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Methodological approach and the significance of environmental information disclosure in compliance with sustainability standards

Upravljanje metodologijom i značaj objavljivanja informacija o životnoj sredini u skladu sa standardima održivosti

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Abstract: The Global Reporting Initiative (GRI) represents the most influential and comprehensive framework for sustainability reporting globally. While its standards were initially voluntary, the energy sector has significantly adopted them, particularly in the realm of environmental information disclosure. The introduction of mandatory European Sustainability Reporting Standards (ESRS) has created new challenges in transitioning from GRI to ESRS. This study provides an analytical comparison of these two standards, focusing on their roles in environmental data reporting. The research aims to underscore the significance of environmental reporting by energy companies aligned with GRI standards, while evaluating their compatibility with ESRS requirements under the 'E' (Environmental) pillar. A desk research methodology was employed to examine contemporary trends in sustainability and standardization, referencing works by international experts. The comparative analysis of GRI and ESRS standards highlights their key similarities and differences, with particular emphasis on environmental dimensions. Findings reveal that while GRI offers a robust foundation for environmental reporting, ESRS mandates broader geographical coverage, more granular quantitative data, and an integrated approach to climate risks. For energy companies, this transition presents an opportunity to enhance transparency but necessitates adaptation of existing systems. The study contributes to the theoretical understanding of standard interoperability, offering a framework for future research in sustainable business practices within the energy sector.

Keywords: environmental reports, GRI standards, ESRS standards, comparative analysis.

Sažetak: Globalna inicijativa za izveštavanje (GRI - GII) predstavlja najuticajniji i sveobuhvatni okvir za održivo izveštavanje na globalnom nivou. Iako su njegovi standardi prvobitno bili dobrovoljnog karaktera, energetski sektor ih je značajno usvajao, posebno u domenu ekoloških informacija. Uvođenje obaveznih Evropskih standarda izveštavanja o održivosti (ESIO) stvorilo je nove izazove u tranziciji sa GII na ESIO. U tom kontekstu, ovaj rad pruža analizu dva standarda sa fokusom na njihovu ulogu u objavljivanju podataka o životnoj sredini. Cilj istraživanja je istaknuti značaj ekološkog izveštavanja energetskih kompanija koje su usklađene sa GII standardima, kao i proceniti njihovu kompatibilnost sa zahtevima ESIO-a u okviru stuba „E" (Environmental). Metodološki pristup zasnovan na desk istraživanju omogućio je sagledavanje savremenih trendova u održivosti i standardizaciji, uz referencu na radove međunarodnih stručnjaka. Komparativna analiza GII i ESIO standarda ističe njihove ključne sličnosti i razlike, sa posebnim naglaskom na ekološke dimenzije. Rezultati ukazuju na to da iako GII pruža solidne osnove za ekološko izveštavanje, ESIO zahteva širu geografsku pokrivenost, detaljnije kvantitativne podatke i integrisaniji pristup klimatskim rizicima. Za energetske kompanije, ova tranzicija predstavlja priliku za unapređenje transparentnosti, ali i zahteva adaptaciju postojećih sistema. Rad doprinosi teorijskom razumevanju interoperabilnosti standarda, pružajući okvir za buduće studije u oblasti održivog poslovanja u energetskom sektoru.

Ključne reči: izveštaji o životnoj sredini, GII standardi, ESIO standardi, komparativna analiza.

