

Article

A Comprehensive Analysis of the Best Practices in Applying Environmental, Social, and Governance Criteria within the Energy Sector

Tetiana Zatonatska ¹, Oleksandr Soboliev ¹, Dmytro Zatonatskiy ², Tetiana Dluhopolska ^{3,*},
Marek Rutkowski ⁴ and Natalia Rak ⁴

¹ Faculty of Economics, Taras Shevchenko National University, 01-601 Kyiv, Ukraine; tzatonatska@gmail.com (T.Z.); oleksandr.soboliev@knu.ua (O.S.)

² SESE Academy of Financial Management, Ministry of Finance of Ukraine, 01-053 Kyiv, Ukraine; dzatonat@gmail.com

³ B. Havrylyshyn Education and Research Institute of International Relations, West Ukrainian National University, 46-027 Ternopil, Ukraine

⁴ Institute of Public Administration and Business, WSEI University, 20-209 Lublin, Poland; marekrutkowski@winhill.pl (M.R.); natalia.rak@wsei.lublin.pl (N.R.)

* Correspondence: tetianadluhopolska@gmail.com; Tel.: +380-679957302

Abstract: This article embarks on a crucial exploration of the implementation and integration of environmental, social, and governance (ESG) criteria within the energy sector of European countries, with the ultimate objective of refining the energy legislation in Ukraine. The research delves into the evolving role of ESG standards as a cornerstone in corporate strategy and investment, transitioned from its roots in socially responsible investing to a comprehensive framework that intertwines ethical, environmental, and governance considerations with financial analysis. The main thrust of the study is the following: firstly, it provides a panoramic overview of ESG applications within European energy projects, underscoring pivotal policies, strategies, and instances of successful ESG standard incorporation. Secondly, it benchmarks and compares ESG practices across Europe's energy sector to distill best practices and their consequential trends and impacts. Lastly, this study converges these European insights to forge pragmatic recommendations for Ukraine's energy legislation, aiming for an elevated integration of ESG standards that are in step with European benchmarks. The anticipated outcomes offer recommendations for enhancing Ukraine's energy sector with robust ESG standards, proposing steps that align with the country's newly adopted Energy Strategy 2050 and international sustainability goals.

Keywords: ESG criteria; energy sector; European legislation; renewable energy; climate policy; sustainability reporting; corporate governance; greenhouse gas emissions; energy efficiency; multicriteria analysis



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1. Introduction

The integration of ESG criteria into the energy sector is a critical issue facing nations as they navigate towards sustainable development and climate change mitigation. This article explores the advanced ESG regulatory frameworks of European Union countries, with a keen focus on their application within the energy sector. By analyzing the legislative models and implementation strategies from the Netherlands, Sweden, and Finland, this study substantiates the growing importance of ESG considerations in shaping energy policies and corporate governance.

This research holds particular relevance for countries like Ukraine, which seeks to harmonize its policies with European standards and enhance its energy sector's sustainability. The introduction of robust ESG standards in Ukraine's energy strategy could serve as a

catalyst for economic development, energy security, and environmental protection. The insights garnered from the EU's approach offer a valuable roadmap for Ukraine, demonstrating the potential impact of comprehensive ESG regulations on national energy policies and the broader goal of achieving climate neutrality.

The aim of this article is to conduct a comprehensive analysis of the best practices in applying environmental, social, and governance (ESG) criteria within European energy sector projects and to develop recommendations for enhancing Ukrainian energy legislation focusing on integrating ESG standards. The main objectives of the research are as follows:

- To provide an overview of the application of ESG criteria in the European energy sector. The objective is to present an overview of how ESG criteria are currently applied in the European energy sector, highlighting the critical policies, strategies, and examples of successful integration of ESG standards in energy projects;
- To conduct a benchmarking and comparative analysis of ESG practices in Europe. This objective focuses on benchmarking ESG practices across top-performing European countries in the energy sector, aiming to identify and compare best practices, trends, and the overall impact of these practices;
- To formulate recommendations for Ukrainian energy legislation. The final objective is to synthesize the insights from the European context to propose actionable recommendations for integrating ESG criteria into the Ukrainian energy sector's legislative and regulatory framework.

2. Literature Review

Environmental, social, and governance (ESG) criteria have evolved significantly over the past few decades, transitioning from a niche interest into a central consideration in global investment and corporate strategies.

Friede, Busch, and Bassen (2015) define ESG in their seminal paper ESG criteria as non-financial factors that investors use to identify material risks and growth opportunities, emphasizing the importance of these criteria in predicting financial performance [1]. Sullivan and Mackenzie (2017) delineate ESG criteria as metrics that enable investors to evaluate a firm's ethical impact and sustainability practices. They highlight the shift from traditional financial reporting to include environmental stewardship, social responsibility, and effective governance as crucial for long-term investment strategies [2]. Clark, Feiner, and Viehs (2015) articulate ESG standards as a framework that assesses companies based on their environmental conservation efforts, social relationships, and governance structures. Their definition underscores the role of ESG standards in enhancing or diminishing shareholder value through its impact on a company's reputation and operational efficiency [3]. Busch, Bauer, and Orlitzky (2016) describe ESG criteria in their analysis as indicators of a company's commitment to sustainable development goals. They view ESG as encompassing a company's energy use, waste management, employee relations, and board diversity, among other factors, indicating a firm's resilience to environmental and social challenges [4].

In the context of ESG applicability in investment, the origins of ESG can be traced back to the socially responsible investing (SRI) movement of the 1960s and 1970s, which was initially driven by the civil rights movement, anti-war protests, and environmental activism. Townsend (2020) highlights that SRI's evolution into ESG standards was significantly influenced by the recognition of climate change risks and the importance of governance in corporate performance. This transition marked a shift from exclusionary practices based on moral or ethical grounds to a comprehensive framework that integrates sustainability into financial analysis [5]. MacNeil and Esser (2021) provide a critical analysis of this evolution, illustrating how the initial CSR (Corporate Social Responsibility) focus expanded into a broader ESG framework. They argue for a transition from a "financial" model, which views ESG criteria primarily through the lens of risk and returns, to an "entity" model that emphasizes sustainability and governance within corporations themselves. This shift reflects a growing consensus on the need for a more integrated approach to sustainability that encompasses legal, ethical, and financial dimensions [6].

The debate on ESG versus SRI centers on their origins and scope. While some view ESG as an evolved, broader form of SRI, others consider SRI a more ethical, niche subset of ESG. The consensus leans towards ESG as a wider term that incorporates SRI's values into broader management practices, focusing on sustainability. ESG, favored by institutional investors for its universal applicability, merges SRI's ethical considerations with governance, indicating that ESG is an extension of SRI, reflecting its integration into modern, socially responsible investment strategies.

It is also worth mentioning that the EU has not officially defined “ESG”, but it has embraced related concepts surrounding “sustainability”. This approach is reflected in various policies and regulations aimed at promoting sustainable practices and investments within the EU framework. Given this context, an examination of how different international and European organizations conceptualize ESG becomes crucial. The following table provides a comparative analysis of ESG definitions provided by the European Bank for Reconstruction and Development (EBRD), the World Bank (WB), and the International Monetary Fund (IMF), showcasing the diverse perspectives and emphasis each organization places on the environmental, social, and governance components of sustainability (Table 1). This comparative analysis serves as a foundation for understanding the broader implications of ESG considerations in the financial and investment sectors, stressing the evolving nature of sustainability in global financial practices.

Table 1. Comparative analysis of ESG definitions by international and European financial organizations.

Organization	The Definition
The European Bank for Reconstruction and Development (EBRD)	ESG standards at EBRD involve a comprehensive approach towards sustainable development, focusing on promoting environmentally sound and sustainable growth through various policies and strategies. This includes commitments to environmental and social sustainability as a core aspect of achieving their mandate.
The World Bank (WB)	Sustainable finance, closely related to ESG standards, is defined by the World Bank as the process of integrating ESG considerations into financial decision-making. This leads to investments that ensure long-term sustainability in economic activities and projects. Another aspect is the inclusion of ESG factors in fixed-income investments, emphasizing their materiality as credit risks and advocating for their inclusion in credit risk analysis for stable financial returns.
The International Monetary Fund (IMF)	The IMF highlights sustainable finance as critical for financial stability, incorporating ESG principles into business and investment strategies. It covers a broad range of issues from climate change and pollution to labor practices and corporate behavior. The IMF's discussions emphasize the significant impact of ESG issues on firm performance and financial stability, with a special focus on climate change risks. This approach is seen as crucial for addressing systemic risks and ensuring future generations can meet their needs.

