THE ROLE OF ENERGY COMPANIES IN ACHIEVE NET ZERO EMISSIONS IN INDONESIA BASED ON SUSTAINABILITY DISCLOSURES PERIOD 2020 – 2022

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Abstrak

This study aims to analyze the contribution of energy companies listed on the IDX in efforts to achieve zero carbon emissions through disclosure of sustainable reports. The object of this study is energy companies listed on the IDX for the period 2020-2022. The research sample was determined based on purposive sampling. The data used were financial reports and sustainability reports published on the IDX and the company's website. The total data was 195 financial reports and sustainability reports from 65 companies for 3 years. The data analysis method in this study is content analysis and statistical analysis. Sustainability disclosure is measured based on 6 indicators; climate change, greenhouse gas emission accounting, energy consumption accounting, efficiency and cost of greenhouse gas reduction, carbon emission accounting, and greenhouse gas prevention efforts. Content analysis is carried out by providing a dummy measurement scale from 0 - 6, based on the description of sustainability disclosure. The results of the study found that in general, sustainable disclosure from 2020 - 2022 increased, but was still low, as indicated by an average score of 1-2. This shows that most companies disclose qualitatively and quantitative data, but have not disclosed progress on the form of tables or graphs, as well as strategies and efforts to prevent carbon emissions from their business activities in the future.Companies are increasingly compliant in sustainability disclosures as indicated by an increase in the quality of disclosures in sustainability reports, although it has not yet reached a maximum score of 6. Based on the difference test, it was found that there was a difference in the quality of disclosures from year to year (2020-2021): CC, EC, RC, and (2021-2022): CC, CHG, EC, RC. Meanwhile, it was also found that there was no difference in the quality of disclosures (2020-2021): CHG, ACC, MTG), and (2021-2022): ACC, MTG.

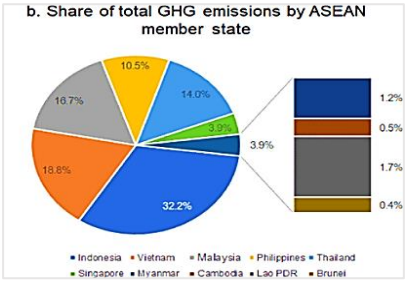
Keywords: *Sustainability, Carbon Emissions, Energy, Compliance*

I. INTRODUCTION

Global warming is currently a hot issue and an important concern for the whole world. Global warming causes various problems, from public health problems and death (Bush et al., 2011).The impacts of climate change include warming temperatures, changes in rainfall, increasing the frequency and intensity of some extreme weather events, and rising sea levels. Impacts vary depending on where a person lives, how sensitive they are to health risks, how exposed they are to the effects of climate change, and how well they and their community can adapt to the changes (Kjellstrom & McMichael, 2013; Majra & Gur, 2009). This research generally aims to analyze the commitment of the energy company sector (IDXENERGY) which is listed on the Indonesia Stock Exchange in order to support net zero emission which is Researchndonesia's commitment 2060.

This research was conducted because of the agreement of world leaders (2015) to realize the Sustainable Development Goals (SDGs), a blueprint for achieving global prosperity in 2030. In line with these SDGs, Indonesia (2022) has confirmed its commitment to reducing greenhouse gas (GHG) emissions by 29%. One of the strategies is to increase the use of renewable

energy in the national energy mix, and is targeting an increase from 5% in 2010 to 23% in 2025 and 25% in 2030 ((IEA), 2022),(Ministry of Finance, 2022)



Source: ASEAN electricity generation mix and Greenhouse Gases (GHG) emissions shares in 2020

Figure 1.1. Share of Total GHG emission by ASEAN

Comparing the ASEAN member states, the five largest contributors of GHG emissions were Indonesia (32.2%), Vietnam (18.8%), Malaysia (16.7%), Thailand (14%), and The Philippines (10.5%). The other five countries only accounted for less than 8% of the ASEAN power sector emissions in 2020, with Brunei being the smallest contributor.