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INTRODUCTION

The growing threat of a global environmental crisis has significantly increased public awareness of the importance of corporate environmental reporting, making this area crucial for academic research and business practice. According to Gerged (2021), corporate environmental reports include the process through which companies communicate the impacts of their operations on the environment in external reports, usually annual reports. Różańska et al. (2024) emphasize that reporting standards are key tools that enable businesses to effectively communicate their environmental efforts. These standards help build stronger relationships with stakeholders, assess impact, uncover new business opportunities, mitigate risk, improve accountability and transparency. Moreover, they play a crucial role in the global reporting landscape by promoting standardization on issues of pollution, climate change and biodiversity. Finally, they encourage investors and other stakeholders to make public information decisions. In the dynamically growing field of environmental reporting, the Global Reporting Initiative (GRI) standards are widely recognized as a comprehensive framework that provides guidance to organizations around the world. Although primarily voluntary in nature, GRI standards have played a significant role in the European Union in helping companies meet the mandatory requirements of the Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU). However, the adoption of the European Sustainability Reporting Standards (ESRS) within the Corporate Sustainability Reporting Directive (CSRD) (Directive (EU) 2022/2464) presents a challenge for EU companies, which face the transition from GRI to mandatory ESRS standards. Rimmel et al. (2024) point out that the transition from voluntary to mandatory sustainability reporting standards represents a significant challenge for companies, while opening opportunities for research on readiness for change and interoperability analysis. Similarly, Bais et al. (2024), analyzing the state of research on GRI, call for further research on the implications of the introduction of ESRS for users of GRI. Previous studies (Yehezkiel et al., 2023; Mamun, 2023; Talbot & Boiral, 2018; Szczepankiewicz & Mućko, 2016; Zrnic et al., 2023) have found significant gaps in the compliance of energy company reports with GRI standards, which raises questions about the role of GRI in facilitating the transition to ESRS, especially in the domain of the environmental pillar (“E”). According to GRI and EFRAG, companies that already use GRI reporting can take advantage of existing practices when preparing sustainability statements in accordance with the ESRS. However, the academic discourse on how GRI standards can support ESRS compliance is still in its infancy (Filtikaki et al., 2023). This paper provides an assessment of the compliance of GRI reporting with ESRS requirements under the environmental pillar (“E”), exploring the role of GRI disclosure in transition readiness. Through a comparative analysis of the GRI standards, widely used in the energy sector, and the recently introduced ESRS, the paper highlights the importance of comparative approaches for meeting the requirements of publishing environmental information. The authors investigate three key research questions: (1) the degree of adoption of GRI standards for environmental topics (“E”) in energy company reports; (2) compliance of these reports with environmental requirements of ESRS; and (3) contributing to the GRI's publication of the environmental status of compliance with the ESRS. The authors of the paper emphasize the importance of the introduction of research tools - GRI-ESRS interoperability index - for assessing the readiness of GRI users to implement ESRS, which have been used in many scientific articles related to this issue. It is also important to identify the role of GRI standards in ensuring readiness for the transition to new standards. The authors emphasize the importance of presenting similarities and differences in environmental reporting within the framework of GRI and ESRS. In a way, the work provides theoretical insights into current and new practices in environmental reporting, with the desire that the valuable implications are recognized by energy companies in Serbia as well. The paper includes several parts - after the introductory part and highlighting the role of energy companies for environmental reporting, the third part provides basic information on GRI and the applicability of standards, as well as on mandatory ESRS standards introduced through CSRD. After a review of theoretical perspectives relevant to environmental reporting and literature related to the energy sector, a comparative analysis follows, followed by concluding remarks.

1. THE EUROPEAN STANDARDS REVISION FORUM (EFRAG) AND ITS SIGNIFICANCE FOR SUSTAINABILITY REPORTING STANDARDS

EFRAG (European Standards Review Forum) represents a key institution in the development of standards for sustainable reporting in the European Union. The abbreviation EFRAG comes from the full name of the institution, which is the European Financial Reporting Advisory Group. According to its

status, it belongs to an independent organization that operates under the supervision of the European Commission, founded in 2001. Its goal is to provide technical advice for the development of quality and harmonized financial and non-financial standards in the EU. From 2023, EFRAG is responsible for the development of European Sustainability Reporting Standards (ESRS) under the CSRD Corporate Reporting Directive. EFRAG technically developed ESRS at the request of the European Commission, with the participation of experts from business, audit, civil society and academia. ESRS replaces earlier voluntary frameworks (like GRI) and becomes a mandatory standard for EU companies. According to the text (EFRAG and GRI: Cooperation on sustainability reporting standards. EFRAG), EFRAG and GRI are cooperating to ensure that existing GRI data can be used to prepare ESRS reports. For example CO_2 emissions data (GRI Standard 305) can be directly mapped to an ESRS request. This reduces duplication of work for companies. EFRAG oversees the implementation, as it provides guidelines for the implementation of the ESRS. It also develops verification procedures for sustainable reporting and organizes public consultations to ensure that the standards meet the needs of stakeholders (European Commission, 2023). The cooperation between EFRAG-GRI is very important because it enables the transition from GRI to ESRS reporting standards. Companies that already have experience with GRI can “recycle” existing data for ESRS, which speeds up adaptation. EFRAG also contributes to standardization by ensuring that ESRS is aligned with global frameworks (such as GRI), preventing confusion in reporting. As far as legal certainty is concerned, the ESRS is directly integrated into the CSRD law, while the GRI is voluntary. EFRAG's opinion explains how companies can meet legal requirements using GRI data (Gray, 2022). From all the above, it can be concluded that EFRAG is in a way the “architect” of the ESRS standard, while cooperation with GRI is crucial for the smooth transition of companies from the old to the new legal framework. This is particularly important for the energy sector, where environmental data (E) is critical.

