From Compliance to Credibility: Assessing the quality of BRSR Disclosures

Amit Kr Eshore[1] and Sana Jasmine[2]

[1,2] Indira Gandhi Institute of Development Research, Mumbai, India

Abstract

India's Business Responsibility and Sustainability Reporting (BRSR) framework, mandated for the top 1,000 listed companies from 2022-23 [Securities and Exchange Board of India (2021)], represents a significant shift toward mandatory environmental disclosure in emerging markets. However, the quality and reliability of reported data remain largely unexplored. In emerging markets like India, where environmental measurement infrastructure is less developed, concerns about data quality are particularly acute. This paper analyzes a sample of NIFTY listed firms reporting data from 2022 to 2024 to assess data quality and identifies the determinants of consistent reporting using a novel feasibility metric based on grid emission factors. Our analysis finds that environmental data, specifically emissions and energy intensities, are severely compromised by systematic missingness and non-uniform reporting.

1 Introduction

In 2023, the Securities and Exchange Board of India (SEBI) made a bold move: it transitioned from voluntary to mandatory ESG reporting through the BRSR framework, for top 1000 listed companies by market capitalization. The BRSR framework requires detailed quantitative disclosures; on social responsibility action taken, governance related reporting to detailed environmental metrics including energy consumption, greenhouse gas emissions, water usage, and waste management. Environmental reporting under the BRSR framework is critical because it shifts corporate sustainability from vague, qualitative narratives to hard, quantifiable data that directly impacts a company's financial and strategic viability. By mandating disclosures on energy consumption, greenhouse gas (GHG) emissions, water usage, and waste management, the framework forces companies to confront their operational footprint, often uncovering hidden efficiencies that lead to long-term cost savings. Beyond internal management, this section acts as a vital signal to global investors who increasingly use ESG (Environmental, Social, and Governance) performance as a risk-assessment tool; companies with transparent, auditable environmental data are more likely to attract lower-cost capital and qualify for green financing. Furthermore, it serves as a robust defense against "greenwashing", providing stakeholders including regulators and consumers with a standardized benchmark to verify a company's progress toward India's Net Zero goals and the United Nations Sustainable Development Goals (SDGs).

The 2022-23 fiscal year marked a pivotal turning point, when a regulatory shift triggered a sudden and massive surge in the volume of sustainability data entering the public domain. However, as the focus moves beyond the initial rush to comply, a critical evaluation of reporting quality has become necessary to determine if these disclosures are truly meaningful. Research indicates that while the quantity of data is rising, significant issues with consistency and accuracy persist. For instance, companies often use inconsistent measurement units for energy, or provide ambiguous underlying data for critical intensity calculations. Furthermore, some firms have incorrectly reported fundamental metrics. Without thorough checks to verify that this data is meaningful, the current reporting ecosystem could end up presenting a misleading picture of how sustainably corporate India is truly performing.

2 Literature Review

The transition from India's Business Responsibility Report (BRR) to the Business Responsibility and Sustainability Reporting (BRSR) framework was designed to shift corporate disclosure from qualitative narratives toward quantitative substance (Debnath and Kanoo (2022)). However, empirical assessment of 1,358 firm-year observations from 2022-2024 reveals that the reliability of this data is severely compromised by systematic reporting failures. Nial and Parashar (2024) identify "implementation difficulties" where "quantifying and qualifying data to fit the format remains difficult for many businesses." Our 75% inconsistent data points associated with the environmental reportings provides empirical validation of this challenge, suggesting the technical demands of emission calculation exceed current corporate capacity. Gurung and Sarkar (2024) document similar problems in waste management reporting, finding practices that are "inconsistent, unstandardized, and unstructured" with massive quantities of industrial waste remaining "unaccounted for" despite mandatory disclosure requirements. Theoretical perspectives explain these failures through institutional dynamics. Devi et al. (2025) argue that mandatory discloses trigger "coercive isomorphism," producing high information redundancy where firms repeat narrative disclosures across reports to obscure a lack of technically accurate data. This behavior has direct economic consequences. Pandey et al. (2024) demonstrate that while the Indian market generally rewards the BRSR mandate, firms with higher pre-existing ESG scores experienced significantly negative abnormal returns, suggesting investor skepticism about whether these companies could maintain reported performance under stricter quantitative requirements. The authors attribute this to "reputational risk theory" rather than simple greenwashing detection, but either interpretation reveals market doubt about data credibility. Institutional practitioners corroborate these concerns: the CFA Institute and NSE (2024)CFA Institute et al. (2024) as primary barriers to investor confidence.

