

## Article

# Corporate COVID-19-Related Risk Disclosure in the Electricity Sector: Evidence of Public Companies from Central and Eastern Europe

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**Abstract:** Risk disclosures contribute to financial stability by providing stakeholders with a better understanding of companies' risk exposures and risk management practices. Presently, corporate risk has been accelerated by the COVID-19 pandemic, and the level of disclosure varies across industries, companies, and organizations. Due to the strategic importance of the energy industry, the paper aims to assess COVID-19-related risk disclosure in the biggest electricity companies in Central and Eastern European countries, and to identify the main determinants of the disclosure. For this purpose, risk disclosure was assessed based on publicly available data disclosed by the 10 biggest public electricity companies operating in this region. Our findings indicate that factors such as the company's size, leverage, and profitability do not significantly affect COVID-19-related risk disclosure in financial reports; nevertheless, COVID-19 risk disclosure in non-financial reports is significantly correlated with the company's assets and revenues. Moreover, there is a significantly strong positive relationship between the scope of COVID-19-related risk disclosure in the management reports and the number of women on the company's management board. COVID-19-related risk disclosure in management board's reports is significantly higher than disclosure in non-financial reports and explanatory notes of financial statements. Our results suggest that risk disclosure is needed to mitigate information asymmetry, especially in pandemic situations.

**Keywords:** energy industry; electricity; COVID-19; risks; risk disclosure; determinants



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## 1. Introduction

COVID-19 has been one of the most disruptive and transformative events in a generation. This pandemic has created a new kind of risk, which has resulted in logistical, health, and financial issues that many companies did not see before. In particular, it made business circumstances more volatile, unpredictable, and risky, which can be identified in annual reports, and financial and non-financial disclosure. Corporate risk reports reveal a forward-looking awareness of potential business risks related to the COVID-19 crisis, which is leading to stock market developments. Nevertheless, the awareness of COVID-19 and corporate risk disclosure in this matter differs substantially between industries [1], as well as among developed versus developing countries.

Corporate risk disclosure is the subject of numerous scientific studies. The research so far concentrates on general risk disclosure issues, such as the corporate risk-related disclosure practices in different countries [2–6], risk disclosure rules and determinants [3], [7,8], corporate governance practices and their effect on risk disclosure [4], managers' economic incentives for risk reporting [9], and risk disclosures in the financial crisis [10]. Nevertheless, there is still a little research on risk disclosure in times of uncertainty such as during pandemics [11].

The COVID-19 pandemic opens a new chapter in risk management and corporate risk disclosure. Its novum led to a high degree of uncertainty and huge challenges to the development of the global economy, many industries, and companies. The research conducted so far indicates that COVID-19-related risk disclosure has been explored from the perspective of a particular country, such as the UK [1], the USA [12], Australia [13], and China [14]. In turn, Roberts et al. [15] revealed that only 15.5 percent of companies disclosed anything related to pandemic risk, whereas over 70 percent of reporting companies use a boilerplate, providing minimal useful information to stakeholders. Companies had little incentive to consider and/or disclose pandemic risk so only a few companies were doing so as a practice [16]. Thus, this may imply difficulties in assessing the performance of enterprises by their stakeholders, as well as intended use to conceal unfavorable information. Despite existing regulations on disclosing financial and non-financial information about risks, there is no standardized methodology for providing risk disclosures, which further complicates the assessment of risks identified in a pandemic. This exposes a legislative gap regarding reporting in crisis situations.

In this paper, we focus on the COVID-19 pandemic-related risk disclosure by electricity companies, as well as on the company's determinants on this risk disclosure. To the best of our knowledge, there are no studies of risk disclosures by electricity companies in Central and Eastern European Countries (CEECs). Moreover, there are no studies on the impact of financial results on the scope of COVID-19 risk disclosure so far. There are also no studies using corporate reporting theories to support the assessment of such disclosure. In our opinion, the need to give stakeholders an account of the risks associated with a sudden crisis, such as that of a pandemic, is connatural to the principles of sustainability. Therefore, corporate COVID-19-related risk disclosure may be interpreted in the light of theories of corporate financial reporting and sustainability reporting, such as legitimacy theory, stakeholder theory, institutional theory, signaling theory and political cost theory, as presented in this paper. Therefore, the research gap of the study is an existing research niche in the field of assessment of corporate COVID-19-related risk disclosure and its determinants, as well as their interpretation in the light of corporate reporting theory.

Our research is focused on the energy sector due to its specific business risk and its huge importance to the economy's stability, as well as its environmental sensitivity. The energy industry is one of the most essential pillar industries of economies, and thus the COVID-19 pandemic has affected the energy industry on all fronts [17]. Sudden lifestyle change has dramatically increased the residential electricity demand and reduced electricity demand in business and industry and that eventually affects the national energy demand profile, and also, the results affect energy cost [16]. COVID-19 has heavily impacted stock prices in the energy sector, with this industry among the worst affected [17]. According to some research [18], companies in the energy sector publish higher-quality integrated reports than companies in the other sectors; nevertheless, risk disclosures' completeness depends on the operation sector. Moreover, the energy sector is one of the least COVID-19-related risk disclosure sectors [15].

The hierarchy of energy corporate risk factors developed by [19] indicates that each of the nine energy subsectors has a different number of risk factor types. According to this research, the electricity subsector is characterized by the greatest number of risks (after oil and gas) [19]. The other business risk for this subsector is economic transformation toward greener energy in sustainable development. In particular, the EU Taxonomy compass indicates electricity generation using solar photovoltaic technology, concentrated solar power technology, as well as electricity generation from wind power, ocean energy technologies, and hydropower, geothermal energy, from renewable non-fossil gaseous and liquid fuels, and bioenergy. This energy transformation risk has been accelerated by the COVID-19 pandemic [16,20]. At the same time, proliferation of transparency and accountability initiatives in the energy sector are on the rise, including international accounting standards which require more disclosure specifically for energy projects. Thus, proper sustainability risk

disclosures are “the most urgent challenge in relation to disclosure and transparency” for the energy industry [21].

The paper aims to assess the COVID-19-related risk disclosure in the biggest electricity companies in Central and Eastern European Countries and to identify the main determinants of the disclosure. This study refers to disclosure issued in the electricity sector in this region, and in particular, it aims to examine whether electricity companies identify their relevant COVID-19-related risk, and whether they attempt to evaluate it and publicly disclose it in financial statements or other reports (like annual reports, management commentary, sustainability reports, integrated reports, and non-financial reports). The paper presents the results of an empirical study of corporate COVID-19-related risk disclosure, assessed and measured based on publicly available data disclosed by the 10 biggest public electricity companies in CEECs (the biggest companies by revenue come from Poland, the Czech Republic, and Romania).

