

EU Sustainability Reporting: Evolution, Impact, and Future Outlook

Briefing Document: Evolution and Impact of EU Sustainability Reporting Regulations

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Subject: Comprehensive Review of EU Sustainability Reporting Frameworks and their Influence on Corporate Strategies This briefing document provides a detailed overview of the evolving landscape of sustainability reporting in the European Union, focusing on the key regulatory developments, their impact on corporate strategies, and the associated challenges and opportunities. The information is derived from a systematic literature review (Borzoueinia, Rezazadeh Pilehdarmoni, & Salehi, 2025).

1. Executive Summary

The European Union has progressively established the world's most comprehensive sustainability reporting framework, shifting from voluntary disclosures to a mandatory and metrics-driven regime. This transformation, primarily driven by the **Non-Financial Reporting Directive (NFRD)** and its successor, the **Corporate Sustainability Reporting Directive (CSRD)**, aims to embed environmental, social, and governance (ESG) considerations into core corporate strategies and risk management practices. The **European Sustainability Reporting Standards (ESRS)** provide the detailed framework for these disclosures, emphasizing a "double materiality" approach. While these regulations present significant compliance challenges, particularly for data quality, Scope 3 emissions tracking, and SME readiness, they also unlock substantial strategic opportunities for companies, including enhanced stakeholder trust, improved access to sustainable finance, better risk management, and a catalyst for innovation. Technology, especially AI and blockchain, is emerging as a crucial enabler for effective and transparent reporting.

2. Historical Evolution of EU Sustainability Reporting Regulations (2014-2025)

The EU's journey towards comprehensive sustainability reporting began in 2014 and has accelerated significantly.

2.1 Non-Financial Reporting Directive (NFRD) (2014-2018):

- **Initial Step:** The NFRD (Directive 2014/95/EU) was the EU's "first law requiring big public-interest corporations to report ESG-related information" (Borzoueinia, et al., 2025, p. 3).
- **Scope:** Targeted Public Interest Entities (PIEs) with over 500 employees (approx. 6,000 companies), including listed firms, banks, and insurance companies. SMEs were largely excluded from mandatory reporting (Borzoueinia, et al., 2025, p. 15).
- **Principles-Based:** Offered companies discretion in reporting format and depth, addressing areas like "corporate board diversity, human rights, social and labor concerns, environmental policies, and anti-corruption measures" (Borzoueinia, et al., 2025, p. 15).
- **Limitations:** Its "comply or explain" model and lack of mandatory auditing led to "inconsistencies and limited comparability between firms" (Borzoueinia, et al., 2025, p. 15). The "double materiality" concept was introduced but "inconsistently applied across countries" due to a lack of clear definitions (Borzoueinia, et al., 2025, p. 15).

2.2 Transition to CSRD (2019-2022): Addressing NFRD's Limitations:

- **Motivation:** Criticisms regarding "lack of clarity, standardization, and enforcement" of the NFRD spurred a formal review (Borzoueinia, et al., 2025, p. 16). Over 80% of public consultation participants supported mandatory standards (Borzoueinia, et al., 2025, p. 16).
- **Shift in Terminology:** The move from "non-financial reporting" to "sustainability reporting" acknowledged the "financial significance of ESG matters and the necessity for integrated and future-oriented reporting" (Borzoueinia, et al., 2025, p. 16).

2.3 Corporate Sustainability Reporting Directive (CSRD) (2023-2024):

- **Enactment:** Formally adopted in December 2022, effective early 2023 (Borzoueinia, et al., 2025, p. 16).
- **Expanded Scope:** "Dramatically expands reporting obligations," covering all businesses listed on EU-regulated markets and large entities exceeding defined thresholds, increasing the reporting universe from ~11,700 to nearly 50,000 firms (Borzoueinia, et al., 2025, p. 3, 18).
- **Key Innovations:**

- **Mandatory European Sustainability Reporting Standards (ESRS):** Developed by EFRAG, these are legally binding and provide "thorough reporting requirements in the domains of governance, social responsibility, and the environment" (Borzoueinia, et al., 2025, p. 17).

