

ASSESSING THE FINANCIAL SUSTAINABILITY OF ENERGY SECTOR IN ROMANIA UNDER CRISIS CONDITIONS**Simona-Maria BRÎNZARU***Ștefan cel Mare University of Suceava*
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ioana.andrioaia99@gmail.com**Abstract**

Improving the financial sustainability of Romanian electricity generating companies can be achieved by adopting a set of strategic measures. These measures may include: investments in more efficient and cleaner technologies, such as natural gas power plants or renewable energy sources. These technologies could reduce production costs and help reduce greenhouse gas emissions. In this context, the aim of this paper is to identify the determinants of increased financial sustainability of electricity generating companies in Romania. In order to achieve the proposed goal, the following objectives have been formulated: O1 - Analysis of efficiency indicators with influence on increasing or reducing financial sustainability; O2 - Identification and analysis of risk indicators influencing growth or reduction of financial sustainability and O3 - Analysis of performance indicators influencing growth or reduction of financial sustainability. The research methodology is based on the sample analysed consisting of 150 companies operating in the power generation sector. The results of the research consist in the development of a model for the assessment of financial sustainability of electricity generating companies in Romania under crisis conditions. The usefulness of these results is reflected in the outline of a reference framework for monitoring and quantifying the financial sustainability of electricity generating companies in relation to reported economic and financial indicators.

Keywords: *financial sustainability; energy sector; economic and financial indicators, energy crisis.*

JEL Classification: M40.

I. INTRODUCTION

In the current economic context, it is increasingly important to investigate the relationship between the level of sustainability (ESG, i.e. environmental, social and governance performance) and sectoral energy performance. Sustainability is, in fact, the process of shifting the short-term view of performance towards sustainable performance and brings together the strategy adopted by an entity with the objectives about ethics and governance, social and environmental, and value creation for all stakeholders (Mateș et al., 2018). In this respect, companies in the energy sector are directly concerned by the concept of sustainability and its reporting.

As a result, in recent years, concern for environmental protection and sustainable development has become a priority for many economic actors, including energy companies (Alhawaj et al., 2022). In this respect, there is a growing body of scientific research exploring how the level of sustainability can influence renewable energies, energy efficiency, new technologies and solutions to reduce greenhouse gas emissions. Directive (EU) 2022/2464 also proposes to develop a sustainable, resource-independent economy and to ensure a just social transition for all regions and citizens of the European Union, avoiding major macroeconomic imbalances. So there is a strong link between sustainability and electricity, and research and policies that address this relationship are vital to develop a more sustainable and prosperous future for all.

In this context, the aim of this paper is focused on identifying the determinants in maintaining and increasing the financial sustainability of electricity generating companies in Romania. In order to achieve this aim, we set the

following three objectives: O1 - Analysis of operating efficiency indicators with influence on the increase or reduction of financial sustainability; O2 - Identification and analysis of risk indicators with influence on the increase or reduction of financial sustainability and O3 - Analysis of performance indicators with influence on the increase or reduction of financial sustainability. The results obtained are materialized in the development of a model for the assessment of financial sustainability of electricity generating companies in Romania under crisis conditions. The usefulness of the results is essential both for all stakeholders of this business model, but especially in shaping a reference framework for monitoring and quantifying the financial sustainability of electricity generating companies in relation to the quality of reported financial and non-financial information.

II. LITERATURE REVIEW

The energy sector is one of the environmentally sensitive industries, so in this sector we expect a positive link between sustainable and financial performance, especially in times of crisis (Wieczorek-Kosmala et al., 2021). In the same lines, Adamkaite et al. (2023), state that the energy sector is under pressure from society because of its negative impact on the environment and its social importance. As environmental protection expectations become higher, the energy sector must adapt, taking into account social and environmental aspects and finding new solutions that will certainly influence the financial sustainability of the energy sector.

In the literature, there is no unanimously accepted definition of financial sustainability, however it could be understood as reflecting the efforts and achievements of companies in ensuring short and long term value creation from a financial perspective but not at the expense of social and environmental performance (Socoliuc, et al., 2020).