This study may potentially contribute to the scientific and practical debate on the impact of the COVID-19 pandemic on the energy sector in several dimensions. First, as a comparison between different countries, it offers a deeper consideration of the features of the electricity subsector and its risks in the energy market in Central and Eastern Europe. The second contribution of this research is the implementation of a unique research approach in the risk management area—using textual content analysis as a research method we obtained qualitative information in a structured way, which helps to compare difficult to compare narrative disclosure. This study relies on a set of hand-collected data disclosed by energy companies in their reports. This study also contributes to risk management-related literature by offering a broader context of the examination of electricity companies’ risk assessment and risk management strategies. Therefore, the research results can be a valuable practical guide for electric companies that are going to prepare their risk reporting under the EU Taxonomy, including reporting according to the Corporate Sustainability Reporting Directive (in annual reports for 2023 and beyond).

The paper is organized as follows. The second section provides a practical and theoretical framework for the research by explaining the premises for the growing importance of corporate risk disclosures in practice and science, and concludes with research hypotheses’ development. The third section explains the methodology of the empirical research, whereas the fourth and fifth sections present and discuss the results. The final part presents theoretical and practical implications and limitations, and implications for future research.

## **2. Practical and Theoretical Underpinning, Literature Review, and Hypotheses Development**

### *2.1. Practical Premises of COVID-19-Related Risk Disclosure*

The harmonization process of non-financial disclosure, including risk disclosure, is ongoing, and its completion will contribute to increasing transparency and enhancing the discipline of the market [22]; thanks to this, investors consider increased risk disclosure important for their portfolio investment decisions (i.e., [23,24]). Nevertheless, many companies are still reluctant to provide risk disclosure [22]. This phenomenon may result from voluntary non-financial disclosure, but also from micro factors related to the entity’s size, its organizational culture, and the financial situation [25–30], as well as from differences between countries and macro factors (i.e., political, historical, environmental, socio-cultural, and ethical) (i.e., [31,32]). The 2019 coronavirus pandemic is a new important material factor determining corporate risk, risk management, and risk disclosure.

Presently, in the pandemic’s time, COVID-19 will rank among the greatest challenges and risks many executives will have faced [12], and it implies numerous risks related to running a business. A widespread health crisis with the unprecedented number of deaths and hospitalizations, and the implementation of protection measures (e.g., quarantines, regional lockdowns, and social distancing) to contain this pandemic have challenged the growth of global economic and business activity [33]. It has resulted in economic slowdowns, widespread business disruptions, and significant hardship [34]. According to [35], there are two main effects of the coronavirus on business activities. First, the spread of the virus

encouraged social distancing which led to the shutdown of financial markets, corporate offices, businesses, and events. Second, the heightened business uncertainty led to a flight to safety in consumption and investment. Thus, this crisis has had a material effect on all business operations, including energy price volatility, collateral effects on the finance and banking industries, slower corporate activity, decline in consumer confidence, disruptions with contract manufacturers and disruptions or delays in shipments, reduced corporate profits and capital spending, trouble with the workforce, and soaring inflation. Despite such negative impacts, the COVID-19 crisis also presents unique opportunities for entrepreneurs to come up with creative disruption for the benefit of individuals, organizations, and society [36], used to rebuild the business.

Corporate results will depend to a large degree on future developments of pandemics, which are highly uncertain and cannot be predicted. Thus, corporate risk disclosure becomes more important to capital markets and investors looking for information on portfolio balancing, and ipso facto reporting issuers are expected to reveal specific references to the corona virus's current and possible future impact on an entity's business. Therefore, the financial and reputational consequences of failing to adequately disclose information can be significant. At this moment, risk factors relating to the impact of COVID-19 and the pandemic may be revealed in public information in a financial statement, management's discussion and analysis, and voluntary non-financial disclosure since the coronavirus disease outbreak in 2019.

Risk disclosures have contributed to financial stability by providing stakeholders with a better understanding of companies' risk exposures and risk management practices, for many years. Therefore, various regulators all over the world, in response to the crisis, released disclosure guidance public companies need to address trends and risks that could reasonably affect their financial statements, operations, and business in general. Nevertheless, there is no standardized methodology for corporate risk disclosures that harmonizes corporate disclosure levels, mandatory and voluntary, financial and narrative. Moreover, this uncertain time with no generally accepted rules on risk disclosure may encourage companies to deliberately distort or omit the disclosure of unfavorable (such as threatening risks) information. Even more, according to [37], corporate fraud in the post-pandemic era is becoming more sophisticated and insidious. Therefore, the significant impact of COVID-19 on business activity determines new tasks for reporting issues such as in public companies. The novum of COVID-19 implicates unpredictable risks that are not easily extracted.

The research so far indicates the following determinants of COVID-19 risk disclosure [1,2,7,10,38]: the country development level, corporate size, and board independence are positively and significantly associated with the extent of voluntary risk disclosure [10];

- the country development level, corporate size, and board independence are positively and significantly associated with the extent of voluntary risk disclosure [10];
- risk reporting practices differ among countries, i.e., in the UK and the USA risk reporting practices are consistently better than overall practices, regarding qualitative information as well as quantitative information on risk types [38];
- there is a significant positive relationship between the COVID-19 disclosure and the firm performance disclosure in the annual reports [1].
- both board independence and gender diversity moderate the relationship between the COVID-19-related information and the level of performance disclosure in the annual reports [1];
- the level of COVID-19 disclosure varies from industry to industry; corona-related risk topics and their perceived relevance for different industries can be identified [1];
- cross-country variation in risk disclosure attributes can only partly be linked to domestic disclosure regulation, suggesting that risk disclosure incentives play an important role [7];
- the more detailed risk disclosure provided in the integrated reporting in comparison with management commentary [39];

- there is a positive relationship between COVID-19 disclosure and uncertainty in annual reports [1];
- companies appear to manage their reputation through disclosure of risk-related information [2];
- the presence of independent directors improves the level of risk-related disclosure [2].

Moreover, firms with larger boards exhibit more significant uncertainty in annual reports with COVID-19 disclosure; however, the significance of uncertainty in annual reports with COVID-19 disclosure remains at the same level as different board independence percentages [1].

## 2.2. Theoretical Premises of COVID-19—Related Risk Disclosure

COVID-19-related risk disclosure, although a completely new phenomenon in business, may be embedded in basic theories of corporate reporting and disclosure. Corporate risk disclosure spans a great range of information and addresses various reasons and dynamics for providing such information and it is a tool in a complex market situation created for demand and supply of information [40]. Assuming that this situation incorporates information asymmetry, adverse selection, and unequal access to information, the risk disclosure may be perceived in the context of system-oriented theories, including legitimacy theory, stakeholder theory and institutional theory, as well as in the context of manager incentives theories (agency theory, signaling theory, and political cost theory). Importantly in international research, environmental factors cause the differences in the corporate reporting environment from one country to another, and subsequently corporate disclosure and the application of its theories will differ among countries [40].