- **Double Materiality Principle:** A "fundamental shift in governance," requiring companies to assess "both the financial impact of sustainability risks and their broader social and environmental consequences" (Borzoueinia, et al., 2025, p. 2, 4).

- **Mandatory Third-Party Assurance:** Introduced for sustainability information, with a pathway to reasonable assurance, aiming to "mitigate the prevalence of greenwashing and enhance the credibility of reported data" (Borzoueinia, et al., 2025, p. 17).

- **Digital Formatting:** All disclosures must be "digitally tagged in XHTML format, enabling machine-readability" (Borzoueinia, et al., 2025, p. 17).

2.4 Complementary Regulations:

- **EU Taxonomy Regulation (July 2020):** A "uniform categorization system for sustainable economic activities," providing a consistent basis for investor decision-making (Borzoueinia, et al., 2025, p. 3).

- **Sustainable Finance Disclosure Regulation (SFDR):** Mandates financial institutions to "include sustainability concerns into their investment choices" (Borzoueinia, et al., 2025, p. 3).

- **Corporate Sustainability Due Diligence Directive (CSDDD):** "Imposes mandatory human rights and environmental risk assessments across global value chains," requiring companies to adopt enforceable codes of conduct (Borzoueinia, et al., 2025, p. 3-4).

3. Current Status Quo of EU Sustainability Reporting Regulations (2025)

As of 2025, the CSRD is being implemented in phases, supported by the ESRS framework and adjusted by the Omnibus Package.

3.1 CSRD Implementation Timeline and Scope Expansion:

- **Phased Approach:** Structured across four waves from FY2024 to FY2028, gradually broadening reporting scope (Borzoueinia, et al., 2025, p. 18-19).
 - **Wave 1 (FY2024/Report Due FY2025):** Large public-interest companies already under NFRD (~11,700 firms).
 - **Wave 2 (FY2025/Report Due FY2026):** Other large firms (~30,000 firms).
 - **Wave 3 (FY2026/Report Due FY2027):** Listed SMEs, non-EU firms (~8,000 firms).
 - **Wave 4 (FY2028/Report Due FY2029):** Significant non-EU entities (~500 firms).
- This phased rollout allows companies to adapt internal systems and processes (Borzoueinia, et al., 2025, p. 19).

3.2 European Sustainability Reporting Standards (ESRS) Framework:

- **Core of CSRD:** Developed by EFRAG, these 12 sector-agnostic standards (ESRS 1-2 cross-cutting, ESRS E1-G1 topical) enforce "double materiality assessments and align with global reporting initiatives" (Borzoueinia, et al., 2025, p. 20).
- **Double Materiality:** Requires assessment of both "impact materiality (how a company's activities affect society and the environment) and financial materiality (how sustainability risks and opportunities impact the company's financial performance)" (Borzoueinia, et al., 2025, p. 21).
- **Benefits:** Facilitates improved comparability by standardizing KPIs (e.g., Scope 3 emissions tracking, labor practices) and enhances market positioning for compliant firms, opening access to the EU's €15 trillion market (Borzoueinia, et al., 2025, p. 21).

3.3 The Omnibus Package (February 2025): Simplification Measures:

- **Purpose:** Aims to "minimize the compliance workload on companies while preserving the integrity of sustainability disclosures" (Borzoueinia, et al., 2025, p. 18, 22).

- **Key Measures:**

- **Increased Employee Threshold:** For mandatory reporting to over 1,000 employees (with additional financial criteria), reducing the number of firms requiring full-scale reports from ~50,000 to ~10,000 (Borzoueinia, et al., 2025, p. 23).

- **ESRS Lite:** A simplified framework for SMEs, reducing mandatory data points and streamlining disclosure (Borzoueinia, et al., 2025, p. 23).

