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Documented Managerial Integration in the CSRD Reporting Context: Evidence from Romanian Listed Energy Groups

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Abstract

This exploratory study examines documented managerial integration of sustainability information in three Romanian listed energy groups: OMV Petrom, Electrica and Romgaz. The Corporate Sustainability Reporting Directive (CSRD) provides the institutional context for tracing information-to-decision relationships across 2022–2025, including antecedents to the groups' first European Sustainability Reporting Standards (ESRS) cycles. The purpose is to assess documentary support for these relationships and their reporting connections, without estimating an isolated causal effect of CSRD. The analysis follows 31 managerial episodes through 100 main-period observations and one separate follow-up from 2026. Each episode is assessed in terms of documentary support, action stage, and direction of change. Explicit reporting connections concern assessment, reporting arrangements, sustainability planning, and specified preparatory actions. Investment and target choices also retain strategic, financial, regulatory and commercial antecedents. Formal requirements, preparation, reported implementation and procedural omissions warrant different interpretations. Continuing reporting arrangements can coexist with less demanding targets or incentive parameters. The contribution is a source-traceable comparison of decision episodes that distinguishes documented integration from regulatory attribution. A proposed decision-record structure remains untested.

Keywords: corporate sustainability reporting; ESRS; double materiality; management control; corporate governance; managerial decisions; energy sector; documentary analysis

1. Introduction

The Corporate Sustainability Reporting Directive (CSRD) and European Sustainability Reporting Standards (ESRS) provide the institutional reporting context for this study [1,2]. The empirical object is documented managerial integration: the traceable relationship between sustainability information and elements of managerial practice in public records. We examine documentary support for these relationships and their connections to reporting requirements, without estimating an isolated causal effect of CSRD. A materiality assessment, a sustainability policy, and a capital project may all appear in a report without establishing the relationship between them. Examining that relationship requires evidence about the decision object, responsible authority, timing, and subsequent action.

Mandatory reporting may have economic and organizational consequences, but these depend on incentives and institutional conditions [3]. Research on the earlier European Union (EU) non-financial reporting mandates identifies changes in corporate social responsibility (CSR) activity, including anticipatory responses [4]. Sustainability-control research

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also examines how information, responsibilities, and control practices integrate with corporate strategy [5,6]. These perspectives justify investigating managerial connections while keeping regulatory attribution separate from observed changes.

This study focuses on three Romanian listed energy groups: OMV Petrom (Romania), Electrica (Romania), and Romgaz (Romania). We compare decision episodes over 2022–2025, covering antecedents and the groups' first ESRS reporting cycles. We selected the sample based on public document availability and a shared energy-sector setting. It is not representative of Romanian companies. The unit of analysis is an identifiable managerial episode within a company or project perimeter, rather than the report as a whole. The groups' first ESRS reporting cycles provide the temporal reference for the comparison. Within this setting, we assess whether the sources connect CSRD/ESRS requirements, or double-materiality assessment undertaken within that reporting process, to specific managerial developments. Pre-existing arrangements and episodes with unresolved reporting connections are retained to preserve chronology and examine competing explanations. These episodes are not treated as untreated controls, and an unresolved connection does not establish that reporting had no influence.

Research already addresses materiality and organizational arrangements. Dragomir and colleagues examine materiality disclosures in 20 Romanian listed companies, including the governance of internal assessment processes [7]. In *Sustainability*, Herrera-De La Barrera and colleagues develop and apply the Integrated Strategic Sustainability Model (MISE), linking materiality, programs, governed indicators, evidence, and review in one industrial organization [8]. These studies motivate a complementary question: what can public records establish about the relationship between sustainability information and particular managerial choices over time? A comparison across reporting groups can address this question by examining the same decision objects in successive documents.

Research on Romanian firms combines sustainability assessment in construction [9] with financial and sustainability-based resilience modeling in road freight transport [10] and real estate [11]. These studies develop measurement and analytical tools that can inform managerial review. The present study examines a complementary question: how companies document the use of sustainability information in managerial arrangements and decisions. Its energy-sector corpus and qualitative design are distinct, and the analysis focuses on the chronology and support for specific decision links.

The central research question is how do Romanian listed energy groups document connections between sustainability information and managerial decisions during 2022–2025? Three questions structure the analysis: (RQ1) Which relationships between sustainability information and particular managerial choices are supported by the public records? (RQ2) What do successive documents establish about the approval, implementation, and review of those choices? (RQ3) How do the direction of change and plausible alternative explanations compare across management domains and organizational perimeters? The study aims to contribute a longitudinal comparison of decision episodes and an evidence-based approach to assessing documented managerial integration. Its scope is the selected cases, rather than Romanian companies as a population.

Three operational objectives guide the study: (O1) identifying the relationships between sustainability information and specific managerial choices that public documents support; (O2) reconstructing the approval, implementation, and review of those choices while preserving their organizational and temporal boundaries; and (O3) comparing the direction of change across management domains and examine plausible explanations alongside reporting requirements. These objectives correspond to RQ1, RQ2 and RQ3, respectively.

The regulatory setting also changed after the main observation period. Directive (EU) 2026/470 amended the reporting framework [12]. We do not apply later scope changes ret-

rospectively to decisions in 2022–2025 or treat the present corpus as a legal census. Selection relies on the groups' publicly stated use of ESRS and availability of longitudinal records. The analysis does not determine every company's current statutory reporting obligation.

2. Theoretical Framework

2.1. Sustainability Information in Management Control

We define documented managerial integration as the traceable relationship between sustainability information and specific elements of managerial practice in public records. It is an analytical construct for assessing supported connections. It is not a company-level maturity score, a measure of sustainability performance, or a claim about management effectiveness.

Gond and colleagues conceptualize integration through technical, organizational, and cognitive dimensions and distinguish diagnostic and interactive uses of control systems [5]. We examine shared information and procedures, and, where visible, the allocation of formal responsibilities. Managers' interpretation of sustainability priorities and interactive discussion are less accessible through public documentation. We therefore do not assign complete control configurations or infer cognitive agreement from a materiality approval.

Adams and Frost connect sustainability indicators with managerial planning and decisions [13]. Maas and colleagues articulate relationships between assessment, accounting, control and reporting [6]. Crutzen and colleagues examine formal and informal sustainability controls [14], while Edirisinghe and colleagues investigate integration using interviews and documentary evidence [15]. These studies establish that sustainability information can be integrated in different ways across management processes. The present study asks how public records distinguish the existence of a formal arrangement, its documented application, and the direction of a subsequent decision. These have separate analytical properties: evidence of an arrangement does not establish its effective operation or the ambition of the objective it supports. Public documents allow examination of recorded relationships and chronology but provide limited access to informal negotiation.

Reward and compensation systems are among the mechanisms examined in sustainability management-control research [14]. In this study, remuneration is analyzed through the published scheme, eligible roles, metric scope, weighting, and assessment period. These features describe the formal evaluation arrangement; their effects on managerial behavior require separate evidence.

The capacity to collect, validate, and use information also has a technical and professional dimension. Grigoras-Ichim and colleagues' legislative and bibliometric study of accounting digitalization in Romania discusses platform interoperability, data validation, and the development of reporting skills [16]. This provides context for the information infrastructure supporting reporting and its potential managerial use. In the present study, we examine the specific responsibilities and process connections documented by the selected groups.

2.2. Materiality and Decision Objects

The ESRS double-materiality assessment (DMA) identifies relevant impacts, risks and opportunities (IROs) from impact and financial perspectives [2]. That process can inform managerial priorities. However, its presence in a report does not establish that a particular investment or supplier decision resulted from its findings. We assess whether a priority is explicitly connected to a decision object, authority, or implementation requirement.

Recent studies investigated the practical implementation of double materiality in a Polish construction company [17], its interpretation in Italian family businesses [18], and internal tensions in Italian small and medium-sized enterprises (SMEs) with voluntary

reporting [19]. These studies motivate a distinction between maintaining a materiality assessment, using its findings in a strategy or rule, and tracing their consequences for a specific choice or resource allocation. The present study examines what public records establish at each point, without assuming they form a necessary sequence. Disclosures of assessment or strategic alignment alone cannot establish a decision-specific consequence.

2.3. Formalization, Implementation and Results

Bromley and Powell distinguish policy–practice decoupling from means–ends decoupling [20]. We retain this distinction as a secondary lens with evidential limits. Policy approval supports a claim about formalization. A documented omission within a relevant procedure supports a narrower claim about that procedure. An unobserved application remains an evidential gap; it is not equivalent to a reported inconsistency between a policy and an applicable procedure. Establishing policy–practice decoupling requires evidence about enactment, while establishing means–ends decoupling requires evidence about implemented practices and their relationship to intended outcomes. These requirements constrain how either concept can be applied to public reporting.

Figure 1 guides the examination of how sustainability information relates to authority, a decision or rule, implementation, and a reported outcome. We ask three questions about each episode: which relationship does the source support, what stage has the action reached, and how has it changed over time? A report may explicitly link materiality to planning while leaving its use in an individual project unclear. An authorized review may revise a target in either direction. Examining these differences allows us to compare managerial choices without assigning an overall integration score to a company. Earlier priorities may shape a decision, and later feedback may alter them. The same care is needed with resources and project stages: an estimate, a commitment and expenditure describe different things, as do approval, contracting, construction and operation. Capital raised, allocated and spent is recorded separately.

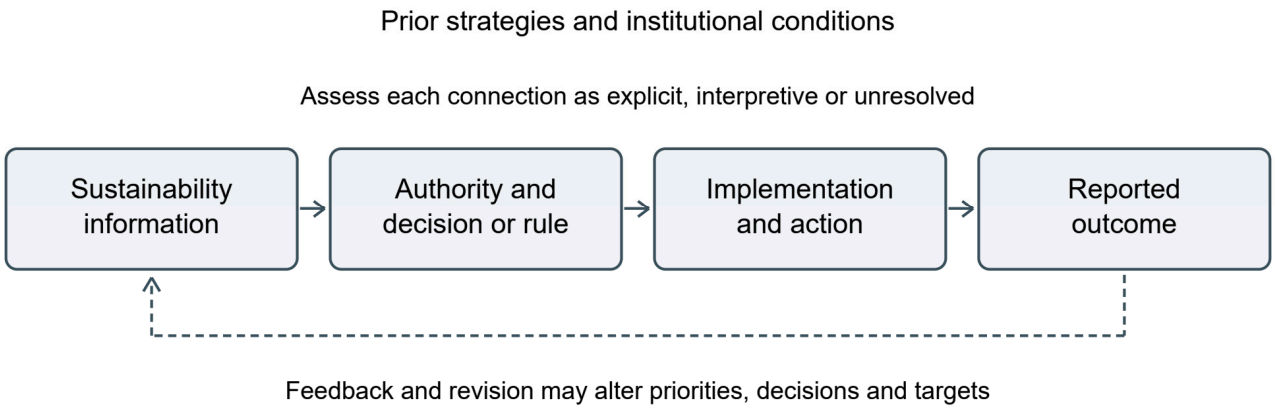


Figure 1. Analytical framework for documented managerial integration. Authors' synthesis. Arrows organize documentary questions and do not establish causation or a mandatory sequence.

The interpretation also depends on what a measure actually represents. In their study of real-estate firms, Grigoras-Ichim et al. treat accounting-based sustainability proxies separately from externally validated environmental, social and governance (ESG) performance and interpret fixed-effects estimates as associations [11]. We follow the same principle here. Evidence that sustainability information enters a recorded management process supports a claim about that process. Assessing financial resilience, sustainability performance, or regulatory compliance requires measures and evidence suited to those questions.

2.4. Analytical Orientation

Three interpretive concerns organize the comparison: documentary visibility, variation across management domains, and competing explanations. Documentary visibility concerns whose arrangements, choices, implementation stages, and outcomes appear in the public record. Variation concerns differences in documented relationships, action stages, and change direction within and across the groups. Competing explanations concern earlier strategies and overlapping governance, regulatory, financing and commercial considerations. These concerns connect the theoretical framework with RQ1–RQ3. They were refined through engagement with pilot material and guide interpretation of the same documentary corpus. They are not formulated or evaluated as independent predictions.

3. Materials and Methods

3.1. Design, Case Selection and Temporal Boundaries

The study uses an exploratory longitudinal documentary comparison with managerial episodes embedded in three company cases. Documentary analysis examines organizational records but requires attention to their origin, purpose, and limitations [21]. The coding framework and analytical orientation in Section 2.4 were informed by theory and refined using pilot material within the same abductive process. The analytical orientation was not pre-registered, and neither selection nor the codebook was fixed before data collection. The comparison therefore does not provide independent prediction testing.

