

CARBON EMISSIONS DISCLOSURE PRACTICES: A COMPARATIVE STUDY OF CONSUMER DISCRETIONARY AND CONSUMER STAPLES SECTORS IN SRI LANKA

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ABSTRACT

The research paper focuses on the degree of carbon emission disclosure by companies in the Consumer Discretionary and Consumer Staple industry of the Colombo Stock Exchange (CSE) in Sri Lanka. As the world is increasingly focused on environmental transparency and climate responsibility, it is necessary to gain insight into the disparities in disclosure practices across the various sectors especially in the emerging economies where regulatory frameworks are not well-developed. A quantitative and cross-sectional research design was adopted and secondary data were collected through annual reports of 48 randomly selected companies during the 2023/2024 financial year. The Carbon Emissions Disclosure Index (CEDI) was designed using an 18-item questionnaire, which was created through the Global Reporting Initiative (GRI) Standards and previous literature. The scoring of each disclosure item was done in a binary manner, which renders objectivity and consistency in its measurement. The normality tests, such as Shapiro Wilk and Kolmogorov Smirnov tests, revealed that the data were not normally distributed; hence, the non-parametric Mann Whitney U test was used in order to determine the difference of carbon emission disclosure practices in the two sectors. The results indicate no statistically significant difference in the disclosure of carbon emission between Consumer Discretionary and Consumer Staples companies, suggesting that sectoral classification does not significantly influence disclosure practices in the Sri Lankan context, and that the disclosure levels of companies in both industries are relatively similar. The paper is a contribution to the scanty empirical data available on the disclosure of carbon emissions in emerging markets, given that the article presents sector-specific comparative evidence in Sri Lanka. It also presents some useful implications to the policymakers, as it points to the necessity of more effective regulatory frameworks and standardized reporting principles to increase transparency and comparability across industries. Further studies can expand this investigation by adding the number of sectors, long-term data, and the qualitative measurement of the quality of disclosure.

Keywords: *Carbon Emissions Disclosure, Consumer Discretionary, Consumer Staples, Mann-Whitney U Test, Sri Lanka*

1. INTRODUCTION

Climate change is a burning worldwide issue, and the governments, industries, and corporations must take immediate measures to reduce the production of greenhouse gases (Filonchik et al., 2024). Emissions are a major contributor of corporate activity, and stakeholders need to understand carbon emissions disclosure in order to assess the environmental performance and consistency in meeting climate objectives (Cai et al., 2024). Carbon Emissions Disclosure has turned into an essential part of corporate sustainability reporting, which enables stakeholders, including investors, regulators, and the general population, to estimate the environmental performance of companies and their compliance with international climate goals (Ma et al., 2023; Tang and Demeritt, 2018). With the increasing intensity of environmental regulations in the world, firms in all industries are increasingly expected to report their carbon emissions publicly and take measures to reduce their environmental footprint (Luo & Tang, 2023; Okereke and Russel, 2010). The Carbon Emissions Disclosure allows not only to increase the corporate transparency but also allows companies to control the reputational risks, fulfil the regulatory demands and find the investors interested in sustainability (Jarboui et al., 2025).

Carbon emissions in Sri Lanka amounted to 20.78 million metric tons in 2022, which constitute 0.056% of the world emissions (UNDP Climate Promise, n.d.). Although its role is minimal, Sri Lanka has pledged a 14.5 percent carbon reduction by 2030 as part of the Climate Promise program, which puts a strain on local businesses to improve on carbon emissions reporting practices (UNDP Climate Promise, n.d.). This means that Sri Lankan firms are now being pushed to improve their environmental reporting, especially on the carbon emissions. Nonetheless, the academic studies on the topic of carbon emissions disclosure in Sri Lanka are scarce, particularly regarding the differences between the sectors (Maldeniya and Mallawaarachchi, 2024).

The Consumer Discretionary and Consumer Staples industries play an important role in the Sri Lankan economy and each has a different environmental footprint because of the differences in production processes, supply chains, and operational activities. Examples of industries in the Consumer Discretionary industry are Consumer Durables and Apparel, Retailing, and Consumer Services, and they tend to be energy-intensive during their production, have international supply chains, and produce high levels of emissions related to transportation (Astuti and Setiany, 2021). Conversely, the Consumer Staples industry, which includes Food, Beverage and Tobacco, Food and Staples Retailing, and Household and Personal Products, is confronted with the problem of agricultural emissions, food processing, refrigeration, packaging wastes, and logistics (Widia Astuti and Setiany, 2021). These sectoral variations imply that the level and the character of disclosure of carbon emission could be different in the two sectors.