- **Postponed Deadlines:** Waves 2 and 3 deadlines extended by two years (to FY2027 and FY2028 respectively) (Borzoueinia, et al., 2025, p. 23).

- **Debate:** While reducing administrative burden, environmental advocates express "concerns that easing requirements could dilute the regulatory framework's effectiveness in achieving long-term sustainability goals" (Borzoueinia, et al., 2025, p. 23).

4. Corporate Strategy Adaptations to Evolving Regulations

Companies are undergoing profound transformations in response to EU sustainability regulations.

4.1 Governance Changes:

- **Embedding Sustainability:** Many companies, like Siemens, have established "Sustainability Committees" at the board or C-suite level to "integrate Environmental, Social, and Governance (ESG) considerations into the core decision-making processes" (Borzoueinia, et al., 2025, p. 24). Siemens' DEGREE framework (decarbonization, ethics, governance, resource efficiency, equity, employability) exemplifies this (Borzoueinia, et al., 2025, p. 25).

- **Legitimacy Theory:** Firms adopt transparent governance practices to "secure societal approval and mitigate reputational risks" (Borzoueinia, et al., 2025, p. 25).

4.2 Operational Overhauls:

- **ESG Data Integration:** By FY2025, many large companies integrated ESG data into their Enterprise Risk Management (ERM) systems to link environmental metrics directly to business risks (Borzoueinia, et al., 2025, p. 26).

- **Sectoral Shifts:** TotalEnergies, for instance, has accelerated its transition towards renewable energy, aiming for "35 GW of gross renewable capacity" by FY2025 and a "17% reduction by FY2025" in lifecycle carbon intensity compared to 2015 levels (Borzoueinia, et al., 2025, p. 26).

4.3 Supply Chain Management Strategies:

- **Value Chain Transparency:** CSRD's focus on Scope 3 emissions (accounting for "75-85% of total greenhouse gas emissions across most sectors") compels firms to implement rigorous due diligence protocols covering environmental, social, and human rights considerations (Borzoueinia, et al., 2025, p. 26-27).

- **Example:** Volkswagen audited "over 40,000 suppliers" in FY2024 for labor practices and environmental compliance, aligning with the CSDDD (Borzoueinia, et al., 2025, p. 27).

4.4 Innovation as a Strategic Response:

- **Green Technologies & Circular Economy:** Companies are investing heavily to comply with CSRD and gain competitive advantages. Siemens, for example, announced a €2 billion global investment strategy by July 2023, partly focused on "driving forward the industrial metaverse and net-zero operations," with a new campus designed as a "net-zero location" (Borzoueinia, et al., 2025, p. 28).

4.5 Risk Management Architecture Transformation:

- **Integrated ERM:** Sustainability reporting "reshapes corporate behavior by embedding sustainability considerations into formal risk management practices" (Borzoueinia, et al., 2025, p. 2). This strengthens internal control frameworks and aligns ERM with long-term corporate sustainability strategies (Borzoueinia, et al., 2025, p. 2).

- **Risk Disclosure:** Disclosing risks in sustainability reports helps banks, investors, and rating agencies make informed decisions, as it "enhances transparency and helps stakeholders make informed decisions" (Borzoueinia, et al., 2025, p. 29). Empirical studies show a positive correlation between ERM and sustainability reporting quality and firm performance (Borzoueinia, et al., 2025, p. 29).

4.6 Workforce and Organizational Culture Adjustments:

- **Competency Building:** Companies are investing in training programs (e.g., Siemens' 23 hours of digital learning per employee in 2023) to equip employees with ESG data management skills (Borzoueinia, et al., 2025, p. 30).

- **Cross-Functional Collaboration:** Teams integrating HR, finance, operations, and procurement are being formed to collect ESG data and perform materiality assessments (Borzoueinia, et al., 2025, p. 31).

- **Cultural Shifts:** Organizational culture is vital; Siemens' "people-centered approach" includes investing in employee education and achieving diversity targets (e.g., 32.6% women in top management by FY2024) (Borzoueinia, et al., 2025, p. 31).