Stakeholder theory forms a theoretical foundation in which to analyze the impact of prior economic performance, strategic posture toward social responsibility activities, and the intensity of stakeholder power on levels of corporate social disclosure [41]. The normative and instrumental aspects of its theory [42] allow us to interpret risk disclosure, in particular COVID-19 -related risk disclosure, in three aspects [43]:

- descriptive aspect—to assess the reporting behavior of a company paying attention to the combination of competing interests of the company and its stakeholders;
- instrumental aspect—to evaluate the achievement of organizational goals and their presentation through reporting;
- normative aspect—to assess compliance with standards and rules based on moral principles assuming that stakeholders have a mandate to influence the organization, and present their expectations which are of significant value to the company.

Legitimacy theory, in turn, sees the risk disclosure as a way for a company to legitimize its existence to society [44–47]. It looks at society as a whole, while the stakeholder theory recognizes some selective groups within the society to be more powerful than others [48]. Thus, risk disclosure may be presented to enhance legitimacy for two major reasons: first, by fulfilling institutional pressures to assure the effectiveness of market discipline; and second, by managing stakeholder perception of a corporation's reputation [47]. According to [48], legitimacy theory seems to be more suitable for organizations working in developed countries, on the other hand, stakeholder theory appears to be most suitable for organizations working in developing countries. Moreover, in less developed countries, a corporation can manage its stakeholders and the pressure to comply with existing legislation is less as compared to the developed countries [48].

According to institutional theory, companies disclose their risk information because of institutional pressure [43–47]. The institutional theory suggests that organizations are influenced by their institutional contexts, which consist of socially constructed norms, myths or rationales [43]. So risk disclosure may not be purely an economic decision, particularly when social and political aspects also need to be considered, and thus managers may consider mimicking other companies' disclosures particularly companies with good reputations, signaling that their risk management systems are equivalent to the industry standard [49].



Manager incentives theories suggest that managers would like to reduce information asymmetry by disclosing more information. Signaling theory may perceive risk disclosure as an instrument for gaining a competitive advantage, because it assumes that companies give information voluntarily to the capital market in order for firms to compete successfully in the market for risk capital [48]. Agency theory, in turn, conceives of disclosure as a mechanism which decreases the costs resulting from conflicts between managers and shareholders (compensation contracts) and from conflicts between the firm and its creditors (debt contracts) [50].

Due to political cost theory, certain groups of voters have an incentive to lobby for the nationalization, expropriation, break-up, or regulation of an industry or corporation [51]. It means that by avoiding the attention that “high” profits draw attention because of the public’s association of high reported profits and monopoly rents, management can reduce the likelihood of adverse political actions and, therefore, reduce its expected costs [51]. Therefore, business organizations have to be concerned with different socio-political factors that raise cost and controversy [52]. Political cost theory assumes that as larger firms are subject to larger public visibility, which causes them to be exposed to greater regulatory actions by the government or to be expected to take more social responsibility [53,54]. This size hypothesis emphasizes the concern of the press and politicians with size of profits and potential monopoly abuses, highlight that companies with high profits are “obvious targets for public criticism” [53].

Such multi-theoretical perspectives of risk disclosure help to develop the hypothesis of the paper.

### 2.3. Hypotheses Development

Due to the level of COVID-19 risk disclosure varying from industry to industry [1], we choose the energy sector because—according to the authors’ knowledge—no prior work has fully determined COVID-19 risk disclosure in this industry. Energy companies are often perceived as the riskiest type of companies to invest in [55,56], and they are exposed to various risk factors. During the COVID-19 pandemic, the energy sector suffered from a higher risk perception [57], and the crisis influenced the energy market structure [58–61]. Moreover, the global spreading of COVID-19 caused numerous impacts on the sustainability of worldwide production and consumption of various commodities, which also contributed to the growing expectations of transforming energy companies by many stakeholders, such as governments, policymakers, and international organizations worldwide, to increase the use of renewable energy sources and improvement of energy efficiency. We also focus on electricity companies because of the business challenges they will face in making several transformations in the coming years [62,63]. All analyzed countries have put in a lot of effort in recent years to adjust their energy systems to the European Union energy policy, which is to create an internal energy market for all Member States. Moreover, after the accession to the EU, they have taken the responsibility to reduce emissions of environmentally harmful greenhouse gases, which requires a large investment in the construction and modernization of the existing outdated energy infrastructure [64,65].

Taking into account the above premises, we base our empirical study on research results [19] that reveals electricity subsector is characterized by the greatest number of risks in the energy sector (after oil and gas), and its risk factors and their importance proportion are following: financial condition (14.45%), energy price (12.00%), regulation (11.99%), power transmission (9.00%), M&A (8.95%), capital market (6.20%), the stock market (5.17%), weather conditions (5.12%), cost (5.01%), and obligations (4.99%). Therefore, we analyze the content of COVID-19-related risk disclosure of the biggest public electricity companies by revenue from CEECs (the analysis of the revenue indicated public companies from Poland, the Czech Republic, and Romania) in the light of the following determinants:

1. corporate size,
2. leverage,
3. corporate profitability,

4. board gender diversity (number of women on board),
5. the way/the method of most risk disclosure (financial statement, management commentary, integrated report, non-financial report)

### 2.3.1. Corporate Size

The larger firms may have greater incentives to disclose more information to reduce agency costs, hence reducing information asymmetries between managers and shareholders [6]. Previous risk disclosure studies found that a relationship between the company's size and the level of risk disclosures exists. For example, a company's size has a significant positive effect on corporate risk disclosure in the UK [29], in Portugal [2], and in Italy, size was positively related to the number of risk disclosures but no association was found between quality of risk disclosure and size in Italy [66], in Malawi [67], in Malaysia [68], in banks of emerging Islamic countries [3], in Japan [69], Greece [5], the USA, UK, Germany, Canada [7], India [4], China [70], the Netherlands [9], manufacturing companies in key South-East Asian countries [10], non-Asian countries [15], and in 20 European countries [8].

Risk disclosure was not related to size in the UK [6], Italy [66], the UK FTSE companies [71], in Sub-Saharan Africa [72], and China [14].

Exploring the relationship between COVID-19 disclosure and total assets as the measure of the company's size in UK companies, no significant relation was found [1].