The company is one of the contributors to environmental damage, carbon emissions (electricity, transportation, manufacturing), water and soil pollution, waste, and deforestation, if not managed properly (Welbeck, 2017; Kwame Ameyaw Domfesh, 2012; Gaskin et al., 2003). Previous research has mostly focused on the effect of social responsibility disclosure on the interests of stakeholders, such as; management, shareholders, lenders and other parties who focus on investment risk (Wasara & Ganda, 2019), increase profitability (Kuzey & Uyar, 2017), and influence on corporate value (Kamaliah, 2020; Sreepriya et al., 2023).

Meanwhile, other studies have found that Corporate Social Disclosure (CSD) is intended to create "to create positive image", to "act accountability" and to "comply with stakeholders' needs" (Gunawan, 2007), increase brand image with consumers. (Blomback & Scandelius, 2013; Serafeim, 2011)

The purpose of this study is to find out how far the disclosure of carbon emissions by energy companies (IDXENERGY) listed on the Indonesia Stock Exchange is going between 2020 and 2022. This article provides the latest information and explanations about reporting carbon emissions in Indonesia. This article also describes several variables and items for disclosing carbon emissions that are used to determine the extent to which companies disclose carbon emissions based on their items.

The results of this study are expected to provide input to the government as a regulator to formulate policies related to the disclosure of carbon emissions in companies. In addition, the results of this study are expected to provide stakeholders with an understanding of the company's commitment to disclosing carbon emissions for sustainability, especially energy sector companies.

II. THEORETICAL REVIEW

2.1. Legitimacy Theory

The definition of legitimacy (Suchman, 1995; McInnes, 2019) is a general view of the

assumption that the actions of an entity are desirable on paper or according to some norms, values, beliefs, and definitions of a socially constructed system. Deegan (2002), legitimacy theory, as a framework to understand external reporting behavior, is used extensively in the social and environmental accounting literature.

Legitimacy increase enhances both the stability and the comprehensibility of organizational activities, and stability and comprehensibility often enhance each other (Suchman, 1995). Legitimacy affects not only how people act toward organizations, but also how they understand them. Thus, audiences perceive legitimate organizations are not only more viable, but also as more meaningful, more predictable, and more can be trusted.

Kuruppu et al., (2019), by integrating elements that are important to stakeholders into legitimacy theory, it can inform environmental management decision-making, when to take action, and provide external reports that receive a more positive response.

According to Deegan (2002), as an effort to legitimize aspects of organizational operations, motivating managers to report external information about the social and environmental performance of organizations. Transparant and reliable sustainability report will strengthen the company's legitimacy, by showing its seriousness in managing sustainability impacts. This can reduce or eliminate the distrust that stakeholders have of the organization's business practices or environment. Reports and activities related to social responsibility help management to maintain support from stakeholders by disclosing commitments and actions taken to fulfill social and environmental responsibilities.

2.2. Stakeholder Theory

According to Freeman (2010), Stakeholder theory is a theory that explains to whom a company is responsible. Stakeholder theory posits that a business organization needs to maintain good relations with all stakeholders, rather than merely with it's shareholders, and must satisfy their informational needs through sustainability reports (Reverte, 2009; Lourenço & Branco, 2013).

Interaction with stakeholders has an important role in the organization towards sustainability; and reciprocity in relation to the value proposition that creates sustainability (Fobbe & Hilletofth, 2021). How to maintain relationships with stakeholders and maintain the interests between management and stakeholders, publish sustainability reports (Hörisch et al., 2020)

2.3. Sustainability

Sustainability is a condition in which humans and nature, society and the biosphere, the world and the earth, live life together and maintain productive harmony, stability and resilience to support present and future generations (Sukaharsono & Andayani, 2021).Sustainability reports are not only in the form of a summary of the annual report, but are strategic in nature which are able to

provide information on sustainable performance that has been carried out, is being carried out and targets or commitments to efforts to maintain sustainability. So the company must have a plan regarding strategy and risk estimation to maintain the sustainability of the organization (Juniati Gunawan, 2015).

Business organizations have a great influence on the economy and life in general and almost all business decisions involve social and environmental issues. Regarding the concept of sustainability, it is time to change the organizational approach to achieve sustainable development goals (SDGs) and create a just and sustainable world for all. Economic factors cannot stand alone, social and environmental involvement determine economic success (Del-Aguila-Arcentales et al., 2022).