While existing literature identifies qualitative similarities between BRSR and global standards and assesses general market reactions, there is a critical gap in objective technical validation of reported quantitative data. Current research relies heavily on subjective content analysis or survey-based investor perceptions. No study tests the mathematical consistency of environmental disclosures against grid emission intensities. This paper addresses this gap by introducing a novel feasibility metric based on Grid Emission Factors (GEF) per unit of electricity. By calculating the implied GEF from self-reported Scope 2 emissions and total energy consumption from non renewable sources, we provide an objective, non-survey-based measure of reporting quality. Furthermore, our study empirically identifies the firm-level determinants such as active GHG reduction projects and operational scale that predict technical accuracy. This shifts the discourse from identifying that data quality is poor to understanding why specific firms succeed or fail in the transition to quantitative disclosure.

3 Data

Our primary data source is BRSR reports filed by Indian listed companies for fiscal years 2023 and 2024 [NSE (2024)]. BRSR reports are publicly available on company websites and stock exchange filings. We scraped BRSR reports for randomly chosen 500 companies listed on the National Stock Exchange (NSE) among top 1000 companies in India that filed BRSR reports during this period by mandate.

Data on critical metrics including energy consumption, greenhouse gas emissions, and governance compliance were extracted from individual BRSR filings. Our initial assessment identified non-uniform reporting practices, characterized by inconsistent units and ambiguous boundaries. To mitigate these issues, we integrated standardized financial data from the CMIE Prowess database [CMIE (2025)], mapping entities via their Corporate Identification Numbers (CINs). This external validation was particularly vital for revenue figures, as our analysis uncovered significant discrepancies in the financial data self-reported by firms within their sustainability disclosures.

To make our analysis manageable and meaningful, we grouped detailed five-digit NIC codes into eight broader industry categories, allowing us to compare reporting quality across major economic sectors namely Manufacturing Industrial, Manufacturing Chemical Pharma, Manufacturing Consumer Goods, Financial Services, Trade Transport, Information Technology and Telecom, Construction Energy Utilities and Others.

Our data collection began with 1,358 firm-year observations. However, as detailed in Quality analysis, we encountered significant data quality challenges that required careful handling. We excluded companies with completely missing environmental data, but even among reporting firms, we found systematic problems. Many companies reported without mentioning the units, suggesting calculation errors or misunderstandings of reporting requirements.

4 Data Quality Analysis

Our assessment on data for the years 2022-2024 reveals that the reliability of this data is severely compromised by systematic reporting failures. The sudden mandate by SEBI although increased the number of companies reporting but the quality of the reporting is something that is under question. In this section we do a quality assessment of data.

The transition from what companies know to what they must calculate exposes profound gaps in measurement capacity. Revenue from operations was not reported in 2022, but because of mandated reporting, we could see less missing values in this section across consecutive years. But interestingly unit inconsistency persist, some companies report in crores,some in millions,some in lakhs, where the units are just given as INR, it is difficult to interpret whether its 2500 cr or 2500 million or 2500 billion, creating 10 million-fold differences that render cross-company comparison meaningless without manual standardization.

Most troubling is the near-total absence of historical data across all three reporting years. Variables specifically designed to enable year-over-year trend analysis remained 98-100% missing, indicating that firms lack integrated environmental management systems. This pattern suggests companies are generating data on an ad-hoc, compliance-driven basis rather than pulling from systematic records. The few companies that do report previous year values often show inexplicable inconsistencies with their actual prior filings, raising questions about data integrity.

Unit inconsistency becomes a more severe problem while looking at environmental quantitative data. The units were reported as “pure”, the definition of this pure being joule or kilojoule or megajoule is itself a major issue while analysing. We notice almost no mention of “pure” as a unit of reporting by 2023, this shows the efforts by the regulators to improve data quality.