Given the above, hypothesis 1 (H1) can be formulated as follows:

**Hypothesis 1 (H1).** *There is a positive relationship between the electricity company's size and the scope of COVID-19-related risk disclosure.*

### 2.3.2. Leverage

Considering the agency theory perspective, creditors of highly leveraged companies should have greater incentives to recommend that management disclose more information. Agency theory predicts that corporate disclosure is expected to increase with leverage [5,6]. However, the empirical evidence for this hypothesis is contradictory [6]. For example, a company's leverage has a significant positive effect on corporate risk disclosure in Portugal [2], and gearing was positively related to the number of risk disclosures, but no association was found between the quality of risk disclosure and gearing in Malawi [67], the USA, UK, Germany, and Canada [7], and capital structure is significantly and negatively related to quantitative risk information in Chinese financial companies [70], in the Netherlands [9], and in 20 European countries [8]. However, leverage was found to have an insignificant association with the level of risk disclosure in the UK [6,29], in UK FTSE companies [71], in Australia [73,74], in Sub-Saharan Africa [72], in Greece [5], and in China [14]. According to the other research, the leverage control variable is significant, but the opposite—companies, which have more leverage, disclose fewer risk disclosures, not more [10]. These arguments lead to the following second hypothesis:

**Hypothesis 2 (H2).** *There is a positive relationship between the electricity company's leverage and COVID-19-related risk disclosure.*

### 2.3.3. Corporate Profitability

According to agency theory and political cost theory, companies with more profit may be more encouraged or forced to present more risk disclosure. Profitability is significantly positively associated with risk disclosure in Netherlands [9], in Australia [73], [74], and in Sub-Saharan Africa [72]. The results also show that there is no significant relationship between the number of risk disclosure and the level of the relative profitability of the sample companies in Japan [69], manufacturing companies in key South-East Asian countries [10], in 20 European countries [8], in Polish energy companies [75], China [14], and in UK companies [1,76]. The results indicate a negative and significant association between firm growth (FG) and corporate risk disclosure [4]. These results lead to the third hypothesis:

**Hypothesis 3 (H3).** *There is a positive relationship between the electricity company's profitability and COVID-19-related risk disclosure.*

#### 2.3.4. The Board Gender Diversity (Number of Women on Board)

Gender on the management board may explain differences in companies' behavior. Nielsen and Huse [77] found that women directors influence board strategic involvement through their contribution to board decision-making, which in turn depends on women directors' professional experience and the different values they bring. Women on the board made a positive and significant impact on risk disclosure in India [4], and COVID-19 disclosure and performance information is higher when there are a higher number of women on the board in UK FTSE non-financial firms [1]. The presence of women on the board was not significantly related to the extent of CSR disclosure in a US context [78]. Women on the board and CEO duality impact ESG disclosure negatively in Latino America [79]. The above arguments lead to the following fourth hypothesis:

**Hypothesis 4 (H4).** *There is a positive relationship between the board gender diversity of the electricity company and COVID-19-related risk disclosure.*

#### 2.3.5. The Form of Risk Disclosure

COVID-19-related risk disclosure may be published in different statements of the company's annual reporting. Analyzing big companies, it can be stated that they disclose financial and non-financial information in different statements, i.e., explanatory notes of financial statements, management commentary, and non-financial (corporate social responsibility or sustainability) reports. The content of company reports is regulated, but different statements are regulated by different frameworks. Financial statements and explanatory notes to the financial statements are regulated by International Financial Reporting Standards (IAS/IFRS), integrated reporting is regulated by the International Integrated Reporting Council (IIRC) Framework, and social responsibility report is regulated by the chosen framework, but the preparation of management commentary is not regulated by any standards. Italian listed companies the more detailed risk disclosure provided in the integrated reporting in comparison with management commentary [39]. The above arguments lead to the following fifth hypothesis:

**Hypothesis 5 (H5).** *COVID-19-related risk disclosure provided in the integrated reporting and non-financial report is more detailed than risk disclosure in management commentary.*

From this background, our paper tries to fill the actual gap, by investigating the level of COVID-19-related risk disclosure and the determinants of the risk disclosure.

### 3. Research Design and Methods

#### 3.1. Sample Selection

The sample consists of the companies obliged to follow the Directive 2014/95/EU on the disclosure of non-financial and diversity information, exceeding both 500 employees and one of the two-dimensional limits (total assets of 20 million EUR and total revenues of 40 million EUR). These are the first 10 largest listed energy (subsector electricity) companies in CEECs, all with a revenue of above 250 EUR million. We collected data on COVID-19-related risk disclosure of the electricity companies: from Poland (PGE S.A., Tauron Polska Energia S.A. (Tauron PE S.A.), Enea S.A., Energa S.A., ZE PAK S.A., Polenergia S.A., Kogeneracja S.A.), from Czech Republic-CEZ a. s., from Romania-Societatea Nationala Nuclearelectrica (SNN Ro), Compania Nationala De Transport Al Energiei Electrice Transelectrica (TRNS).

All included organizations have a fiscal year-end of 31 December. The source of the list is the EMIS list published on 1 January 2022, online at the EMIS database [80].



### 3.2. Variable Measurement and Data

The period for analysis of COVID-19-related risks disclosure was 2019–2020. This period is significant because it includes the first years of the worldwide COVID-19 pandemic. COVID-19-related risk disclosure analysis started in steps following a process similar to other disclosure studies (e.g., [22,74]). The first step was to identify the disclosure sources from where information will be collected. As annual reports are generally considered to be the most important source of corporate information [5], based on the analyzed financial and non-financial risk disclosure regulations, for our research we identified the following reports:

- financial statements,
- independent auditor's reports,
- explanatory notes to the financial statements,
- management discussion and analysis (management board report, management report),
- non-financial information reports

Using the past literature approach, to measure the extent of COVID-19 -related risk disclosure the authors chose to calculate sentences as the recording unit. We found all sentences about COVID-19-related risk or its risk management information disclosed by the chosen electricity companies. Sentences were included to analyze whether they mentioned the current or future uncertainty of the situation because of the COVID-19 pandemic or its consequences. Keywords such as 'COVID', 'pandemic', 'epidemic', 'SARS', and 'corona' had to appear within any sentence to calculate it into the analysis. Our search was not limited to the risk disclosure section, because risk-related information may be distributed throughout the whole report [15,39]. It should be noted that our instrument captures risk disclosure quantity and does not necessarily its quality [7,81].

Consistent with past studies [10], we define COVID-19-related Risk Disclosure (RD) as the total number of sentences with at least one risk-related keyword:

$$RD_i = \sum RD\_in\_EN_{ij} + \sum RD\_in\_NFR_{ij} + \sum RD\_in\_MBR_{ij}$$

where:  $RD_i$  = total number of sentences containing COVID-19-related risk disclosure;  $RD\_in\_EN_{ij}$  = number of financial risk sentences for the sentence attribute I in the jth company;  $RD\_in\_NFR_{ij}$  = number of non-financial risk sentences for the sentence attribute I in the jth company;  $RD\_in\_MBR_{ij}$  = number of risk management sentences for the sentence attribute I in the jth company.

We define all the variables in Table 1.

**Table 1.** Variables and Their Definitions.

Independent Variable	Definition
RD	COVID-19-related risk disclosure measure.
RD_in_MBR	COVID-19-related risk disclosure measure in Management Board Report
RD_in_EN	COVID-19-related risk disclosure measure in Explanatory notes of financial statements of companies.
RD_in_NFR	COVID-19-related risk disclosure measure in non-financial reporting (Social Responsibility Report, Non-financial Report, Sustainability or Corporate Social Responsibility Report).
ASSETS	Company's size measured as the total assets in the end of the financial year.
REVENUE	Company's size measured as the total revenues at the end of the financial year.
LEVERAGE	Company's leverage measured as the total debt divided by total assets at the end of the financial year.
ROA	Company's profitability is measured by the return-on-assets ratio (ROA).
GENDER	Gender is measured by the number of women in the company's Management Board divided by the total members of the Board.