Source: [7–9].

Baran et al. (2022) investigated the relationship between the ESG performance of companies in the Polish energy sector and their corporate financial performance, namely return on equity, return on assets, and return on sales [10]. Makridou et al. (2024) investigate the impact of ESG on the profitability of energy companies in Europe through return on assets by modeling and analyzing aggregate valuation and individual ESG parameters over the period 1995–2020 [11]. In the article [12], the impact of Industry 4.0 on the ESG standards of the energy sector is determined using machine learning using the method of structural equations and confirmatory factor analysis. In the article [13], Chodnicka-Jaworska analyzes the impact of ESG measures on credit ratings of the energy sector during the COVID-19 crisis. The purpose of Wanday and Ajour's research [14] is to investigate the impact of companies' ESG activities on investors' returns, using quantitative analysis of public companies' financial indicators using return on equity, return on assets, return on sales, return on investment, and using the SARIMA (Seasonal Autoregressive Integrated

Moving Average) model to forecast revenues of companies. After controlling regional and industry effects, a positive relationship between ESG standards and investor returns was found.

3. Materials and Methods

In the methodology of this study, a combination of general and specialized approaches was utilized to effectively address the set objectives. This encompasses systematic, analytical, and synthetic methods tailored to dissect and interpret the research data comprehensively. A key part of the analysis involved comparative assessments to align with relevant benchmarks, alongside a detailed legal examination of regulatory frameworks in peer countries. Case study evaluations provided practical insights into the application of laws, while multicriteria analysis assisted in the nuanced comparison and ranking of legislative options through grouping and classification techniques.

To augment the existing methodological framework, SWOT analysis was employed to assess the strengths, weaknesses, opportunities, and threats related to ESG legislation, offering a balanced perspective on potential impacts and strategic considerations. Additionally, the simple additive weighting (SAW) method was integrated into the multicriteria analysis to prioritize and rank legislative options based on a set of defined criteria, ensuring a systematic and objective approach to decision-making. This method involves assigning relative weights to each criterion before calculating a cumulative score for each option, thereby facilitating a straightforward comparative analysis.

Additionally, we applied regression analysis using the method of least squares to model and analyze the influence of different factors on fuel and oil expenditures as well as the share of renewable energy production (percentage of total gross electricity production). The factors analyzed include the level of GDP (in current USD), investments, migration (inflows of foreign population by country), and a dummy variable for the Russian–Ukrainian war (Boolean variable with “0” for 1994–2021 and “1” for 2022). The analysis was conducted for Germany, Poland, the Czech Republic, and France.

The primary data sources include references [15–17] as well as Eurostat data on gross and net production of electricity and derived heat by type of plant and operator [18], general government expenditure by function [19], the World Bank data on GDP [20] and foreign direct investment [21], and OECD data on migration [22].

We checked the normality of distribution for all variables. The results showed that the level of expenditures on fuel and oil, the share of renewable energy production, and the level of migration have normal distributions for all countries, whereas GDP and investments do not have normal distributions for most countries.

Through the application of these methodologies, the study aims to build a solid theoretical and methodological foundation, enabling a thorough examination and synthesis of findings that contribute to the broader understanding of ESG legislative frameworks.

4. Results

4.1. ESG Breakdown

The inception of environmental, social, and governance (ESG) criteria marks a transformative era in the global economy, underscoring a pivotal shift towards sustainable investment practices. ESG embodies a comprehensive framework, evaluating corporate entities not solely on financial performance but also on their environmental stewardship, social responsibility, and governance integrity. This evolution reflects a growing recognition of the interconnectedness between corporate operations and broader societal and environmental challenges.

Considering the nature of the ESG definition, it requires an analysis of the breakdown of this concept to understand the evolution of the legislative framework and recently imposed approaches to regulation across different countries.

According to professors at BYU Marriott School of Management E. Stice and J. Stice [23], Environmental activities within the ESG concept include energy use, carbon footprint, natural resource stewardship, management of dangerous substances, compliance with governmental environmental regulation, and sustainability in resource use [15]. Social activities may include the following key components: positive community involvement, emphasis on diversity and equity in hiring and promotion, and fair and protective treatment of customers. Finally, governance activities mainly comprise transparency in the decision-making of the board of directors, diversity of the composition of the board of directors, fairness in executive compensation, and controls to ensure ethical business practices.

This breakdown is not limited but represents only the main components of the generally accepted approach to understanding ESG components in the literature and regulation.

There are additional frameworks and standards that offer varied perspectives and methodologies for evaluating and implementing environmental practices within organizations. One such framework is provided by the Sustainability Accounting Standards Board (SASB), which offers a detailed hierarchy for tracking and evaluating environmental practices. SASB standards are sector-specific, recognizing that environmental issues impact industries differently. These standards range from broad sustainability dimensions to specific accounting metrics, covering areas such as greenhouse gas emissions, water use, waste and pollution, land use, and biodiversity.

Not only environmental issues but other ESG components' weights can vary significantly within the concept of materiality, which is very well covered [24–26]. Materiality in the context of ESG standards refers to how significant certain ESG factors are to a company's financial performance, risk assessment, and investment decision-making. It suggests that not all ESG elements have the same level of impact or importance for every industry, company, or country. The concept of materiality helps investors and companies focus on ESG issues that are most likely to affect financial outcomes and sustainability performance.

The weighting of materiality typically involves investors, analysts, and companies themselves assessing which ESG factors are most relevant and significant to a company's business model and industry.

In a 2017 study, J. Bender investigated the varying significance of ESG factors across different sectors. They highlighted that the emphasis on ESG components differs by industry, demonstrating that the real estate sector prioritizes environmental factors exclusively, assigning them a 100% weight. Conversely, sectors such as materials, industrials, consumer discretionary, and consumer staples distribute equal importance to all three ESG dimensions. This allocation reflects the unique characteristics and operational demands of each industry, indicating a tailored approach to ESG prioritization. According to the study, the energy sector is more focused on the environmental (40%) and governance components (40%) [24].

The report [25], published by Refinitive (Table 2), studies the change in the weights of ESG components for each industry presented on the capital market. Below is the distribution of weights for the energy sector presented with such subsectors as Electric Utilities and IPPs, and Renewable Energy. According to the study, there were no changes during the last two years.

Table 2. Indicative ESG category weights matrix based on Refinitive assessment.

Industry	Environmental	Social	Governance
Electric Utilities and IPPs (2022)	43%	33%	24%
Electric Utilities and IPPs (2023)	43%	33%	24%
Renewable Energy (2022)	40%	27%	33%
Renewable Energy (2023)	40%	27%	33%

Source: [25].

Another study by Nagy, 2020, discusses the increasing importance of the governance factor in ESG ratings over time. Initially, governance's significance grew more than other factors, indicating that negative governance-related events impact company capitalization more swiftly compared to social and environmental events. Governance issues are seen as relevant across all sectors, whereas social and environmental factors tend to be more industry-specific [26].

The analysis underscores the evolving landscape of ESG criteria, highlighting the diverse impact of environmental, social, and governance factors on corporate performance across different sectors. This differentiation emphasizes the necessity of a nuanced approach to ESG evaluation, considering the unique materiality of ESG elements to each industry, company, and country. Governance factors have gained prominence, reflecting their broad relevance. Understanding these dynamics is crucial for navigating ESG legislation and regulatory frameworks, pointing towards a future where ESG integration becomes increasingly sophisticated and tailored to specific sectoral and geographical contexts.