The challenge of globalization today is to meet the world's growing demand for capital and consumer goods, while ensuring the sustainability of human life in its social, environmental and economic dimensions. To overcome this challenge, industrial value creation must be oriented towards sustainability (Stock & Seliger, 2016). This situation is also a concern of research related to the supply chain (Koberg & Longoni, 2019; Zhao et al., 2017)

Population growth will correlate with increased demand, industries consume more resources to meet customer demand, resulting in increased pollution (Cassettari et al., 2017). Kroyer (1995) finding, the production process of the manufacturing industry is one of the significant contributors to carbon emission pollution. Sun et al., (2017) opinion agricultural emissions that substantially contribute to air pollution can occur at any stage along the food supply chain. This will affect crop growth and animal health and also shift the market balance of agricultural inputs and outputs in the food supply chain and thus indirectly affect food security.

Although firms contribute positively to economic growth, society continues to experience the negative consequences of their activities, such as degradation, pollution and disregard for employee health and safety.Therefore, it is appropriate for the company to be responsible for the environmental damage it causes, as stipulated in Indonesian regulations (UU No. 40, chapter 1 (3), chapter 66 (2c) 2007). Corporate activities regarding social responsibility are then disclosed and published in sustainability reporting.

III. METHODOLOGY

3.1. Sample and Data Collection

The research data is secondary data. Data collection is from annual financial reports and sustainability reports published by energy companies (IDXENERGY) listed on the Indonesia Stock Exchange, period 2020 – 2022. Data collection was obtained from websites of energy companies listed on the Indonesian stock exchange. The data in this study were 65 companies that had complete data and were used in this study. In this study,

there were 15 companies that did not have complete data. Sustainability report data and financial reports are 195.

3.2. Variable

This type of research is qualitative research. The research variable which is an independent variable is the disclosure content of the energy issuer's sustainable report (IDXENERGY). The method of data analysis in this research is content analysis, with quantity and quality measurements. Analysis of the content of sustainability disclosures in this study, includes content regarding: roadmaps, strategies and policies disclosed by the company, both those that have been realized and those that will be realized.

Figure of research framework as following :

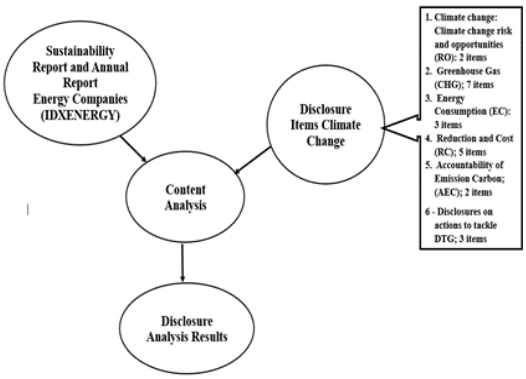


Figure 3.1. Frame Research

3.3. Measurement Variable

Measurements in this study related to content analysis refer to previous studies (Bae Choi et al., 2013), in collaboration with research (Borghei-Ghomi & Leung, 2013; Wiseman, 1982) sustainability disclosure measurement consists of 6 categories;

Table 3.1. Operational Variable

Climate change: risks and opportunities	CC1 – assessment/description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks
	CC2 – assessment/description of current (and future) financial implications, business implications and opportunities of climate change
GHG emissions accounting	GHG1 – description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO)
	GHG2 – existence external verification of quantity of GHG emission– if so by whom and on what basis
	GHG3 – total GHG emissions – metric tonnes CO2-e emitted
	GHG4 – disclosure of Scopes 1 and 2, or Scope 3 direct GHG emissions
	GHG5 – disclosure of GHG emissions by sources (e.g. coal, electricity, etc.)
	GHG6 – disclosure of GHG emissions by facility or segment level
	GHG7 – comparison of GHG emissions with previous years
Energy consumption accounting	EC1 – total energy consumed (e.g. tera-joules or peta-joules)
	EC2 – quantification of energy used from renewable sources
	EC3 – disclosure by type, facility or segment
GHG reduction and cost	RC1 – detail of plans or strategies to reduce GHG emissions
	RC2 – specification of GHG emissions reduction target level and target year
	RC3 – emissions reductions and associated costs or savings achieved to date as a result of the reduction plan
	RC4 – cost of future emissions factored into capital expenditure planning
	Supply Chain Involvement (Zahra et all , 2013)
	ACC1 – indication of which board committee (or other