Regardless of these apparent differences, the absence of empirical studies that investigate the existence of these sector-specific traits with regard to the disclosure practices of carbon emissions in the Sri Lankan setting is apparent. The majority of the previous research has concentrated on the overall disclosure rates or firm-specific

factors and has largely ignored comparative analysis in terms of sectors in an emerging economy (Hassan et al., 2021; Saha et al., 2021). This leaves a distinct research gap, especially in the quest to determine whether or not industry classification is an important factor in the determination of disclosure behavior in a regulatory environment where carbon reporting is still largely voluntary.

The issue that this research aims to solve is thus the lack of empirical data on whether firms in various industries do dramatically vary in levels of carbon emissions disclosure. In the absence of such evidence, policymakers and regulators might be in trouble trying to come up with specific and effective disclosure frameworks that match the sector-specific requirements. Even though there is an increasing focus on environmental accountability, there is limited empirical research on comparing carbon emission disclosure practices in these two industries in Sri Lanka. In this paper, aims to close this gap through a comparative study of Carbon Emissions Disclosure of the listed companies in the Consumer Discretionary and Consumer Staple sectors in Sri Lanka.

This research is based on the need to give empirical evidence that will be useful in enhancing more organized and standardized carbon disclosure practices in Sri Lanka. This study aims at identifying the role of sectoral affiliation in the disclosure behavior by comparing two economically relevant sectors to the extent that it helps to achieve a more balanced picture of environmental reporting practices in the emerging market.

The results of this study will be very useful to regulators, policymakers and corporate stakeholders to improve carbon disclosure practices in order to supplement national and global sustainability commitments to Sri Lanka. This paper has a number of important contributions to the existing literature. First, it offers one of the few sector-based comparative analysis of disclosure of carbon emissions in Sri Lanka. Second, it proposes a systematic index of Carbon Emissions Disclosure Index (CEDI) to disclosed levels, using GRI standards. Third, it provides practical implications to policymakers by indicating the need to have sector-specific regulatory approaches or not. All these contributions combine to close the gap between theory and practice of environmental reporting in the emerging economies.

2. LITERATURE REVIEW

Carbon Emissions Disclosure has emerged as a highly significant area of scholarly inquiry, particularly as the global community amplifies its efforts to address and mitigate the adverse impacts of climate change (Giannarakis et al., 2017). Businesses are increasingly being called upon by regulators, investors and the general population to report their carbon footprint, management policies and their carbon reduction targets (Dragomir, 2012; Sullivan, 2009).

The development of international agreements such as the Kyoto Protocol (Freedman & Jaggi, 2005; Lee et al., 2015) and voluntary initiatives like the Carbon Disclosure Project (Depoers et al., 2016; Kolk et al., 2008) has prompted firms worldwide to increase the transparency and scope of their carbon reporting. These

frameworks aim to standardize the disclosure of climate-related information, allowing stakeholders to evaluate corporate responses to climate change consistently.

Empirical study has revealed that carbon emissions disclosure is different among firms and industries. Larger and more publicly visible companies are more likely to disclose more information to address reputational risk, as well as to meet the expectations of stakeholders (Hahn & Kühnen, 2013; Tong, 2013; Yu et al., 2017). Differences in disclosure practices also arise due to industry factors (Thassim, 2025). Companies in carbon-intensive sectors (e.g., manufacturing, energy, and some consumer goods) tend to be more burdened with the requirements to report transparently (Crocco et al., 2024; Q. Tang and Luo, 2011).

The situation is more complicated in the case of developing economies. As the example, Nuskiya et al. (2021) highlighted that in Sri Lanka, carbon emissions disclosures remain relatively limited due to the absence of comprehensive regulations, lower stakeholder pressure, and limited awareness. Similarly, in Indonesia, a key emerging economy and one of the G20 countries, the challenges are even more pronounced. Although Indonesia reported 619 million metric tons of CO₂ emissions in 2022, an increase of over 20% from 2021 (Aripiyanto et al., 2024; Q. Tang & Luo, 2011), there is still no robust legal framework mandating carbon disclosures (Ayostina et al., 2022; Wahyuningrum et al., 2024). While the Indonesian government has committed to ambitious emissions reduction targets and introduced the IDXCarbon exchange (IDX, 2023), corporate disclosures remain largely voluntary, leading to inconsistencies and selective reporting.