Source: Own elaboration.

### 3.3. Statistical Tests

Spearman's correlation coefficient has been calculated using SPSS for testing our hypotheses. The empirical model involved the estimation of Spearman correlation coefficients and the following linear equation:

$$RD = \beta_0 + \beta_1 \times ASSETS + \beta_2 \times LEVERAGE + \beta_3 \times ROA + \beta_4 \times GENDER$$

To test the last hypothesis, we should use the basic parametric test of the normal distribution—*t*-test or the basic nonparametric test Wilcoxon test, which uses the median to calculate statistical significance. The *t*-test and Wilcoxon test analyze the hypotheses, comparing the samples: disclosures in non-financial reporting and disclosures in management board's reports. The *t*-test and Wilcoxon test evaluate by *p*-value. If the value is higher than the chosen significance level, then null hypothesis *H*<sub>0</sub>—disclosed sentences in non-financial reporting and management board's reports do not differ will be accepted, and if the *p*-value < 0.05, we can state that differences exist and conclude that disclosed sentences in non-financial reporting and management board's reports differ significantly.

The Kolmogorov–Smirnov and Shapiro–Wilk tests are used for the analysis of data distributions. These tests were used to verify the normality of COVID-19-related risks disclosure sentences. If the resulting *p*-value is less than the significance level (*p* < 0.01 or 0.05), the hypothesis that the data are distributed normally is confirmed.

If the *t*-test will show a significant difference between disclosures in reports, Cohen's *D* will be calculated because it measures the relative strength of the differences between the means of two populations based on sample data. The calculated value of effect size is then compared to Cohen's standards of small (0.2), medium (0.5), and large (0.8) effect sizes.

#### 4. Results

Table 2 shows the statistics for the variables analyzed. Some companies (Polenergia S.A., Kogeneracja S.A., TRNS) did not disclose the COVID-19-related risk at all—two companies that did not mention the pandemic in a single sentence in any of their 2019 reports. These companies prepared and presented their reports before the announcement of the general quarantine, i.e., on 4 and 10 March.

**Table 2.** Descriptive Statistics.

	Min	Max	Mean	Median	St. Deviation
RD	0	219	60.65	50.5	56.63
RD in MBR	0	86	29.8	23	31.17
RD in EN	0	111	23.8	18.5	26.81
RD in NFR	0	23	5.95	0	8.91
ASSETS	582.3	18234	7084	3052.45	8741
REVENUE	257.87	10296	3161.43	1699.88	3353.31
LEVERAGE	0.15	0.67	0.48	0.53	0.15
ROA	−0.14	0.08	0	0.03	0.07
GENDER	0	0.2	0.12	0.14	0.11

Source: Own elaboration.

One company (Tauron PE S.A.) disclosed the most COVID-19-related risks in 219 sentences in all reports in 2020, but the total average of disclosed sentences was only 60 sentences. It should be mentioned that the statistics of COVID-19-related risk disclosures have an important difference in 2019 and 2020 (Table 3).

We can conclude that all parameters (minimum, maximum, mean, median, and standard deviation) of COVID-19-related risks disclosures in 2020 were higher than in 2019. Despite the similar values of minimum and maximum in 2019, only half of the companies disclosed information in the management reports and only one company (CEZ a. s.) disclosed information about COVID-19 in non-financial reporting in 12 sentences. However, this company (CEZ a. s.) did not disclose information about COVID-19-related risk in explanatory notes of financial statements, while other companies disclosed in 9 to 30 sentences such information in 2019 (Tauron PE S.A., Energa S.A. presented 29 and 30 sentences accordingly).

**Table 3.** Descriptive Statistics in 2019 and 2020.

	Min	Max	Mean	Median	St. Deviation
2019					
RD	12	64	30.5	23	18.2
RD in MBR	0	34	10.6	6	14
RD in EN	0	30	17.7	18	10.6
RD in NFR	0	12	1.7	0	4.5
2020					
RD	29	219	100.1	98	53.7
RD in MBR	9	97	52	54	28.3
RD in EN	0	111	35.2	27	32.9
RD in NFR	0	23	10.7	10	10.1

Source: Own elaboration.

For 2020, we have a very different disclosure situation because a year later, all the researched companies already disclosed between 29 and 219 sentences about COVID-19-related risks in their annual reports (TRNS and Polenergia, S.A. disclosed the least information; Tauron PE S.A., ZE PAK S.A. disclosed the most information). Almost half of the sentences were in reports of Management Boards, but the number of sentences was evenly distributed, i.e., between 9 and 97 sentences. Then, only one company did not present information about COVID-19-related risks in the Explanatory Notes of financial statements, while other companies disclosed from 9 to 111 sentences containing such information. Companies explained briefly the impact of the COVID-19 pandemic on the going concern principle, financial risk, operational risk, and the activity of the company. Non-financial reporting had a surprisingly weak amount of information about COVID-19-related risk and its impact on companies' social, and environmental activities and the struggle against the pandemic situation because companies disclosed from 3 to 23 sentences, while three companies did not disclose this information at all. Figures 1 and 2 show the situation of the disclosure each year by each company.

In 2019, most disclosures were presented by Energa S.A. and Enea S.A. from Poland, in explanatory notes for financial statement and management report, while Tauron PE S.A. only used for this purpose explanatory notes. At the beginning of the pandemic, the companies from Poland—Polenergia S.A., Kogeneracja S.A., as well as from Romania—TRNS did not disclose their risks to stakeholders in their reports. The only company that disclosed the risks in non-financial reports (and chose this as the only form of risk disclosure) was CEZ a.s. from the Czech Republic. In 2020, in turn, all companies chose non-financial reports as a way for risk disclosure, presenting it in parallel with explanatory notes for financial statement and management report (although with a different disclosure structure).

Correlation analysis (Table 4) of all collected data showed that there are no relations between COVID-19-related risks disclosures and control variables in 2019–2020 because no significant correlation coefficients were found. However, we can identify that COVID-19 risk disclosure (RD\_in\_NFR) was significantly correlated with the company's assets and revenues and the correlation coefficient is about 0.45. That means that the company's size and disclosure of COVID-19-related risks in non-financial reporting are related as the first hypothesis states.

As the data for 2019 and 2020 were very different, the authors found it useful to calculate correlations separately for each year. However, calculations for 2019 did not find any significant relationship between variables. The analysis of 2020 (see Table 5) showed the significant relationship between the company's assets and revenue and COVID-19-related risk disclosure in explanatory notes of financial statements when the correlation coefficient was about 0.71. In addition, a significantly strong positive relationship (coefficient 0.686) was found between the COVID-19-related risk disclosure in the Management Board's reports and the number of women on the company's management board.