Carbon emission accountability	executive body) has overall responsibility for actions related to climate change
	ACC2 – description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change
Disclosures on actions to tackle GHG	Use of new technologies (Zahra et all , 2013)
	Use of renewable energy (Zahra et all , 2013)
	Recycling (Wiseman, 1982)

Based on these five categories, 22 specific items. Quality Factor Measurement Framework, as follows:

Table 3.2. A framework of Quality Factors Measurement

Deskrision Content	Level
Not disclose / do not publish	0
Disclose in the form of a description / qualitative but not detailed	1
Disclose qualitative and quantitative (many activities)	2
Disclose qualitative, quantitative, many activities, monetary, picture, grafik, table	3

3.4. Research Analysis Method

The data analysis method in this research will be carried out in the following process :

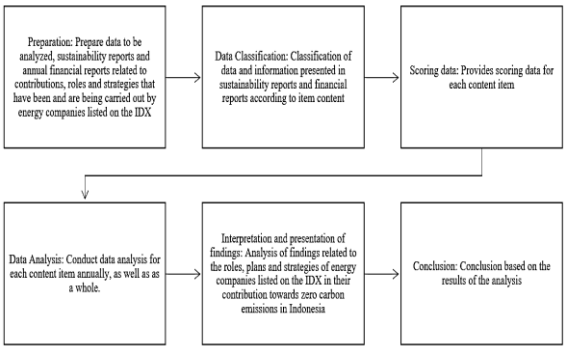


Figure 3.2. Data Analysis Processing

IV. ANALYSIS AND DISCUSSION

4.1. Descriptive Statistict

Based on the carbon emission disclosure data that has been given a score from 2020 to 2022, the following descriptive statistics can be presented :

Table 4.1. Descriptive Statistict

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
CC1	195	0	2	214	1.10	.413
CC2	195	0	3	153	.78	.736
CGH1	195	0	3	112	.57	.872
CGH2	195	0	3	89	.46	.747
CGH3	195	0	3	117	.60	.864
CGH4	195	0	3	91	.47	.741
CGH5	195	0	2	89	.46	.712
EC1	194	0	2	72	.37	.616
EC2	195	0	3	83	.43	.724
EC3	194	0	3	281	1.45	.808
RC1	195	0	2	158	.81	.746
RC2	195	0	3	374	1.92	.480
RC3	195	0	3	98	.50	.769
RC4	195	0	3	90	.46	.705
RC5	195	0	3	97	.50	.706
ACC1	195	0	2	82	.42	.687
ACC2	195	0	3	204	1.05	.814
DTG1	195	0	2	88	.45	.585
DTG2	193	0	2	81	.42	.554
DTG3	195	0	2	183	.94	.562

Source: SPSS Output

4.2.Content Analysis of Carbon Emission Disclosures from 2020 to 2022 Based on 6 Measurement Categories.

1. Content Analysis of Risk Disclosures Related to Climate Change and Actions Taken or Will Be Taken to Manage Risks.

Based on the content analysis, the results are presented as follows:

Table 4.2. Assessment of Content Analysis of The Risks Relating to Climate Change and Actions Taken or to be Taken to Manage The Risks

Inf. Disajikan berdasarkan Score	2020				2021				2022			
	CC1		CC2		CC1		CC2		CC1		CC2	
	Jml	%	Jml	%	Jml	%	Jml	%	Jml	%	Jml	%
0	3	4,6	31	47,7	3	4,6	30	46,2	2	3,1	14	21,5
1	55	84,6	23	35,4	54	83,1	27	41,5	51	78,5	40	61,5
2	7	10,8	10	15,4	8	12,3	7	10,8	12	18,5	10	15,4
3	0	0,0	1	1,5	0	0,0	1	1,5	0	0,0	1	1,5
Jumlah	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the table and output above the assessment/description of risk items (regulatory, physical or general) related to climate change and the actions taken or will be taken to manage the risk, of 65 companies 195 data, for CC1 disclosures from 2020 to 2022, the majority of the scores are 1, meaning that several companies disclose information in the form of qualitative descriptions, without

providing quantitative data in the form of images, graphs and monetary values still dominate. While most of the CC2 disclosures are at a score of zero (0), this explains that the company does not disclose information or no information is disclosed at all by the company. Even so, several companies are at a score of 2, meaning that several companies have disclosed their information, even from 2020 to 2022 they have increased. This process has increased from year to year, this shows that company awareness is increasing in continuing information disclosure. This means that the contribution of companies related to reducing carbon emissions towards zero carbon is increasing. However, no company fully discloses the information reported in its sustainability report or financial report.