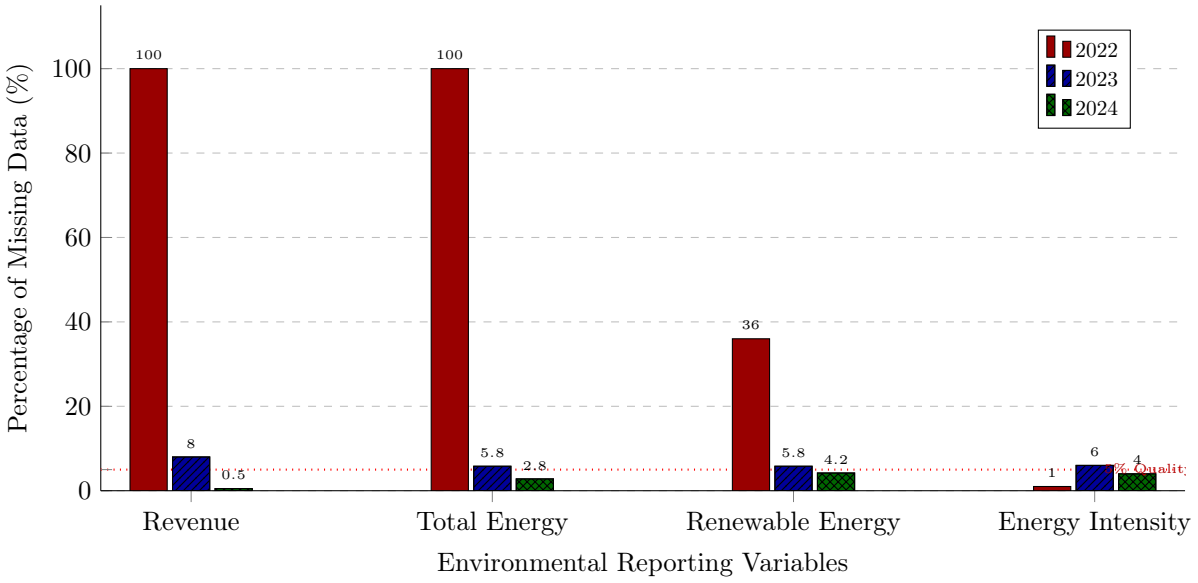

Figure 1: Missing Data Trends in BRSR Energy-Related Variables (2022–2024)

Beyond missingness and unit problems, we assessed consistency of the reported values. We calculated two emission factors for each company: the Fuel Emission Factor (Scope 1 emissions divided by non-renewable fuel consumption) and the Grid Emission Factor (Scope 2 emissions divided by purchased electricity). Based on International Energy Agency combustion factors and India’s grid emission factors, we established expected ranges of 56-110 tonnes CO_2 per terajoule for fuel and 0.50-0.95 tonnes CO_2 per megawatt-hour for grid electricity.The results are alarming: only 27.3 % of companies (223 out of 817 with complete data) report emission factors which are consistent. This means 72.7 % of reported emissions data is mathematically inconsistent with physical reality. Almost 62 % companies reported grid emission factor greater than 1000, which is physically infeasible, likely because they under-reported Scope 2 emissions by excluding purchased grid power or incorrectly subtracting renewable electricity from the denominator. These systematic 1000-fold errors suggest companies are back-calculating emissions from generic estimates rather than measuring actual energy consumption and applying correct emission factors. [Debnath and Kanoo (2022)] argued that quantification is the "real challenge" for firms; a 1000

times error in a fundamental factor confirms that many of the top 1,000 firms are still in the most basic "Formative" stage of the Sustainability Reporting Maturity Model.

The empirical problems we identify are not isolated failures but reflect systemic issues confirmed by recent literature on BRSR implementation. [Nial and Parashar (2024)] identify "implementation difficulties" where "quantifying and qualifying data to fit the format remains difficult for many businesses." Our 75% infeasibility rate provides empirical validation of this challenge, suggesting the technical demands of emission calculation exceed current corporate capacity.

5 Methodology

To investigate the determinants of reporting quality in India's Business Responsibility and Sustainability Reporting (BRSR) framework, we adopt a quantitative approach focusing on the top listed entities for the fiscal year 2023-2024 . Recognizing that self-reported "compliance" does not necessarily equate to "accuracy," we construct a objective quality metric based on the Grid Emission Factor (GEF). For a disclosure to be mathematically consistent, the reported Scope 2 emissions must logically follow the fundamental identity:

$$\text{Scope 2 Emissions} = \text{Total Electricity Consumption (Non-renewable)} \times \text{Grid Emission Factor} \quad (1)$$

In the Indian context, the feasible GEF range is technically bounded between 0.50 and 0.95 kg CO_2/kWh . We define *consistent Reporting* as a binary outcome variable (1 if the implied GEF derived from a firm's disclosure falls within this feasible range, and 0 otherwise). Within our sample, approximately 27.3% of firms meet this consistency criterion . This suggests a significant prevalence of mathematically inconsistent or fabricated emissions data across the broader corporate landscape . To identify the drivers of this quality gap, we integrate firm-level characteristics, granular environmental metrics, and governance data into our econometric framework .