5. Sectoral Impacts: Varied Responses Across Industries

The impact of CSRD and ESRS varies depending on sector-specific environmental footprint, operational complexity, and stakeholder expectations.

5.1 High-Impact Sectors (Energy, Manufacturing, Automotive)

Under intense scrutiny due to significant GHG emissions. They are adopting "aggressive decarbonization strategies" (Borzoueinia, et al., 2025, p. 32).

- **Energy:** TotalEnergies aims for a "30% renewable energy mix by FY2025" (Borzoueinia, et al., 2025, p. 32).

- **Manufacturing:** Siemens implements "innovative waste reduction strategies that have contributed to a 15% reduction in emissions" (Borzoueinia, et al., 2025, p. 33).

- **Automotive:** Volkswagen is transitioning to EVs, achieving "emission reductions of up to 25% compared to traditional internal combustion engines" (Borzoueinia, et al., 2025, p. 33).

5.2 Financial Sector

Leading in ESG integration, driven by SFDR and CSRD. ING Bank, for example, increased its "Taxonomy-aligned assets from 30% in FY2023 to 40% in FY2025" (Borzoueinia, et al., 2025, p. 33).

5.3 SMEs

Largely exempt from direct CSRD reporting under the Omnibus Package but face "considerable indirect pressures from larger corporate partners demanding detailed Scope 3 emissions data" (Borzoueinia, et al., 2025, p. 34). Voluntary reporting (e.g., EcoWeave using ESRS Lite) is critical for market access and competitiveness (Borzoueinia, et al., 2025, p. 34).

5.4 Tech Sector

Plays a pivotal role in driving ESG transparency through "digital transformation tools such as big data analytics, cloud computing, and blockchain technologies" (Borzoueinia, et al., 2025, p. 35).

5.5 Agriculture and Food Industry

Required to report on practices like "regenerative agriculture, optimized water management, and biodiversity conservation under ESRS guidelines" (Borzoueinia, et al., 2025, p. 35).

5.6 Construction Industry

Scrutinized for environmental footprint, focusing on green building practices, sustainable materials, and waste management (Borzoueinia, et al., 2025, p. 35).

6. Challenges and Opportunities in Compliance

The shift to comprehensive sustainability reporting presents both significant hurdles and strategic advantages.

6.1 Challenges in Achieving Compliance:

- **Data Quality:** Ensuring "accuracy, reliability, comparability, and totality of information across ESG dimensions" is a critical concern, with proposed revisions to ESRS aiming to remove less critical data points and emphasize quantitative data (Borzoueinia, et al., 2025, p. 37).

- **Tracking Scope 3 Emissions:** A major impediment due to "difficulty in obtaining accurate and reliable data" from complex, global supply chains (Borzoueinia, et al., 2025, p. 38). Non-compliance can lead to "legal and financial consequences, along with potential harm to a company's reputation" (Borzoueinia, et al., 2025, p. 39).

- **Limited Data Availability from SMEs:** SMEs often lack "dedicated staff, expertise, and funds" for sophisticated data collection (Borzoueinia, et al., 2025, p. 39). The Omnibus package and EFRAG's SME forum aim to address this (Borzoueinia, et al., 2025, p. 39-40).

- **Complexity and Lack of Expertise:** The interconnectedness of CSRD, ESRS, EU Taxonomy, and SFDR creates a multifaceted reporting environment. The concept of "double materiality," particularly "impact materiality," is new and introduces "new sources of legal risk for reporting companies" (Borzoueinia, et al., 2025, p. 40-41).

- **Cost Implications:** Significant for startups and SMEs, requiring "substantial new investments in systems, processes, and expertise" (Borzoueinia, et al., 2025, p. 41).

- **Greenwashing:** The practice of "exaggerating or misrepresenting the sustainability credentials" to attract investors (Borzoueinia, et al., 2025, p. 41). The complexity of regulations can create opportunities for selective data presentation and unsupported claims (Borzoueinia, et al., 2025, p. 42).