If a company does not fully disclose risk information related to climate change, several negative impacts may arise, both for the company itself and for other stakeholders. These impacts include:

a. Financial Loss: When companies do not disclose risks related to climate change, investors and other stakeholders will not have sufficient understanding of the potential losses that may occur due to climate change impacts. This can lead to an erroneous assessment of the value of the company and have a negative impact on the company's share price and access to funding.
b. Operational Disruption: Climate change can have an impact on a company's operations, such as damage to infrastructure, delays in the supply of raw materials, or disruptions in the supply chain. If companies do not disclose these risks, they may not prepare the necessary mitigation strategies to deal with these challenges, and this can disrupt the smooth running of the company's operations.
c. Lawsuits: If companies do not disclose climate change risk information, they may be subject to lawsuits from stakeholders who feel aggrieved. This is especially true if the company's actions or decisions are suspected to be contrary to the interests of stakeholders or if the company is deemed not to have met appropriate disclosure obligations.
d. Bad Reputation: When companies are not transparent in disclosing climate change risks, this can damage the company's reputation in the eyes of consumers, investors, and society in general. Lack of corporate responsibility towards environmental issues and climate change can create a negative image that is difficult to repair and impacts relationships with customers, business partners and the wider community.
e. Regulatory Non-compliance: Many countries and jurisdictions have regulations and requirements that require companies to disclose environmental risks, including risks related to climate change. If companies do not comply with this obligation, they may face legal, fine or administrative sanctions.

The low level of information disclosed regarding the participation of energy companies as the object of this research in handling carbon emissions illustrates that the company's commitment to achieving zero carbon emissions which is the government's commitment has not yet received full support from energy companies, especially the actions taken or will be taken to manage the risk of carbon emissions in the company.

2. Content Analysis of The Methodology Use to Calculate GHG Emission.

Based on the content analysis, the results are presented as follows:

Table 4.3. Assessment of Content Analysis of The Methodology used to Calculate GHG Emissions

Methodologies for calculating GHG Emissions	2020							2021							2022						
	GHG1	GHG2	GHG3	GHG4	GHG5	GHG6	GHG7	GHG1	GHG2	GHG3	GHG4	GHG5	GHG6	GHG7	GHG1	GHG2	GHG3	GHG4	GHG5	GHG6	GHG7
	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %	Jml. %
0	49	52	80,8	48	73,8	51	78,5	49	75,4	51	78,5	50	76,9	44	67,7	47	72,3	46	70,8	47	72,3	50	76,9	39	60,0	47	72,3	54	83,1	46	70,8	52	80,0	46	70,8
1	6	5	7,7	6	9,2	8	12,3	5	7,7	9	13,8	8	12,3	10	15,4	9	13,8	7	10,8	11	16,9	10	15,4	12	18,5	8	12,3	5	7,7	9	13,8	6	9,2	10	15,4
2	7	7	10,8	10	15,4	5	7,7	7	10,8	4	6,2	6	9,2	8	12,3	8	12,3	12	18,5	7	10,8	8	12,3	9	13,8	6	9,2	8	12,3	6	9,2	5	7,7	7	10,8
3	3	1	1,5	1	1,5	1	1,5	0	0,0	0	0,0	1	1,5	3	4,6	1	1,5	1	1,5	1	1,5	0	0,0	0	0,0	1	1,5	3	4,6	1	1,5	2	3,1	1	1,5
	65	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the data above, it shows that of the 65 companies and 195 data, most are on a score of zero from 2020 to 2022. This illustrates that most companies have not disclosed in their sustainability reports the method used to calculate carbon emissions. Although there are several companies that have started to disclose qualitative information, or are at a score of 2, relatively few companies disclose carbon emission calculation methods in full. This shows that the company's motivation to disclose information in a transparent manner is still low regarding the method used to calculate and solve carbon emission problems in its business activities.