OMV Petrom, Electrica, and Romgaz were selected purposively because they publish sustainability statements describing ESRS application, have accessible antecedent reports, and disclose governance and decision information in the energy sector. These three listed reporting groups constitute the company cases. Subsidiaries and projects define the organizational perimeter of particular episodes and are not additional company cases. The design shares a broad sector context while comparing different objects and governance arrangements. It does not control for ownership, business model, or investment exposure. The study used no interviews, questionnaires, internal documents, or paid ESG scores.

The reports for financial year (FY) 2025 provide a contextual profile of the differences between the cases. OMV Petrom combines oil and gas production, refining and power activities, with OMV Aktiengesellschaft as its majority shareholder and a two-tier structure comprising an Executive Board and a Supervisory Board [22]. Electrica's core activities concern electricity distribution and energy supply, alongside renewable-generation development; the Romanian State is its largest shareholder, with a holding below half of the share capital, and the company uses a one-tier Board of Directors structure [23]. Romgaz combines natural gas production and storage with gas and power investment projects; the Romanian State is its majority shareholder, and the company also uses a one-tier governance structure [24]. These profiles describe different ownership, organizational and investment settings rather than equivalent energy businesses.

Comparison proceeds from the chronology of each episode within its own perimeter to contrasts between specified managerial functions and action stages across cases. Ownership, governance arrangements, asset portfolios, financing conditions and project maturity inform the interpretation of those contrasts. The study does not estimate the effects of these characteristics or assume that membership of the broad energy sector equalizes commercial, environmental or financing conditions.

The main window is 2022–2025. Financial-year-2022 reports published in 2023 provide antecedents to the first financial-year-2024 ESRS statements, not an anticipation-free pre-CSRD baseline. Event dates are recorded separately from financial years and publication dates. A 2026 publication reporting financial year 2025 can support a retrospective statement

about 2025; an event or status observed in July 2026 cannot be assigned to the end of 2025. Approvals for future implementation are retained as approvals.

We define each episode by the reporting group, subsidiary, or project to which the evidence refers. Gabare, for example, is a Bulgarian project within OMV Petrom's investment portfolio. Records concerning Electrica's distribution subsidiary, Distribuție Energie Electrică România (DEER), or Romgaz's storage subsidiary, Depogaz, are interpreted at that subsidiary level. OMV Petrom and Romgaz, through Romgaz Black Sea, participated in the Neptun Deep project [22,24]. The retained investment-decision episode is recorded as OMV-9 and is not counted again as a separate Romgaz episode. Electrica's FY2025 statement also reports a memorandum with Romgaz concerning potential renewable-energy and storage projects [23]. This memorandum provides coordination context and does not establish completed joint investment. These relationships prevent treating the groups as independent replications of a reporting effect. The 31 episodes provide a set of managerial developments to compare; they cannot be used to estimate the prevalence of practices across companies.

3.2. Documentary Corpus and Episode Selection

We assembled a corpus of 22 publicly available sources: 20 PDFs and two web announcements. The corpus comprises 12 principal company-year reports covering 2022–2025 and 10 supplementary sources on strategy, governance, remuneration, financing, and key decision milestones. The team selected the supplementary documents to corroborate approvals, clarify decision parameters, and establish subsequent status. They were not included in the automated search counts. The team accessed and archived the documents on 7 September 2026. The source register records each document's identifier, URL, institutional owner, language, and reporting year, together with a SHA-256 checksum for each archived PDF. The technical searches covered 3753 physical PDF pages in the 12 main reports, of which 3735 contained extracted text. Table 1 summarizes page coverage, text extraction, and both types of search matches for each principal report.

Table 1. Coverage of the principal report searches. Counts describe technical matches, not unique decisions.

Document ID	PDF Pages	Pages with Extracted Text	Action and ESG Matches	Completion and ESG Matches
OMV22	160	160	269	52
OMV23	179	178	309	59
OMV24	331	330	405	97
OMV25	298	297	353	93
EL22	100	100	140	12
EL23	660	659	594	37
EL24	94	93	447	55
EL25	795	793	693	141
SNG22	174	174	189	26
SNG23	131	131	175	26
SNG24	400	396	587	54
SNG25	431	424	686	79
Total	3753	3735	4847	731

We searched for English and Romanian action terms near environmental, social, and governance topic terms after case and diacritical normalization. Action terms covered approval, establishment, implementation, revision, contracting, postponement, and withdrawal. For each retained action match, the script extracted a context extending up to 220 characters before the match and 480 characters after its end. Further matches starting fewer than 200 characters after the previous retained match on the same page were suppressed. We retained a context only when the corresponding ESG topic expression occurred within the extracted window.

A separate search covered completion, commissioning, operation, and elimination, using its own topic expression. The complete expressions and processing order are retained in the executable scripts.

The searches returned 4847 action-and-topic records and 731 completion-and-topic records. The resulting 5578 technical records include overlapping windows, repeated descriptions, and false positives. They therefore represent documentary search results rather than distinct managerial decisions. An auxiliary routing rule combined identical document/page/matched-term/context-hash records and identified 1383 locators containing both a 2022–2025 year and a listed authority or decision term. This rule supported documentary screening; these terms alone did not establish episode eligibility. The screening register accounts for all 5578 records, including those outside this routing set. The early list of 265 contexts and the initial register of 36 candidate families were working navigation aids, not successive counts of unique eligible decisions. Analytical selection is documented separately at technical-record, documentary-object and episode levels. Historical classifications are preserved separately from the documented reasons for retaining, linking, or not selecting an object for a main episode dossier.

Screening combined technical classification, source-clause assessment, complete-context reading, and selected full-page examination. Source-clause-linked assessments cover 2158 technical records. We examined a further 1489 records through their complete original search windows. Overlapping windows in this set were combined without text loss into 1103 passage groups, each with an explicit interpretive decision. This detailed review includes 33 selected full-page examinations and visual checks of four tables. The team recorded five additional page-level witnesses separately from the technical-hit total. The register identifies the evidential basis and qualifications for individual decisions. The depth of examination was not uniform across all 5578 records, and screening of the technical search records did not include independent duplicate assessment. The separate second-author review of selected episode-level coding is described in Section 3.3.

At the technical-record level, the dispositions are INCLUDE (245), MERGE (1117), CONTEXT (3443), and EXCLUDE (773). INCLUDE identifies a primary navigation anchor for a documentary object, while MERGE links supporting records to reviewed objects. These dispositions do not determine the number of analytical episodes. CONTEXT retains background, standing practices, aggregate information, intentions, and other evidence insufficient to establish a separate eligible action at that location. EXCLUDE identifies a stated failure of documentary eligibility, such as a lexical false positive, an external decision maker, or an unsupported specific ESG connection. Each record retains its source, physical PDF page, matched term, original context, context hash, disposition, and justification.

Documentary eligibility required an identifiable decision object and organizational or project perimeter; a specified actor or authority and action or choice; an event date or justified current-period attribution within 2022–2025; and a source-supported ESG relationship. An ESG term appearing near an action term was insufficient. Explicit event dates took precedence over reporting years and publication dates. A reporting-year attribution was accepted only where the source presented the action as an activity of that period. A report's description of a standing policy did not, by itself, establish its adoption date.

We distinguished preparation, approval, contracting, implementation, and reported completion. A documented drafting or selection decision could be retained at that stage without establishing policy adoption, contract delivery, or subsequent application. We preserved statements that an activity had not occurred, a target had not been met, or a procedure lacked a provision as contrasting evidence. We treated missing public evidence as a limitation, not as proof that an action had not occurred. Developments after 2025

remained outside the main observation period, including subsequent events described in reports bearing the financial-year label 2025.

Repeated descriptions and successive stages were linked where the decision object and perimeter could be reconciled. Different assets, subsidiary decisions, policies and incentive schemes remained distinct. Program components retained their own identities without automatically counting both a program and its components as independent episodes. A thematic or site-level parent relationship alone did not establish that two entries referred to the same decision. Reporting-method changes, baseline restatements and disclosure-boundary choices were distinguished from operational changes and achieved outcomes. Links between technical records, documentary objects and analytical episodes were retained separately because these relationships can be many-to-many.

The documentary catalog contains 301 objects and comparison entries. Analytical selection was purposive and iterative, consistent with the exploratory design. It sought variation across management domains, organizational perimeters, action stages, and documented relationships between sustainability information and managerial choices. The selection included explicit reporting-related connections, developments with earlier strategic or institutional antecedents, and cases in which application or completion remained unresolved. Eligibility did not require evidence that CSRD caused the action or that the action improved sustainability performance.

The main analytical sample comprises 31 episode dossiers: 13 for OMV Petrom, 8 for Electrica, and 10 for Romgaz. The remaining 270 catalog entries have separately recorded roles: 13 provide linked evidence for main dossiers, 17 retain program components, nine identify reporting choices, seven provide preparatory comparisons, 207 retain additional comparison objects, seven have temporal or action-identification limitations, and ten do not establish a separate eligible episode in the reviewed evidence. Non-selection for a main dossier is therefore distinguished from documentary ineligibility. Additional comparison entries remain available for examining implementation, non-implementation, and competing explanations. The sample supports contextual comparison; it does not constitute a census of managerial decisions, and we make no claim of exhaustive search recall or theoretical saturation. The Selection worksheet in Supplementary Material S1 provides a candidate-to-episode crosswalk. For each of the 36 initial families, it preserves the initial classification and records the analytical disposition, episode link where applicable, and a decision-specific reason. A linked index identifies the six additional main dossiers. Family entries, supporting records, and episode dossiers are not added together when counting the analytical sample.

Supplementary Material S1 presents the 31 selected episodes, supported by 100 main-period observations and one separate 2026 follow-up. An observation is a source-linked analytical record within an episode; closely related passages may be grouped in one record. Repeated citation or reassignment of an existing record does not create another observation. The detailed screening register, object-level selection reasons, passage judgments, archived text, and executable search and replay scripts are retained in the research archive and are available for editorial assessment. Replay reproduces technical searches and recorded decisions; it does not independently validate interpretive judgments. Technical processing for the documented screening audit and replay used Python, version 3.12.14 (Python Software Foundation, Beaverton, OR, USA), with pypdfium2, version 5.14.0 (pypdfium2-team, open-source project), for PDF text extraction and page rendering. Spreadsheet reading, updating, and verification used openpyxl, version 3.1.5 (openpyxl development team). Auxiliary workbook export and image-preview preparation used XlsxWriter, version 3.2.9 (XlsxWriter project), and Pillow, version 12.3.0 (Pillow contributors), respectively. The standard-library modules re, unicodedata, hashlib, and json support regular-expression searches, normalization, checksums,

and structured record handling. These operations organized and checked the documentary evidence without establishing managerial effectiveness or an isolated causal effect of CSRD.

3.3. Coding and Analysis

The evidence register lets the reader move from an analytical finding back to its source. Each record identifies the episode and document, reported year and event date, PDF and printed-page locators, a paraphrase of the finding, its analytical dimensions, a source identifier linking to the source URL, and an interpretive limit. We compare eight dimensions: materiality, authority, action, resources, chronology, monitoring, incentives, and connections. We also record the management domain, type of change, temporal role, source ownership, and the point beyond which the documents no longer support the proposed sequence. Table 2 summarizes the eight analytical dimensions, their interpretive rules and their main uses in answering RQ1–RQ3. The mapping is not exclusive: the dimensions are considered together within each episode, while the direction of change, organizational perimeter, antecedents and alternative explanations provide context for the comparative analysis.

Table 2. Analytical coding dimensions, interpretive rules and links to the research questions.

Code and Dimension	Rule	Main Research Question(s)	Theoretical Basis
MAT—Materiality	Identify the topic or IRO. Being material does not show that an action was implemented.	RQ1, RQ3	Double materiality and the identification of decision-relevant sustainability topics [2,7].
GOV—Authority	Identify the body or function and its stated role. Establishing it is insufficient evidence of effectiveness.	RQ1, RQ2	Organizational integration and the allocation of formal responsibilities [5,6].
ACT—Decision or action	Distinguish proposals, preparation and drafting, approval, contracting, implementation, and reported completion.	RQ1, RQ2	The distinction between formal commitments and their application [20].
RES—Resources	Distinguish estimates, commitments, funds raised, allocations, and expenditure.	RQ1, RQ2	The connection between sustainability assessment, accounting, and resource decisions [6].
TIM—Chronology	Separate the event, financial year, publication date, and future application.	RQ2, RQ3	Longitudinal differentiation of formalization, implementation, and subsequent review [20].
MON—Monitoring	Record targets, revisions, progress, and achieved outcomes separately.	RQ2, RQ3	Sustainability indicators in planning and performance management [13].
INC—Incentives	Record the scheme, eligible role, and metric, including what a percentage weighting refers to.	RQ1, RQ3	Reward and compensation systems within sustainability management control [14].
LNK—Connection	State whether the source explicitly links the elements, an interpretation is justified, or the link remains unresolved.	RQ1	Authors' synthesis of information–control relationships and the distinction between policy, practice and outcomes [5,6,20].