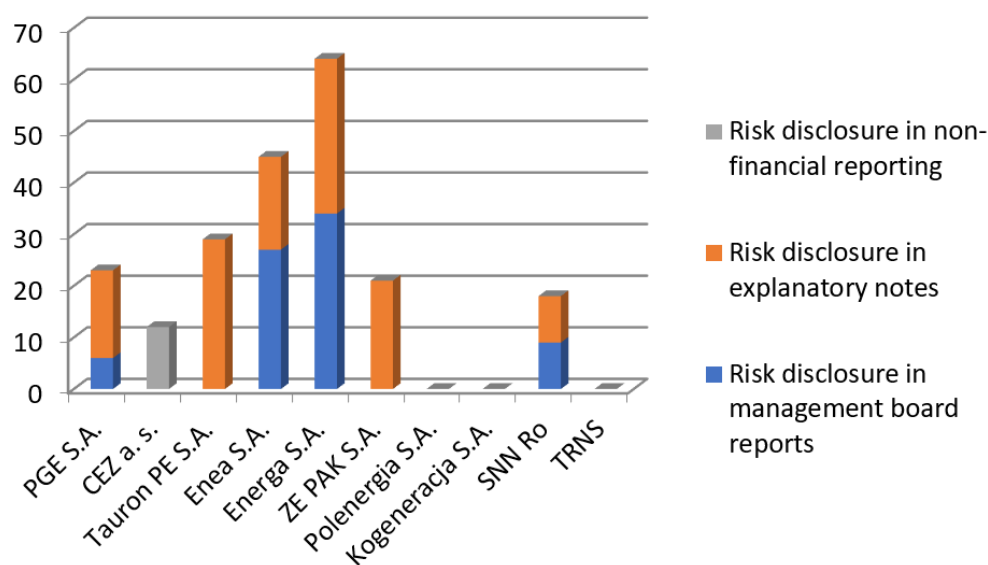


Figure 1. The Structure of Risk Disclosure by Companies in 2019.

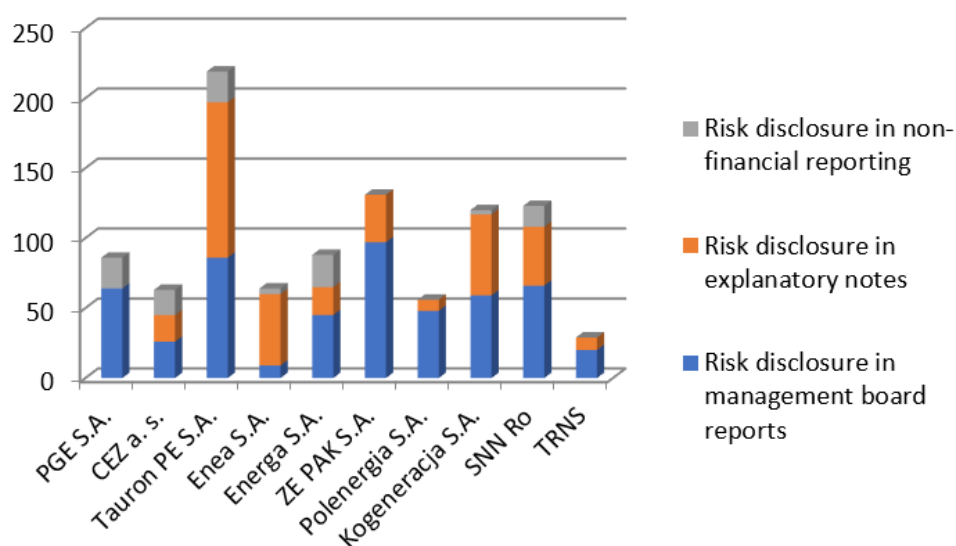


Figure 2. The Structure of Risk Disclosure Information by Companies in 2020. Source: Own elaboration.

Table 4. Correlation Matrix.

	RD	RD_in_MBR	RD_in_EN	RD_in_NFR	ASSETS	REVENUE	LEVERAGE	ROA	GENDER
RD	–								
RD_in_MBR	0.921 **	–							
RD_in_EN	0.746 **	0.524 *	–						
RD_in_NFR	0.574 **	0.456 *	0.272	–					
Assets	0.147	0.007	0.052	0.449 *	–				
Revenue	0.185	0.007	0.067	0.452 *	0.869 **	–			
Leverage	0.276	0.105	0.302	0.243	0.323	0.508 *	–		
Roa	−0.178	0.001	−0.295	0.077	−0.222	−0.394	−0.514 *	–	
Gender	−0.105	0.038	−0.362	−0.019	−0.350	−0.224	0.064	−0.003	–

\* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed). Source: Own elaboration.

**Table 5.** Correlation Matrix.

	RD	RD_in_MBR	RD_in_EN	RD_in_NFR	ASSETS	REVENUE	LEVERAGE	ROA	GENDER
RD	–								
RD_in_MBR	0.248	–							
RD_in_EN	0.068	0.111	–						
RD_in_NFR	0.406	0.522	0.354	–					
Assets	−0.212	−0.164	0.726 *	0.290	–				
Revenue	0.018	−0.127	0.695 *	0.290	0.915 **	–			
Leverage	0.146	0.146	0.148	0.291	0.280	0.486	–		
Roa	−0.109	−0.158	−0.037	−0.291	−0.061	−0.347	−0.616	–	
Gender	−0.037	−0.686 *	−0.127	−0.418	−0.212	−0.150	0.031	−0.128	–

\* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed). Source: Own elaboration.

The regression analysis of all data showed very weak prediction power because  $R^2 = 0.05$ , adjusted  $R^2 = 0.202$ . Analyzing only 2020 data  $R^2 = 0.09$ , adjusted  $R^2 = 0.64$  (see Tables 6 and 7), and further regression results we see that p levels are too high for rejecting the null hypothesis. Therefore, we may accept  $H_0$  which means that we cannot predict the dependent variable (RD—COVID-19-related risk disclosure) with features of our companies such as the company's assets, leverage, ROA, and the number of women in the company's management board.

**Table 6.** Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.299 <sup>a</sup>	0.090	−0.639	36.166

<sup>a</sup> Predictors: (Constant), GENDER, LEVERAGE, ASSETS, ROA Source: Own elaboration.

**Table 7.** Regression Results for RD as the Dependent Variable.

Model	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	54.830	51.653		1062	0.337
ASSETS	−0.001	0.002	−0.194	−0.355	0.737
1 LEVERAGE	4815	115.746	0.027	0.042	0.968
ROA	−71.984	228.416	−0.191	−0.315	0.765
GENDER	−5084	100.512	−0.022	−0.051	0.962

Source: Own elaboration.

The regression analysis proved that the correlations obtained above are random. Therefore, COVID-19-related risk disclosure in the biggest electricity companies cannot be explained with the chosen variables. Our hypotheses should be rejected and it can be stated that there is no relationship between the electricity company's size, leverage, profitability, and board gender diversity and COVID-19-related risk disclosure.