If a company does not disclose the method of calculating the carbon emissions they generate, this can have a number of negative impacts, both for the company itself and for other stakeholders, including:

a. Lack of transparency: By not disclosing the method of calculating carbon emissions, companies lose transparency in their efforts to reduce their environmental impact. This can reduce the trust of consumers, investors and the general public in the company.
b. Difficult to compare and measure progress: Without a clear accounting method, it is difficult for companies to compare their emissions to industry standards or assess their progress in reducing emissions. This can hinder companies' efforts to set ambitious emission reduction targets and monitor their progress.
c. Reputation risk: In an era of increasing awareness of environmental issues, the lack of transparency around carbon emissions can expose companies to serious reputational risk. Environmentally concerned consumers may turn to other companies that are more transparent and responsible when it comes to carbon emissions.
d. Regulations and potential penalties: In many countries, regulations regarding carbon emissions are becoming more stringent. If companies cannot prove that

they are correctly calculating and reducing their emissions, they may be subject to sanctions or penalties imposed by governments or regulatory agencies.

e. Missing business opportunities: Many customers and business partners today seek partnerships with companies that care about the environment and are committed to reducing carbon emissions. By not disclosing the method of calculating emissions, companies may lose business opportunities with parties who prioritize environmental responsibility.

It is therefore important for companies to disclose their method of calculating carbon emissions in order to build trust, monitor progress and maintain their reputation. Transparency and environmental responsibility are being increasingly valued in today's business world, and companies that don't follow suit could face disastrous consequences.

3. Content Analysis Energy Consumtion Accounting

Based on the content analysis, the results are presented as follows:

Table 4.4. Assessment of Content Analysis of Energy Consumption Accounting

Ref. Disajikan berdasarkan Score	2020						2021						2022					
	EC1		EC2		EC3		EC1		EC2		EC3		EC1		EC2		EC3	
	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%
0	12	18.5	29	44.6	1	1.5	11	16.9	26	40.0	1	1.5	9	13.8	21	32.3	0	0.0
1	19	29.2	25	38.5	9	13.8	18	27.7	27	41.5	8	12.3	16	24.6	29	44.6	8	12.3
2	31	47.7	11	16.9	52	80.0	34	52.3	12	18.5	53	81.5	37	56.9	15	23.1	50	76.9
3	3	4.6	0	0.0	3	4.6	2	3.1	0	0.0	3	4.6	3	4.6	0	0.0	7	10.8
	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the table above, it shows that of the 65 companies and 195 data, during the period 2020 to 2022, most disclose information related to recording the use of carbon emissions at a score of 2 and tends to increase. This explains that the company has provided qualitative and quantitative information even though it is still in the form of a number of activities, but this shows a positive thing, that there is a company motivation to disclose this information to the public. Although there are still some companies that only disclose qualitatively and there are also companies that do not disclose it. However, several companies have also fully disclosed, both qualitatively, quantitative data and monetary values recorded in the report.

Basically, disclosure related to recording the cost of handling carbon emissions in a company through a sustainability report will have several benefits. These benefits include:

a. Increase transparency and accountability: By disclosing the cost of carbon emissions, companies demonstrate their commitment to transparency and accountability in their efforts to reduce their environmental impact. This helps build trust with stakeholders such as consumers, investors, governments and the general public.

b. Motivate emission reductions: By disclosing the cost of carbon emissions, companies can make themselves aware of the financial impact their emissions have. This can motivate companies to adopt more sustainable and energy efficient business practices to reduce costs associated with carbon emissions.

c. Enhance competitive advantage: Companies that actively disclose the costs

of carbon emissions and take steps to reduce them can gain a competitive advantage in a market that is increasingly concerned about environmental issues. Consumers and business partners who prefer environmentally responsible entities may choose such companies as business partners or customers.

d. Improve brand image and attractiveness: In an increasingly environmentally conscious business environment, companies that publicly disclose the cost of carbon emissions can gain a better image as a company that is responsible and cares about the environment. This can enhance a company's brand appeal and give it an edge in winning customer support and loyalty.
e. Compliance with regulations and policies: In many countries, regulations regarding carbon emissions are becoming more stringent. By disclosing the cost of carbon emissions, companies can meet existing regulatory requirements and prepare for potentially more stringent regulations in the future.