Notes: RQ1 concerns documentary support for specified relationships between sustainability information and managerial choices. RQ2 concerns approval, implementation and review over time. RQ3 concerns the direction of change and alternative explanations across management domains and organizational perimeters. The mapping indicates the main analytical uses of each dimension, rather than exclusive assignments. For the seven dimensions MAT–INC, G denotes a general claim without object-specific detail; S denotes a specific object, rule, or parameter; I denotes reported execution or progress; NI denotes information not identified in the selected evidence; and NA denotes reasoned non-applicability. S/I retains both specific detail and reported execution or progress. These annotations are descriptive and are not combined into a numerical or maturity score. LNK concerns a specified relationship within an episode and distinguishes explicit connections, justified interpretations, and unresolved links. Separately, R-E, R-I, and R-U classify the episode-level connection between CSRD/ESRS requirements or reporting-based DMA and the main managerial development, as defined in this section. They denote explicit, interpreted, and unresolved support, respectively. These episode-level classes are not interchangeable with local LNK judgments.

We code a relationship when a claim connects a specified input, authority, rule, action, or outcome within an episode. A connection is explicit when the source itself links the specified elements. An explicit connection may affirm, deny, or qualify the relationship; it does not necessarily indicate implementation or a positive outcome. Mentioning them in the same passage is insufficient. Where we interpret a connection, we record the justification, drawing on the object, dates, and roles of the sources. If those records do not support the proposed link, it remains unresolved. The judgment concerns the particular relationship being examined. For instance, an explicit link between ESG and executive evaluation does not show that CSRD prompted the introduction of that evaluation rule. The same interpretive rules apply to all selected episodes.

Evidence states apply to a specified dimension and action. An assessment can receive I without implying implementation of the entire sustainability strategy. A disclosed procedural omission is a specific fact, while subsequent application may remain unresolved. The combined S/I annotation is not an additional evidence state or a numerical grade. Report length is not a measure of documented managerial integration.

The chronology distinguishes the event date, financial year, and publication date. If documents give different parameters for a target relating to the same year, we retain both definitions and their dates. A later value cannot simply replace the earlier plan. We describe a revision only where the record supports the change or its chronological basis; unexplained discrepancies remain unresolved. An announcement made at the time of approval may establish its date, while a later report describes the subsequent status. Several documents from the same issuer can corroborate that chronology, although they share corporate authorship. We also check the metric's scope, denominator, and subsidiary perimeter before combining observations.

We assess ambiguous passages against the specified episode object, action stage, and observation period. Information about another project on the same page is not used to establish the authority, resources, or implementation of that object. A disclosed procedural omission is retained as evidence of the omission, rather than treated as missing information. Where a source contains inconsistent parameters or results, the competing statements are retained with their locators and interpretive limits. Text affected by extraction across columns or tables is checked against the original page layout before being used to support a coding judgment.

We distinguish the statement made by a source, corroboration available in another document, and the authors' analytical interpretation. Verification against an original passage establishes whether the analytical statement accurately represents the documentary record. It does not independently establish that the underlying managerial practice operated as reported. Corroboration is therefore assessed for the particular claim and with attention to source ownership: another issuer document may confirm a disclosed date or parameter while retaining common institutional authorship.

Table A2 provides illustrative original-language excerpts linked to existing observation identifiers. Romanian excerpts are accompanied by English translations; passages from English-language sources require no translation. The table separates the quoted wording from the supported analytical reading and its limits. These excerpts complement the paraphrased records in Supplementary Material S1 and the relationship-specific classifications in Table 4.

For each episode, we set out what preceded the change, what was reported to have changed, which relationship is best supported, what remains uncertain, and which alternative explanation is plausible. Table 3 illustrates the approach with EL-2. Readers can compare all 31 episodes using the same fields in Appendix A or the Episodes and Evidence worksheets in Supplementary Material S1. Table 4 groups them by management domain to

make the comparison easier to follow. The groupings do not imply that different projects are equivalent or indicate how common a practice is. Throughout the analysis, we consider reporting demands alongside earlier strategies, governance and environmental obligations, financing conditions, and commercial or technological constraints.

Table 3. Worked example of relational analysis: Electrica materiality and strategy (EL-2).

Analytical Step	Evidence and Interpretation	Boundary
Object and antecedent	Sustainability strategy, distinct from ESG organization; broader corporate strategy published in December 2023 and committee endorsement, during 2023, of a sustainability strategy for 2024–2030 [25].	Keep EL-2 separate from the responsibility arrangements in EL-1. Committee endorsement of the 2024–2030 strategy is distinct from Board approval of the 2025–2030 version.
Information-to-planning claim	EL24, PDF p. 9 (D15), states that the sustainability strategy was developed based on DMA [26].	Explicit DMA—strategy relationship; not a complete causal chain for a capital project.
Approval chronology	ELSTR24, PDF p. 1 (D42), corroborates approval on 17 December 2024 [27].	Approval establishes an authorized choice, not subsequent project implementation.
Reported extension	EL25, PDF p. 309 (D88), states that IRO management forms part of major-project decision-making [23].	A general statement does not show which IRO changed an individual selection or budget.
Dimension-specific judgment	The cited record supports specific authority/action detail and an explicit planning connection.	Record project-level allocation or realized impact only if separately evidenced; no aggregate score.
Competing explanation	Earlier corporate strategy, stakeholder consultation and financier demands remain possible influences.	The incremental contribution of CSRD is not identified by this chronology.

For the comparative synthesis, we assess a specified reporting connection: whether CSRD/ESRS requirements, or double-materiality assessment explicitly undertaken within that reporting process, are linked to the main managerial development reconstructed in each episode. This assessment is separate from local LNK judgments concerning other relationships, such as the use of climate targets in investment appraisal or executive evaluation. R-E denotes an explicit reporting connection stated in the source. R-I denotes a justified interpretation supported by object-specific evidence and chronology, where the reporting connection is not explicitly stated. R-U denotes a reporting connection that the selected evidence cannot establish. An episode classified as R-U may nevertheless contain explicit relationships between sustainability objectives, managerial rules and actions.

An R-E classification identifies a source-stated connection to reporting requirements or reporting-based DMA. It does not establish that CSRD prescribes the particular organizational structure, remuneration formula, investment or target revision. Additional or competing explanations are retained for every episode in the Antecedent and Alternative explanation fields of Supplementary Material S1 and the corresponding fields of Table A1. Strategic, institutional, financing, and commercial considerations may operate alongside reporting requirements; this design cannot separate their relative causal contributions.

Each episode is assigned one reporting-connection class and one presentation domain for the descriptive counts in Table 4, Panel B. The classification concerns the specified relationship, rather than every relationship within the episode. Repeated passages and successive observations do not generate additional episode counts. The counts use the main observation period, 2022–2025; the separate 2026 follow-up does not create another episode. The classes describe documentary support and do not measure managerial effectiveness or establish a causal effect of CSRD.

A second-author review examined a simple random sample of 10 of the 31 episode dossiers (32.3%), selected without replacement. The sampling frame was ordered by company prefix and the numerical part of the episode identifier, and the draw used Python's random.Random(20261018).sample(frame, 10). The selected dossiers were EL-3, EL-4, EL-7, OMV-3, OMV-7, OMV-9, OMV-10, SNG-4, SNG-5 and SNG-7. Together, they contained 29 main-period documentary units and one separate follow-up unit from 2026. For the main-period units, the review form included 203 dimension-specific assignments across MAT, GOV, ACT, RES, TIM, MON, and INC, plus 29 LNK judgments on predefined relationships. These judgments were nested within 10 episode dossiers and do not represent 232 independent cases. The 2026 follow-up was reviewed separately.

The second author completed a separate review form for these units. The form recorded the assigned annotation or relationship class, the claim assessed, supporting original-language quotations, source locators, and interpretive limits. She had consulted the initial codes before completing the form. We therefore describe the exercise as a non-blinded second-author coding review. It documents a further assessment of the coding and its evidential support, while acknowledging that prior exposure may have influenced the judgments.

4. Results

4.1. Reporting Responsibilities and Information Controls

The register contains 13 OMV Petrom, eight Electrica and ten Romgaz episodes, supported by 100 main-period observations and one separate 2026 follow-up. Table 4 compares the management domains, while Table A1 in Appendix A retains all objects, their antecedents, relationships, and open boundaries. Cells labeled "No retained episode" indicate that the study retained no episode in that presentation group; they do not establish the absence of a company practice. The following results distinguish reporting-related connections, action stages, and the direction of change.

Electrica's 2024 ESG specialization had antecedents: its financial-year-2022 report already identified a Strategy and Sustainability Department [28]. Its financial-year-2024 and financial-year-2025 records describe reporting coordination and cooperation between ESG, Treasury, and risk-management structures in the materiality review [23,26]. The 2025 report also identifies an end-December update of the Group Risk Management Policy and Procedure ELSA-PS-6.1, edition 5/0, covering financial and non-financial risks, including ESG and climate risks [23]. This supports a connection between sustainability information and organizational coordination. It does not establish that the sustainability function was newly created, that all planned procedural integration steps were completed, or that the arrangements operated effectively.

EL-7 concerns the separate sustainability-reporting policy and procedure. Electrica disclosed that the specified reporting-risk process was not formalized in 2024 and that policy development had begun [26]. In 2025, it reported implementing a formalized process under policy ELSA-POL-ESG-1 and procedure ELSA-PO-ESG-1.1, connecting DMA, data collection and validation, and consolidation and reporting responsibilities [23]. The evidence supports reported process implementation. It does not independently establish operating effectiveness or demonstrate how the process changed an individual investment or supplier choice.

Romgaz reported creating an ESG office in 2024. Its disclosure for that year noted the absence of a reporting-risk methodology, while the 2025 report described assessment results presented to the board [24,29]. These records trace a change in how the company controlled reporting information. They leave open whether the assessment influenced a

particular operational or strategic choice. We therefore analyze this development separately from changes in general risk management.

OMV Petrom approved its ESRS double-materiality assessment in December 2023 and reviewed it in 2024 and 2025 [22,30]. Work on the information process therefore preceded the first ESRS financial year. The records show approval and reassessment, but do not trace a particular IRO through to an investment choice. Nor can changes in the number or grouping of IROs, by themselves, be read as changes in underlying risk.

OMV Petrom reported establishing dedicated Sustainability Business Partner roles in 2025 to support its business divisions [22]. OMV-13 is distinct from the continuing sustainability sub-department and subject-matter-expert reporting lines. These roles extend the organizational evidence beyond assessment approval and reporting coordination. The source does not identify a particular divisional choice or outcome produced by those roles, and it does not establish CSRD as the cause of their creation.

Romgaz's DMA is a separate object from its ESG office and general risk-management arrangements. The 2024 ESRS assessment used sustainability-related entries from the annual Risk Register and aligned the financial-materiality assessment with the risk-management procedure [29]. In 2025, internal workshops reviewed and revalidated the IROs, with importance and scores unchanged [24]. Unchanged scores do not mean that no review occurred. The same report explicitly states that stakeholder information produced no strategy or business-model changes during the period. SNG-9 therefore establishes an assessment-to-risk-information connection while preserving a stated limit on subsequent strategic change.

4.2. Materiality and Strategic Planning

Electrica states that double materiality informed the development of its sustainability strategy. A current report issued at the time confirms approval on 17 December 2024, and later reporting returns to the connection [23,26,27]. The company thus describes how the assessment entered planning, beyond simply listing material topics. At project level, however, the selected documents do not show which IRO changed an individual budget or approval.

This strategy also has a broader corporate antecedent published in December 2023 and a separate antecedent in committee endorsement, during 2023, of a sustainability strategy for 2024–2030 [25]. That endorsement is kept separate from Board approval of the 2025–2030 version in December 2024. In 2025, Electrica states that managing IROs forms part of major-project decision-making [23]. The statement extends the reported management relationship, but a general declaration and project list do not provide a complete decision chain for each project. The evidence therefore supports an explicit planning connection with a separate limit at project-level attribution.

Romgaz's 2024 statement identified developing and approving an ESRS E1-aligned transition/decarbonization plan as a 2025 priority [29]. Romgaz approved its decarbonization strategy on 22 October 2025, a date also recorded in a communication issued at the time [24,31]. The EUR 2.76 billion investment estimate covers the Net Zero scenario through 2050. The issuer explicitly qualifies its implementation by technological maturity, feasibility, financing availability, and regulatory conditions, with milestones subject to reassessment [24]. Further climate analysis was planned for 2026 [24]. Strategy approval constitutes a documented managerial action, while the scenario estimate remains conditional and does not establish an authorized investment budget, committed expenditure, or achieved emissions reductions. Approval alone is also insufficient to establish full compliance with the ESRS transition-plan requirements.