Model Specification

We estimate the likelihood of a firm reporting consistent data using a logistic regression framework. Let the binary outcome variable y take the value 1 if a firm provides consistent Reporting, and 0 otherwise. The latent variable formulation of the model is given by:

$$y^* = \mathbf{x}'\boldsymbol{\beta} + \varepsilon,$$

where y^* is the unobserved latent propensity for quality reporting, $\mathbf{x}$ is a vector of explanatory variables (including firm size, energy mix, and governance attributes), $\boldsymbol{\beta}$ is the corresponding vector of coefficients, and ε is the error term following a logistic distribution with mean zero and variance $\pi^2/3$. The observed binary outcome is defined as:

$$y = \begin{cases} 1 & \text{if } y^* > 0, \\ 0 & \text{if } y^* \leq 0. \end{cases}$$

The probability that a firm provides consistent Reporting, conditional on the vector of covariates $\mathbf{x}$, is expressed as:

$$\Pr(Y = 1 \mid \mathbf{x}) = \frac{\exp(\mathbf{x}'\boldsymbol{\beta})}{1 + \exp(\mathbf{x}'\boldsymbol{\beta})} = \Lambda(\mathbf{x}'\boldsymbol{\beta}),$$

where $\Lambda(\cdot)$ denotes the logistic cumulative distribution function. The parameters are estimated via Maximum Likelihood Estimation (MLE) by maximizing the log-likelihood function:

$$\log \mathcal{L}(\boldsymbol{\beta}) = \sum_{i=1}^{N} \left[y_i \log \Lambda(\mathbf{x}_i'\boldsymbol{\beta}) + (1 - y_i) \log \left(1 - \Lambda(\mathbf{x}_i'\boldsymbol{\beta})\right) \right].$$

We specify four distinct models to test the robustness of our findings :

Model 1: Baseline Specification

$$y_i^* = \beta_0 + \beta_1 \ln(\text{Size}_i) + \beta_2 \text{Renewable\_Ratio}_i + \mathbf{Z}_i\gamma + \delta_s + \tau_t + \varepsilon_i \quad (2)$$

Rationale: Evaluates the direct impact of renewable energy intensity on data quality.

Model 2: Complexity Interaction Model

$$y_i^* = \text{Eq. } 2 + \beta_3(\ln(\text{Size}_i) \times \text{Renewable\_Ratio}_i) + \varepsilon_i \quad (3)$$

Rationale: Tests the "Capability Hypothesis" i.e, whether larger firm scale mitigates the reporting complexities inherent in high renewable energy adoption.

Model 3: Robustness (Identification Check)

$$y_i^* = \beta_0 + \beta_1 \ln(\text{Size}_i) + \beta_4 \text{GHG\_Proj}_i + \beta_5 \text{Assurance}_i + \mathbf{Z}_i\gamma + \delta_s + \tau_t + \varepsilon_i \quad (4)$$

Rationale: Excludes the Renewable Ratio to ensure findings for strategic variables are not biased by potential multicollinearity .

Model 4: Operational Scale Model

$$y_i^* = \beta_0 + \beta_1 \ln(\text{Size}_i) + \beta_6 \ln(\text{Total\_Energy}_i) + \beta_4 \text{GHG\_Proj}_i + \mathbf{Z}_i\gamma + \delta_s + \tau_t + \varepsilon_i \quad (5)$$

Rationale: Controls for the absolute scale of energy footprint to isolate operational drivers from purely financial firm size

In all specifications:

- $\ln(\text{Size}_i)$ denotes the natural log of total income derived from standardized **Prowess** records.
- $\mathbf{Z}_i$ represents a vector of corporate governance controls, including Firm Age, Board Size, and the percentage of Female Directors.
- δ_s and τ_t represent Super-Sector and Panel Year fixed effects, respectively, to control for unobserved industry-specific complexities and temporal shifts in reporting standards .