Overall, by disclosing the cost of carbon emissions, companies can play a more proactive role in protecting the environment, building trust, increasing operational efficiency, and gaining a competitive advantage in a market that is increasingly concerned about environmental issues.

4. Content Analisys of GHG Reduction and Cost

Based on the content analysis, the results are presented as follows:

Table 4.5. Assessment of Content Analysis of GHG Reduction and Cost

Inf. Disajikan berdasarkan Score	2020										2021										2022									
	RC1		RC2		RC3		RC4		RC5		RC1		RC2		RC3		RC4		RC5		RC1		RC2		RC3		RC4		RC5	
	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%
0	51	78,5	52	80,0	49	75,4	52	80,0	20	30,8	44	67,7	44	67,7	40	61,5	47	72,3	19	29,2	32	49,2	32	49,2	31	46,2	36	55,4	15	23,1
1	6	9,2	6	9,2	10	15,4	7	10,8	30	46,2	11	16,9	13	20,0	19	29,2	10	15,4	24	36,9	24	36,9	26	40,0	29	44,6	21	32,3	30	46,2
2	7	10,8	6	9,2	5	7,7	6	9,2	13	20,0	9	13,8	8	12,3	5	7,7	8	12,3	20	30,8	8	12,3	7	10,8	5	7,7	8	12,3	18	27,7
3	1	1,5	1	1,5	1	1,5	0	0,0	2	3,1	1	1,5	0	0,0	1	1,5	0	0,0	2	3,1	1	1,5	0	0,0	1	1,5	0	0,0	2	3,1
	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the table above on the GHG reduction and cost items, from 65 companies, for disclosures RC1 to RC 4 which include strategies, targets, emission and cost reductions as well as capital expenditure planning calculations from 2020 to 2022, most of them have a score of zero (0), which means that some companies do not disclose information regarding strategies, targets, emission reductions and costs as well as details of capital expenditure calculations.

While the disclosure of RC5 which is the involvement of the supply chain is mostly at a score of one (1), this explains that some companies disclose information related to the involvement of the supply chain in the form of qualitative descriptions, without providing quantitative data in the form of images, graphs and monetary values still dominate. From these results it can be seen that the percentage from year to year has increased, this shows that the company's awareness is increasing in disclosing sustainable information. This means that the company's contribution related to reducing carbon emissions towards zero carbon is increasing. The still low level of information disclosed regarding the role of energy companies that are the objects of this study in handling carbon emissions provides

an illustration that the company's commitment to efforts towards zero carbon emissions which is the government's commitment has not received full support from energy companies, especially actions taken or to be taken to manage carbon emission risks in their companies.

5. Content Analysis of Carbon Emission Accountability

Based on the content analysis, the results are presented as follows:

Table 4.6. Assessment of Content Analysis of Carbon Emission Accountability

Disajikan berdasarkan Sc	2020				2021				2022			
	ACC1		ACC2		ACC1		ACC2		ACC1		ACC2	
	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%
0	44	67,7	44	67,7	38	58,5	41	63,1	34	52,3	34	52,3
1	16	24,6	17	26,2	25	38,5	23	35,4	29	44,6	29	44,6
2	5	7,7	4	6,2	2	3,1	1	1,5	2	3,1	2	3,1
3	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0
	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the table above on the carbon emission accountability item, out of 65 companies, for the disclosure of ACC1 which is an indication that the board committee has responsibility for Actions related to climate change from 2020 to 2022, most of them have a score of 0, which means that some companies do not disclose information related to indications that the board committee or other executive board have responsibility for actions related to climate change.

While the ACC2 disclosure, which is a description of the mechanism by which the board or other executive body reviews the company's progress related to climate change, is also mostly at a score of zero (0), this explains that the company is also not disclosing information related to the company's progress related to climate change.

However, from the results it can be seen that the percentage from year to year has increased, this shows that the company's awareness is increasing in disclosing sustainable information. This means that the company's contribution related to reducing carbon emissions towards zero carbon is increasing. The still low level of information disclosed regarding the role of energy companies that are the objects of this study in handling carbon emissions provides an illustration that the company's commitment to efforts towards zero carbon emissions which is the government's commitment has not received full support from energy companies, especially actions taken or to be taken to manage carbon emission risks in their companies.