4.2. The Substance of ESG Regulation

To understand the legal framework that regulates ESG standards, it is important to outline key trends and prerequisites that determined its current state. Given the current discussion, there are two key factors that can be outlined:

- Environmental concerns have increasingly become a central aspect of regulatory and investment considerations, catalyzing the implementation of ESG regulations. Historically seen as merely reputational risks, environmental issues are now recognized as significant risks for both companies and investors, prompting enhanced regulatory standards. The anticipation of regulatory changes, alongside heightened shareholder engagement and consumer demand for corporate responsibility in mitigating climate change, underscores the essential role of environmental stewardship in ESG practices. This shift highlights the necessity for companies to adapt and improve their environmental performance as a fundamental prerequisite for navigating the evolving ESG regulatory landscape [27].
- The 2007–2008 financial crisis highlighted the significant impact of poor corporate governance and risk management on the global economy and financial markets. This event served as a catalyst for increased investor awareness and set the stage for the implementation of ESG regulations. It underscored the necessity for companies to adopt stronger governance and risk management practices as part of broader ESG criteria to prevent future economic disruptions and align with evolving regulatory expectations [28].

The implementation of ESG regulations is also influenced by several prerequisites that ensure their effectiveness and integration into corporate strategy and operations. Beyond the immediate response to financial crises and environmental concerns, these prerequisites play a crucial role in shaping the landscape of ESG compliance and reporting. Here are some key prerequisites for ESG regulation implementation:

- Stakeholder Engagement. The involvement of stakeholders, including investors, customers, employees, and communities, is crucial. Their expectations and demands for corporate responsibility and transparency drive companies to adopt ESG practices. Engaging with stakeholders helps identify material issues that are most impactful and relevant to both the business and its wider community.
- Corporate Governance and Leadership Commitment. Effective ESG implementation requires strong governance structures and commitment from the top. This includes the board of directors and senior management who are responsible for integrating ESG standards into corporate strategy, risk management, and decision-making processes. Leadership commitment ensures that ESG considerations are embedded across all levels of the organization.

- **Access to Reliable Data and Measurement Tools.** Companies need access to reliable data and robust tools to measure and track ESG performance. This includes frameworks for assessing environmental impacts, social contributions, and governance practices. Accurate data collection and analysis are essential for setting benchmarks, monitoring progress, and reporting on ESG outcomes transparently.
- **Capacity Building and Education.** Developing internal expertise and understanding of ESG issues is critical. This may involve training programs for employees at all levels, from executives to operational staff, to ensure they understand the importance of ESG standards and how to implement related practices within their roles.
- **Market Demand and Competitive Pressure.** The increasing demand for sustainable products and services, along with pressure from competitors who are advancing in ESG, can serve as a catalyst for companies to adopt ESG regulations. Being competitive in the market often requires demonstrating a commitment to sustainability and responsible business practices.
- **Technological Innovation.** Advances in technology play a significant role in enabling ESG practices. From renewable energy technologies to digital platforms for stakeholder engagement and data analytics for sustainability metrics, technological innovation supports the effective implementation of ESG initiatives.

These prerequisites highlight the multifaceted approach needed to implement ESG regulations effectively. They underscore the importance of a supportive ecosystem that includes regulatory frameworks, corporate commitment, stakeholder engagement, and the tools and knowledge to measure and improve ESG performance.

4.3. Legal Framework

In recent decades, a fascinating phenomenon has emerged, highlighting the European Union's profound influence on global regulatory landscapes. This influence, known as the "Brussels Effect", reveals how the EU's legislative prowess extends far beyond its borders, shaping standards and practices worldwide. The term, introduced by Columbia Law School Professor Anu Bradford in 2012, encapsulates the EU's unique form of regulatory power, which contrasts sharply with the traditional notions of hegemony rooted in military might or economic dominance.

According to [27], there is the observation that the interconnectedness of global regulation sees lawmakers around the world increasingly taking cues from decisions made in regions far from their own. This trend has profound implications, affecting not just the legal frameworks within countries but also the operational dynamics of companies and individuals globally. The EU, with its ambitious regulatory standards in banking, social protection, and beyond, has positioned itself as a leader, guiding the path of international regulation.

Bradford's analysis brings to light the EU's ability to dictate global norms in a range of sectors without resorting to force or economic coercion. Instead, through market mechanisms and the sheer scale of its internal market, the EU exports its regulations, influencing third countries and setting benchmarks in environmental governance, digital privacy, and chemical safety, among others. Landmark legislations such as the General Data Protection Regulation (GDPR), the Registration, Evaluation, Authorisation of Chemicals (REACH), and directives on electronic waste have not only been pioneering within their fields but have also prompted multinational corporations to align their global operations with EU standards for reasons of efficiency and effectiveness.

The study extends to the realm of ESG criteria, where the EU's legislative measures aimed at decarbonizing the economy are scrutinized. The paper explores the potential ripple effects of these standards on non-EU countries' legislations and their impact on global business practices. Here, European businesses emerge as key market players, driving the adoption of stringent ESG legislation from both shareholder and corporate perspectives, underscoring the broader influence of the "Brussels Effect" in steering the global community towards sustainable development and responsible governance.

Analyzing ESG regulation in the EU, it is important to highlight the most significant milestones in the evolution of ESG standards:

- The United Nations-supported Principles for Responsible Investment (PRI) were introduced in 2006 to provide a framework for integrating ESG considerations into investment decision-making and ownership practices. With signatories ranging from asset owners to investment managers and service providers, the PRI have significantly influenced the investment industry, steering billions of dollars toward sustainable investments [29].
- The adoption of the Task Force on Climate-related Financial Disclosures (TCFD) Framework (2015). The Financial Stability Board established the TCFD to develop recommendations for more effective climate-related disclosures that could promote more informed investment, credit, and insurance underwriting decisions. This initiative reflects a shift from voluntary to mandatory climate risk reporting, significantly impacting how companies and financial institutions disclose climate-related risks and opportunities [30].
- The significant increase in the number of signatories to the Principles for Responsible Investment (PRI) by 2019, with 2300 asset owners representing USD 80 trillion in assets, marks a pivotal event in the global investment community's shift towards sustainability. This event is not merely a milestone in terms of numbers but a profound demonstration of the investment community's growing consensus on the importance of integrating environmental, social, and governance (ESG) considerations into investment practices [29].
- The enhancement of the EU Sustainable Finance Disclosure Regulation (SFDR), which came into effect in March 2021. This regulation represents a major step forward in the European Union's commitment to sustainable investing and transparency in financial markets. The SFDR aims to increase transparency in the financial market regarding sustainability, requiring financial market participants and financial advisers to disclose how they integrate ESG factors into their risk processes, investment decisions, and advisory activities [31].

It also worse mentioning that there are two important ESG regulations that came into effect in 2023:

- The EU Taxonomy Regulation, established under Regulation No. 2020/852, creates a definitive classification for environmentally sustainable economic activities within the EU, aiming to guide investment into projects that contribute to European environmental objectives. It sets technical criteria for each activity to be considered sustainable if it substantially contributes to one of six environmental objectives without causing significant harm to any of the other objectives. This regulation also mandates that companies also report comprehensively on their environmental impact, thus enabling investors to make informed decisions and integrate sustainability into their investment policies. Public institutions also utilize the taxonomy to refine ecological transition policies. Since 1 January 2023, significant companies and financial market participants must disclose the extent to which their activities are aligned with the EU Taxonomy's sustainability criteria [32].
- The EU's Sustainable Finance Disclosure Regulation (SFDR) seeks to enhance the transparency of sustainability claims in the investment market, targeting the practice of "greenwashing". It requires that financial market participants disclose ESG metrics at both the entity and product levels. Since becoming mandatory in January 2023, it requires financial entities to conform to specific disclosure obligations, including the use of reporting templates and adherence to detailed regulatory content and methodologies. Compliance is crucial for maintaining reputation and avoiding penalties [33].

The EU Taxonomy Regulation, established under Regulation No. 2020/852, creates a definitive classification for environmentally sustainable economic activities within the EU, aiming to guide investment into projects that contribute to European environmental objectives. It sets technical criteria for each activity to be considered sustainable if it substantially contributes to one of six environmental objectives, which include climate change mitigation and adaptation, the sustainable use and protection of water and marine resources, the transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems, without causing significant harm to any of the other objectives.

This regulation also mandates that companies not only adhere to these criteria but also report comprehensively on their environmental impact, thus enabling investors to make informed decisions and integrate sustainability into their investment policies. Public institutions also utilize the taxonomy to refine ecological transition policies. Since 1 January 2023, significant companies and financial market participants must disclose the extent to which their activities are aligned with the EU Taxonomy's sustainability criteria, as stipulated by the CSRD and SFDR, which were previously limited to just two environmental objectives and now encompass all six to ensure a broader and more accurate representation of their sustainable practices.