The lack of obligatory reporting standards is usually associated with biased disclosure, as companies can emphasize the positive environmental performance and ignore less positive information (Tadros et al., 2020). Consequently, policymakers are encouraged to come up with legal provisions that would promote more uniform, dependable, and comprehensive reporting in industries (Maharani et al., 2023).

3. METHODOLOGY

This study employs a quantitative, comparative, and cross-sectional research design to examine whether there is a statistically significant difference in the Carbon Emissions Disclosure Index (CEDI) between companies listed under the Consumer Discretionary and Consumer Staples sectors on the Colombo Stock Exchange (CSE) in Sri Lanka. The design facilitates objective measurement and sector-wise comparison through the analysis of systematically collected secondary data.

A random sampling method was used to take a sample of 48 companies out of a population of 109 listed firms under the two sectors as of October 30, 2024, thus increasing the representativeness and the generalizability of the findings. Random sampling is reputed to be suitable in this research study since every firm in the identified population has an equal chance of being selected and thus selection bias is limited, and the sample is more representative. Despite the limited focus of the analysis to two sectors, the sectors have firms of different characteristics regarding their size, complexity of operations and disclosure practices. Based on this, random

sampling will ensure the unbiased and balanced selection of firms, which will further allow making more reliable and generalizable inferences in the framework of the study.

The annual reports of the chosen companies in the financial year 2023/2024 were used to obtain the data used in the analysis. The Carbon Emission Disclosure Index (CEDI) is the main variable of interest which was developed with a 18-item checklist based on the previous authors (Hapsari and Hardiyanti, 2024; Choi et al., 2013; Manurung et al., 2022) and the Global Reporting Initiative (GRI) Standards. The scoring system was based on binary coding system wherein a score of 1 was placed when a particular disclosure was found and 0 when it was not found. Each company was then given an overall score that was then divided by 18 giving the CEDI value between 0 and 1 and this indicates the degree of disclosure. A binary scoring method increases the objectivity, consistency, and replicability of measurement because subjectivity is removed on how deeply or the quality of disclosure. This makes sure that the index reflects presence of disclosure in a standard and transparent way among all firms. The hypotheses in the study were the following:

- **H₀** There is no significant difference in the Carbon Emissions Disclosure Index between listed companies in the Consumer Discretionary and Consumer Staples sectors in Sri Lanka.
- **H₁** There is a significant difference in the Carbon Emissions Disclosure Index between listed companies in the Consumer Discretionary and Consumer Staples sectors in Sri Lanka.

Prior to selecting the appropriate statistical test, the normality of the data was assessed using the Shapiro-Wilk and Kolmogorov-Smirnov tests, along with visual inspections of histograms and Q-Q plots. If the data were normally distributed, an independent samples t-test was employed; otherwise, the non-parametric Mann-Whitney U test was used to compare the two independent groups. These methodological choices ensure that the statistical analysis is aligned with the distributional properties of the data, thereby supporting the validity and reliability of the findings.

4. RESULTS

4.1 Normality test

Table 1. Tests of Normality for Carbon Emissions Disclosure Index in Consumer Discretionary and Consumer Staples Sectors