In SNG-10, Romgaz evaluated consultancy offers and selected a winner in 2025 for a climate-risk and vulnerability study explicitly described in relation to CSRD/ESRS and EU Taxonomy requirements [24]. The contract was planned for execution in the first quarter of 2026. The report also states that no climate-scenario-based IRO assessment was conducted in that reporting exercise; the assessment was qualitative. The procurement milestone is therefore retained separately from strategy approval, completed consultancy delivery and the execution of scenario-based analysis.

4.3. Procurement, Risk and Procedural Requirements

OMV Petrom explicitly refers to CSRD and the Corporate Sustainability Due Diligence Directive (CSDDD) together when describing its 2024 supplier-risk revision, which continued in 2025 [22,30]. Its procurement and supplier relationships already included sustainability practices in 2023 [32]. The chronology therefore points to revising an existing process in response to several stated regulatory drivers. It supports a stated regulatory rationale for the reported process revision, while leaving the specific contribution of CSRD and any effect on an individual supplier choice unresolved. Table A2 reproduces the original wording.

Electrica's supplier-framework development represents a different stage. In EL-8, the 2025 report describes consultations, existing-policy analysis, and drafting of a sustainable-procurement policy and supplier code in connection with CSRD and EU Taxonomy requirements [23]. This establishes the preparation of a specified framework. It does not establish final adoption, application to an individual supplier, or value-chain verification. The comparison therefore distinguishes OMV Petrom's process revision, Electrica's policy preparation, and Romgaz's policy adoption and disclosed procedural omission.

Under Romgaz's revised board regulation for 2025, relevant decision materials must include an analysis of environmental and social alignment or proposals for mitigation [24]. The rule specifies information to be brought into a decision. The selected records, however, provide no complete example of its use in an individual choice. Monitoring planned for a later date cannot establish a result achieved in 2025.

Romgaz's 2025 statement reports adoption of a sustainable-procurement policy and explicitly states that the applicable procurement procedure lacked specific circularity provisions [24,29]. Table A2 reproduces the Romanian wording and its English translation. This is an issuer disclosure of a specific procedural omission, rather than an absence inferred from silence. The procedure and individual procurement contracts were not examined directly. The finding does not establish the absence of all sustainable-procurement practices or determine the policy's broader effects.

Sustainability risks had already entered Romgaz's general risk system in its November 2023 revision [33]. This earlier change helps place the later developments in context. Reporting, risk assessment, general risk management, procurement procedures, and board materials involve different management processes. Including them in the same sustainability statement does not give them a common origin or establish that they formed a single reform.

4.4. Incentives and Target Revisions

The three incentive episodes show sustainability entering management evaluation at different times. OMV Petrom reports weightings of 25% for greenhouse gases and 10% for gender representation in its long-term incentive plan; safety has a separate 15% weighting in the annual bonus [22,30]. The long-term and annual weightings refer to different schemes, so adding these percentages would misrepresent their share of total pay. Earlier policies and later revisions also differ in their governing bodies and application dates [22]. The

evidence concerns the evaluation formula and its continuation. It does not establish the payment received or a change in behavior.

Electrica reports a sustainability objective for executive management in 2024, weighted at 15–25% within specific performance indicators [26]. Electrica reports at least one sustainability objective for its chief executive officer (CEO) and chief financial officer (CFO) in 2025, weighted at 10–25% within the category of specific indicators [23]. The ranges depend on eligible roles and refer to specific-indicator categories, not total remuneration; their difference does not establish a uniform weakening of incentives. The selected documents do not establish the first introduction date, the individual metric's achievement, or attributable bonus payment. These limits prevent the disclosure from being treated as a demonstrated new incentive caused by CSRD.

Romgaz's Iernut CO_2 key performance indicator (KPI) illustrates the distinction between disclosed parameters and their interpretation. The 2024 statement presents a ceiling of 0.360 tCO_2/MWh for 2025 and a weighting of 3%, whereas the 2025 statement presents a ceiling of 0.565 tCO_2/MWh and a weighting of 1% [24,29]. Table A2 reproduces the original wording concerning the weighting. The comparison identifies a more permissive published ceiling for 2025 and a lower weighting within the total set of performance indicators. Both statements define the underlying physical metric as direct CO_2 emissions per MWh of electricity produced at Iernut [24,29]. However, the latter schedule first assigns the 0.360 threshold to 2026, rather than 2025. This documents a change in the evaluation timetable, without establishing the abandonment of the lower threshold. The commonly stated definition does not independently verify that measurement boundaries, input data, and operating conditions remained unchanged. Moreover, the project-action table in the 2025 report still lists 0.360 tCO_2/MWh for 2025 [24]. We therefore distinguish the remuneration benchmark from the project target and do not treat their numerical difference as proof of a weaker long-term environmental commitment. The remuneration report corroborates the 2025 parameters and records the contract-related approval, while the shareholder resolution provides a separate approval record [34,35]. These documents corroborate disclosed parameters and governance steps in the issuer's documentary record; they do not independently verify managerial behavior. The remuneration report also documents application of the criterion in the executive and director assessment: the table reports an achievement factor of 0.99 and, at the 1% weighting, a contribution of 0.99 percentage points to the aggregate KPI assessment [34]. This provides evidence of reported scoring beyond disclosure of the formula alone. The factor is not an emissions-reduction percentage, and the weighted contribution is not a percentage of salary. These figures do not isolate the remuneration effect of revising the environmental criterion or establish a corresponding change in managerial behavior or physical emissions.

Target ambition and incentive design also require separate assessment within OMV Petrom. The earlier 2030 objectives, relative to 2019, specify separate 20% reductions in Scope 1–3 intensity and absolute emissions [32]. The Supervisory Board report dates approval of a strategic-target and financial-framework update to December 2025 and states that some revised targets were communicated on 4 February 2026 [22]. The same annual report specifies a 10% intensity objective and withdrawal of the absolute Scope 1–3 emissions objective. This chronology distinguishes approval from later communication; the individual approval minutes were not examined. The long-term incentive climate criterion concerns Scopes 1–2 [22]. Consequently, the strategy revision does not by itself establish a weakening of that remuneration criterion. We interpret the disclosed reduction in the required percentage and withdrawal of the absolute objective as less demanding target parameters. An absolute-emissions target specifies a reduction in total emissions, whereas an intensity target relates emissions to an activity denominator. Intensity can improve without a corresponding

reduction in total emissions when activity volumes change. Withdrawal of the absolute objective therefore changes the dimension of performance covered by the quantified targets; it should be distinguished from a methodological restatement of emissions. The issuer attributes these adjustments to changing market demand and the evolving product portfolio. The Supervisory Board report also describes a concurrent reallocation of capital from less mature technologies towards traditional-business and regional-gas opportunities [22]. These statements establish the company's disclosed rationale and strategic context; they do not independently establish the relative influence of these considerations on the revised targets. Separately, the same report states that absolute Scope 1–2 emissions in 2025 were 19% below the 2019 baseline, while the carbon intensity of energy supply covering Scopes 1–3 was 3% below that baseline [22]. The company attributes the latter reduction primarily to higher power sales volumes. These measures have different scopes and denominators and cannot be treated as interchangeable indicators of environmental performance. They describe company-reported outcomes relative to 2019, not effects attributable to the target revision approved in December 2025. The full-year figures do not establish a behavioral response to that late-year revision or a causal effect of CSRD. Table A2 reproduces the original wording concerning the target revisions.

4.5. Financing, Implementation and Reported Completion

Electrica's green bonds illustrate why raising finance and implementing a project need separate examination. The contemporary listing announcement jointly issued by Electrica and the Bucharest Stock Exchange confirms the disclosed EUR 500 million nominal issuance [23,36]. Its joint authorship does not independently corroborate managerial outcomes. The financing framework sets responsibilities for project selection, monitoring allocations, and temporarily managing unallocated proceeds [37], while the financial-year-2025 notes report temporary treasury investments [23]. An assessment by the European Investment Bank (EIB) provides a non-issuer institutional account of the promoter's environmental and social capacity and the conditions for financing [38]. Table A2 reproduces its conclusion. The assessment does not establish the actual allocation of all proceeds, achieved project impacts, or a causal reporting effect and must be interpreted in light of the EIB's financing role. Together, the documents describe how the financing was organized. Establishing eligible allocations or expenditure requires further evidence beyond the amount raised. The July 2026 observation is retained as a separate follow-up; it cannot retrospectively establish an allocation at the end of 2025 [39].

Some investments followed directions established before the first ESRS financial year. OMV Petrom's sustainable aviation fuel (SAF), hydrotreated vegetable oil (HVO) and hydrogen program progressed from earlier planning and activities to a decision in 2024 and reported construction in 2025. The EUR 750 million figure refers to the combined program, rather than demonstrated spending in a single year [22,30,32,40]. The Oltenia Energy Complex (CE Oltenia) photovoltaic partnership also had changes in capacity and timetable [22,41]. We follow it separately from OMV Petrom's own 89 MWp Iṣalniṭa project, since the two investments have different project boundaries [22,30,42].

Neptun Deep is a shared project. The selected records describe the investment decision and a planned net contribution by OMV Petrom; they do not establish total project spending or independently verified climate benefits [32,41]. For Gabare, the records show an interest acquired in 2025, with later milestones for decision and operation [22]. Both episodes concern portfolio and resource choices, but the available evidence does not establish that CSRD initiated them.

Electrica's Vulturu records distinguish acquisition, connection for testing, and operation reported for 2025 [23,25]. In another episode, DEER reported completing the elimination

of capacitors containing polychlorinated biphenyl (PCB), under a program with earlier environmental obligations [23,25]. These records describe stages beyond policy approval. They do not, however, provide an independent evaluation of impact or show that CSRD initiated the program.

Safety and integrity episodes retain further antecedents and bounded implementation. OMV Petrom's safety assessments informed action plans in 2022; Romgaz approved an integrity plan in April 2022; and Depogaz reported a 2025 procedure revision and employee training [24,41,43]. Their inclusion prevents interpreting all ESG-related arrangements as new CSRD responses. Plans, training, and outcomes remain distinct objects.

OMV-12 concerns investment-appraisal criteria rather than an individual asset project. In 2022, OMV Petrom updated and pilot-tested capital-allocation scoring that included climate-target impact alongside business strategy, financial metrics, and risk profile [41]. Its 2023 report describes implementation starting in 2022 [32]. The 2024 report states that these criteria informed major-transaction review and Supervisory Board submissions, and that minimum returns for low- and zero-carbon projects were raised, with investor feedback cited [30]. This documents climate information within appraisal criteria and a revision of financial requirements. It does not trace a particular DMA finding through scoring to a named approval or establish that CSRD introduced the framework.

4.6. Cross-Case Comparison of the Retained Episodes

Regarding RQ1, Table 4, Panel B distinguishes explicit, interpreted, and unresolved reporting connections. Nine episodes contain an explicit connection between CSRD/ESRS requirements, or DMA undertaken within that reporting process, and a specified managerial development: OMV-4, OMV-5, EL-1, EL-2, EL-7, EL-8, SNG-1, SNG-9 and SNG-10. These relationships concern assessment, reporting responsibilities and processes, sustainability planning, supplier-framework development and climate-study procurement. Joint references to CSRD and other requirements in OMV-4, EL-8 and SNG-10 prevent isolation of the contribution of any single regulatory framework.

Table 4. Comparative synthesis of the 31 retained managerial episodes. Panel A identifies the decision objects and comparative contrasts. Panel B summarizes documentary support for the specified reporting connection by company and management domain. Source-linked episode profiles are provided in Table A1 and Supplementary Material S1.

Panel A. Decision Objects and Comparative Contrasts.

Management Domain	OMV Petrom Objects	Electrica Objects	Romgaz Objects	Comparative Reading
Reporting coordination and materiality	OMV-5; OMV-13	EL-1; EL-7	SNG-1; SNG-9	Reporting-related assessment, coordination and specified process implementation are explicit; subsequent individual decisions require separate evidence.
Planning, appraisal and board inputs	OMV-12	EL-2	SNG-2; SNG-4; SNG-10	DMA-to-strategy, climate-related appraisal criteria, consultancy selection and board-input rules support different managerial connections.