Differences in ESG regulation between individual EU countries and overarching EU regulation highlight the complex landscape of sustainable finance and disclosure requirements. While the European Union sets broad regulatory standards through directives and regulations, individual member states may implement these standards differently, leading to variations in how ESG factors are regulated across the continent. For instance, France, Germany, and the Netherlands have introduced additional national policies that complement EU-wide measures, such as the Corporate Sustainability Reporting Directive (CSRD) and the SFDR. These national policies might cover more specific aspects of sustainable finance or provide further details on implementation, reflecting each country's unique economic and environmental priorities.

To provide recommendations for the improvement of Ukrainian regulation, we need to conduct an empirical evaluation of individual EU member states. This assessment aims to identify those countries that exemplify best practices in ESG regulation, offering a comprehensive view of the landscape from which to derive actionable insights and recommendations for Ukraine. By ranking EU countries based on their ESG regulatory frameworks and sustainable investment practices, we intend to highlight the most progressive and effective models of ESG integration.

There were several steps in our analysis: the selection of a set of criteria to rank the list of EU member states, application of a multi-criteria decision-making method (MCDM) to choose a group of countries for more detailed analysis, and a case study, which highlighted European best practices in ESG regulation approach in the energy sector.

Twenty EU member states with the highest GDP per capita Field (Gross Domestic Product per capita in the European Union in 2022, by the member state, 2022) were chosen for ranking (presented in Table 3). The following criteria were chosen:

- **Renewable Energy Penetration.** This criterion reflects a country's commitment to sustainable energy sources, reducing dependence on fossil fuels, and combating climate change. A higher penetration of renewable energy in a country's energy mix signifies progress towards sustainability goals and energy security [15].
- **Energy Efficiency.** Energy efficiency measures the effectiveness of energy use in a country, indicating how well energy resources are utilized to produce goods and services. High energy efficiency is associated with reduced energy costs, lower greenhouse gas emissions, and improved economic competitiveness.
- **Final energy consumption between 2012 and 2022** by Eurostat was used as a variable for this criterion. In 2012, the European Union (EU) set forth Directive 2012/27/EU on enhancing energy efficiency, aiming for a 20% reduction in energy use by 2020 compared to forecasted levels. This goal translates to limiting primary energy use to

1483 million tons of oil equivalent (Mtoe) and final energy use to 1086 Mtoe by 2020. For 2030, the EU established a mandatory target of reducing energy consumption by at least 32.5% [15].

- Another criterion, which shows the level of ESG regulation and adoption level, is Morningstar Sustainability Atlas Index [16]. This is an analysis of the sustainability profiles of Morningstar's 48 country-specific equity indexes. The focus is on evaluating ESG practices across these countries, highlighting Europe and Hong Kong as leading in ESG practices.

It suggests that the report evaluates countries based on the following:

- ESG Practices: Assessing how countries perform in environmental, social, and governance aspects.
- Carbon Metrics: Evaluating the carbon footprint and related environmental metrics of companies within each country.
- Company Controversies: Considering the negative impacts of any controversies involving companies on the country's overall ESG score.

The methodology involves analyzing data across these dimensions to rank countries according to their sustainability and ESG performance. The report aims to provide insights into the sustainability profiles of various countries by examining their equity markets through an ESG lens. This involves both developed and emerging markets, offering a comprehensive view of global sustainability practices [16].

The resulting analysis is presented in the table below.

Table 3. Ranking of top 20 EU member states by GDP per capita.

	Country	Morningstar Country Indexes' Portfolio Sustainability Scores	Energy Efficiency, %	Share of RES, %	GDP Per Capita (EUR)
1	Luxembourg	n/a	−12%	15.40%	119
2	Ireland	21.02	12%	13.60%	98
3	Denmark	21.34	−7%	36.65%	63
4	Netherlands	16.29	−17%	14.60%	53
5	Sweden	19.54	−5%	64.60%	53
6	Austria	21.39	−3%	37.80%	49
7	Finland	17.17	−7%	43.70%	48
8	Belgium	19.79	−3%	13.10%	47
9	Germany	20.08	−5%	20.30%	46
10	France	19.01	−9%	20.00%	39
11	Italy	19.73	−8%	18.45%	32
12	Malta	n/a	37%	13.80%	32
13	Cyprus	n/a	2%	18.40%	29
14	Slovenia	n/a	−3%	24.30%	28
15	Spain	19.38	−2%	21.60%	28
16	Estonia	n/a	−2%	38.00%	27
17	Czech Republic	31.16	1%	18.00%	26
18	Lithuania	n/a	−12%	29.40%	24
19	Portugal	19.36	3%	25.30%	23
20	Latvia	n/a	−1%	35.30%	21

Source: [15–17].

In the pursuit of discerning the most suitable European models for ESG regulation in the energy sector, the employment of a multicriteria decision-making (MCDM) method is imperative. MCDM allows for the consideration of multiple criteria simultaneously, which is crucial when assessing the holistic performance of countries in ESG regulation. It provided a structured approach to quantify the nuances and trade-offs inherent in ESG practices, ensuring a comprehensive evaluation beyond simplistic or unidimensional

analysis. The goal of the MCDM application was to select top three countries for more detailed analysis. For the purposes of the analysis, the SAW method was selected.

The Simple Additive Weighting (SAW) method, also known as the weighted sum model, is a straightforward MCDM technique. It is used to evaluate a set of alternatives in terms of multiple criteria, which are typically of differing levels of importance [34]. The results of the analysis are presented in Table 4.

Table 4. Results of the SAW method, multicriteria selection.

	Country	Morningstar Country Indexes' Portfolio Sustainability Scores, Adjusted Variable	Energy Efficiency, %, Adjusted Variable	Share of RES, %, Adjusted Variable	GDP Per Capita (EUR), Adjusted Value
1	Luxemburg	0.47	0.94	0.24	0.55
2	Ireland	0.77	0.74	0.21	0.58
3	Denmark	0.76	0.89	0.56	0.73
4	Netherlands	1.00	1.00	0.23	0.74
5	Sweden	0.83	0.87	1.00	0.90
6	Austria	0.76	0.86	0.59	0.73
7	Finland	0.95	0.89	0.68	0.84
8	Belgium	0.82	0.86	0.20	0.63
9	Germany	0.81	0.87	0.31	0.67
10	France	0.86	0.91	0.31	0.69
11	Italy	0.83	0.90	0.29	0.67
12	Malta	0.47	0.61	0.21	0.43
13	Cyprus	0.47	0.81	0.28	0.52
14	Slovenia	0.47	0.86	0.38	0.57
15	Spain	0.84	0.85	0.33	0.67
16	Estonia	0.47	0.85	0.59	0.63
17	Czech Republic	0.52	0.82	0.28	0.54
18	Lithuania	0.47	0.94	0.46	0.62
19	Portugal	0.84	0.81	0.39	0.68
20	Latvia	0.47	0.84	0.55	0.62

Source: authors' analysis.

Based on the results, the Netherlands leads with the highest scores in two categories, while Sweden and Finland show strong performance across the sample, making them exemplary cases for ESG regulatory analysis in this sector.

4.4. Case Study: Netherlands

Within the environmental dimension of ESG standards, the European Union has intensified its focus on climate policy and the reduction in greenhouse gas emissions in recent years. The EU Climate Law formalizes ambitious climate objectives, including achieving carbon neutrality by 2050 and targeting a reduction in greenhouse gas emissions of at least 55% by 2030 relative to 1990 levels, as delineated in the National Climate Agreement [35] and reflected in the Dutch Climate Plan. These targets underscore the EU's commitment to transitioning towards a fully climate-neutral economy by 2050, necessitating a comprehensive transformation of the Netherlands' energy infrastructure to mitigate climate change impacts.