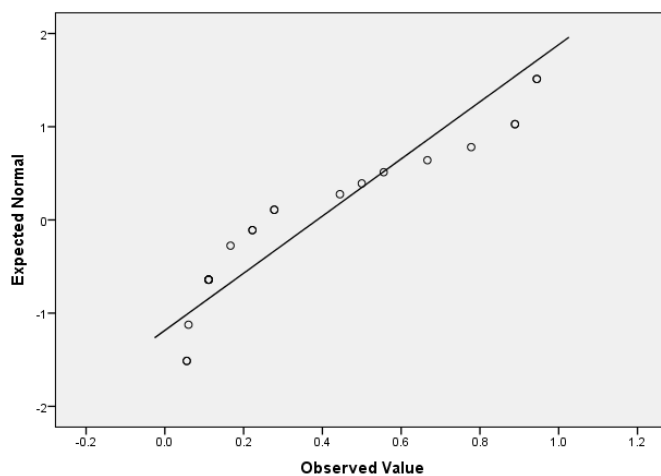
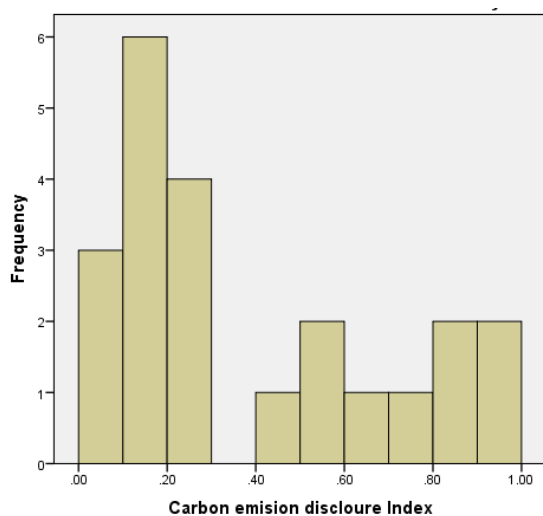
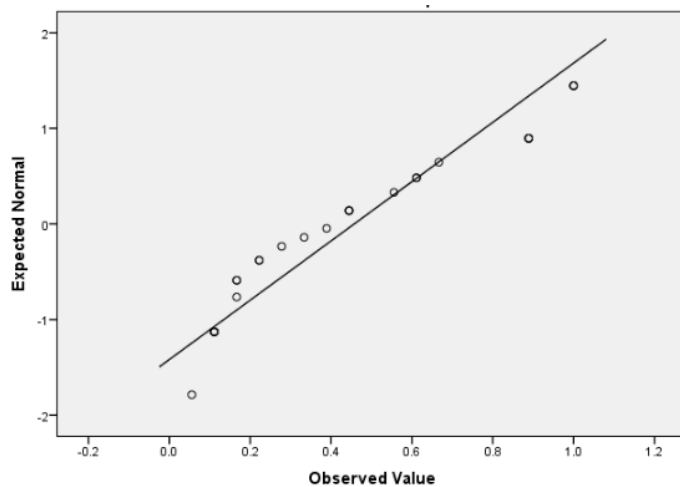
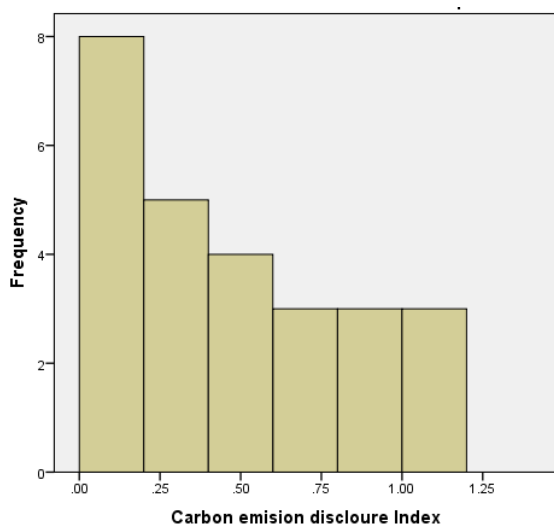
Sectors		Kolmogorov-Smirnov ^a			Shapiro-Wilk			Skewness	Kurtosis
		Statistic	df	Sig.	Statistic	df	Sig.		
CE DI	Consumer Discretionary	0.22	22	0.01	0.84	22	0.00	0.69	-1.13
	Consumer Staples	0.13	26	0.20	0.90	26	0.01	.367	-1.20

Source: Constructed by Authors

The research aims to determine if there is a significant difference in the CEDI between listed companies in the Consumer Discretionary and Consumer Staples sectors in Sri Lanka. The dependent variable, CEDI, is measured on a ratio scale, representing a continuous numerical value, while the independent variable, sector (Consumer Discretionary vs. Consumer Staples), is measured on a nominal scale, classifying companies into two mutually exclusive groups.

Table-1 presents the results of the Shapiro-Wilk and Kolmogorov-Smirnov tests, along with skewness and kurtosis values, to assess the normality of the CEDI for the Consumer Discretionary and Consumer Staples sectors. Before conducting the statistical analysis, assumptions of normality were tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests. The results indicated that the data for both sectors (Consumer Discretionary - Kolmogorov-Smirnov tests $Sta=0.22$, $P<0.05$; Shapiro-Wilk $Sta =0.84$, $P <0.05$) (Consumer Staples - Shapiro-Wilk $Sta =0.90$, $P <0.05$) deviated significantly from normality. The skewness for the Consumer Discretionary sector was 0.69 indicating moderate positive skewness. Both sectors exhibited negative kurtosis values, with the Consumer Discretionary sector at -1.13 and the Consumer Staples sector at -1.20, suggesting that the data distributions are platykurtic, with lighter tails than a normal distribution.