Table 4. *Cont.*

Panel A. Decision Objects and Comparative Contrasts.				
Management Domain	**OMV Petrom Objects**	**Electrica Objects**	**Romgaz Objects**	**Comparative Reading**
Procurement and social policies	OMV-4; OMV-6	EL-8	SNG-5	Joint regulatory invocation, policy continuity, framework preparation, and a disclosed procedural omission must remain distinct.
Incentives and target direction	OMV-3; OMV-7	EL-4	SNG-3	Evaluation formulas can continue while other target parameters are revised in a less demanding direction.
Finance and capital projects	OMV-1; OMV-2; OMV-8; OMV-9; OMV-10	EL-3; EL-6	No retained episode	Authority, resources, and milestones are visible; financing/strategic antecedents complicate CSRD attribution.
Other operational and governance antecedents	OMV-11	EL-5	SNG-6; SNG-7; SNG-8	Safety, environmental completion and integrity/risk arrangements retain distinct obligations and perimeters.
Panel B. Descriptive counts by reporting-connection class.				
Management domain	**OMV Petrom: R-E, R-I, R-U**	**Electrica: R-E, R-I, R-U**	**Romgaz: R-E, R-I, R-U**	**All episodes: R-E, R-I, R-U**
Reporting coordination and materiality	1, 0, 1	2, 0, 0	2, 0, 0	5, 0, 1
Planning, appraisal and board inputs	0, 0, 1	1, 0, 0	1, 1, 1	2, 1, 2
Procurement and social policies	1, 0, 1	1, 0, 0	0, 0, 1	2, 0, 2
Incentives and target direction	0, 0, 2	0, 0, 1	0, 0, 1	0, 0, 4
Finance and capital projects	0, 0, 5	0, 0, 2	0, 0, 0	0, 0, 7
Other operational and governance antecedents	0, 0, 1	0, 0, 1	0, 0, 3	0, 0, 5
Total	2, 0, 11	4, 0, 4	3, 1, 6	9, 1, 21

Notes: Each cell reports episode counts in the order R-E, R-I, and R-U, as defined in Section 3.3. Company totals are 13 episodes for OMV Petrom, eight for Electrica, and ten for Romgaz. Each episode appears once. R-U indicates that the specified reporting connection remains unresolved; it does not indicate the absence of an explicit local ESG relationship or demonstrate that reporting had no influence. Counts describe the purposefully selected documentary sample. They do not estimate prevalence, support company rankings, or measure managerial superiority. A zero indicates that no retained episode occupies that cell, not that the company lacks the relevant practice.

SNG-2 provides an interpreted reporting connection. The 2024 statement identifies an ESRS-aligned transition/decarbonization plan as a priority for 2025, while subsequent documents record approval of the decarbonization strategy in October 2025 [24,29,31]. This object-specific chronology supports an interpretation of reporting-related planning development. It does not establish that the approved strategy completed the initially envisaged ESRS-aligned transition plan or that reporting requirements independently caused its adoption.

The specified reporting connection remains unresolved in the other 21 episodes. Several nonetheless show explicit managerial relationships: climate-target impact enters OMV Petrom's appraisal criteria in OMV-12; sustainability objectives enter executive evaluation in EL-4 and OMV-7; and Romgaz's board papers require sustainability alignment or mitigation in SNG-4. These local relationships differ from evidence that CSRD/ESRS reporting prompted their introduction or subsequent revision. Similarly, the financing and capital-project episodes document choices, rules, and implementation milestones without tracing a reporting-derived input to each authorization. The comparison therefore distinguishes documented managerial integration from attribution to reporting requirements.

Regarding RQ2, successive documents distinguish assessment, preparation, approval, procedural requirements, implementation, and reported completion. EL-7 supports reported implementation of a named reporting process, while EL-8 remains at the policy-drafting stage and SNG-10 records consultancy selection with delivery still prospective. SNG-9 establishes revalidation despite unchanged scores. EL-2 combines a stated planning connection with dated approval; SNG-4 establishes a board-input rule whose application to an individual decision remains unobserved; and SNG-5 identifies a specific procedural omission. EL-5 and EL-6 provide contrasting implementation records. EL-3 further shows why funds raised, temporarily managed, allocated, and spent require separate temporal assessments.

Regarding RQ3, earlier strategic and commercial considerations remain visible across the different business models. OMV Petrom's investment and appraisal episodes trace back to its existing strategy, partnerships, and capital-allocation framework, while Electrica's Vulturu acquisition precedes the first ESRS financial year and Romgaz's decarbonization planning follows earlier strategic directions. OMV-3 explicitly invokes market demand and technological readiness, and OMV-12 identifies investor feedback in revising minimum-return requirements. These records preserve additional explanations for managerial developments without establishing their relative causal importance or excluding regulatory anticipation.

Other institutional and financing contexts also differ across the cases. OMV-4 jointly invokes CSRD and CSDDD, while EL-8 and SNG-10 refer to CSRD/ESRS alongside EU Taxonomy requirements. Romgaz's incentive revision in SNG-3 is associated with the Agency for Monitoring and Evaluation of the Performance of Public Enterprises (AMEPIP) and public-enterprise governance requirements; DEER's capacitor-elimination episode, EL-5, retains earlier environmental obligations and reporting to the European Bank for Reconstruction and Development (EBRD). Financing arrangements introduce further distinctions: EL-3 concerns green-finance eligibility, proceeds management and project timing, whereas OMV-8 retains an earlier partnership and Modernization Fund financing. These considerations are examined alongside the reporting connections rather than treated as mutually exclusive origins.

Cross-case comparison therefore concerns defined managerial functions, stages and evidential boundaries. In procurement, OMV Petrom's process revision, Electrica's framework preparation and Romgaz's policy adoption with a disclosed procedural omission represent different developments, rather than a ranking of procurement quality. Incentive arrangements retain their own roles, schemes, denominators and assessment periods, while investment progress is interpreted against each project's earlier decisions and timetable. The less demanding parameters in OMV-3 and SNG-3 remain contrasts in the direction of change, not evidence of an ownership effect or a reporting consequence. Table 4 summarizes the selected documentary relationships; differences between its company counts cannot identify differences in managerial effectiveness or the prevalence of practices.

5. Discussion

5.1. Uneven Integration Across Management Domains

The cases show why managerial integration is difficult to capture in a single judgment. Reporting coordination and assessment are explicitly associated with ESRS, whereas investment projects also follow earlier strategic and financing decisions. Even within governance, a requirement for board materials raises a different question from a procurement procedure with an acknowledged omission. The target revisions add a further complication: an authorized review can make an objective less demanding. We therefore examine the supported relationship, the action's stage and the direction of change separately. A sustainability statement alone cannot independently establish operating effectiveness or improved managerial outcomes.

Adams and Frost [13] examine the use of sustainability indicators in planning, decision-making and performance management. EL-2 provides a comparable connection at the planning level, OMV-12 identifies climate-target impact within appraisal criteria, and EL-4 and OMV-7 identify sustainability-related evaluation arrangements. The public records establish stated relationships and evaluation arrangements; SNG-3 additionally provides a published application of the climate criterion within the KPI assessment [34]. Authorized target revisions and recorded performance assessments are observable formal managerial actions. They do not establish how executives subsequently adapted their operational choices, investment priorities, or effort in response to the revised targets or incentives.

The potential mechanism also requires qualification. A more permissive target changes the benchmark against which performance is assessed. Under otherwise unchanged scoring conditions, a lower weighting reduces the contribution of a given achievement factor to the aggregate evaluation. Any effect on remuneration nevertheless depends on the other indicators and applicable payment rules. For an incentive revision to affect environmental performance, it would need to influence operational or investment choices whose outcomes could subsequently be observed. The selected records document revisions and reported assessment, but do not trace this complete sequence from a changed criterion through managerial response to an attributable environmental outcome.

Carbon-accounting research helps explain why matching units alone cannot establish comparability. Liu et al. [44] integrate carbon accounting into virtual-power-plant scheduling and carbon-trading decisions, illustrating how accounting choices enter operational optimization. Their model concerns a different organizational and market setting and does not validate the Iernut indicator. For this comparison, its relevance is methodological: a physical emissions-intensity measure, an incentive achievement score, and an absolute-emissions objective represent different quantities. Assessing a threshold revision requires consistent emissions boundaries, electricity-output definitions, and assessment periods, together with an account of relevant operational changes.

Scenario-based planning requires a similar distinction between a strategic pathway and an operational optimization result. Zhuang et al. [45] develop scenario reduction that accounts for the decision consequences of uncertainty in stochastic power-system operation. This provides a methodological reference for evaluating how uncertainty is represented, rather than evidence that Romgaz used that approach. Romgaz's long-term Net Zero pathway addresses a different planning horizon, and the selected disclosures do not establish probabilistic scenario reduction or stochastic optimization. Its conditional investment estimate should therefore be interpreted alongside its assumptions, technological dependencies, and review milestones. Scenario uncertainty does not invalidate the documented strategy approval; approval alone does not establish feasibility or expenditure.

Crutzen et al. [14] identify different patterns of formal and informal sustainability controls, while Edirisinghe et al. [15] examine integration through interviews and doc-

umentary evidence in five Sri Lankan manufacturing cases. This variation is consistent with integration being uneven across management processes. However, our sources mainly reveal formal responsibilities, rules, and disclosed actions. They do not support assigning the Romanian groups to complete internal control configurations or assessing informal negotiation and cognitive integration.

The procurement comparison also distinguishes preparation from adoption and application: Electrica reports drafting a framework, whereas OMV Petrom describes revising an existing supplier-risk process [22,23,30]. Romgaz's procurement disclosure gives a useful example. The company reports a procedure without specific circularity provisions, despite adopting a broader sustainable-procurement policy [24]. Management must decide whether and how to address that omission. Its board-input requirement presents a different problem: the rule is documented, but the selected records contain no example of its use in a particular decision. Here, further evidence of application is needed before judging practice. Keeping the two situations separate makes the policy–practice and means–ends perspectives more useful, while avoiding a diagnosis of decoupling based only on missing disclosure [20].

5.2. Contributions and Competing Explanations

The findings contribute to sustainability-management and control research by showing how the documented relationship, action stage, and direction of change can diverge within identifiable managerial episodes. OMV-3 and SNG-3 document less demanding target or incentive parameters alongside continuing reporting arrangements [22,24,29]. EL-7 reports implementing a formal reporting process [23], while OMV-12 identifies an appraisal framework with an earlier origin [30,41]. These contrasts qualify the interpretation of formal integration: within this corpus, its documentation does not establish stronger objectives, effective control operation, or improved managerial outcomes. The contribution is an episode-level account of these differences, situated within existing research on sustainability information and management control [5,6,13].

For double materiality, the comparison distinguishes assessment maintenance, stated strategic use, and a traceable consequence for a particular decision. SNG-9 records revalidation with unchanged IROs and scores [24]. EL-2 explicitly connects DMA to the sustainability strategy, while leaving project-specific choices and budget consequences unresolved [23,26,27]. OMV-12 documents climate-related appraisal criteria, but does not establish that they originated in DMA [30,41]. These findings extend understanding of the managerial implications of materiality by showing why completion or revalidation of an assessment, strategic alignment, and a specific resource consequence require separate evidence. An unchanged assessment is compatible with a completed review, while a stated strategic connection does not establish a particular allocation decision.

For organizational decoupling, the contribution concerns the evidential conditions under which the concept applies to public disclosures [20]. SNG-5 contains a company-reported omission of circularity provisions from the applicable procurement procedure alongside a broader policy commitment [24]. This supports a bounded finding about formal procedural content. SNG-4 presents a different situation: a board-input requirement is documented, but the selected records do not identify its application to a particular decision. EL-8 concerns framework preparation, which does not establish either adoption or failed implementation [23]. Distinguishing these situations prevents an acknowledged procedural inconsistency, an unobserved application, and an unfinished preparation process from receiving the same interpretation. None of these observations alone establishes means–ends decoupling or independently verified operational non-implementation.

Mandatory reporting may increase the visibility and scrutiny of climate objectives without determining the direction of their revision. Christensen et al. [3] explain that reporting effects depend partly on stakeholder responses and their consequences for managerial choices. Sustainability-control research likewise highlights how information enters planning, evaluation, and resource allocation [5,6,13]. From this perspective, OMV-3 raises a substantive question about what the review process changes: an objective can become more explicitly documented while the required improvement becomes less demanding.

Commercial and capital-allocation considerations have the most direct documentary support in this episode. The issuer connects the revision to market demand and portfolio changes and describes a concurrent capital reallocation [22]. Separately, OMV-12 records higher minimum returns for low- and zero-carbon projects and cites investor feedback [30]. These observations provide a documented context for interpreting the revision through financial prioritization. They do not establish that the appraisal changes caused the target revision or identify how individual considerations determined its magnitude.

Materiality-driven reframing offers another possible explanation. Assessing impacts alongside financial risks and opportunities may make tensions between climate objectives, commercial exposure and the business model more explicit [2]. Management might consequently reconsider priorities, target scope or time horizons. However, the selected records do not connect a specific DMA finding to OMV-3. They therefore do not establish that materiality assessment prompted the revision or that climate impacts ceased to be considered material.