For testing the last hypothesis  $H_5$ , we need another method. To compare two independent, but related samples of one company usually  $t$ -test is used. Generally, the null hypothesis for these samples'  $t$ -test is that two variables have equal population means.

However, this test requires some assumptions: (1) independent observations, and (2) normality—different scores must be normally distributed in the population if the sample size is smaller than 25. Our COVID-19-related risk disclosures data hold independent observations' assumptions because each case holds a separate company that did not interact with other companies. Since we have the sample consisting of 10 companies over two years, we require the normality assumption. The Kolmogorov–Smirnov and Shapiro–Wilk tests (Table 8) were used for testing the normality of the sample.



**Table 8.** Test of Normality Distribution.

	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ASSETS	0.228	20	0.007	0.757	20	0.000
REVENUE	0.271	20	0.000	0.805	20	0.001
LEVERAGE	0.180	20	0.088	0.914	20	0.075
ROA	0.180	20	0.090	0.873	20	0.013
GENDER	0.221	20	0.012	0.840	20	0.004
RD	0.176	20	0.104	0.884	20	0.021
RD_in_MBR	0.198	20	0.039	0.870	20	0.012
RD_in_EN	0.192	20	0.053	0.802	20	0.001
RD_in_NFR	0.348	20	0.000	0.683	20	0.000

Source: Own elaboration.

As the level of significance is  $p < 0.05$ , we can reject the null hypothesis and state that our two samples are normally distributed. Disclosures of COVID-19-related risk in non-financial and management board reports are likely to be normally distributed in the population. This violates the normality assumption required by the *t*-test. This implies that we should run a *t*-test on these reports (Table 9).

**Table 9.** Results of T-test.

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig. (2-Tailed)
				Lower	Upper			
RD_in_MBR— RD_in_NFR	23.850	28.147	6.294	10.677	37.023	3789	19	0.001

Source: Own elaboration.

We may conclude that the mean difference between risk disclosure in the Management board's reports and non-financial reporting is statistically significant because the level of significance  $p$  is 0.001. Our *t*-test shows that COVID-19-related risk disclosure in management board's reports has a higher mean score than in non-financial reporting. Cohen's *D* is 0.8473 which means that the size of the differences between the means for the two reports is large. Therefore,  $H_5$  should be accepted.

## 5. Discussion

The COVID-19 pandemic has huge and wide-ranging effects, both on economies and businesses. Governments and companies around the world are exposed to the resulting risks for the highly interconnected global economy. Presently, the COVID-19 pandemic states is a new risk component on top of economic and market uncertainty [82] that affects electricity corporations. Therefore, electricity companies are the subject of the research due to their importance in the energy market, as well as to the energy transformation in the European Union. The largest public entities are accepted, counting on their exemplary, transparent disclosures, constituting a model for smaller entities, with lower quality standards of financial reporting. However, research shows significant gaps in disclosures regarding risks and uncertainties during the pandemic, especially in financial and non-financial reporting in 2019.

Considering the characteristics of CEECs, and their business environment, our research tests whether the prevailing theories exist in regards to electricity markets, and it explains the phenomena of corporate reporting and risk disclosure, including COVID-19 related risk, from the perspective of public electricity companies. The obtained results in risk disclosure let us compare corporate reporting in 2019 and 2020. As the pandemic began in the beginning of 2020 and the economic uncertainty suddenly increased, most of the companies were preparing their annual reports with the financial and non-financial results for 2019.

Some companies published their annual reports for 2019 before the global quarantine started, thus avoiding any news of impending risks and post-reporting events in that year's reports. Other companies were able to present the news as post-reporting events and to describe the risks involved, mainly by describing the going concern principle and by commenting on other financial information in the explanatory notes of financial statements. The entities we surveyed presented only some sentences about COVID-19 related risk in the management board's reports, and only one company disclosed 12 sentences about COVID-19 in non-financial reporting in 2019. This phenomenon proves that electricity companies did not provide risk disclosures to stakeholders quickly and in detail. The results of our research cannot be compared with the research on disclosures for 2019 published by energy companies in other countries, as such studies are not available. Nevertheless, our results are in line with the results of research on disclosures by Australian public universities, which COVID-19 risk disclosure for 2019 was minimal in a qualitative, neutral and constant format [13]. Our results are consistent with research results of UK FTSE non-financial firms' COVID-19 disclosures [1] which vary from industry to industry where energy sector is one of three with the lowest COVID-19 disclosures. The identified weaknesses in risk disclosure of 2019 annual reports is also similar to risk disclosure in all global companies presented in [15]—only 6.7 percent of companies from energy sector 6.7 percent considered the potential impact of pandemics.

In 2020, risk disclosures by electricity companies increased. All researched companies disclose risk information, with the most disclosures presented in management board's reports. As the research revealed, most electricity companies presented in their annual reports the impact of the pandemic on both the financial and non-financial performance. Nonetheless, key information regarding COVID-19 related risk were presented in the financial statements, with much less scope in non-financial reports. Some companies even disclosed no information about COVID-19 in their non-financial reporting. This reflects incomplete disclosure and proves that template-based reporting does not take into account new circumstances related to all spheres of sustainable development, also taking into account social and environmental aspects.

The conducted correlation analysis found some significant relationships. COVID-19 risk disclosure in non-financial reporting was significantly correlated with the company's assets and revenues (what is in line with some research such as in [10,25–30]); nevertheless we cannot say the same about the financial and management reporting. The disclosure of COVID-19 related risk information in financial statements and management board's reports does not significantly related with company's size. For 2020, significantly strong relationship between the COVID-19-related risk disclosure in the management board's reports and the number of women on the company's management board let us conclude that the more diversity in the management board of the company, the most likelihood that the company will disclose COVID-19 related risk in its report. The more women on management board, the more information about COVID-19 is provided. These results fall in line with the results obtained by [1,4] that empirically proved a positive and significant impact of a higher number of women on board on risk disclosure.

Results of our research cannot confirm the fact that the risk disclosure of energy sector companies is very qualitative and sufficient, as stated in the previous research [18], comparing disclosures of Polish energy and non-energy companies in 2013–2018. According to the authors [18] the integrated reports in the energy sector is of much higher quality than reports in non-energy sector, and they exceed the legal requirements of disclosing information. Our research; however, does not confirm this phenomenon in the list of pandemic risk disclosures.

Based on the empirical results, we may conclude that at the beginning of the pandemic, the level of risk disclosures was relatively low among the electricity companies, which could have resulted from the surprise of the sudden outbreak of the pandemic. Subsequent reports for 2020 indicate a significant improvement in risk disclosure, which may be interpreted as a way of meeting the information expectations of the stakeholders as well

as management of the reputation through disclosure of risk-related information, what is suggested by [2]. The results of our study are contrary to those achieved e.g., by [39], as the more detailed risk disclosure provided in the integrated reporting in comparison with management commentary. Our research subjects disclose risk information mainly in explanatory notes for financial statement and management report, with less use of non-financial reporting for this purpose.