2. GLOBAL REPORTING INITIATIVE (GRI) AND APPLICABILITY OF ITS STANDARDS

GRI (Global Reporting Initiative) represents an independent, international non-profit organization, which was founded in Boston (USA) in 1997. Currently based in Amsterdam (Netherlands), this organization manages a global network consisting of seven regional offices in Brazil, China, India, USA, South Africa, Colombia and Singapore (RawMat, 2023). Initially, GRI focused on the development of guidelines and standards to improve sustainability reporting, helping organizations, i.e. companies and governments, to understand and understand their impact on sustainability and elements of sustainability related to climate change, human rights, governance and social well-being (Eurostat). Over time, the mission of the GRI has expanded beyond the formulation of methodology and standards, that is, guidelines to encompass broader goals. With the achievement of the ultimate goal - creating a sustainable future, the wider focus of the organization included harmonizing the environment for reporting on sustainable business, positioning the central hub of sustainability reporting, promoting efficient and effective reporting and encouraging the use of information on sustainable practices to improve organizational performance (IRENA).

Since its founding, GRI has published six versions of methodological guidelines and standards, adapted over time to ensure accessibility and consensus building through dialogue, feedback, roundtables and pilot testing. The first version of the GRI guidelines (G1) was published in 2000. Subsequent versions (G2, G3, G3.1 and G4, published in the period 2002-2013) have significantly evolved, i.e. changed in terms of structure and content (United Nations, Sustainable development goal 7). This iterative process culminated in 2016 with the launch of the first global standards for sustainability reporting - the GRI standards. The GRI standards, developed through a transparent, multi-stakeholder process, are issued by the Global Sustainability Standards Board. It is an independent body established by the GRI organization to establish standards on sustainability practices and sustainability reporting. The methodology and standards are publicly available to organizations and companies, allowing them to download and use them for free when compiling sustainability reports. They are structured into modular, interconnected components, including (GRI): universal standards, sectoral and thematic standards (Figure 1). All of them provide a comprehensive overview related to the economic side of organizations, the impacts that the organization has on ecology, as well as management approaches. The enumerated standards are continuously updated and expanded, including the soon-to-be new Thematic Standards on Taxes (2019) and Waste (2020), a significant update of the Universal Standards (2021), as well as the introduction of Sectoral Standards.

Figure 1. Sustainability reports with pillars of standards
Source: authors

Adams et al. (2022) note that although GRI standards can be applied by various organizations, their adoption varies by country, industry and company. Global research by KPMG (Klynveld, Peat, Marwick, Goerdeler, 2022) reveals that the GRI remains the dominant sustainability reporting framework, used by over two-thirds of the N100 companies and three-quarters of the G250 companies. KPMG belongs to one of the world's four largest auditing and consulting firms (known as the "Big Four"), together with PwC, Deloitte and EY, which provide various services related to financial statement audits, tax consulting, risk consulting, as well as sustainability reports and ESG (Environmental, Social, Governance) reporting. The "big four" studies represent a reference source for trends in corporate reporting. The N100 group includes the 100 largest companies by market value in each of the 50 countries in which KPMG conducts research. The criterion for the research is actually with a focus on national dominance (eg in Serbia it would be the most dominant companies like NIS, Telekom and the like). The aim of the research is to determine how and to what extent leading national companies follow sustainability standards. G250 represents a group of the 250 largest companies - globally by market capitalization (eg. Apple, Shell, Siemens, Toyota). Their reporting sets the standards for smaller organizations. Companies from the N100 and G250 groups have the greatest impact on the natural environment, as they are largely significant emitters of carbon dioxide (eg energy companies from the G250 contribute 70% to global CO_2 emissions). The KPMG house combines data from both groups in order to gain insight into national trends in the adoption of eco reporting and regulatory pressures in the N100 group, i.e. the adoption of global standards and reaching a competitive position in the G250 group. For example, if an energy company from Serbia (e.g. NIS) were in the N100, and Shell or ExxonMobil in the G250, KPMG's research would show that both groups massively use GRI/GRI standards, but with differences in reporting details (countries from the G250 group often cover wider areas). However, the authors highlight the fact that there are regional variations in the adoption of the standard, with rates of 75% in the Americas, 68% in Europe and the Asia-Pacific region, and 62% in the Middle East and Africa. Singapore, Taiwan and Chile are among the leading countries in adopting the GRI. The GRI report database for the period 2016-2020 shows that European companies published the most reports (40%, or 1,805 reports), with Spain, Sweden, Germany, Switzerland and Italy being particularly active. This trend is partly explained by the EU's NFRD (Non-Financial Reporting Directive), which required certain entities to publish non-financial information from 2017 onwards. The EU NFRD is the key legal framework of the European Union that introduced mandatory sustainability reporting for large companies. The NFRD requires certain companies to publish information on ESG factors to increase transparency and support the decisions of investors and other stakeholders.