Decoupling provides a further interpretive possibility. Continuing reporting arrangements alongside reduced target ambition raise the question of whether formal information and review processes remain connected to substantive environmental objectives [20]. The episode does not, by itself, establish policy–practice or means–ends decoupling: the disclosed revision could reflect reassessment of feasibility, accommodation of commercial priorities, or a weakening of environmental commitments. Distinguishing these interpretations requires evidence about implementation and subsequent outcomes. The analytical implication is that reporting may expose how management reconciles competing objectives, while the environmental consequences of that reconciliation remain a separate empirical question.

The longitudinal reconstruction extends Romanian research on materiality assessment and its governance [7] by following the same decision objects across successive documents. Appendix A preserves their antecedents, changes, and competing explanations, helping to distinguish a new managerial development from a later description of an existing arrangement. The resulting contribution is a bounded empirical refinement of how documented integration is interpreted. Research on the real effects of mandatory reporting addresses behavioral change relative to a counterfactual [4]; the present study identifies supported connections and changes without estimating an isolated reporting effect. The proposed decision record in Section 5.3 is a separate practical output whose usefulness remains to be evaluated.

The episode chronologies do not establish a uniform progression from reporting formalization to managerial use. Implementation developments coexist with less demanding target or incentive parameters, illustrating why documented integration and the direction of change require separate assessment.

5.3. Implications for Management

Table 5 separates documentary findings from proposed questions and fields for a managerial decision record. The documentary findings concern the selected episodes; the questions and fields are design proposals derived from their contrasts. The proposed record would retain the information used, decision object and perimeter, alternatives considered,

responsible authority, authorized choice and date, applicable rule, resource state, implementation milestone, subsequent revisions, and basis of outcome review. This study has not implemented or empirically evaluated it. The MISE study includes a case-based application of a sustainability-management architecture [8]; the present proposal has no comparable organizational application. Its potential usefulness for managerial review therefore remains an empirical question.

Table 5. Documentary findings and proposed questions and fields for a managerial decision record. The proposed record has not been implemented or empirically evaluated.

Management Object	Documentary Finding	Proposed Review Question	Proposed Record Fields
Materiality and planning	Electrica connects DMA and strategy [26,27]; OMV Petrom includes climate impact in appraisal criteria [30,41].	Which priority or criterion changed a particular choice?	The IRO or appraisal criterion, options, authority, decision date, and resource consequences.
Board decision inputs	Romgaz formalizes environmental/social input requirements [24].	How was the requirement applied to a specific decision?	The decision scope, alignment analysis or proposed mitigation, and authorized response.
Procurement	OMV Petrom revises supplier risk; Electrica drafts a framework; Romgaz discloses a circularity omission [23,24,30].	Which criteria enter the procedure and the supplier choice?	The procedure version, assessment, and contract-level application.
Green finance	Electrica documents issuance and temporary treasury management [23].	What is raised, allocated, and spent at the reporting date?	Separate balances, eligible project approvals and expenditure evidence.
Remuneration	OMV Petrom and Romgaz disclose scheme-specific metrics [22,34].	Which role, scheme and period does the indicator affect?	The metric scope, weighting denominator, effective date, and evaluation result.
Target revision	OMV Petrom revises Scope 1–3 objectives [22].	What changed, who authorized it, and what follows?	The old and new definition, stated rationale, and related resource decisions.
Operational completion	DEER reports elimination of PCB capacitors [23].	Which assets and subsidiary does completion cover?	The asset boundary, completion milestone, and basis of outcome assessment.
Reporting process and organizational support	Electrica reports a formal process; OMV Petrom establishes divisional support roles [22,23].	How are validated inputs used, and what evidence establishes control effectiveness?	The named process, responsibilities, validation trail, relevant decision, and control assessment.

Notes: The second column summarizes findings from the documentary corpus. The third and fourth columns contain design proposals. Their presentation alongside documentary findings does not constitute empirical validation of the proposed record.

Board reporting can distinguish adopting a rule from an example of its application. Reporting teams can distinguish a named process and data-validation workflow from evidence that controls operated effectively. Procurement monitoring can separate general policy commitments from the criteria actually included in a procedure and a contract. Finance teams can separate mobilization, temporary treasury management, allocation, and expenditure. Remuneration reporting can specify the scheme, eligible roles, weighting denominator, effective date, and actual evaluation result. These distinctions are intended to make the basis and limits of a managerial review explicit. Whether the proposed record reduces ambiguity or improves review requires empirical evaluation; more complete disclosure alone would not demonstrate managerial effectiveness.

Target revision records should also retain which objective changed, why management states it changed, and whether the related incentive criterion uses the same scope and denominator. This is particularly relevant when strategic targets and compensation measures differ. A documented revision can support scrutiny of a decision; it does not by itself determine whether the decision was appropriate.

EL-2 provides a retrospective illustration of the proposed fields using existing public evidence. The decision object is Electrica's sustainability strategy; the stated information input is DMA [26], and the approval date is 17 December 2024 [27]. The record would retain these supported fields while marking project-specific alternatives, resource consequences, and subsequent implementation links as not identified in the selected evidence. No managers used the proposed record; this documentary illustration does not assess its usability or effects on decisions.

5.4. Limitations and Further Research

The study relies on purposive selection and does not establish exhaustive search recall or theoretical saturation. The second-author review described in Section 3.3 covered 10 randomly selected episode dossiers, but the second author had seen the initial codes before completing her form. This prior exposure may have anchored subsequent judgments. Acceptance of the documented corrections does not establish the reproducibility of coding by a researcher unfamiliar with the initial assignments. No intercoder-agreement statistic is reported. The retained episodes are examples of managerial developments, not a census of decisions. What we can find also depends on the report's language and format. Informal choices and discussions largely fall outside its reach. Corporate reports, issuer resolutions and remuneration documents may corroborate disclosed dates or parameters while retaining common institutional authorship. The EIB assessment provides a non-issuer account within a financing relationship, rather than independent verification of the managerial practices or outcomes examined here. Original-language quotations improve the traceability of disclosed content but do not substitute for independent evidence of implementation, effectiveness, or impacts. These constraints limit how far the analysis can explain behavior inside the organizations.

The three groups differ in their activities, ownership, governance arrangements, and investment portfolios. These characteristics provide interpretive context, but three purposively selected cases cannot capture their effects. Shared projects and coordination relationships also limit treating the cases as independent replications. Unequal episode counts and differences in documentary visibility prevent interpreting the descriptive frequencies as company-level rates of integration or managerial effectiveness. The study cannot separate the causal contribution of reporting from strategic, institutional, financing, and commercial influences, establish full ESRS compliance, or independently verify project-level environmental benefits. The separate 2026 follow-up adds information about one financing episode only. For OMV-3 and SNG-3, a targeted public-document follow-up could align effective dates, consistently defined emissions outcomes, disclosed operational or investment decisions, KPI achievement and remuneration relating to the relevant performance year, where these are publicly available. Such analysis would need to account for changes in production and sales mix, technology and other performance indicators. An emissions trend or an aggregate remuneration award alone would not identify the effect of the revised target or incentive. For OMV-3, distinguishing materiality-driven reframing from financial prioritization would require dated links between successive materiality assessments, target-review decisions and capital-allocation choices. Assessing decoupling would additionally require evidence on whether implemented actions remained connected to the stated environmental objectives, using consistent boundaries and performance measures.

A useful next step would be to replicate the documentary selection and have a researcher who has not seen the initial assignments assess the coding, retaining the separate coding files before any reconciliation. Researchers could then examine additional public records to resolve remaining links between information and decisions. Comparisons across sectors or over longer periods would test whether the same patterns recur. Interviews and internal records could add managers' interpretations and negotiations, although they fall outside the present study's public-data design. Future analyses should also apply changes in legal scope by effective year and national implementation, preserving the historical setting of each episode.

The proposed decision record requires separate feasibility and usability testing. An initial study could use public documentary packets for additional episodes not used to develop the structure, covering procurement, financing, and target review in energy and other sectors. Analysts unfamiliar with the original coding could use either the proposed record or a narrative extraction template on the same packets. A separately adjudicated source-based assessment could support comparison of source traceability, classification of action stages and resource states, identification of unresolved links, agreement between analysts and completion time. These outcomes would assess documentary usability and reproducibility, without treating disclosure completeness as evidence of managerial quality.

Longitudinal documentary tests could examine whether later records resolve specific outstanding links. Examples include whether the procurement framework prepared in EL-8 is subsequently adopted and applied to a supplier decision; whether the consultancy selection in SNG-10 is followed by study delivery and documented use; and whether the board-input rule in SNG-4 appears in an identifiable decision. These are candidate follow-ups conditional on public evidence becoming available. Later developments would need to be assessed on their own terms, without assuming that adoption, delivery or application necessarily occurred.

Effects on managerial deliberation, decision quality or implementation would require a separate prospective organizational study in which the record is actually used and assessed against a defined comparison. Such a study would require organizational access beyond the present public-data design. Until that evaluation is undertaken, the record remains a proposed review aid with untested managerial benefits.

6. Conclusions

This study examined how sustainability information connects to managerial decisions in OMV Petrom, Electrica and Romgaz during 2022–2025. The analysis follows 31 episodes through 100 main-period observations, with one separate follow-up from 2026. For RQ1, the records establish explicit reporting connections in materiality assessment, reporting coordination, a formal reporting process, and specified planning or preparatory activities. They also document local relationships between sustainability information and appraisal criteria, board inputs and executive evaluation. Evidence of these relationships does not, by itself, identify reporting requirements as their cause.

For RQ2, successive documents distinguish preparation, approval, reported implementation and completion, while leaving some applications unresolved. A completed materiality review can retain unchanged IROs and scores; a procedural omission differs from an application that the selected records do not show. For RQ3, continuing reporting arrangements coexist with less demanding target or incentive parameters, while earlier strategies, governance requirements, financing conditions and commercial considerations remain relevant explanations. Reported emissions outcomes and KPI scoring provide additional information about performance and assessment, but do not establish behavioral or

environmental effects attributable to the revisions. The findings therefore support assessing the documented relationship, action stage, and direction of change separately.

The methodological contribution is a traceable reconstruction of decision episodes across documents and reporting periods. The analytical rules in Table 2, episode histories in Table A1, illustrative quotations in Table A2, and source-linked observations in Supplementary Material S1 allow readers to examine the basis and limits of each interpretation. Retaining the decision object, organizational perimeter, chronology, and competing explanations helps distinguish a new development from a repeated description of an existing arrangement. This approach makes interpretive boundaries explicit, including where an unanswered implementation question must remain unresolved. Documentary traceability does not independently validate the underlying managerial practice.

For managers, the findings support reviewing sustainability information through identifiable decisions and their subsequent implementation. A review should retain the information and metric used, responsible authority, authorized choice and date, resource state, implementation evidence, and later revisions. Procurement review should distinguish policy adoption from procedural and contract-level application. Financial review should distinguish funds raised, allocated, and spent. Remuneration review should retain the scheme, eligible role, metric scope, weighting denominator, assessment result, and relevant performance period. Target revisions should preserve the earlier definition and stated rationale, particularly where strategic objectives and remuneration criteria differ. Table 5 translates these recommendations into proposed questions and record fields; its usability and managerial benefits remain untested.

These conclusions are limited by the purposive selection of three heterogeneous energy groups, unequal documentary visibility, and substantial reliance on issuer-produced records. Shared projects also limit treating the cases as independent replications. The second-author review covered 10 episode dossiers after exposure to the initial codes; it does not establish coding reproducibility by an unfamiliar researcher, and it reports no intercoder-agreement statistic. The descriptive episode counts cannot support company rankings or population estimates. The study does not isolate a causal CSRD effect, establish full ESRS compliance, or independently verify managerial effectiveness and environmental impacts.

Further research should assess coding with researchers unfamiliar with the initial assignments, extend the documentary comparison to additional settings, and follow unresolved decision links over time. Testing the proposed record on additional public-document packets could assess documentary usability. Claims about its effects on managerial decisions would require a separate prospective organizational evaluation.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/su182110872/s1, Supplementary Material S1: Public research database containing 31 managerial episodes, 100 main-period observations and one separate 2026 follow-up observation, source details, coding definitions, and a dataset guide. The workbook contains the Episodes, Evidence, Sources, Coding, Readme, and Selection worksheets.

