	0.93	0.40
2011	0.86	−1.03
2012	0.85	0.26
2013	0.88	−0.30
2014	0.60	0.34
2015	0.52	0.31
2016	0.62	1.11
2017	0.64	0.55
2018	0.65	0.70
2019	0.59	0.71
2020	0.53	0.83
2021	0.61	0.95
2022	0.60	1.06
2023	0.61	1.08
2024	0.52	1.06
Median (2005-2024)	0.61	0.50

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro and PJSC Inter RAO

is higher than the normative values and is not the minimum value for 2005-2024, but it is almost two times lower than the median value of this indicator for 2005-2024.

The overall results of the calculations of 4 bankruptcy likelihood prediction models are presented below (Table 5).

According to these models, Rushydro has been financially stable throughout all years of analysis, however the increase of total debt in the past 5 years has resulted in a downward trend of all scores. Inter

1 Here and further values highlighted green indicate that the risk of bankruptcy is minimal, values highlighted red indicate that the risk of bankruptcy is high, values left white indicate that the company is in the "gray" zone

Table 4: Results of calculating the X-Score of Zmijewski's model for Rushydro and Inter RAO in 2005-2024

Year/Company	Rushydro	Inter RAO
2005	−4.29	0.10
2006	−3.84	−4.18
2007	−4.17	−3.40
2008	−4.09	−2.87
2009	−4.08	−2.13
2010	-4.17	−2.59
2011	−3.45	−1.86
2012	−3.18	−3.38
2013	−3.17	−3.35
2014	−3.57	−3.95
2015	−3.51	−4.04
2016	−3.66	−5.24
2017	−3.57	−4.00
2018	−3.35	−3.68
2019	−3.34	−3.25
2020	−3.32	−2.84
2021	−3.32	−2.49
2022	−2.90	−2.22
2023	−2.46	−2.16
2024	−1.83	−2.14
Median (2005-2024)	−3.48	−3.06

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro and PJSC Inter RAO

RAO has witnessed times of high bankruptcy risk until the 2010s, where some years the company ended with net losses. Although it has recovered, many models also show a downward trend in scores – an increase of debt and poorer liquidity have caused this. It is important to note that in the case of Rushydro, the equity of the company is still much higher than its' obligations, so the current results are not alarming, but should be noted to mitigate potential risks. Next, we shall assess the key government initiatives that support the financial stability of electricity companies in Russia, as well as build a forecast of Inter RAO's and Rushydro's revenue levels in 2025-2026.

5. DEVELOPMENT PROSPECTS OF THE RUSSIAN ELECTIRICTY COMPANIES IN THE CONTEXT OF ECONOMIC UNCERTAINTY

During the crisis years of 2020-2023 for the economy of the Russian Federation, Inter RAO received a total of 55.7 billion rubles worth of the government financial aid, with the maximum amount received in 2023 – 20.7 billion rubles (or 37.2% of total support). The financial aid included the following support measures (Inter RAO, 2024):

- 63.8% - subsidies (compensation of lost income due to providing preferential tariffs for certain categories of the population).
- 33.1% - tax benefits and preferences received by subsidiaries of the Group located in the Russian Federation (includes land tax, value added tax, insurance premiums, property tax for entities, income tax for entities, transport tax).
- 3.0% - tax benefits and preferences received by subsidiaries of the Group located abroad (includes corporate and income taxes, social taxes).

Table 5: Accumulative results of the calculations of bankruptcy likelihood prediction models

Model/ Company	Rushydro	Altman
Altman	Financially stable (100%), downward trend of score	Financially stable (90%), downward score trend of score
Taffler	Financially stable (95%), downward trend of score	Financially stable (65%), current score meets median value
Grover	Financially stable (100%), downward trend of score	Financially stable (90%), upward score trend of score
Zmijewski	Financially stable (100%), downward trend of score	Financially stable (95%), downward trend of score

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro and PJSC Inter RAO

- 0.2% - state export intergovernmental credit.

Rushydro received almost 3.76 times more government financial aid, with it amounting to 209.7 billion rubles in 2020-2023. Most of the support was received in 2023 – 55.7 billion rubles (or 28.1% of total support). The financial aid provided was all in the form of subsidies that compensate lost income due to providing preferential tariffs for certain categories of the population, as well as for the cost of purchased fuel and electricity (Rushydro, 2024).

It is important to note that the case of Rushydro receiving more financial aid than Inter RAO is a result of an increase in the support of the transition to renewable energy sources: in 2025, the second program to support renewable electricity generation will begin, and it will be carried out until 2035. The total volume of the program amounts to 350 billion rubles, and it is expected to result in the implementation of an additional 6.7-12.0 GW of renewable energy capacity (TASS, 2022).

Considering current trends and using the Least Squares Method (LSM), we will build a forecast of Inter RAO's and Rushydro's revenues in 2025-2026. For this we will use previous data from 2005-2024 (Tables 6 and 7).

In accordance with the Least Squares Method, we will calculate parameters of a and b from this system of equations:

$$\begin{cases} na + b\sum t = \sum y_t \\ a\sum t + b\sum t^2 = \sum y_t t \end{cases} \quad (5)$$

$$\begin{cases} 20 = 850 \\ 770b = 1589 \end{cases} \quad (6)$$

From the first equation we will express a, then we will insert the value of a into the second equation to get b. By doing this, we get that a is equal to 42.47, while b is equal to 2.06. So, we get our final forecast equation of y_t=42.47+2.06t. By inserting the t values for 2025-2026 (which are equal to 11 and 12), we predict that in 2025-2026, revenues of Inter RAO will amount to 65.2 billion rubles and 67.2 billion rubles accordingly. This is a 23.2% growth in 2025 and a 3.2% growth in 2026.