In these specifications, *Size* is proxied by the log of total income , *Ren_Ratio* denotes the share of renewable energy in the total energy mix , and $\mathbf{Z}_i$ represents a vector of controls including firm age, board size, and gender diversity . Sector-level fixed effects (δ_s) and year fixed effects (τ_t) are included to control for industry-specific measurement complexities and temporal trends .

The marginal effect of a continuous variable on the probability of reporting quality is calculated as:

$$\frac{\partial \Pr(Y = 1 \mid \mathbf{x})}{\partial \mathbf{x}} = \Lambda(\mathbf{x}'\boldsymbol{\beta})\left[1 - \Lambda(\mathbf{x}'\boldsymbol{\beta})\right]\boldsymbol{\beta}$$

For categorical or binary variables, such as the presence of GHG projects, we report the average partial effect:

$$\text{APE} = \frac{1}{n}\sum_{i=1}^{n}\left[\Pr(Y = 1 \mid \mathbf{x}_i, d_i = 1) - \Pr(Y = 1 \mid \mathbf{x}_i, d_i = 0)\right]$$

5.1 Descriptive Statistics

Table 1 presents the descriptive statistics for our sample of 820 firm-year observations. The final regression sample consists of 817 complete cases after handling missing values.

The sample exhibits considerable heterogeneity in firm characteristics. Average total income is 88,897.69 crore with substantial variation (standard deviation of 394,398.84 crore), reflecting the presence of both large multinational corporations and smaller listed entities. The median firm age is 35 years, though the range extends from 3 to 162 years. On average, firms have 8.58 board members with 20% female representation, though this varies widely (0% to 100%).

Table 1: Descriptive Statistics

Variable	N	Mean	Median	Std. Dev.	Min/Max
Panel A: Continuous Variables					
Total Income (Crore)	820	88,897.69	18,333.90	394,398.84	-4,850 / 5,370,341
Age of Firm (years)	820	40.27	35.00	23.63	3 / 162
Board Size	820	8.58	8.00	2.43	2 / 20
Female Board %	820	0.20	0.17	0.10	0 / 1.00
Renewable Ratio	820	0.20	0.03	0.32	0 / 1.00
Panel B: Binary Variables (N = 820)					
		Yes	**No**	**Yes %**	
High Quality Reporting		225	595	27.4%	
PAT Scheme		96	724	11.7%	
External Assurance		245	575	33.4%	
GHG Projects		635	185	81.0%	
Environmental Compliance		674	146	96.3%	

Table 2: Sector Distribution of the Sample

Sector	Count (N)	Percentage (%)
Panel C: Sector Distribution (N = 817)		
Manufacturing – Industrial	177	21.7%
Manufacturing – Chemicals/Pharma	164	20.1%
Finance & Services	106	13.0%
Manufacturing – Consumer Goods	97	11.9%
Trade & Transport	86	10.5%
IT & Telecom	74	9.1%
Other	40	4.9%
Construction	39	4.8%
Energy & Utilities	34	4.2%

Most striking is the renewable energy adoption pattern: while the mean renewable ratio is 20%, the median is only 3%, indicating a highly skewed distribution where most firms use minimal renewable energy while a few are heavily invested. Only 11.7% of firms are designated under the PAT energy efficiency scheme, suggesting this regulatory mechanism has limited reach. Despite 96.3% of firms claiming environmental compliance, only 27.4% achieve high-quality reporting by our feasibility metric revealing a substantial gap between claimed compliance and technical accuracy.

6 Results

The regression analysis identifies GHG reduction projects and firm scale as the primary drivers of reporting quality. In all four model specifications, having active projects related to reducing greenhouse gas emissions is the strongest predictor of high-quality data ($p < 0.01$). The marginal effects from Model 2 indicate that firms with GHG projects are associated with 15 to 20 percentage points higher reporting quality of feasible emission data. This suggests that firms with concrete environmental initiatives have likely invested in the necessary measurement systems to accurately calculate their emissions.

Contrary to what one might expect, companies using more renewable energy actually struggle more with their environmental reporting. Our analysis shows that for every percentage point increase in renewable energy usage, a company becomes 0.9 percentage points less likely to provide reliable data. This surprising finding holds true across different statistical models, suggesting it's a real pattern rather than a coincidence.Why would using cleaner energy make reporting worse? The answer lies in complexity. Renewable energy creates new measurement challenges that many Indian companies aren't equipped to handle. Solar panels, wind turbines, and biomass systems require specialized monitoring equipment and new accounting methods. Companies need to track energy production across different sources, calculate avoided emissions compared to grid power, manage the intermittent nature of renewables, and navigate less-standardized reporting protocols.