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Abbreviations

The following abbreviations are used in this manuscript:

ACT	Decision or Action
AMEPIP	Agency for Monitoring and Evaluation of the Performance of Public Enterprises (Agenția pentru Monitorizarea și Evaluarea Performanțelor Întreprinderilor Publice)
BVB	Bucharest Stock Exchange (Bursa de Valori București)
CE Oltenia	Complexul Energetic Oltenia (Oltenia Energy Complex)
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CO_2	Carbon Dioxide
CSDDD	Corporate Sustainability Due Diligence Directive
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
DEER	Distribuție Energie Electrică România
DMA	Double-Materiality Assessment
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EPCC	Engineering, Procurement, Construction and Commissioning
ESG	Environmental, Social and Governance
ESRS	European Sustainability Reporting Standards
EU	European Union
EUR	Euro
FY	Financial Year
G	General Claim Without Object-Specific Detail
GOV	Authority
HSSE	Health, Safety, Security and Environment
HVO	Hydrotreated Vegetable Oil
I	Reported Execution or Progress
ID	Identifier
INC	Incentives
IRO	Impact, Risk or Opportunity
IROs	Impacts, Risks and Opportunities
ISO	International Organization for Standardization
KPI	Key Performance Indicator
LNK	Connection
MAT	Materiality
MISE	Integrated Strategic Sustainability Model
MON	Monitoring
MWp	Megawatt-Peak
NA	Not Applicable
NI	Information Not Identified in the Selected Evidence
OCR	Optical Character Recognition
OECD	Organization for Economic Cooperation and Development
PCB	Polychlorinated Biphenyl
PDF	Portable Document Format
R-E	Explicit Reporting Connection
RES	Resources
R-I	Interpreted Reporting Connection
R-U	Unresolved Reporting Connection

S	Specific Object, Rule or Parameter
S/I	Combined Specific Detail and Reported Implementation or Progress
SAF	Sustainable Aviation Fuel
SHA-256	Secure Hash Algorithm, 256-bit
SME	Small and Medium-Sized Enterprise
tCO_2/MWh	Tonnes of Carbon Dioxide per Megawatt-Hour
TIM	Chronology
UNGP	United Nations Guiding Principles on Business and Human Rights
URL	Uniform Resource Locator

Appendix A

Table A1. Longitudinal comparison of all 31 retained decision objects. Analytical statements are English paraphrases of the cited documents. Source locators cover 100 main-period observations and the separate EL-3 follow-up. Supplementary Material S1 provides the detailed records. Table A2 provides illustrative original-language excerpts, English translations, and evidential boundaries.

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
OMV-1 · Own Iṣalnița photovoltaic project · OMV Petrom	FY2022 renewable direction and a separate CE Oltenia partnership. Change: Own Iṣalnița project approved and contracted in 2024.	Authority → investment approval and EPCC contract.	Own-project budget and end-2025 progress unresolved; no IRO-to-approval chain.	Energy strategy, electricity market and financing.	D01 · OMV24, PDF p. 33 [30]; D02 · OMVPV24, web [42]; D03 · OMV25, PDF p. 35 [22]; D31 · OMV22, PDF p. 29 [41]
OMV-2 · Petrobrazi SAF/HVO and hydrogen · OMV Petrom	Earlier lower-carbon-fuel direction and preparatory activities. Change: SAF/HVO–hydrogen decision in 2024; construction reported in 2025.	Earlier strategy → investment and implementation milestones.	Program estimate is not annual spending; CSRD origin unresolved.	Strategy 2030, feedstock, EU finance and fuel demand.	D04 · OMV23, PDF p. 31 [32]; D05 · OMV24, PDF p. 33 [30]; D06 · OMVSAF24, web [40]; D07 · OMV25, PDF p. 18 [22]; D32 · OMV22, PDF p. 29 [41]
OMV-3 · Climate targets and capital direction · OMV Petrom	Separate 2030 Scope 1–3 intensity and absolute targets against 2019. Change: Strategic-target and financial-framework update approved in December 2025; the report describes less demanding Scope 1–3 parameters and communication of some revised targets in February 2026. The same report gives 2025 outcomes of a 19% reduction in absolute Scope 1–2 emissions and a 3% reduction in Scope 1–3 energy-supply carbon intensity, both relative to 2019; these outcomes are not attributed to the December 2025 target revision.	Strategy review → revised targets and capital direction.	Approval timing and target parameters are linked through passages from the same issuer report; individual approval minutes were not examined. Reallocated amount and climate effect unresolved; Scope 1–2 incentive is separate.	Stated market demand and technological readiness.	D08 · OMV23, PDF p. 32 [32]; D09 · OMV25, pp. 17 and 35 [22]; D10 · OMV25, PDF p. 35 [22]; D33 · OMV22, PDF p. 30 [41]

Table A1. *Cont.*

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
EL-1 · ESG responsibilities and risk coordination · Electrica	Strategy and Sustainability Department already identified for FY2022. Change: 2024 ESG specialization; joint risk/ESG DMA work and a named general risk-policy/procedure update reported in 2025.	ESRS reporting → allocation and coordination of responsibilities.	The specified policy update is documented; completeness of all procedural integration, individual decision use, and operating effectiveness remain unresolved. EL-7 covers the distinct reporting process.	Governance development, auditor recommendations and group coordination.	D11 · EL23, PDF p. 26 [25]; D12 · EL24, PDF p. 9 [26]; D13 · EL25, PDF p. 307 [23]; D14 · EL25, PDF p. 114 [23]; D34 · EL22, PDF p. 37 [28]; D35 · EL22, PDF p. 87 [28]; D101 · EL25, PDF p. 517 [23]
EL-2 · Materiality and sustainability strategy · Electrica	Broader corporate strategy published in December 2023, alongside committee endorsement during 2023 of a sustainability strategy for 2024–2030. Change: DMA-linked sustainability strategy approved in December 2024.	DMA → sustainability planning, explicitly stated.	Committee endorsement, Board approval and implementation remain distinct. Specific IRO-to-project choice, budget effect and incremental CSRD effect unresolved.	Stakeholder consultation, financier demands and corporate strategy.	D15 · EL24, PDF p. 9 [26]; D16 · EL25, PDF p. 319 [23]; D17 · EL25, PDF p. 329 [23]; D36 · EL22, PDF p. 10 [28]; D37 · EL22, PDF p. 92 [28]; D42 · ELSTR24, PDF p. 1 [27]; D72 · EL23, PDF p. 59 [25]; D88 · EL25, PDF p. 309 [23]; D100 EL23, PDF p. 115 [25]
EL-3 · Green bonds and temporary fund management · Electrica	Finance framework specifies eligible uses, governance and allocation rules. Change: EUR 500 million nominal green bonds in 2025; temporary management reported.	Green-finance rules → selection authority and treasury arrangements.	Raised, allocated and spent balances differ; July 2026 status stays separate.	Financing conditions, taxonomy, project timing and interest costs.	D18 · EL25, PDF p. 35 [23]; D19 · EL25, PDF p. 73 [23]; D38 · EL22, PDF p. 85 [28]; D43 · ELLIST25, PDF p. 1 [36]; D44 · ELGF25, PDF p. 12 [37]; D45 · ELGF25, PDF p. 14 [37]; D46 · EL25, PDF p. 774 [23]; D47 · ELEIB25, PDF p. 2 [38]; D48 · ELALLOC26, PDF pp. 1 and 3—separate 2026 follow-up [39]
SNG-1 · ESG office and reporting risk · Romgaz	First-ESRS-period disclosure identifies a reporting-risk methodology gap. Change: 2024 ESG office; reporting-risk assessment described in 2025.	ESRS transition → reporting organization and information control.	The records do not establish operational effects, costs, or effectiveness.	Learning after the first ESRS cycle and group reporting needs.	D20 · SNG24, PDF p. 110 [29]; D21 · SNG24, PDF p. 110 [29]; D22 · SNG25, PDF p. 140 [24]; D39 · SNG22, PDF p. 70 [43]
SNG-2 · Decarbonization strategy · Romgaz	Earlier strategy and decarbonization direction. Change: Strategy approved in October 2025; further climate analysis planned.	Earlier strategic direction → approved conditional decarbonization planning. The reporting connection is interpreted from the 2024 ESRS-alignment priority and the 2025 approval. Study procurement is retained separately as SNG-10.	The EUR 2.76 billion figure estimates a conditional scenario; it does not commit to spending.	Earlier strategy, energy policy and the feasibility of the technology.	D23 · SNG23, PDF p. 53 [33]; D24 · SNG24, PDF p. 149 [29]; D25 · SNG25, PDF p. 175 [24]; D26 · SNG25, PDF p. 180 [24]; D40 · SNG22, PDF p. 114 [43]; D49 · SNGSTR25, PDF p. 1 [31]

Table A1. *Cont.*

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
SNG-3 · Iernut CO_2 incentive revision · Romgaz	Climate KPI predates first FY2024 ESRS reporting. Change: The published 2025 threshold becomes more permissive, the lower threshold is scheduled for 2026, and weighting falls. Equivalence of the underlying measurement basis is not independently verified. The executive and director assessment table reports a climate-KPI achievement factor of 0.99 and a weighted contribution of 0.99 percentage points at the 1% weighting.	Governance requirements → revised evaluation parameters.	Published KPI scoring documents reported assessment, without establishing a physical emissions improvement, a remuneration effect attributable to the revised criterion, or a behavioral response. The CSRD contribution cannot be isolated.	AMEPIP requirements and changes in the governance of public enterprises.	D28 · SNG24, PDF p. 149 [29]; D29 · SNG25, PDF pp. 175 and 192 [24]; D30 · SNG25, PDF p. 137 [24]; D41 · SNG22, PDF p. 49 [43]; D50 · SNGAGA25, PDF p. 2 [35]; D51 · SNGREM25, PDF p. 15 [34]; D52 · SNGREM25, PDF p. 26 [34]; D53 · SNGREM25, PDF p. 6 [34]
OMV-4 · Supplier risk and procurement · OMV Petrom	Supplier assessment and ESG procurement practices already existed. Change: Supplier-risk process revised in 2024 and continued in 2025.	CSRD + CSDDD → supplier-risk revision, explicitly invoked together.	Individual supplier-selection and contractual effects unresolved.	Supply resilience, HSSE and prior ESG practices.	D54 · OMV23, PDF p. 80 [32]; D55 · OMV24, PDF p. 200 [30]; D56 · OMV25, PDF p. 169 [22]
OMV-5 · Materiality approval and review · OMV Petrom	Materiality process reviewed before the first ESRS financial year. Change: ESRS DMA approved in December 2023; later reviews reported.	ESRS → authorized assessment and review process.	Specific IRO-to-investment connection unresolved; IRO counts are not risk outcomes.	Existing sustainability/risk practices and assessment methodology.	D57 · OMV23, PDF p. 22 [32]; D58 · OMV24, PDF p. 96 [30]; D59 · OMV25, PDF p. 111 [22]
OMV-6 · Human-rights policy · OMV Petrom	Established human-rights commitments and external principles. Change: Human-rights policy approved in 2023; continuing activities reported.	Social commitments → policy and stated procedures.	Individual remediation and impact unresolved; CSRD origin unestablished.	UNGP, OECD and labor-rights obligations.	D60 · OMV23, PDF p. 101 [32]; D61 · OMV25, PDF p. 146 [22]
EL-4 · CEO and CFO sustainability objectives · Electrica	A sustainability objective is reported for executive management in 2024; the earliest introduction date is not established. Change: Sustainability-linked evaluation arrangements reported in 2024–2025 within the specific-indicator category.	Sustainability objective → executive evaluation arrangement.	Introduction date, metric achievement, and attributable bonus unresolved.	Remuneration policy, governance and possible earlier continuity.	D62 · EL23, PDF p. 122 [25]; D63 · EL25, PDF p. 311 [23]; D99 EL24, PDF p. 10 [26]
EL-5 · DEER PCB-capacitor elimination · Electrica/DEER	DEER PCB-elimination program with earlier environmental obligations. Change: All DEER PCB capacitors reported eliminated in December 2025.	Earlier environmental program → reported asset-specific completion.	Completion covers capacitors at DEER; independent impact evaluation unresolved.	Prior environmental plans, legal obligations and EBRD reporting.	D64 · EL23, PDF p. 137 [25]; D65 · EL25, PDF p. 143 [23]