Previous studies have shown significant regional differences in GRI adoption. Legendre and Coder (2013) linked these variations to national business cultures, finding fewer reports in shareholder-oriented cultures compared to stakeholder-oriented cultures. Economic development also affects adoption.

Tauringana (2021) documented limited interest in sustainability reporting in developing regions such as Africa, parts of Asia and Latin America. Moreover, as argued by Halkos and Nomikos (2021), government policy plays a role, with countries where governments place less emphasis on sustainability reporting showing lower adoption rates. At the sectoral level, Karikasole (2018) identified financial services, energy, food and beverages, and utilities as the most active users of GRI standards from 2000 to 2018. On the other hand, sectors like construction, real estate, chemicals and mining lagged behind. This difference can be attributed to different stakeholder pressures (Halkos & Nomikos, 2021; Caricasole, 2018) and sector-specific social and environmental risks (Fernandez-Feijoo et al., 2014). Company-specific factors such as size also influence GRI adoption. Larger firms are more likely to disclose sustainability information due to external pressures and agency concerns (Font et al., 2016;

Toppinen & Korhonen-Kurki, 2013). The NFRD further reinforces this trend, as its requirements apply only to businesses or companies with over five hundred employees. Carikasole (2018) confirmed that large companies lead the way in GRI reporting, but noted the growing involvement of small and medium-sized enterprises during the period 2000-2018. She also emphasized the importance of experience, with repeat reporters consistently outnumbering first-time adopters of the GRI standards. This background provides valuable context for analyzing the transition from GRI reporting to ESRS as mandated by the CSRD.

3. IMPORTANCE OF ENERGY SECTOR RESEARCH AND COMPLIANCE WITH STANDARDS

According to Eurostat data, due to its status as the largest emitter of greenhouse gases in the European Union, the energy sector is a very important factor in the analysis because it can play a key role in solving climate change (European Commission, 2023). As an environmentally sensitive industry, energy companies face significant pressures to align their sustainable practices that mitigate environmental degradation with global initiatives such as the Sustainable Development Goals (SDGs), and comply with ever-changing regulatory frameworks. The legal framework and reporting standards allow companies from the energy sector to gain and have insight into the value chain, to improve resilience and stability in the market in the medium and long term, along with the anticipated expectations of stakeholders in managing climate-related risks. The role in the energy transition, highlighted by the International Renewable Energy Agency (IRENA) (Gray, 2022), underlines their importance in advancing the goals of renewable energy and sustainability, with a wider impact on the achievement of other sustainable development goals (RawMat, 2023). For the reasons mentioned, the energy sector must place its key focus on assessing compliance with GRI standards and ESRS, when compiling environmental reports. Research findings indicate that the greater compliance with GRI environmental announcements, the easier it will be for energy companies to transition to ESRS requirements, which are directly related to environmental protection. According to Matuszak et al. (2025), research results reveal significant differences in the application of GRI standards among energy companies (Matuszak et al., 2025) According to the same authors, the level of environmental information disclosure based on GRI standards is relatively low compared to ESRS requirements, suggesting that energy sector companies must face challenges in establishing systems to meet future reporting requirements. A study by Matuszak et al. (2025) provided insight into current and emerging practices in environmental reporting, offering valuable implications for EU energy companies preparing environmental reports in accordance with ESRS requirements. The CSRD (Directive EU 2022/2464) marks a key legislative advance, significantly expanding and tightening the scope of the NFRD (Directive 2014/95/EU). It extends the reporting requirements beyond listed companies, including large unlisted entities and certain small and medium-sized enterprises. These organizations must report in accordance with the ESRS, developed by the European Financial Reporting Advisory Group (EFRAG), an independent body supporting the EU in financial and sustainability reporting. The ESRS aims to establish a single framework for environmental, social and governance (ESG) reporting, including ESRS 1 and ESRS 2, which describe general requirements and disclosures, and ten additional standards addressing specific ESG topics (Dienes et al., 2016). Entities already covered by the NFRD must switch to the new standards starting in 2024, and the first reports were to be submitted in 2025.