To further investigate the renewable energy paradox, In Model 2, the interaction term between Firm Size ($LogTotalIncome$) and the Renewable Ratio was introduced to test if larger firms handle this

Table 3: Logistic Regression Results: Determinants of High-Quality Reporting

	Model 1 Baseline	**Model 2 Interaction**	**Model 3 No Renewable**	**Model 4 Total Energy**
Firm Characteristics				
Log Total Income	0.1113*	0.0678	0.1243**	0.0173
	(0.0631)	(0.0667)	(0.0628)	(0.0674)
Age of Firm	-0.0025	-0.0029	-0.0027	-0.0033
	(0.0037)	(0.0037)	(0.0037)	(0.0037)
Governance				
Board Size	-0.0363	-0.0354	-0.0322	-0.0335
	(0.0376)	(0.0375)	(0.0377)	(0.0378)
Female Board %	-0.3680	-0.4650	-0.4331	-0.3056
	(0.8680)	(0.8721)	(0.8733)	(0.8726)
External Pressures & Capabilities				
PAT Scheme	-0.0855	-0.0294	-0.0591	-0.4061
	(0.2669)	(0.2679)	(0.2646)	(0.2821)
External Assurance	0.2235	0.1914	0.1933	0.0717
	(0.1989)	(0.1999)	(0.1980)	(0.2018)
GHG Projects	0.8712***	0.8502***	0.9152***	0.7454***
	(0.2456)	(0.2466)	(0.2447)	(0.2539)
Environmental Compliance	-0.2043	-0.2192	-0.1721	-0.2743
	(0.2181)	(0.2186)	(0.2152)	(0.2209)
Operational Complexity				
Renewable Ratio	-1.0680***	-5.1105**		
	(0.3300)	(2.2411)		
Log Income × Renewable		0.4145*		
		(0.2224)		
Log Total Energy				0.1486***
				(0.0310)
Intercept	-2.2825***	-1.7748**	-2.5680***	-2.8994***
	(0.7811)	(0.8207)	(0.7688)	(0.7925)
Sector Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	817	817	817	817
Pseudo R^2	0.074	0.078	0.062	0.094
AIC	924.5	922.7	934.3	905.5
Log-Likelihood	-443.2	-441.4	-449.1	-433.8

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All models include sector and year fixed effects (coefficients not reported for brevity). Dependent variable: High Quality Reporting (1 = feasible grid emission factor, 0 = otherwise).

complexity better. While the interaction term is positive (0.4145) and marginally significant suggesting renewable energy reporting is a barrier for small-to-medium firms, but large firms can handle it.

Furthermore, Model 4 serves as a crucial robustness check by controlling for the absolute scale of energy consumption ($LogTotalEnergy$). The results show that energy scale is a highly significant positive predictor of reporting quality ($\beta = 0.1486$, $p < 0.01$). This suggests that the influence of firm size is operational rather than institutional; firms with substantial energy footprints face greater operational imperatives to maintain precise measurement systems, independent of their corporate governance structures.

The analysis highlights a distinct decoupling between regulatory compliance signals and actual data precision. Despite 96.3% of the sample self-reporting full compliance with applicable environmental laws, the $EnvironmentalCompliance$ variable shows no statistically significant relationship with reporting quality across any specification. Similarly, participation in the Perform, Achieve, and Trade (PAT) scheme a mandatory energy efficiency program yielded negative and statistically insignificant coefficients, indicating that regulatory mandates alone are insufficient to drive technical accuracy without concurrent capacity building.

Notably, traditional credibility signals failed to predict higher data quality. External assurance, often cited as a proxy for reliability, demonstrated no statistically significant correlation with the feasibility of reported data ($\beta \approx 0.19$, $p > 0.10$). This null result raises concerns that current assurance engagements may function as procedural "check-the-box" exercises rather than rigorous technical audits of complex carbon calculations.Even at the leadership level, governance factors such as board size and gender diversity showed no significant correlation with reporting quality, implying that high-level oversight does not automatically translate into better measurement capabilities on the ground.

Table 3 presents the logistic regression results across four model specifications. Model 1 serves as the baseline specification. Model 2 introduces an interaction term between firm size and renewable energy ratio to test whether larger firms handle renewable energy reporting complexity better. Model 3 excludes the renewable ratio to assess model sensitivity. Model 4 includes total energy consumption as an alternative specification.