6. Content Analysis of Disclosureson Actions to Tackle GHG

Based on the content analysis, the results are presented as follows:

Tabel 4.7. Assessment of Content Analysis Disclosureson Actions to Tackle GHG

Inf. Disajikan berdasarkan Score	2020						2021						2022					
	DTG1		DTG2		DTG3		DTG1		DTG2		DTG3		DTG1		DTG2		DTG3	
	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%	JML	%
0	11	16,9	21	32,3	33	50,8	16	24,6	16	24,6	30	46,2	10	15,4	12	18,5	25	38,5
1	47	72,3	30	46,2	22	33,8	43	66,2	35	53,8	25	38,5	43	66,2	32	49,2	29	44,6
2	7	10,8	13	20,0	10	15,4	6	9,2	13	20,0	10	15,4	12	18,5	20	30,8	11	16,9
3	0	0,0	1	1,5	0	0,0	0	0,0	1	1,5	0	0,0	0	0,0	1	1,5	0	0,0
	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100	65	100

Source: Data Processing

Based on the table above on the carbon emission accountability item, from 65 companies, the disclosure of DTG1 which is the use of new technology from 2020 to 2022 is mostly at score two (2), which means that

some companies have disclosed information in the form of qualitative and quantitative descriptions in the form of images, graphs and monetary values still dominate those related to climate change.

Meanwhile, the disclosure of DTG2, which is the use of renewable energy related to climate change, is also mostly at a score of two (2), which means that some companies have disclosed information in the form of qualitative and quantitative descriptions in the form of pictures, graphs and monetary values which still dominate. with climate change.

In the DIG3 item which is partially related to recycling in 2020 and 2021 The largest score is zero (0), which explains that the company does not disclose information regarding recycling related to climate change. Meanwhile in 2022 there will be an increase with the majority being at score one (1), meaning that some companies disclose information related to recycling in the form of qualitative descriptions, without providing quantitative data in the form of images, graphs and monetary values still dominating.

Based on the results, it can be seen that the percentage has increased from year to year, this shows that company awareness is increasing in disclosing sustainable information. This means that the company's contribution to reducing carbon emissions towards zero carbon is increasing. The still low level of information disclosed regarding the role of energy companies that are the objects of this study in handling carbon emissions provides an illustration that the company's commitment to efforts towards zero carbon emissions which is the government's commitment has not received full support from energy companies, especially actions taken or to be taken to manage carbon emission risks in their companies.

V. CONCLUSION, CONTRIBUTION, AND LIMITATION

5.1. Conclusion

Based on the results of data analysis and discussion, the conclusions of this study are as follows:

1. The contribution of energy companies in Indonesia measured by 6 dimensions is still low, where the average disclosure quality value is at a score of 2, which means that some companies in disclosing carbon emission management in carrying out their business activities are still limited to qualitative disclosures and equipped with graphs or images, but have not disclosed quantitatively, either the costs used to manage carbon emissions or strategies to prevent carbon emission reduction.
2. The level of corporate compliance in disclosing carbon emissions is still relatively low. Based on 22 indicators used to measure the quality of disclosure, there are still companies that do not disclose in full with a score of zero.
3. Based on comparative analysis, it shows that from year to year, corporate awareness to improve the quality of carbon emission disclosure is increasing. This is indicated by the quality of disclosure in 2021 being

better than in 2020, while in 2022 it is better than in 2021.

5.2. Contribution

This research contributes to the development of literacy related to social responsibility and sustainability. In addition, it also contributes to regulators in determining policies as an effort to realize zero carbon emissions that have been planned. For companies, the results of this study can be used as an evaluation to improve compliance in managing carbon emissions from their business activities, as a form of social responsibility and responsibility to future generations**.**

5.3. Limitations

This study has limitations, related to the companies used are only energy companies, so that for further researchers can expand the scope of the company. In addition, further research can develop new dimensions and indicators to expand the measurement of disclosure quality, for example by adding aspects of carbon emission reduction disclosure by explaining the benefits obtained due to the efficiency of carbon emissions carried out.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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