The Q-Q plots for the Consumer Discretionary and Consumer Staples sectors reveal that the data points deviate significantly from the diagonal line. This suggests that the CEDI scores for these sectors do not follow a normal distribution. Furthermore, the histograms for both sectors confirm this observation, showing patterns inconsistent with normality. These visual findings are consistent with previous normality tests, reinforcing the conclusion that nonparametric analysis methods are more appropriate for analyzing the CEDI scores in these sectors. Attempts to transform the data using logarithmic and square root transformations did not resolve the non-normality, which further supports the use of a nonparametric test.



Source: Constructed by Authors

Figure 1: Histogram and Q-Q Plot

Table 2. Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
0.08	1.00	46.00	0.78

Source: Constructed by Authors

Levene's test for the Carbon Emission Disclosure Index yields a p-value of 0.78, indicating no significant difference in variances across groups, thereby satisfying the assumption of homogeneity of variances. However, given the violation of the normality assumption, it is advisable to employ non-parametric alternatives, such as the Mann-Whitney U test, to address Research Question One. The use of this test is supported by numerous studies (Field, 2013), which advocate for non-parametric tests when normality or homogeneity of variance assumptions are violated. Utilizing the Mann-Whitney U test ensures the robustness and validity of the results despite the normality violation.

4.2 Mann-Whitney U test

Table 3. Mann-Whitney U Test Results for CEDI Between Consumer Discretionary and Consumer Staples Sectors

Sector Classification	N	Mean Rank	Sum of Ranks	U	Z	Asymp. Sig. (2-tailed)
Consumer Discretionary	22	22.34	491.5	238.5	-0.99	0.32
Consumer Staples	26	26.33	684.5			
Total	48					

Source: Constructed by Authors

To assess whether there is a significant difference in the CEDI between listed companies in the Consumer Discretionary and Consumer Staples sectors in Sri Lanka, a Mann-Whitney U test was conducted. The results of this analysis are presented in Table 3.

The results of the Mann-Whitney U test showed that the Consumer Discretionary sector had a mean rank of 22.34 (sum of ranks = 491.50), while the Consumer Staples sector had a higher mean rank of 26.33 (sum of ranks = 684.50). Table 03 shows that the asymptotic significance (p-value= 0.32) is (U statistic =238.50, Z test statistic = -0.99), exceeding the conventional threshold of 0.05, indicating no statistically significant difference between the groups. This indicates that there is no statistically significant difference in the CEDI scores between the two sectors.

Therefore, based on the Mann-Whitney U test, fail to reject the null hypothesis, which suggests that there is no significant difference in the carbon emissions disclosure between the Consumer Discretionary and Consumer Staples sectors in Sri Lanka.

This suggests that sector classification does not significantly influence the extent of carbon emissions disclosure in Sri Lanka.

5. DISCUSSION

The results of the Mann-Whitney U test indicate that there is no statistically significant difference in carbon emissions disclosure levels between Consumer Discretionary and Consumer Staples companies listed on the Colombo Stock Exchange. This suggests that, despite the distinct operational characteristics and environmental impacts of the two sectors, their approach to carbon emissions disclosure is relatively similar.

This finding may reflect a broader pattern within the Sri Lankan corporate landscape, where carbon disclosure practices are not yet deeply differentiated by industry type. One possible reason for this could be the absence of mandatory disclosure regulations, which leave companies with considerable discretion over what, how, and whether to disclose carbon-related information. Without clear legal requirements or strong incentives, firms across sectors may adopt similar, often minimalistic, reporting practices.

This result can be compared with the existing literature that indicates that the differences in carbon disclosure in the industry are not necessarily meaningful in voluntary reporting conditions. Luo and Tang (2016) discover that national level variables, culture, affect disclosure practices more than industry membership. In a similar vein, Mateo-Márquez et al. (2020) show that regulatory context has a significant influence on carbon disclosure, frequently contributing to the similarity of the practices across industries in weak regulatory settings. Contrarily, there is research that indicates sectoral variation; such as Choi et al. (2013) do where firm characteristics including size and visibility, as opposed to industry type per se, play a significant role in determining disclosure levels. Moreover, Depoers et al. (2016) emphasize that companies can use the same voluntary disclosure strategies irrespective of the industry because of the stakeholder pressure, whereas Hsueh (2022) argues that a company in a consumer-oriented industry can follow the symbolic carbon disclosures. Hence, the fact that no substantial differences are found between Consumer Discretionary and Consumer Staples industries in the present research is congruent with the findings that institutional and firm-specific influences usually prevail above industry effects in the voluntary disclosure settings.