At the COP 27 summit [36], the EU's climate commissioner, Frans Timmermans, announced plans to elevate the 2030 emissions reduction target from 55% to 57%, with the European Commission tasked with establishing an interim climate goal for 2040 by early 2024. The Dutch Climate Act, meanwhile, aligns national policy with these broader EU directives, setting a domestic objective of a 60% CO₂ emissions reduction by 2030, with further milestones of 70% by 2035 and 80% by 2040, culminating in complete climate neutrality by 2050. An amendment to the Climate Act on 10 July 2023 codifies these targets, embedding a legally binding commitment to a minimum of 55% emissions reduction by

2030, inclusive of land use considerations, and affirming the goal of achieving climate neutrality by the mid-century mark.

Under the Dutch Climate Act, a comprehensive framework is established to ensure the Netherlands meets its climate objectives. This framework includes the following:

- **Climate Plan:** A document detailing the government's policy for the next decade to address climate change, with the Minister of Economic Affairs and Climate holding responsibility for its implementation.
- **Annual Climate and Energy Report:** This report offers both a retrospective and forecasted view of CO₂ emissions within the country, providing a basis for evaluating progress towards emission reduction targets.
- **Climate Memorandum:** This serves as an assessment of the government's progress in achieving set targets, including any new policy measures proposed to meet these goals.

Starting from 2023, the Dutch government has committed to bi-annual updates to the parliament on climate policy progress. Additionally, a draft for the second iteration of the 10-year climate plan is slated for release in 2024. A significant development in the legislative framework is the proposed establishment of a Climate Council within the Climate Act. This council, comprising independent scientists and advisors, will play a crucial role in reviewing and advising on the upcoming climate plan, ensuring that the latest scientific insights and effective practices inform the Netherlands' climate policies.

In July 2023, the Dutch government unveiled the draft for the National Energy System Plan, articulating a strategic vision for the transformation and sustainability of the Netherlands' energy system through to 2050. This comprehensive plan outlines the government's approach to constructing, conserving, distributing, and expediting the transition towards a sustainable and equitable energy framework, emphasizing innovation and efficiency in the energy sector.

Concurrently, the Dutch cabinet introduced an augmented climate package in 2023, targeting a 60% reduction in CO₂ emissions by the year 2030. This package proposes a series of measures aimed at reforming the energy tax system to favor sustainable practices and ensure that the cost of pollution is borne by the polluters. Noteworthy within this suite of initiatives is the proposal to modify energy taxation to incentivize sustainability and impose higher charges on polluting activities.

In September 2023, the Netherlands Environmental Assessment Agency (PBL) published its Climate and Energy Report for the year, marking a pivotal moment by indicating that the Netherlands' climate goals for 2030 are within feasible reach. This optimism is supported by several regulatory measures in the energy sector, including the Coal Phase-Out Act, which limits coal use in electricity production and encourages the closure of coal-fired power plants through voluntary actions in exchange for subsidies.

The Dutch government's Hydrogen Strategy [37], released in March 2020, positions hydrogen as a critical element in the sustainability plans for industrial sectors, ports, and transportation across the Netherlands. The strategy highlights ongoing efforts by market participants to integrate renewable and low-carbon hydrogen through feasibility studies, business model development, and investment plans, signaling hydrogen's expanding role in the nation's energy transition.

The Dutch government is planning to establish a legal framework for social enterprises focused on societal goals, including ESG objectives. These enterprises will be required to operate in accordance with their social purpose and report their impact on society. The EU is progressing with its taxonomy rules for sustainability standards, while the IFRS Foundation has created the ISSB to develop global sustainability disclosure standards. The Netherlands supports this global harmonization of standards. Additionally, the (Netherlands Authority for Consumers and Markets) ACM in the Netherlands is fostering business collaborations for sustainability, balancing competition with societal benefits. Misleading sustainability claims are also under scrutiny by the ACM.

Dutch corporate governance is strengthening its focus on ESG aspects. Listed companies are already required to report on environmental and social matters, and there is an ongoing discussion to impose a duty of care on board members for societal and environmental responsibilities. The proposed Act for Responsible and Sustainable International Business Conduct [38] could introduce due diligence obligations for companies, which would be enforced with possible fines. Criticism has led to revisions of the Act, indicating a careful approach to aligning it with international standards. Concurrently, the European Parliament is discussing the Corporate Sustainability Due Diligence Directive to mandate companies to mitigate their environmental and human rights impacts.

4.5. Case Study: Sweden

Sweden is one of the leading adopters of ESG requirements, with renewable energy sources (RES) exceeding 50% of the total country's generating capacity's structure.

Sweden, with its ambition under Roadmap 2050, is on a path to becoming the world's first nation free from fossil fuels [39], mirroring the Netherlands' commitment to significantly reduce greenhouse gas emissions. Both countries have set substantial emission reduction targets, with Sweden aiming for a 40% reduction compared to 1990 levels by 2020 and envisioning a vehicle fleet devoid of fossil fuels by 2030. Similarly, the Netherlands has implemented aggressive CO₂ reduction targets to mitigate climate impact.

The Swedish government's investment of SEK 4.4 billion (USD 633 million) in 2016 [39], at the beginning of the RES capacity-building trend towards solar and wind energy, smart grids, and clean transport, reflects a broader European trend towards sustainable energy solutions, a direction also pursued by the Netherlands through its various green initiatives and investments in renewable energy sectors. Both countries finance these environmental efforts through innovative funding mechanisms, including the imposition of heavy taxes on petrol and diesel fuel, alongside strategic closures and divestments from traditional energy sources.

The cornerstone of environmental regulation in Sweden is the Swedish Environmental Code, which incorporates various EU directives into its framework. This comprehensive code encompasses a broad range of environmental aspects, including land and water management, the oversight of environmentally hazardous activities, operations affecting water bodies, as well as the regulation of chemical products and waste management practices. This pivotal legislation is further bolstered by an array of regulatory tools at both the EU and national levels, ensuring a robust legal structure for environmental stewardship.

In the realm of corporate governance, listed companies in Sweden—those with shares traded on a regulated market—are governed by a blend of statutory law, self-regulatory guidelines, and established norms. The foundational legal framework for corporate conduct is outlined in the Swedish Companies Act [40]. This act delineates the responsibilities of corporate boards and CEOs, delineates shareholders' rights, and sets forth the procedural requirements for general assemblies and the formulation of executive compensation policies. Complementary governance structures include the Swedish Corporate Governance Code, listing rules of regulated markets, and the advisories of the Swedish Securities Council, which collectively define the standards for exemplary conduct in Sweden's securities sector.

A critical requirement of the Corporate Governance Code is the obligation for corporate boards to establish policies that guide the company's societal interactions, aimed at safeguarding the firm's capacity for sustained value generation. This includes assessing the influence of sustainability issues on the company's risk profile and growth prospects. Moreover, boards are tasked with implementing effective mechanisms to ensure adherence to disclosure mandates, encompassing those related to environmental, social, and governance (ESG) factors, thereby promoting transparency and ethical business practices.

The Swedish Annual Accounts Act [40], incorporating the EU Accounting Directive (2013/34/EU) and the Non-Financial Reporting Directive (2014/95/EU) (NFRD), mandates the preparation of an annual report by Swedish entities. This report is essential for providing a comprehensive overview of the company's operational progress, financial health, and

outcomes. It is specifically required to include a directors' report detailing sustainability aspects critical for assessing the company's trajectory, encompassing environmental and employment-related information. Furthermore, entities engaged in activities under the ambit of the Environmental Code, necessitating a license or notification, including energy companies, are obliged to disclose the environmental ramifications of their operations within this report.

Moreover, the act [40] stipulates that sizable corporations compile a sustainability report addressing ESG considerations. Eligibility for this reporting requirement hinges on meeting at least two of the following criteria over the two most recent fiscal years: having an average workforce exceeding 250 employees, a balance sheet total surpassing SEK 175 million, or net sales exceeding SEK 350 million. Considering the construction of such regulation, the criteria are subject to further review and probably will include more companies. The sustainability report should elucidate the company's strategies regarding environmental stewardship, social responsibility, employee welfare, human rights adherence, and anti-corruption efforts. Additionally, it should outline the significant risks these areas pose, thereby ensuring stakeholders have a holistic understanding of the company's ESG engagement and risk management practices. Also, a lot of listed companies impose voluntary ESG disclosures, which only improves the degree of ESG standard adoption in the country.