6.2 Strategic Opportunities Arising from Compliance:

- **Enhancing Stakeholder Trust:** Transparent reporting "fosters confidence among investors, consumers, and other stakeholders, contributing to a more positive perception of the company" (Borzoueinia, et al., 2025, p. 42). Compliance helps companies "credibly signal their commitment and differentiate themselves" (Borzoueinia, et al., 2025, p. 42).

- **Access to Sustainable Finance:** Clear and consistent sustainability information makes companies more appealing to sustainability-focused investors, enabling access to the "expanding pool of funds allocated to sustainable endeavors" (Borzoueinia, et al., 2025, p. 43). The EU Taxonomy links reporting with key financial metrics like CapEx and OpEx, ensuring investment in sustainable technologies (Borzoueinia, et al., 2025, p. 44).

- **Improving Risk Management:** Mandatory ESG risk reporting pushes companies to "recognize, evaluate, and control a wider variety of risks," enhancing their capacity for risk management and enabling proactive mitigation (Borzoueinia, et al., 2025, p. 45).

- **Catalyst for Innovation:** Regulations incentivize businesses to "create and implement cutting-edge solutions that increase their social effect and lessen their environmental impact," leading to new products, services, and business models that provide competitive advantage (Borzoueinia, et al., 2025, p. 45-46).

7. Future Outlook

The future of EU sustainability reporting points towards stricter regulations and increased reliance on technology.

7.1 EU Sustainability Reporting Post-2025:

- **Stricter Regulations:** The trend is towards raising businesses' awareness of negative externalities and encouraging ethical practices (Borzoueinia, et al., 2025, p. 46).

- **Expanded Scope:** CSRD will affect over 49,000 businesses, requiring digital disclosure, thorough ESRS reporting, and verification (Borzoueinia, et al., 2025, p. 46).

- **Biodiversity Reporting:** Expected to be a greater emphasis, with ESRS E4 covering "disclosure obligations pertaining to ecosystems and biodiversity" (Borzoueinia, et al., 2025, p. 47).

7.2 The Role of Technology in Enhancing Sustainability Reporting:

- **AI-Powered ESG:** Utilizes machine learning, NLP, and predictive analytics to "automate data collection and analysis," providing real-time interpretation and forecasting (Borzoueinia, et al., 2025, p. 48). AI helps "minimize carbon emissions, optimize resource use, and assess environmental consequences" (Borzoueinia, et al., 2025, p. 48).

- **Blockchain Technology:** Offers significant promise for "improving supply chain transparency" by providing a "decentralized and immutable ledger" that enhances trust, reduces fraud, and ensures data integrity (Borzoueinia, et al., 2025, p. 49-50). It improves social responsibility by ensuring fair labor standards and ethical material procurement (Borzoueinia, et al., 2025, p. 50).

◦ **Challenges of Tech Integration:** Data quality and reliability, integration with existing systems, keeping up with evolving standards, data security/privacy, algorithm bias, and over-reliance on automation (Borzoueinia, et al., 2025, p. 50-51). Strong data governance frameworks, transparent AI procedures, and collaboration among stakeholders are crucial for optimization (Borzoueinia, et al., 2025, p. 51).

8. Conclusion

The CSRD is fundamentally redefining how European companies approach sustainability and risk. It is not merely a compliance framework but a strategic driver, influencing corporate behavior, risk culture, and governance mechanisms. While significant challenges remain, particularly concerning data consistency, SME adaptation, and the complexities of "double materiality," the directive also creates substantial opportunities for enhanced transparency, access to sustainable finance, improved risk management, and fostering innovation. The increasing integration of advanced technologies like AI and blockchain will be critical in navigating these complexities and achieving the EU's ambitious sustainability goals. This evolution lays the groundwork for a more resilient and accountable corporate landscape in Europe.