Institutionally, this result indicates the role of regulatory and governance environments in determining the behavior of corporate disclosure. In the developing economies like Sri Lanka where the environmental reporting systems are not yet established, companies might react to the broad-based institutional pressure instead of environmental hazards within the industry. This leads to a comparatively homogenized disclosure pattern in industries.

Moreover, lack of major sectoral differences can reflect on the fact that carbon emissions disclosure remains in the development phase where companies are more interested in symbolic compliance rather than real disclosure. The finding is relevant

to the overall body of literature because it indicates that sectoral specifics may not be enough to characterize the differences in disclosure practices in environments where regulation is not enforced.

6. CONCLUSION

This paper aimed to test the hypothesis of the existence of statistically significant difference in the Carbon Emissions Disclosure Index (CEDI) between the companies in the Consumer Discretionary and Consumer Staples groups listed on Colombo Stock Exchange in Sri Lanka. Based on the cross-sectional, quantitative research design and the Mann-Whitney U test, which is suitable because of the non-normality of the data, the analysis did not find a statistically significant difference between the CEDI scores of the two sectors ($p = 0.32$).

Despite the fact that sectoral disparities in production processes, supply chain structures, and sources of emissions may imply the possible variations in disclosure practices, the findings show a comparatively homogenous trend of carbon emissions disclosure between both sectors. This consistency can be considered to be due to the presence of similar institutional, regulatory and stakeholder pressures on the listed firms in Sri Lanka regardless of their industrial sector. In this regard, the null hypothesis (H_0), which argues that the difference in carbon emissions disclosure between the Consumer Discretionary and Consumer Staples sectors does not significantly exist, is not rejected. These results suggest that the level of carbon emissions disclosure in the Sri Lankan context does not have a strong impact by sectoral affiliation in the case of listed companies.

The paper adds to the little literature on the topic of environmental reporting in the developing economies because it provides an empirical evidence on the topic in a sectoral approach in Sri Lanka. Since the country has pledged a 14.5% decrease in emissions by 2030 according to the UNDP Climate Promise, the results indicate that more detailed regulations should be introduced to improve the quality of disclosure and uniformity in all industries.

Despite these contributions, this study has some limitations. The two areas of analysis in the Colombo Stock Exchange are also restricted, and this might not be generalizable to other industries. This narrow range, however, was deliberately chosen in order to enable a deeper and more controlled comparison of the sectors that have unique environmental features. As well, the 48 sample firms were identified by their access to and disclosure of disclosure data in annual reports in the 2023/2024 financial year. Any company that had incomplete or inconsistent disclosures was

locked out to assure reliability and comparability of data. Although this might decrease the sample size, it would contribute to the overall quality and strength of the analysis because it is based on consistent and verifiable data.

It is recommended that future studies be extended to capture a broader range to include more industries and time series data to enhance the generalizability of the research and give a more detailed understanding of the nature of carbon disclosures. Furthermore, the combination of qualitative measures of the quality of disclosures and the firm level determinants would also enhance the knowledge in the field.

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APPENDIX. - CARBON EMISSION DISCLOSURE CHECKLIST

Category	Disclosure Item
1. Climate Change: Risks & Opportunities	Assessment/description of risks (regulatory, physical, or general) related to climate change and actions to manage them
	Assessment/description of financial and business implications and opportunities related to climate change
2. GHG Emissions Accounting	Description of methodology used to calculate GHG emissions (e.g., GHG Protocol, ISO)
	External verification of GHG emissions (including verifier and basis)
	Total GHG emissions disclosed (metric tonnes CO ₂ -e)
	Disclosure of emissions by scope (Scope 1, Scope 2, Scope 3)
	Disclosure of emissions by source (e.g., coal, electricity)
	Disclosure of emissions by facility or segment
3. Energy Consumption Accounting	Comparison of emissions with previous years
	Total energy consumption disclosed
	Energy consumption from renewable sources
4. GHG Reduction & Cost	Energy consumption disclosure by type, facility, or segment
	Plans or strategies to reduce GHG emissions
	Specific emission reduction targets and target year
	Emission reductions achieved and related costs/savings
	Consideration of future emission costs in capital expenditure planning
5. Carbon Emission Accountability	Identification of responsible board committee or executive body
	Mechanism for reviewing climate change performance/progress