Companies can use different methods to assess financial sustainability, and scientific research has found various indicators used in this context such as turnover, liquidity and leverage (Grosu et al., 2022). For example, Abdullah Jaafar et al. (2023) also demonstrate that financial sustainability presented through net profit and ROA indicators had a positive relationship with revenue diversity. Similarly, the results obtained by other authors show that there is a positive correlation between corporate sustainability and financial performance of companies in various industries (Patari et al., 2014; Jung, et al., 2018; Hurduzeu et al., 2022). Moreover, Jing et al. (2022) show that during the economic crisis caused by COVID-19, companies with high sustainability were more resilient and their financial performance declined less than that of companies with poor sustainability performance.

On the other hand, Xin Long et al. (2020) and Duong et al. (2022) have shown that innovation investments in the energy sector in the form of R&D spending or investments in digitalization (Światowiec-Szczepańska & Stępień, 2022) positively influence the sustainability and financial performance of energy companies. The energy sector is therefore under continuous market pressure due to competitiveness, consumer demands and ensuring the sustainability of companies' operations. Based on the principles stated above and debated in the international literature, objectives 2 and 3 of this paper have been set, advancing the following research hypothesis:

H₁ – The financial sustainability indicator is directly positively influenced by risk indicators and performance indicators.

Some researchers are of the opinion that the current economic system, based on continuous growth, is not sustainable, which is why we cannot yet talk about an abrupt end to the use of natural resources. Activity indicators are the most commonly used indicators in management analyses of the integration of green technology (Xu et al., 2021), which focus on the effects of the integration of sustainability elements on operational activity, where we note that ROA, ROE and ROS indicators are frequently used in studies on the assessment of financial sustainability (Wieczorek-Kosmala et al., 2021).

Zhang et al. (2020) argues that the gradual incorporation of green energy innovations is a means of minimizing companies' capital costs, and can also be an element of competitive advantage. Analyzing the most relevant studies dealing with historical trends Hickel and Kallis (2019), found based on empirical data that although some countries have turned to renewable resources, moving away from fossil fuels, this shift has not been simultaneous with economic growth. Moreover, Hurduzeu et al. (2022) demonstrate that ESG policies, in particular, environmental policies negatively affect the financial sustainability of energy companies.

With this in mind, we have established the objective 1 of our paper and formulated hypothesis no. 2:

H₂ – The financial sustainability indicator is negatively influenced by the reduction in the dynamics of business efficiency indicators.

III. RESEARCH METHODOLOGY

This section of the paper presents the research methods used to identify the determinants of increasing financial sustainability of electricity generating companies in Romania. The sample analysed consists of 150 companies operating in the electricity generation sector (CAEN code 3511) and whose data were collected from annual financial statements. The period analysed covers the last ten years of activity of the companies (2012-2021). The collected data were processed using Excel software and subsequently, we developed a multiple linear regression model using SPSS 26 software in which we established the following variables:

Table 1. Econometric multiple linear regression model

AGGREGATED INDICATORS	INDICATORS	FORMULA
Variabila dependentă		
Financial sustainability indicator (FSI)	SR	<i>Solvency Ratio = Total assets / Total debts</i>
Variabilele independente		
Activity efficiency indicators (AEI)	ROA	<i>Return on Assets = Net Profit/ Total assets * 100</i>
	ROE	<i>Return on Equity = Net Profit /Total Equity * 100</i>
	ROS	<i>Return on Sales = Net Profit / Turnover * 100</i>
Risk indicators (RI)	LQ	<i>Liquidities</i>
	TP	<i>Total Provizions</i>
	DR	<i>Debt Ratio = Total debts / Total liability</i>
Performance indicators (PI)	TN	<i>Turnover</i>
	NP	<i>Net profit</i>

Source: Authors' own elaboration

IV.RESULT AND DISCUSSION

Following econometric modelling, the best result obtained is the multiple linear regression model, which is represented by the following equation:

$$FSI = \alpha + \beta_1 * PI + \beta_2 * AEI + \beta_3 * RI + \varepsilon \tag{1}$$

where: $\alpha, \beta_1, \beta_2, \beta_3$ - represents the regression model parameters; ε - the random error variable, which quantifies the influence of randomly acting factors; FSI - financial sustainability indicator, PI - performance indicators, AEI - activity efficiency indicators, RI - risk indicators.