4.6. Case Study: Finland

Finland has embarked on a robust approach to align with the EU's climate directives, underscoring its dedication to becoming a climate-neutral nation. The country's strategy is anchored in the UN Agenda 2030 goals [41], striving for a carbon-neutral and resource-wise society that promotes non-discrimination and equality alongside a highly skilled workforce. The Finnish government has committed to banning coal-fired power and heating by 2029, demonstrating a decisive move towards cleaner energy sources.

Sustainable development is not merely an aspiration but a concrete part of the government's fiscal planning, with the inclusion of such initiatives in the national budget starting in 2019. The budget allocated approximately EUR 1.7 billion in 2019 [42] where the largest single expenditure is directed towards the creation of a bioeconomy and cleantech solutions. These investments highlight Finland's commitment to innovating within the renewable energy sector and related clean technologies.

Finland's climate strategy is further defined by measures that include production subsidies for renewable energy, setting a clear trajectory for the nation to achieve carbon neutrality by 2045 [42]. The country's efforts are reflected in its energy usage statistics from 2017, which show renewables accounting for 43% of total energy consumption, marking Finland as having the second-highest share of renewable energy usage among EU countries at that time.

These concerted actions place Finland at the forefront of implementing the EU's climate directives within the ESG framework, demonstrating a holistic and forward-thinking approach to environmental stewardship, social responsibility, and governance.

The Environmental Protection Act (527/2014) stands as Finland's cornerstone environmental statute, mandating that enterprises conduct their operations in a manner that averts environmental pollution proactively. Where prevention is not entirely feasible, the act requires that pollution be minimized to the greatest extent practicable.

Finland's legislative framework for environmental governance is further strengthened by a suite of significant acts addressing diverse ecological concerns. These include the Nature Conservation Act (1096/1996), which safeguards natural habitats; the Act on Environmental Impact Assessment Procedure (468/1994), ensuring that projects undergo thorough environmental impact scrutiny; the Waste Act (646/2011) and the Chemicals Act (599/2013), governing waste management and chemical use; the Forest Act (1093/1996), protecting forest ecosystems; the Water Act (587/2011), managing water resources; and the Mining Act (621/2011), which regulates mining activities.

Additionally, the Finnish Land Use and Building Act (132/1999) is currently under revision, with a focus on bolstering the legislation’s role in countering climate change. The revision aims to introduce more rigorous standards for reducing the climatic impact of construction activities.

Supporting sustainable industrial practices, the Finnish Government has enacted regulations such as the Act on Production Subsidy for Electricity Produced from Renewable Energy Sources (1396/2010) and the Government Decree on Granting Aid to Businesses for the Promotion of the Circular Economy and Sustainable Green Growth (1197/2020). These regulations incentivize the production of renewable energy and foster a transition to a circular (sustainable) economy.

To sum up, the method that could complement the case study analysis is the SWOT Analysis, applied to the legislative landscape. This method could help identify the strengths, weaknesses, opportunities, and threats of each country’s ESG legislation, offering a strategic view of where these regulations stand relative to the global sustainability objectives (Table 5).

Table 5. SWOT analysis of the ESG legislation and initiatives within the Netherlands, Sweden, and Finland.

Strengths	Opportunities
<p>Comprehensive Legislation: All three countries have robust ESG frameworks, such as the Dutch Climate Act, Sweden’s ambition under Roadmap 2050, and Finland’s commitment to becoming climate-neutral. These frameworks provide a clear regulatory path for achieving sustainability goals.</p> <p>Innovation and Leadership: The Netherlands and Sweden demonstrate leadership in green energy and ESG integration, with initiatives like the Hydrogen Strategy and significant investments in renewable energy.</p> <p>Community and Stakeholder Engagement: Strong focus on involving various stakeholders, including businesses, government entities, and civil society, in the transition towards sustainable energy.</p>	<p>Global Influence and Standards Settings: The EU’s proactive stance on ESG standards can set global benchmarks and influence other regions to adopt similar measures.</p> <p>Innovation and Economic Growth: Investments in green energy and sustainability initiatives open avenues for technological innovation, economic growth, and job creation in emerging sectors.</p> <p>Enhanced Corporate Responsibility: Mandatory ESG reporting can improve corporate transparency, accountability, and overall social and environmental impact.</p>
Weaknesses	Threats
<p>Implementation Challenges: Despite ambitious goals, the actual implementation of these initiatives could face challenges due to technological, financial, or political constraints.</p> <p>Bureaucratic Hurdles: Potential for increased bureaucracy and financial difficulties for SMEs, especially highlighted by German and French SME’s concerns over the EU’s financial regulations.</p>	<p>Economic and Competitive Pressures: Stricter ESG regulations may impose additional costs on businesses, potentially impacting their global competitiveness.</p> <p>Regulatory Divergence: Differences in ESG regulations between the EU and other regions could lead to regulatory divergence, complicating international trade and investment.</p> <p>Risk of Greenwashing: Without stringent enforcement and verification, there is a risk that entities may engage in greenwashing, undermining the credibility of ESG initiatives.</p>

Source: authors’ analysis.

4.7. Regression Analysis for Energy Sectors in Poland, Germany, France and Czech Republic

The purpose of this regression analysis is to identify key factors influencing energy expenditures and renewable energy production in selected European countries: Poland, Germany, France, and the Czech Republic. These countries were chosen due to their relevance to the Ukrainian economy, their diverse energy policies, and data availability. This analysis supports the broader context of our study, which aims to enhance Ukraine’s energy legislation by integrating best practices in ESG criteria. These countries offer a mix of established and emerging markets, aligning well with Ukraine’s economic structure and providing a robust basis for comparative analysis.

Regression models were developed for the period 1994–2022. All models were evaluated for adequacy, significance of factors, absence of autocorrelation and heteroskedasticity, as well as multicollinearity between factors. Additionally, the stability of the models was assessed using Chow’s criterion. The results and main conclusions of the models that meet these requirements are presented below.

The results of this regression analysis will reinforce our conclusions and recommendations for Ukraine, helping to inform targeted policy measures that promote sustainability, efficiency, and resilience in Ukraine’s energy sector.

Figure 1 demonstrates that fuel and energy expenditures are significantly influenced by GDP, renewable energy share, and the Russian–Ukrainian war. The negative coefficient for GDP indicates that as GDP increases, energy expenditures as a percentage of GDP decrease, suggesting improved energy efficiency in wealthier economies. The positive correlation with the share of renewable energy highlights that higher investments in green energy are associated with increased energy expenditures, reflecting the initial costs of transitioning to renewable sources.

Regression				
Multiple R	0.872833333			
R ²	0.761838027			
Adj R ²	0.722144365			
Std Error	0.000872759			
Observations	29			
F	19.192938766			
p-value (F)	0.000000338			
	Coef	Std Error	t-stat	p-value
Intercept	0.005680564	0.001	5.374	0.000
Migrants	−0.000000001	0.000	−1.793	0.086
GDP (billion USD)	−0.000001232	0.000	−2.921	0.007
Renewable energy production	0.007768771	0.004	2.008	0.056
Russian-Ukrainian War	0.007347421	0.001	7.492	0.000

Figure 1. Modeling results for the variable “Expenditure on fuel and energy (% of GDP)” in Germany. Source: authors’ analysis based on data [18–22].

Additionally, the Russian–Ukrainian war has a significant impact, causing a substantial increase in energy expenditures as countries respond to the energy crisis. The model’s high reliability and significance levels across these variables affirm the robustness of these findings.

As can be seen in Figure 2, according to the constructed model (adequate and with all significant factors), fuel and energy expenditures in Poland have a significant relationship with the level of migration. In addition, there is a significant impact of the Russian–Ukrainian war, which caused a significant increase in energy expenditures in order to overcome the consequences of the energy crisis.

As can be seen in Figure 3, according to the constructed model (adequate and with all significant factors), fuel and energy expenditures in the Czech Republic have a significant relationship with the level of investment and the share of renewable energy. It is the development of alternative energy that is a priority direction for investment in the energy sector, as it ensures a stable amount of energy and contributes to an effective solution to the energy crisis, which in particular is gaining momentum due to the Russian–Ukrainian war.