Table 6: Factual and estimated data necessary for building a trend line of Inter RAO's revenue (2005-2024), billion rubles

Year	Y_t	t	t^2	Y_t*t	$Y_t=a+b*t$
2005	0.4	−10	100	−4.5	21.8
2006	0.6	−9	81	−5.5	23.9
2007	0.7	−8	64	−5.9	26.0
2008	33.0	−7	49	−231.3	28.0
2009	46.8	−6	36	−281.0	30.1
2010	61.4	−5	25	−307.0	32.2
2011	73.4	−4	16	−293.6	34.2
2012	42.7	−3	9	−128.1	36.3
2013	41.2	−2	4	−82.4	38.3
2014	32.6	−1	1	−32.6	40.4
2015	46.0	1	1	46.0	44.5
2016	43.2	2	4	86.4	46.6
2017	41.0	3	9	122.9	48.7
2018	53.9	4	16	215.6	50.7
2019	55.1	5	25	275.5	52.8
2020	31.3	6	36	188.1	54.9
2021	88.5	7	49	619.8	56.9
2022	63.2	8	64	505.4	59.0
2023	41.3	9	81	371.9	61.0
2024	52.9	10	100	529.1	63.1
Total	849.5	0.0	770.0	1588.8	-

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Inter RAO

Table 7: Factual and estimated data necessary for building a trend line of Rushydro's revenue (2005-2024), billion rubles

Year	Yt	t	t^2	Yt*t	Yt=a+b*t
2005	0.7	−10	100	−7.1	21.8
2006	5.5	−9	81	−49.4	23.9
2007	41.8	−8	64	−334.4	26.0
2008	61.9	−7	49	−433.1	28.0
2009	79.0	−6	36	−474.0	30.1
2010	89.0	−5	25	−444.9	32.2
2011	92.5	−4	16	−370.0	34.2
2012	94.2	−3	9	−282.6	36.3
2013	108.8	−2	4	−217.6	38.3
2014	108.5	−1	1	−108.5	40.4
2015	107.1	1	1	107.1	44.5
2016	115.0	2	4	230.1	46.6
2017	144.7	3	9	434.1	48.7
2018	162.8	4	16	651.3	50.7
2019	155.2	5	25	775.9	52.8
2020	177.3	6	36	1063.5	54.9
2021	190.1	7	49	1330.7	56.9
2022	199.6	8	64	1596.6	59.0
2023	216.8	9	81	1951.5	61.0
2024	242.9	10	100	2428.8	63.1
Total	2393.3	0.0	770.0	7847.9	-

Source: Calculated and compiled by the authors according to the Russian Accounting Standards balance sheets and income statements of PJSC Rushydro

We conduct the same steps for Rushydro:

In accordance with the Least Squares Method. we will calculate parameters of a and b from this system of equations:

$$\begin{cases} na + b\sum t = \sum y_t \\ a\sum t + b\sum t^2 = \sum y_t t \end{cases} \quad (7)$$

$$\begin{cases} 20a = 2393 \\ 770b = 7848 \end{cases} \quad (8)$$

From the first equation we will express a, then we will insert the value of a into the second equation to get b. By doing this, we get that a is equal to 119.67, while b is equal to 10.19. So, we get our final forecast equation of y_t=119.67+10.19t. By inserting the t values for 2025-2026 (which are equal to 11 and 12), we predict that in 2025-2026, revenues of Rushydro will amount to 231.8 billion rubles and 242.0 billion rubles accordingly. This is a 4.6% decrease in 2025 and a 4.4% growth in 2026.

With both companies remaining financially stable, as well as receiving significant financial aid from the government, based on our forecasts, it is expected that Inter RAO will witness an increase in revenues, which should help further stabilize its financial state, while RusHydro will have a slight decrease in 2025 before stabilizing in 2026.

6. CONCLUSION

During periods of economic turbulence, the world electricity market manages to resist falling as much as the economy, and it recovers quickly. The Russian Federation has been amongst the leading countries in terms of electricity generation and consumption since 1990 and currently holds the fourth place. The electricity market of Russia has witnessed difficult times of turbulence, especially during the nineties. However, since the beginning of the XXI century, it has managed to have mostly positive growth rates and bounces back fast from economic crises. The Russian electricity market has not yet made the same drastic change to renewable sources as the world yet, however significant efforts have been implemented to move in this direction. Unlike most European countries, the Russian Federation is the net exporter of electricity sources. However, since the events of February 2022, exports have witnessed a significant decrease.

Using bankruptcy likelihood models to assess the financial stability of the two electricity generation giants of the Russian Federation, we can note that these companies are currently financially stable and have mostly remained this way since 2005. However, there are negative tendencies in their financial soundness, such as an increase of the share of debt-to-assets, a decrease in liquidity ratios, as well as occurrences of net losses in the case of Inter RAO. Overall, both companies are classified as ones with minimal bankruptcy risk: this is the result of both competent financial management and state support.

Both Inter RAO and Rushydro have received significant state support during the years of economic turbulence (2020-2023). This financial aid comes in the forms of subsidies, tax benefits and preferences and intergovernmental credit. On top of that, support in helping companies using renewable energy sources implement electricity capacity has significantly benefited Rushydro.

According to the author's forecast, Inter RAO should finish the financial years of 2025-2026 with revenue growth – by 23.2% and 3.2%, accordingly; while Rushydro will have a slight decrease in 2025 – by 4.6%, followed by a 4.4% growth in 2026.

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