Table 2. Sumarul modelului^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.871 ^a	.759	.759	.52172136	.742

a. Predictors: (Constant), RI, AEI, PI

b. Dependent Variable: FSI

Source: Own processing in SPSS 26

According to Table 2, we find that there is a significant correlation between the financial sustainability indicator and the performance, business efficiency and risk indicators with a high correlation of 0.871. This shows that in order to ensure financial sustainability, companies need to take into account and continuously monitor the achieved performance, the associated risks, and last but not least, the operating efficiency indicators. Analysing the determination ratio in the same table, we note that the variation of the performance, activity efficiency and risk indicators influences 75.9% of the variation of the financial sustainability indicator variable.

Table 3. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1160.550	3	386.850	1421.233	.000 ^b
	Residual	367.733	1351	.272		
	Total	1528.283	1354			

a. Dependent Variable: FSI

b. Predictors: (Constant), RI, AEI, PI

Source: Own processing in SPSS 26

According to the ANOVA table, the Fischer coefficient value is 1421.233, with a lower F-test value compared to the significance threshold of 0.05, in this case the linear multiple model can explain the correlation between the analyzed at least 95%.

Table 4. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.018	.014		1.242	.215
	PI	.918	.017	.781	55.358	.000
	AEI	-.009	.041	-.003	-.229	.819
	RI	.419	.028	.209	14.827	.000

a. Dependent Variable: FSI

Source: Own processing in SPSS 26

The general model equation is as follows:

$$FSI = 0.018 + 0.918 * PI - 0.009 * AEI + 0.419 * RI \tag{2}$$

According to equation no. 2 we observe the following: An increase in the performance indicator leads to an increase in the financial sustainability indicator, because more profitable firms with higher turnover show higher sustainability, and there is a positive correlation between the financial sustainability indicator and the performance indicator. Therefore, increasing the performance indicator contributes to increasing the financial sustainability indicator. This is also in line with the results obtained by Hurduzeu et al. (2022), according to which the proper application of ESG policies influences the financial sustainability of energy companies under conditions of increasing turnover or profit.

On the other hand, an increase in the aggregate risk indicator leads to an increase in financial sustainability, but only in the context that an increase in leverage points to an increase in business opportunities, and thus an increase in demand for renewable electricity services. Other authors (Andrioaia & Macovei, 2022) have reached the same conclusion, confirming that there is a trend among end consumers towards energy produced from renewable sources, and the more inclined they are towards such a transition, the more state institutions and investors will speed up investments in this type of investment. Another plausible explanation may be to interpret the level of indebtedness in terms of increased investment by energy companies to develop in the area of renewable resources and meet market demand. It is important to underline that within the energy sector there are a number of specific provisions for the decommissioning of tangible fixed assets in the non-renewable mineral resources activity (IFRS 6), which have been classified in this study as risk factors.

Following the analysis of these values, we find that an increase in provisions implies an increase in the value of tangible fixed assets (with equal values) which influences the solvency of the companies analysed and directly increases the financial sustainability indicator. Also, the accounting treatment of the other categories of provisions (which are a current expense) will generate an increase in the value of provisions, with direct effects on the reduction of equity and increase in debt, increasing the debt ratio and reducing profit. Regarding the last risk indicator, liquidity, we find that there is a positive correlation between this indicator and financial sustainability, due to the increase in the value of assets that influences the overall solvency of companies. Under these conditions, hypothesis H₁ is confirmed and objective number 2 and 3 are achieved.

With regard to the aggregate indicator of business efficiency, we note that an increase in this indicator leads to a reduction in the sustainability indicator, which can also be explained by the fact that the acceleration of profitability (ROA, ROE, ROS) also implies the expansion of the activity of electricity generating companies through the unlimited exploitation of non-renewable resources that affect environmental protection. Therefore, the more the indicators of business efficiency increase, the more the sustainability of power companies will be affected, because profitability generates additional costs in traditional resources and not in renewable ones.