4. COMPARATIVE ANALYSIS OF GRI AND ESRS STANDARDS

The European Sustainability Reporting Standards (ESRS) and the Global Reporting Initiative (GRI) represent two key frameworks for environmental reporting, with significant differences in structure, scope and philosophy. The ESRS, within the Corporate Sustainability Reporting Directive (CSRD), includes five thematic environmental standards (E1-E5) covering 32 disclosure subtopics, while the GRI uses eight thematic standards (GRI 301-308) also with 32 subtopics. The ESRS includes 354 mandatory data points (146 narrative, 46 semi-narrative, 162 numerical) and 137 voluntary, with additional indicators for governance processes (GOV), business model strategy (SBM), risk management (IRO) and metrics (MT). On the other hand, the GRI requires the disclosure of the financial implications of climate risks (GRI 201-2) and the management of material issues (GRI 3-3).

According to Matuszak et al. (2025), key results of the comparative analysis include differences in approaches to climate change:

- ESRS E1 offers a detailed structure with nine sub-indicators, focusing on compliance with European legislation and financial implications, while GRI combines emissions

(GRI 305) and energy (GRI 302) with an emphasis on voluntary metric standards.

- In the area of water resources, ESRS E3 highlights environmental thresholds and financial risks (like E3-5), while GRI 303 focuses on minimum qualitative standards, although both share common elements such as water consumption (ESRS E3-4/GRI 303-5) and management policies (ESRS E3-1/GRI 3-3).
- For biodiversity, ESRS E4 applies a qualitative approach with an emphasis on ecosystem impacts, while GRI 304 insists on quantitative metrics. In the context of the circular economy, ESRS E5 integrates financial aspects (eg E5-6), while GRI separates materials (GRI 301) and waste (GRI 306).
- It is particularly important that the ESRS includes unique topics such as financial impacts of pollution (E2-6), water resource risks (E3-5) and ecosystem conditions (E4-6), which do not have direct equivalents in the GRI, highlighting its focus on financial risk integration and regulatory compliance.

Although the two frameworks of the presented standards somewhat overlap thematically (for example water, emissions), the essential difference lies in their philosophy:

- The ESRS is a mandatory, legally oriented system with an emphasis on environmental thresholds and financial implications, while the GRI remains a voluntary, metric-focused framework with a greater emphasis on operational metrics and management procedures.

For energy companies, this comparison points to the need for a two-fold alignment: using existing GRI data as a basis for the ESRS, while adding new elements such as climate risks and financial impacts. This requires strategic integration of existing systems and investment in quantitative and qualitative reporting capacities to achieve full compatibility with new European requirements.

CONCLUSION

In the Republic of Serbia, the energy sector represents a strategically key area whose transformation, stimulated by the accession to the European Union and global pressures for decarbonization, requires careful planning in the field of sustainable reporting. Although Serbia is not yet a member of the EU, Global Reporting Initiatives (GRI) play a crucial role in preparing domestic energy companies for future requirements such as uropean Sustainability Reporting Standards (ESRS). A dominant state-owned enterprise such as EPS, with a growing renewable energy sector, faces challenges from the lack of mandatory standardized transparency frameworks, although national laws such as the Environmental Protection Act require basic reporting. Companies that have proactively adopted GRI standards - including some private energy firms - already use existing data on emissions, resource use and biodiversity impacts as a basis for mapping to ESRS categories, thus gaining a competitive advantage in the transition to sustainability.

However, alignment with ESRS in the Serbian context requires additional adjustments. Although there is no direct obligation under the Corporate Sustainability Reporting Directive (CSRD), pressure from international financial institutions such as the EBRD and EIB, as well as global investors who increasingly apply ESG criteria, imposes the necessity of harmonization with European standards. Energy companies in Serbia face a lack of capacity for digital data publication and independent verification, which requires significant investments in training and technology. A special challenge is the transformation of the EPS, which must integrate the GRI/ESRS framework into the strategy of abandoning coal and developing renewable sources, in order to fulfill international climate obligations and attract green investments.

Future research related to Serbia should focus on a quantitative assessment of the costs and benefits of ESRS implementation, the role of state institutions in promoting standardized reporting, and how the private sector can use the interoperability of GRI and ESRS to attract foreign investment in the energy transition. Proactive adoption of these standards will not only meet future international requirements but will serve as a bridge to EU integration, enabling Serbian companies to gain competitive advantages in the region and global market while simultaneously contributing to the goals of climate neutrality and sustainable development.

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