Regression				
Multiple R	0.9610644625			
R ²	0.9236449010			
Adj R ²	0.9177714319			
Std Error	0.0005544779			
Observations	29			
F	157.2571298067			
p-value (F)	0.0000000000			
	Coef	Std Error	t-stat	p-value
Intercept	0.0010652565	0.0001477	7.2113712	0.0000001
Migrants	0.0000000128	0.0000000	6.9195834	0.0000002
Russian-Ukrainian War	−0.0099761600	0.0028302	−3.5249223	0.0015921

Figure 2. Modeling results for the variable “Expenditure on fuel and energy (% of GDP)” in Poland. Source: authors’ analysis based on data [18–22].

Regression				
Multiple R	0.92792236			
R ²	0.86103990			
Adj R ²	0.85035066			
Std Error	0.00135430			
Observations	29			
F	80.55203330			
p-value (F)	0.00000000			
	Coef	Std Error	t-stat	p-value
Intercept	−0.00221673	0.0008	−2.9517	0.0066
Investments	−0.00000021	0.0000	−2.8332	0.0088
Renewable energy production	0.18976935	0.0153	12.4192	0.0000

Figure 3. Modeling results for the variable “Expenditure on fuel and energy (% of GDP)” in Czech Republic. Source: authors’ analysis based on data [18–22].

As can be seen in Figure 4, according to the constructed model (adequate and with all significant factors except a constant), fuel and energy expenditures in France have a significant relationship with the level of investment, the level of migration and the share of renewable energy. In addition, there is a significant impact of the Russian–Ukrainian war, which caused a significant increase in energy expenditures in order to overcome the consequences of the energy crisis. It is the development of alternative energy that is the priority direction of investment in the energy sector, as it ensures a stable amount of energy and contributes to an effective solution to the energy crisis, which has become increasingly relevant in recent years.

Regression				
Multiple R	0.975969263			
R ²	0.952516002			
Adj R ²	0.944602003			
Std Error	0.000535296			
Observations	29			
F	120.358358901			
p-value (F)	0.000000000			
	Coef	Std Error	t-stat	p-value
Intercept	−0.000232081	0.00	−0.41	0.69
Migrants	0.000000006	0.00	3.56	0.00
Investments	−0.000000010	0.00	−1.96	0.06
Renewable energy production (% of total gross electricity production)	0.017819745	0.00	4.44	0.00
Russian-Ukrainian War	0.009081308	0.00	13.30	0.00

Figure 4. Modeling results for the variable “Expenditure on fuel and energy (% of GDP)” in France. Source: authors’ analysis based on data [18–22].

So, summing up, most of the studied countries are characterized by a rapid increase in energy expenditure in 2022 as a result of the Russian–Ukrainian war and the energy crisis. Under such conditions, an active investment policy, especially in renewable energy, is the main focus, as the modeling results show a significant positive relationship between the share of green energy and investment in the energy sector.

The constructed models in Figures 5–8 revealed a significant relationship between the level of development of green energy and the following factors:

- GDP, the level of investments, fuel and energy expenditures, the level of migration, as well as the beginning of a full-scale war in Ukraine on the example of Germany and the Czech Republic;
- The level of investments, the level of migration, as well as the beginning of a full-scale war in Ukraine following the example of Poland;
- Fuel and energy expenditures, as well as the start of a full-scale war in Ukraine following the example of France.

The regression analysis reveals several key relationships that underscore the importance of investments and economic development in shaping energy expenditures and renewable energy production. Investing in energy infrastructure and renewable sources has a significant positive impact across the countries studied. This finding aligns with the broader study objective of enhancing Ukraine’s energy sector by adopting best practices from European countries.

The analysis shows that higher GDP levels are associated with lower energy expenditures as a percentage of GDP, indicating greater energy efficiency in more developed economies. This suggests that economic growth facilitates investments in advanced technologies and efficient energy systems, which can be crucial for Ukraine’s development.

While the impact of migration was analyzed, it proved to be statistically insignificant in France and varied across other countries, indicating that other factors may play a more critical role in influencing energy expenditures.

Regression				
Multiple R	0.944080608			
R ²	0.891288195			
Adj R ²	0.873169561			
Std Error	0.036446791			
Observations	29			
F	49.19179822			
p-value (F)	3.18667×10^{-11}			
	Coef	Std Error	t-stat	p-value
Intercept	−0.258736632	0.032822245	−7.882965799	4.09251×10^{-8}
Expenditure on fuel and energy (% of GDP)	12.75134326	4.218665706	3.022601018	0.005880916
Investments	0.000406909	0.000129807	3.134734492	0.004496089
Migrants	9.04345×10^{-5}	2.11189×10^{-5}	4.282161644	0.00025772
GDP (billion USD)	8.60538×10^{-5}	1.16092×10^{-5}	7.412530924	1.18461×10^{-7}

Figure 5. Modeling results for the variable “Renewable energy production (% of total gross electricity production)” in Germany. Source: authors’ analysis based on data [18–22].

Regression				
Multiple R	0.9597751			
R ²	0.9211682			
Adj R ²	0.9117084			
Std Error	0.0124307			
Observations	29			
F	97.3769946			
p-value (F)	0.0000000			
	Coef	Std Error	t-stat	p-value
Intercept	0.0239194	0.0043765	5.4653879	0.0000112
Investments	−0.0000009	0.0000004	−2.2403940	0.0341933
Migrants	0.0000007	0.0000001	11.6573180	0.0000000
Russian-Ukrainian War	−0.8493278	0.0803171	−10.5746873	0.0000000

Figure 6. Modeling results for the variable “Renewable energy production (% of total gross electricity production)” in Poland. Source: authors’ analysis based on data [18–22].

Regression				
Multiple R	0.964269419			
R ²	0.929815512			
Adj R ²	0.914558015			
Std Error	0.005393918			
Observations	29			
F	60.941548131			
p-value (F)	0.0000000			
	Coef	Std Error	t-stat	p-value
Intercept	0.014778849	0.002568778	5.753260266	0.000007351
Expenditure on fuel and energy (% of GDP)	3.245929767	0.462757184	−7.014326038	0.000000379
Migrants	−0.000000163	0.000000067	−2.416678976	0.023999023
Russian-Ukrainian War	0.178762391	0.070885841	2.521834932	0.019052470
GDP (billion USD)	0.000095172	0.000028501	3.339282677	0.002847408
Investments	0.000000901	0.000000392	2.295521525	0.031155772

Figure 7. Modeling results for the variable “Renewable energy production (% of total gross electricity production)” in Czech Republic. Source: authors’ analysis based on data [18–22].

Regression				
Multiple R	0.84			
R ²	0.70			
Adj R ²	0.67			
Std Error	0.02			
Observations	29			
F	29.98			
p-value (F)	0.00			
	Coef	Std Error	t-stat	p-value
Intercept	0.07	0.01	6.46	0.00
Expenditure on fuel and energy (% of GDP)	23.96	3.67	6.53	0.00
Russian-Ukrainian War	−0.18	0.04	−4.03	0.00

Figure 8. Modeling results for the variable “Renewable energy production (% of total gross electricity production)” in France. Source: authors’ analysis based on data [18–22].

The significant impact of the Russian–Ukrainian war highlights the vulnerability of energy expenditures to geopolitical events. This underscores the need for Ukraine to focus on developing a resilient and diversified energy infrastructure, reducing dependency on external sources, and mitigating the effects of geopolitical disruptions.

The findings emphasize Ukraine’s need to stimulate investment in renewable energy and energy efficiency. Formulating an effective energy policy that considers these factors is crucial for the stable and sustainable development of the country’s energy sector. These insights support the study’s recommendations for Ukraine to align its energy policies with European best practices, fostering a robust and resilient energy economy.

4.8. Recommendations for Ukraine

Considering the ESG regulatory landscape analyses from the Netherlands, Sweden, and Finland, Ukraine can take definitive steps to enhance its approach to ESG standards within the energy sector. The recommendations for Ukraine are as follows:

Legislative Alignment: Ukraine should aim to align its national legislation with the EU directives on climate and ESG standards. This alignment will standardize Ukraine's approach to ESG and climate issues, fostering consistency and comparability with European standards.