Based on regression analysis, we may conclude that we cannot predict the COVID-19-related risk disclosure with features of our companies such as the company's assets, leverage, and ROA, as suggested in [1,30,76]. Therefore, the disclosure of COVID-19 related risk information is more random than can be explained by any rule. Then unexpected market situations are disclosed unexpectedly, and reporting does not react quickly to the market changes. Nonetheless, for the electricity industry, risk management may be an instrument for accountability and transparency, supporting stakeholder management.

## 6. Conclusions

The outbreak and rapid spread of COVID-19 have caused great challenges and risks to electricity companies. This study is a voice in the debate on the growing importance of risk reporting and the necessary legislative changes in this area. Our article makes several contributions to the existing theory and research.

### 6.1. Theoretical Contributions

First, this study enriches the literature stream of theories used for interpreting mandatory and voluntary corporate disclosures. Using the perspective of the corporate reporting theories (legitimacy theory, stakeholder theory, institutional theory, signaling theory and political cost theory) the significance of risk disclosures, including COVID-19-related risk disclosures, is assessed. The indicated weakness of risk disclosure is not yet perceived in the electricity industry as a neither a competitive advantage nor a form of legitimacy, but rather as additional forms of communications for stakeholders. Such an approach is not basically in line with the positive theories explaining the behavior of enterprises toward their stakeholders, nevertheless the pandemic broke out so suddenly and with such force that companies may not have been prepared to quickly adjust their reports. Moreover, our results may also suggest that CEECs have a less mature financial market than developed countries in West. Our results are in line with the assumptions of Omran and Ramdhony [48] that in less developed countries the stakeholder theory's approach is more suitable, because the information provided is more in line with stakeholders' expectations and financial market information needs, and reduces information asymmetries. It means that the normative aspect of stakeholder theory dominates over the descriptive and instrumental aspects. Thus, our results are in contrast with research conducted on Portuguese practices and risk disclosure [2], highlighting the desirability of enhancing accountability by mandating further disclosure of substantive and relevant risk-related information in annual reports.

Moreover, research results reveal that electricity firms disclose COVID-19 risk-related information because they are obliged to do so by institutions, according to institutional theory. Having in mind that the COVID-19 pandemic is an extraordinarily unexpected situation for the global economy, it is difficult to judge why the biggest and most powerful electricity companies in CEECs might not present risk in reports in 2019 in a proper way. As the research proves, a large, profitable, and low-leveraged company is not more likely to provide full disclosure of COVID-19 related risks. Moreover, the study does not confirm that risk disclosure in the electricity industry works as a mechanism to control managers' performance [50]. Therefore, agency theory and political cost theory could not explain the companies' disclosures, in particular in annual reports at the beginning of the pandemic. Thus, the paper discusses theories that recognize actual features of the electricity market in CEECs, mainly information asymmetry and business uncertainties.

Second, this study contributes to the literature of risk reporting and risk management responses to COVID-19 by comparing the scope of disclosures about risks in the largest listed energy (subsector electricity) companies in CEECs in the light of a deeper consideration of the features of the electricity subsector and its risks in the energy market in this region. For this research a unique research approach in the risk management area is used in the form of textual content analysis. This study also contributes to risk management-related literature by filling the research gap concerning the impact of the COVID-19 pandemic on risk disclosure.

Thirdly, this study supplements the literature of risk reporting to cope with this pandemic crisis from management's perspective. Recent studies suggested various response strategies in corporate reporting (like stakeholder capitalism [83]), this study extends it by multi-theoretical approach to formulate a proper risk reporting in crisis. Thus, the research may be interpreted in a broader context of the examination of electricity companies' risk assessment and risk management strategy. It may be a crucial step toward filling a gap in the theoretical background for corporate risk disclosure research in times of uncertainty.

### 6.2. Practical Contributions

This study may potentially contribute to the practical debate on the impact of the COVID-19 pandemic on the energy sector. The research results were influenced by the specificity of the electricity market in CEECs, an ownership structure with strong state domination—governmental-owned companies may have weaker expectations of investors toward the disclosure of risk, including the COVID-19 related risks for electricity companies, whereas societal expectations during the pandemic were concentrated on costs and the price of energy. Nevertheless, taking into account market trends in other industries [74,84,85], risk management becomes an instrument of accountability and transparency, supporting stakeholder management. Managers in energy companies are expected to present more transparent risk disclosure, “as the energy transition accelerates to be more just, equitable and inclusive post COVID-19” [21]. Therefore, the research results may be a valuable practical guide for managers in electricity companies that are going to prepare their risk reporting.

Moreover, this study reveals that no standardized methodology for providing risk disclosures results in a diversified scope of disclosures by companies, a different form used, and thus limits the usefulness of the presented information for stakeholders and complicates the assessment of risks identified. It exposes a legislative gap regarding reporting in crisis situations.

### 6.3. Limitations

We acknowledge that this study is not without limitations. First, the sample selection was limited to companies specifically recognized by the company's assets and revenues, which resulted in the analysis of only ten companies from three countries with a predominance of Polish companies in the sample. Therefore, this prevents us from drawing conclusions about the differences between countries in risk disclosure in the electricity sector. We focus only on one subsector because institutional investors prefer disclosure of firm-specific risk rather than general business risks [24]. Moreover, although all analyzed companies are obliged to follow the Directive 2014/95/EU on the disclosure of non-financial and diversity information, they may reveal risk information as voluntary and mandatory disclosures. Thus, the frameworks of risk disclosure may be different, then the content may differ; thus, it resulted in limited comparability of data. In turn, content analysis, the research method used in this study, also has limitations. Subjectivity could not be eliminated; however, detailed rules and procedures were followed to minimize its effects. In addition, content analysis measures only the quantity, not the quality, of risk disclosure. More disclosure does not necessarily mean better information. Despite these limitations, the findings from this study can provide insight into COVID-19-related risk disclosure.

#### 6.4. Implications for Future Research

As this study was concentrated on the extent of COVID-19 related risk disclosure, future studies should examine the quality and quantity of risk disclosure in more detail. The cross-national comparison among separated CEE countries could also be valuable to better understanding of the specifics of electricity market in this region and the resulting risk disclosures and impacts in particular CEE countries. Future research could also focus on the analysis of the risk disclosure in longer lag period, as the tangible effects of the COVID-19 pandemic may occur after many years and as the effect of a focused stakeholder engagement that is supported by effective communication. A potential for future research may be constituted by other theories than used in the paper, such as behavioral and organizational disclosure theories as well as and resource-based theory, conservative theory and utilitarian theory (like i.e., [86]). In addition, it may be valuable to assess more determinants of COVID-19 related risk disclosure including attributes of the management board, financial performance of the company, ownership, and structure.

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