7 Way Forward

The current state of BRSR reporting in India reveals a system where regulatory requirements have far outpaced corporate technical capabilities, resulting in an "implementation gap" that compromises the entire framework. To move beyond this formative stage, we must shift from a "check-the-box" compliance mindset to a capacity-building approach that prioritizes measurement infrastructure. A one-size-fits-all model has clearly failed, as evidenced by the 75% of companies unable to provide mathematically feasible emission data. To move forward, SEBI should implement tiered reporting requirements that match disclosure complexity with actual corporate capabilities. For large, high-impact emitters (the top 250 entities), the regulator must mandate "Reasonable Assurance" by FY26 to verify the underlying physics of their data, rather than just the presence of a policy. Simultaneously, Small and Medium Enterprises (SMEs) should be allowed to report through simplified, automated digital templates (Somasundaram (2025)) that reduce the manual calculation errors currently plaguing the system.

To eliminate the astronomical scaling errors where 479 firms reported grid factors exceeding 1,000, India needs a standardized "hard math" infrastructure. The government should establish a Centralized Emission Factor Database hosted by the Ministry of Environment, Forest and Climate Change. This platform would provide official, region-specific grid intensity data, effectively removing the "guesswork" that currently leads to technical infeasibility. Furthermore, SEBI must mandate a single unit of measurement to resolve the chaotic mix of GJ, TJ, and kWh that currently makes sectoral benchmarking impossible.

Finally, environmental reporting must move from a "storytelling" exercise in the finance department to a core operational strategy. Our regression analysis confirms that firms with active GHG reduction projects are significantly more likely to report accurate data, proving that operational engagement drives measurement precision. By incentivizing firms to link executive compensation to the accuracy of these metrics, regulators can discourage the "ceremonial" compliance that currently leads to investor skepticism and "greenwashing" penalties. As these technical gaps are closed, aggregated firm-level data should be used to build realistic, context-specific national climate targets, ensuring that corporate India's transition to Net Zero is founded on physical reality rather than administrative paperwork.

8 Conclusion

Our investigation reveals a troubling reality: while SEBI's mandate successfully increased the volume of sustainability disclosures, the reliability of this data is severely compromised. Only 27.3% of companies report mathematically feasible emission factors, meaning nearly three-quarters of India's top listed firms are providing environmental data that is inconsistent. Systematic problems pervade the reporting landscape from chaotic unit inconsistencies and near-total absence of historical trend data to alarming calculation errors where companies report grid emission factors exceeding 1,000 times the physically possible range. The gap between claimed compliance (96.3% of firms report full environmental adherence) and actual measurement precision exposes a fundamental disconnect: regulatory pressure alone cannot create technical capacity.

Our analysis moves beyond documenting these failures to identifying their determinants through a feasibility metric based on grid emission factors. We find that active GHG reduction projects are the strongest predictor of reporting quality, with firms managing concrete environmental initiatives being 15-20 percentage points more likely to provide accurate data. This confirms that environmental measurement capability emerges from operational integration rather than ceremonial compliance. Counterintuitively, increased renewable energy adoption correlates with worse reporting quality, as the complexity of tracking multiple energy sources overwhelms companies lacking sophisticated monitoring systems ; though larger firms can partially mitigate this challenge. Critically, neither third-party verification, regulatory designation under the PAT scheme, nor governance factors like board diversity show any meaningful impact on data accuracy, revealing that current institutional mechanisms are failing to bridge the implementation gap between what firms must report and what they can actually measure.

The path forward requires a fundamental reimagining of India's sustainability reporting architecture. SEBI must transition from uniform mandates to tiered requirements that match reporting complexity with firm capabilities, allowing smaller companies simplified metrics while subjecting large emitters to rigorous "reasonable assurance" audits that verify physical reality rather than procedural documentation. The government should establish standardized emission factor databases and mandate uniform measurement units to eliminate the scaling errors that currently plague 75% of disclosures. Most importantly, companies must integrate environmental data collection into core operations rather than treating it as a

compliance exercise delegated to finance departments. Our findings demonstrate that when climate action becomes operational as evidenced by active GHG projects , accurate measurement naturally follows. Only by building bottom-up technical capacity can India transform BRSR from a paper exercise into a credible foundation for investment decisions, policy formulation, and the nation's transition toward its Net Zero commitments.

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