Table A1. *Cont.*

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
SNG-4 · Environmental and social board inputs · Romgaz	Board-governance requirements address environmental and social decisions. The regulation was revised in 2025, with monitoring of its use planned for 2026.	Board materials must address ESG alignment or mitigation.	The selected records provide no example of application to an individual decision.	The BVB governance code and reforms in public-enterprise governance.	D66 · SNG25, PDF p. 93 [24]; D67 · SNG25, PDF p. 131 [24]
SNG-5 · Sustainable-procurement policy · Romgaz	Environmental/procurement requirements and sustainable-procurement principles. Change: 2025 policy adopted; circularity omission disclosed in the applicable procedure.	Policy → procedural specification, with an explicit bounded omission.	Contract-level application and broader policy effects unresolved.	ISO 20400:2017 [46], environmental policy and procurement requirements.	D68 · SNG24, PDF p. 200 [29]; D69 · SNG25, PDF p. 237 [24]; D70 · SNG25, PDF p. 238 [24]
SNG-6 · Sustainability in general risk management · Romgaz	General risk-management arrangements predate first FY2024 ESRS reporting. Change: Sustainability risks included in the November 2023 revision.	Sustainability risks → a formal risk-system change.	Complete application and effectiveness unresolved.	General risk management, strategy and regulatory anticipation.	D71 · SNG23, PDF p. 54 [33]
OMV-7 · ESG remuneration criteria · OMV Petrom	Remuneration-policy antecedents include 2022. Change: ESG weights continue in 2024–2025 alongside policy revisions.	Scheme-specific ESG metrics → management evaluation formula.	Separate roles, schemes and effective dates; payment/behavioral effects unresolved.	Strategy, market conditions, law and BVB governance requirements.	D73 · OMV24, PDF p. 84 [30]; D74 · OMV25, PDF p. 102 [22]; D75 · OMV25, PDF p. 69 [22]
OMV-8 · CE Oltenia photovoltaic partnership · OMV Petrom/CE Oltenia	Earlier CE Oltenia photovoltaic partnership and financing direction. Change: Construction reported in 2025; capacity and timetable revised.	Existing partnership → project implementation and schedule review.	Partner perimeter, cost and timing attribution retained; CSRD origin unresolved.	Earlier strategy, Modernization Fund and project maturity.	D76 · OMV22, PDF p. 29 [41]; D77 · OMV24, PDF p. 33 [30]; D78 · OMV25, PDF p. 17 [22]
OMV-9 · Neptun Deep final investment decision · OMV Petrom/Romgaz Black Sea	Neptun Deep planning predates the first ESRS financial year. Change: Shared-project final investment decision in June 2023.	Energy-transition rationale → a stated portfolio decision.	Planned OMV Petrom component is not total spending or independent climate benefit.	Energy security, gas demand and earlier strategy.	D79 · OMV22, PDF p. 29 [41]; D80 · OMV23, PDF p. 32 [32]
OMV-10 · Gabare project participation · OMV Petrom	Existing renewable-portfolio direction; Bulgarian asset perimeter. Change: Gabare participation acquired in 2025, with later milestones.	Renewable-portfolio direction → participation acquisition.	Later decision/operation milestones are not end-2025 completion.	Regional opportunity and commercial partnership conditions.	D81 · OMV25, PDF p. 17 [22]
OMV-11 · Safety assessment and action plans · OMV Petrom	Occupational safety and HSSE assessments were already in place. Their findings informed action plans in 2022.	The source explicitly links safety assessment to action planning.	The records leave implementation and outcome effects unresolved; a CSRD origin is not established.	HSSE and occupational-safety requirements.	D82 · OMV22, PDF p. 44 [41]
EL-6 · Vulturu acquisition and operation · Electrica	Vulturu acquisition in 2023 precedes first FY2024 ESRS reporting. Change: Acquisition, testing and operation reported across 2023–2025.	Earlier investment → distinct implementation milestones.	Testing and operation differ; independent impact evaluation unresolved.	Corporate strategy and earlier commercial opportunities.	D83 · EL23, PDF p. 29 [25]; D84 · EL25, PDF p. 561 [23]; D85 · EL25, PDF p. 309 [23]

Table A1. *Cont.*

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
SNG-7 · Integrity plan · Romgaz	National anticorruption requirements and integrity arrangements. Change: The implementation commission was established by Decision No. 256 of 8 March 2022, and the integrity plan was approved by Decision No. 426 of 8 April 2022.	Integrity requirements → formal governance and plan.	Execution and effectiveness unresolved; not attributed to later CSRD adoption.	National Anticorruption Strategy and integrity obligations.	D86 · SNG22, PDF p. 65 [43]
SNG-8 · Depogaz whistleblowing procedure · Romgaz/Depogaz	Subsidiary integrity and whistleblower-protection arrangements. Change: Depogaz procedure revision and employee training reported in 2025.	Governance requirements → procedure and reported training.	Subsidiary scope retained; reporting-system effectiveness unresolved.	Requirements concerning whistleblower protection and internal governance.	D87 · SNG25, PDF p. 290 [24]
OMV-12 · Capital-allocation criteria and their revision · OMV Petrom	A strategic-scoring framework was updated and pilot-tested in 2022. Change: Implementation described in 2023; climate-related appraisal criteria and higher low- and zero-carbon return thresholds reported in 2024.	Climate-target impact → appraisal criteria; investor feedback → higher minimum-return requirements.	No particular IRO-to-scoring-to-project-approval sequence or isolated CSRD origin is established.	Strategy 2030, investor expectations, risk and financial-return requirements.	D89 · OMV22, PDF p. 10 [41]; D90 · OMV23, PDF p. 11 [32]; D91 · OMV24, PDF pp. 84 and 90 [30].
OMV-13 · Sustainability Business Partner roles · OMV Petrom	Existing sustainability sub-department and subject-matter-expert reporting lines. Change: Dedicated Sustainability Business Partner roles established in 2025 to support business divisions.	Sustainability agenda → business-division support roles, explicitly stated.	Headcount, costs, particular divisional decisions and outcomes are not identified; CSRD causation is unresolved.	Business-division coordination needs and the existing sustainability framework.	D92 · OMV25, PDF p. 100 [22].
EL-7 · Formal sustainability-reporting risk and data process · Electrica	Policy development initiated in 2024, when the specified reporting-risk process was not formalized. Change: First formalized process implementation reported in 2025 under named reporting policy and procedure.	CSRD/ESRS reporting → DMA, ESG data validation, consolidation and reporting responsibilities.	Implementation is reported; operating effectiveness and use in specific investment or supplier decisions remain unresolved.	Reporting needs, assurance preparation and development of Group data governance.	D93 · EL24, PDF p. 11 [26]; D94 · EL25, PDF p. 313 [23].
EL-8 · Sustainable-procurement framework preparation · Electrica	Existing supplier relationships and the Sustainability Strategy 2025–2030. Change: Consultations, policy analysis and drafting of a sustainable-procurement policy and supplier code reported in 2025.	CSRD and EU Taxonomy requirements → integrated supplier-framework preparation.	Drafting does not establish adoption, application to an individual supplier or value-chain verification.	EU Taxonomy, ethical-procurement objectives and supply-chain risk management.	D95 · EL25, PDF p. 530 [23].

Table A1. *Cont.*

Object/Perimeter	Antecedent and Reported Change	Supported Connection	Open Boundary	Alternative Explanation	Evidence Locators
SNG-9 · Double-materiality assessment and revalidation · Romgaz	Management validation of GRI material topics reported in 2023. Change: ESRS DMA conducted in 2024 and revalidated in 2025 with IROs and scores unchanged.	Risk Register and risk-management methodology → materiality assessment and revalidation.	Completed review does not establish a changed strategy or investment; the source reports no stakeholder-information-driven strategy or business-model change during the period.	Existing risk-information routines, prior GRI assessment and ESRS reporting requirements.	D96 · SNG23, PDF p. 9 [33]; D97 · SNG24, PDF pp. 118, 122 and 123 [29]; D98 · SNG25, PDF p. 148 [24].
SNG-10 · Climate-risk consultancy selection and pending delivery · Romgaz	Climate-analysis needs within decarbonization and reporting arrangements. Change: Offers evaluated and a winner selected in 2025; contract execution planned for Q1 2026.	CSRD/ESRS and EU Taxonomy requirements → climate-study procurement.	Winner selection is not study delivery. The exercise reported no climate-scenario-based IRO assessment.	Overlapping Taxonomy requirements, climate-risk needs and strategic planning.	D27 · SNG25, PDF p. 182 [24].

Notes: Antecedents and alternative explanations are retained for each episode and should be read alongside the reporting-connection classification in Supplementary Material S1. These explanations may coexist with an explicit reporting connection. They do not assign an exclusive causal origin to an episode.

Supplementary Material S1 contains the detailed observations, episode comparisons, coding definitions, source URLs, and PDF checksums. It retains 100 observations from 2022 to 2025 and one separately identified 2026 follow-up. Where a record leaves a relationship or implementation unclear, the database preserves that uncertainty. The Selection worksheet provides the compact family-to-episode crosswalk and the index of additional main dossiers. The full technical screening records, documentary-object catalog, search-coverage outputs and scripts remain in the research archive available for editorial assessment.

Appendix B

Table A2. Original-language excerpts, English translations and analytical limits for selected documentary observations.

Episode, Observations and Source Locators	Original-Language Excerpt	English Translation	Supported Reading and Evidential Boundary
OMV-3; D09–D10. OMV25 [22], PDF p. 17; approval chronology on PDF p. 35.	"from 20% to 10%"; "withdraw the 2030 absolute Scope 1–3 reduction target"	No translation required: English source.	The company discloses a reduction in the required percentage for its 2030 Scope 1–3 energy-supply intensity target, relative to 2019, and withdrawal of the absolute target. We interpret these as less demanding target parameters. Approval timing is reconstructed from another passage in the same issuer report; the individual approval minutes were not examined. The quoted target revisions do not establish environmental effects attributable to those revisions or an isolated causal effect of CSRD.
OMV-4; D55. OMV24 [30], PDF and printed p. 200.	"To enhance supply chain resilience and compliance with CSRD and CSDDD requirements, in 2024 we have revised our supplier risk management process"	No translation required: English source.	The source explicitly states a joint regulatory rationale for a reported process revision. It does not isolate the contribution of CSRD or demonstrate application to a particular supplier decision.

Table A2. *Cont.*

Episode, Observations and Source Locators	Original-Language Excerpt	English Translation	Supported Reading and Evidential Boundary
SNG-5; D69. SNG25 [24], PDF p. 237, printed p. 116.	"nu a inclus prevederi specifice din zona de circularitate"	"did not include specific provisions in the area of circularity"	The company explicitly discloses an omission in the procurement procedure applicable during the reporting period. The same page reports adoption of a broader sustainable-procurement policy. The procedure and individual contracts were not examined directly; the disclosure does not establish the absence of all sustainable-procurement practices.
SNG-3; D28–D29 and D50–D52. SNG24 [29], PDF p. 149, printed p. 56; SNG25 [24], PDF pp. 175 and 192, printed pp. 54 and 71. Corroborating issuer records: SNGREM25 [34], PDF pp. 15 and 26; SNGAGA25 [35], PDF p. 2.	2024 statement: "are o pondere de 3% din totalul indicatorilor de performanță". 2025 statement: "are o pondere de 1% din totalul indicatorilor de performanță".	2024 statement: "has a weighting of 3% within the total set of performance indicators". 2025 statement: "has a weighting of 1% within the total set of performance indicators".	The disclosures specify different weightings and present 2025 emissions ceilings of 0.360 and 0.565 tCO_2/MWh, respectively. We interpret the comparison as a lower weighting and a more permissive ceiling. The later evaluation schedule retains the lower threshold for 2026–2027. The project-action table separately retains 0.360 for 2025; these disclosures are not reconciled into a single operational-performance claim. The remuneration report corroborates the 2025 parameters and records the contract-related approval; the shareholder resolution provides an approval record. These documents share issuer ownership. The weighting is not a percentage of salary, and no attributable payment effect is calculated.
SNG-2; D24–D25. SNG24 [29], PDF p. 149, printed p. 56; SNG25 [24], PDF p. 175, printed p. 54.	"în conformitate cu cerințele din ESRS E1-Climă"	"in accordance with the requirements of ESRS E1-Climate"	The excerpt concerns the 2024 statement's priority to develop and approve a transition/decarbonization plan in 2025. The subsequent statement records approval of the decarbonization strategy. Connecting these developments requires chronological interpretation. Approval does not establish completion of the initially envisaged ESRS-aligned transition plan or an isolated reporting effect.
EL-3; D47. ELEIB25 [38], PDF p. 2, Conclusions and Recommendations.	"satisfactory and adequate"; "acceptable for Bank financing"	No translation required: English source.	The EIB provides a non-issuer institutional assessment of environmental and social capacity and financing acceptability, subject to undertakings. Its financing role limits how to interpret this corroboration. The assessment does not establish actual allocation of all proceeds, achieved project impacts, or a causal effect of CSRD.

Notes: Quotation marks identify exact source fragments. Line breaks are normalized, while contextual explanations and translations are presented separately. Source identifiers and observation identifiers correspond to Supplementary Material S1. The excerpts illustrate existing observations and are not counted as additional analytical units. Documentary corroboration is distinguished from independent verification of implementation, effectiveness or outcomes.

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