In this context, we can state that financial sustainability is affected by a number of factors such as: strong competition on the market, insufficient regulation of the energy market, but above all by the instability of the energy market, generated by the current military conflict and the desire of governments to ensure the energy independence of European countries. Under these conditions, hypothesis H₂ is confirmed and objective 1 is met.

The standard equation is as follows:

$$ISF = 0.781 * IP - 0.003 * IEA + 0.209 * IR \tag{3}$$

The financial sustainability indicator is most influenced by the performance indicator, followed by the risk indicator, which shows that both investors and those responsible for the management of these companies are primarily interested in profit, regardless of the risks, motivated by the demand for energy, which often exceeds supply, which is why they can afford such behaviour in a market without adequate regulation to protect the end consumer.

The business efficiency indicator has the least influence on the financial sustainability of the companies analysed because, these companies are concerned to a lesser extent with return on equity, assets or sales, as any operational shortfall is covered by unjustified increases in energy prices, with the burden being borne by the customers and not by the producers or other stakeholders involved. One solution, in this situation, would be to get investors to contribute more to expanding the exploitation of renewable resources for electricity generation. Therefore, if we are witnessing an atypical development or rather atypical correlations between the financial sustainability indicator and the other relevant indicator categories, the explanation is primarily due to the legislator's lack of interest in protecting its consumers, intervening in the market and inducing energy producers and distributors to behave towards physical and industrial consumers and to set prices in relation to the costs and quality of the energy offered.

Table 5. Residual statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-2.1089041	16.8482914	.0270365	.92581152	1355
Residual	-5.51030397	9.04699421	.00000000	.52114306	1355
Std. Predicted Value	-2.307	18.169	.000	1.000	1355
Std. Residual	-10.562	17.341	.000	.999	1355

a. Dependent Variable: FSI

Source: Own processing in SPSS 26

Our research results also show that companies investing in renewables are the most sustainable companies in the energy sector compared to those using traditional energy resources. This shows that companies that have invested the most in developing renewable resource exploitation for power generation and have adopted sustainability strategies that ensure a faster transition to these resources. Thus said, we agree with Păun (2017) who argues that replacing traditional energy sources with renewable ones is not only a matter of financial performance of the companies involved, but it is essential to achieve a full transition to renewable energy sources to ensure the sustainability of the development of the renewable energy sector.

V.CONCLUSIONS

Today, the energy sector is facing major challenges related to the need for affordable and secure energy that leads to the sustainability of companies. Thus, we can say that the aim of this sector is to ensure the conditions necessary to meet the need for energy in the medium and long term, at affordable prices, corresponding to living standards in terms of quality and environmental protection. Electricity companies are under constant pressure from governments and consumers to make the transition to renewable energy sources, which means implementing policies to encourage energy saving and efficient energy use or investing in new, less polluting technologies. Even under these conditions, these companies must ensure the financial sustainability of their activities.

Companies use different methods to assess financial sustainability, hence the importance of the business efficiency, risk and performance indicators we analysed in our research. As a result, the results of the work were materialized in the development of an econometric model that highlights the economic indicators that have a significant influence on the financial sustainability of electricity generating companies in Romania. The correlations showed that the performance indicators represented by turnover and profit, but also the risk indicators represented by provisions, indebtedness and liquidity have a significant positive influence on financial sustainability. Therefore, we can say that those companies in the energy sector with high performance indicators tend to become more financially sustainable. On the other hand, the increase in activity of the companies leads to a decrease in financial sustainability, from which we deduce that the transition to renewable energy sources is absolutely necessary. Increased financial sustainability can be achieved by increasing turnover and net profit to provide a source of investment in the development of renewable resource exploitation, while at the same time effectively controlling the risks of the electricity generating companies' activities. Among the associated risks, we can list the strong competition in the sector, through the existence of a large number of economic agents, namely: electricity producers, the transmission and system operator of the market, distribution operators and, finally, electricity suppliers, as well as insufficient regulation of the energy market. And in the current context, the energy crisis has caused price increases affecting end consumers, as well as the financial sustainability of the generating companies through the reduction of revenues received. Thus, the main purpose of this paper is considered to be

achieved, namely to identify the determining factors in increasing the financial sustainability of electricity generating companies in Romania.

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