Strategic Revision: The Cabinet of Ministers of Ukraine has adopted the new Energy Strategy of Ukraine 2050 [43,44], which also accounted for the Goals of sustainable development of Ukraine, which were adopted in February 2019. Considering the experience of the Netherlands and Sweden, the country's energy strategy can be complemented with a detailed climate plan, which will outline the government's policy on climate action. This plan should articulate a comprehensive strategy that dovetails with Ukraine's Energy Strategy 2050, adding a focused climate component. Another action that could improve the alignment process with the EU legislation is the review and assessment of our ability to incorporate more ambitious climate and sustainability goals where feasible or set another goal based on such assessment. This includes updating the new Energy Strategy 2050 to integrate specific climate objectives.

Annual Status Reporting: Implement an annual reporting mechanism to monitor and evaluate the progress of energy sector transformation. This will ensure transparency and accountability and allow for timely adjustments in strategy to stay on course with ESG objectives.

Climate Council Establishment: Ukraine would benefit from establishing a Climate Council consisting of independent scientists and advisors. This body would oversee and assess the nation's progress toward its climate goals, offering expert recommendations.

Sector-Specific Strategies: Develop distinct visions and strategies for emerging energy sectors, such as a dedicated Hydrogen Strategy, to guide the development and integration of new, sustainable energy sources.

Mandatory ESG Reporting: Introduce mandatory ESG reporting for listed companies, which will encourage transparency and foster investor confidence. This could be extended to include sizable corporations that play a significant role in the economy, ensuring a broader coverage of ESG reporting.

There was an attempt to introduce such reporting: on 10 August 2022, Ukraine enacted significant amendments to its accounting and financial reporting laws [45]. These amendments enhance the requirements for the submission and publication of financial reports. This includes a management report, now mandatory alongside financial statements, outlining the company's current status and development prospects, which must be submitted within the timelines set by law. This report, applicable to large and medium-sized enterprises, covers ecological and social aspects, offering a snapshot of the company's risks and uncertainties. However, the absence of clear standards for the formatting of these reports is an area for improvement.

Reporting standards can be considered as the most important legislative initiative for the development in Ukraine because more and more countries are introducing requirements that can affect their trade partners. For instance, the German Supply Chain Due Diligence Act (LkSG) [46], effective from 1 January 2023, mandates companies with over 3000 employees to ensure their supply chains adhere to specific environmental and social standards. From 2024, it will also include companies with more than 1000 employees. This legislation impacts both German and international companies operating in the German market, aiming to eliminate human rights abuses and environmental exploitation globally. Non-compliance could lead to substantial fines, exclusion from public contracts, and reputational damage. This act is a crucial part of Germany's commitment to global supply chain accountability.

ESG reporting standards are also important in the context of the energy sector: the national emissions trading system (Carbon Border Adjustment Mechanism—the world’s first cross-border tariff on carbon emissions) will be launched in pilot mode in 2024, and it should be fully operational in 2026 [47].

Coal Phase-Out and Green Energy Incentives: This sets clear targets for phasing out coal, aligned with Ukraine’s commitment to eliminate coal by 2035 [44]. Enhancing incentive schemes would encourage the adoption of green energy sources, drawing from successful models of feed-in tariffs and other subsidies.

By considering these points and potentially incorporating best practices from other EU nations, Ukraine can strengthen its ESG regulatory framework, thereby bolstering its energy sector’s sustainability and aligning with international climate goals. These steps will also support Ukraine’s journey towards a more resilient and forward-looking energy economy.

5. Discussion

The evolution of ESG regulation within the European Union, particularly the movement towards mandatory reporting, presents a trend with variable implications across member states. France exemplifies the most stringent application of these obligations, extending mandatory ESG reporting requirements beyond listed companies to include all investment firms managing assets above a specified threshold.

This regulatory approach, instantiated by France’s Climate Energy Law of 2019 and the subsequent decree of May 2021, signals a progressive shift towards transparency and accountability in financial activities. Beginning in 2022, investment firms managing assets over EUR 500 million are mandated to report non-financial metrics, setting a precedent that may influence broader EU policy.

The implications of such stringent ESG reporting requirements are multifaceted. On the one hand, they promise enhanced investor confidence and a commitment to sustainability that aligns with the global push towards a greener economy. On the other hand, the potential increase in administrative load and financial strain, particularly for SMEs, cannot be overlooked. German and French SMEs have expressed concerns that the EU’s planned financial regulations could exacerbate bureaucratic complexities and impose financial burdens that may challenge their operational viability.

The French government, acknowledging these concerns, has initiated the “Impact” platform aimed at equipping French companies with the knowledge and tools necessary to navigate non-financial reporting indicators. This intervention is a commendable step toward mitigating the administrative challenges posed by the new regulations.

The consequences of such regulatory measures could manifest in several ways. Strict reporting requirements may drive more sustainable business ethics, encouraging firms to adopt greener practices. Conversely, the added compliance costs and complexities could deter investment, particularly in sectors where margins are tight. The balance between regulatory oversight and economic pragmatism will be crucial in shaping the future landscape of ESG standard compliance.

As the EU grapples with the dual objectives of economic growth and sustainability, the French model may offer insights into the potential benefits and drawbacks of robust ESG regulation. Future research could explore the long-term economic impact of these regulations, their effect on investment patterns, and the overall sustainability of European businesses within the global market.

6. Conclusions

This research underscores the critical role of ESG regulations in steering the energy sector towards sustainable development and alignment with global climate objectives. Analyzing the ESG regulatory frameworks within the European Union, the study presents a compelling case for the integration of these practices into Ukraine’s energy legislation. The findings highlight that adopting ESG standards significantly influences energy policy

formulation and corporate governance, thereby enhancing the resilience and sustainability of the energy sector.

The research provided a comprehensive overview of the application of ESG criteria in the European energy sector through detailed case studies of the Netherlands, Sweden, and Finland. These case studies illustrated how these countries have successfully integrated ESG criteria through legislative frameworks, policy initiatives, and strategic measures. Specific policies of these countries were highlighted, showcasing the role of governmental regulations and strategic planning in facilitating ESG standard integration. Furthermore, the study explored the alignment of national policies with broader EU directives, such as the EU Sustainable Finance Disclosure Regulation (SFDR) and the EU Taxonomy Regulation, emphasizing their influence in shaping robust ESG practices. These analyses collectively provided a thorough understanding of how ESG criteria are applied and enforced in the European energy sector, offering valuable insights for potential application in Ukraine.

The research involved a detailed comparative assessment of ESG practices in top-performing countries, specifically the Netherlands, Sweden, and Finland. This analysis identified and compared critical policies, strategic measures, and best practices in these countries. The study evaluated the overall impact of these practices on energy efficiency, renewable energy adoption, and sustainability. By examining these benchmarks, the research provided insights into the trends and effectiveness of ESG standard integration, offering a robust framework for Ukraine to adopt similar practices.

The regression analysis highlights key relationships essential for achieving the research objectives. Investing in energy infrastructure and renewable sources has a significant positive impact, aligning with the goal of enhancing Ukraine's energy sector by adopting European best practices. Higher GDP levels correlate with lower energy expenditures as a percentage of GDP, indicating that economic growth fosters energy efficiency through advanced technologies. This is crucial for Ukraine, suggesting that economic development can lead to a more efficient energy sector. The significant impact of the Russian–Ukrainian war on energy expenditures underscores the need for a resilient and diversified energy infrastructure to mitigate geopolitical risks. These insights support the study's recommendations for Ukraine to stimulate investment in renewable energy and align its policies with European standards, promoting a robust and sustainable energy economy.

For Ukraine, incorporating European best practices offers a pathway to fortify its legislative framework, contributing to economic development, energy security, and environmental protection. The alignment with EU directives on climate and ESG standards emerges as a strategic imperative, ensuring consistency with international standards and fostering Ukraine's integration into the global sustainability agenda.

Future studies should investigate the long-term effects of ESG regulations on energy efficiency, market dynamics, and economic growth within transitioning economies. Further research could also explore the scalability of EU ESG practices in diverse geopolitical contexts and the role of technological innovation in supporting ESG standard compliance. The effectiveness of ESG reporting standards and their influence on investment trends in the energy sector presents another avenue for research, particularly in post-conflict regions where rebuilding efforts are aligned with sustainable development objectives.

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general government expenditure by function [19], from The World Bank about GDP [20] and Foreign direct investment [21], from OECD about migration [22].

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