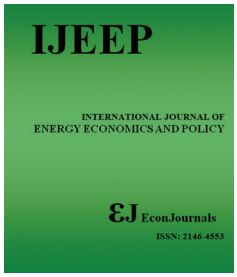

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2023, 13(2), 516-525.

Corporate Energy Management Disclosure : Empirical Evidence from Indonesia Stock Exchange

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Received: 12 December 2022 **Accepted:** 05 March 2023 **DOI:** https://doi.org/10.32479/ijeep.14059

ABSTRACT

Energy is one of the vital needs for humans. Indonesia as a developing country faces problems in ensuring the availability of energy. The aim of this research is to explore the development of practice energy management disclosure in accordance with GRI 302 (energy) in energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) through disclosures issued by each company. This study uses secondary data collected from reports published by energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) and can be accessed online. Data analysis was carried out using the data analysis model of Miles and Huberman (1992), namely data reduction, data presentation, drawing conclusions, and verification. The results of this study indicate that only thirty-six out of 74 energy subsector companies (49%) report energy management disclosure according to GRI 302 (energy) for three consecutive years (2020-2022). Nineteen out of thirty-six companies attach a GRI Index Reference to their GRI 302 (energy) reports. Meanwhile, the other thirty-eight companies did not attach the GRI Index Reference in their reports. The company is expected to develop a power plant that uses renewable energy as its energy source. By using renewable energy, companies can reduce consumption of non-renewable energy, and play a role in reducing CO2 emissions in the environment.

Keywords: Energy Management Disclosure, Energy Sub-Sector, Indonesia Stock Exchange (IDX), Management Energy
JEL Classifications: D21, G2, G4, H32, L2

1. INTRODUCTION

Energy consumption in Indonesia has increased every year. Population growth is a factor that affects the level of energy consumption (Karcher and Jochem, 2015). As it is known that the source of law for the exploitation of energy and minerals is Article 33 paragraph (2) and paragraph (3) of the 1945 Constitution, which stipulates: (2) Branches of production which are important for the state and which affect the livelihood of the people at large are controlled by the state. (3) Earth and water and the natural resources contained therein shall be controlled by the state and used for the greatest prosperity of the people. An organization can consume energy in many forms, such as fuel, electricity, heating, cooling, or steam. For some organizations, electricity is the only significant form of energy they consume. For others, energy resources such as steam or water supplied from district heating plants or cold water plants may also be important.

Consuming purchased electricity, heating, cooling, and steam contribute to an organization's energy indirect (Scope 2) GHG emissions, which are reported in Disclosure 305-2 in GRI 305: Emissions.

Energy can be self-generated or purchased from external sources and can come from renewable sources such as wind, water or diesel) or from non-renewable resources such as coal, petroleum or natural gas. The national energy demand is still dominated by the energy-intensive industrial sector, namely the manufacturing industry engaged in the food and beverage, paper and pulp, chemical fertilizers and rubber, cement and non-metallic, as well as iron and steel base metals (Secretariat General of the Energy Council). National, "Energy Outlook 2016," Jakarta, 2016). Center for Data and ESDM KESDM (2016), in the 2000 Information Technology 2015 period, energy consumption experienced an average annual increase of 2.6% barrels of oil) to 731.22 million BOE.

Based on its type, Indonesia's largest energy consumption is still dominated by natural oil, which is 42.7%, followed by electricity, natural gas, coal, LPG and biofuels (ESDM MEMR information and data center, 2016). The four main energy user sectors are the household, commercial, industrial and transportation sectors. The transportation sector is the largest energy user in Indonesia, namely 45.15%, followed by the industrial sector at 31.69%, the household sector at 15.09%, and the commercial sector at 5.21%.

To trigger companies to switch to using renewable energy, the government can provide subsidies for renewable energy. Energy is one of the biggest cost components for manufacturing companies, so with this renewable energy subsidy, companies will switch to renewable energy. Besides being cheap, renewable energy is easily available and environmentally friendly.

Therefore, efforts are needed to encourage effective and efficient use of energy. The Indonesian government has issued various policies related to energy efficiency measures, such as the Regulation of the Minister of Energy and Mineral Resources Number 14 of 2012 concerning Energy Management. This regulation stipulates that industries that use energy of more than 6000 tons of oil equivalent per year are required to implement an energy management system. ISO 50001: Energy Management, which is a standard used to manage energy performance both for efficiency and energy consumption with a plan, do, check, action cycle approach for continuous improvement (Pinero, 2019). Using energy more efficiently and choosing renewable energy sources are critical to combating climate change and reducing an organization's overall impact on the environment (Georgia Tech Research Corporation and U.S. Department of Energy.,2011).

Energy management can be a distinct competitive advantage for companies if it is implemented in a sustainable manner (Brunke et al., 2014). By implementing energy management companies can reduce energy consumption, energy costs, and CO_2 emission disposal. This study aims to identify energy management practices in the manufacturing sector industry. Alhadi (2015) said that the triple bottom line places a consistent and balanced focus on the economic, social and environmental values of the company. The triple bottom line has three main pillars namely planet, people and profit. Planet is a manifestation of the company's concern for nature and the surrounding environment. Supplies of non-renewable energy reserves, such as oil and coal, are running low (ESDM ESDM Data and Information Technology Center, 2016).

Based on data from the Secretariat General of the National Energy Council (2016), the rate of discovering reserves of oil production wells compared to oil production is at the level of 50%, which means that Indonesia produces more oil than finding reserves of oil production wells. In the future, the industrial sector's energy needs are expected to continue to increase and dominate the final energy demand, because the industrial sector is the driving force of the national economy. Secretariat general of the national energy council (2016), industrial energy needs are still dominated by energy-intensive industrial groups, namely manufacturing industries engaged in the food and beverage sector, pulp and paper, chemical fertilizers and rubber, cement and non-metals, as well as iron and base metals steel. In the second position there is a group of non-energy-intensive industries, namely industries engaged in the textile and leather goods sector, machine tools and transportation and other processing industries. Indonesia's energy problems are on two sides, namely on the supply side of non-renewable energy reserves which are dwindling and from the side of energy consumption which continues to increase along with increased community activity (Flynn et al.,1990).

The government has worked around this problem by enacting the Minister of Energy and Mineral Resources Regulation Number 14 of 2012 concerning Energy Management. The biggest energy supplies in Indonesia are oil, coal and gas, which are included in the non-renewable energy group, while renewable energy, such as water, geothermal and biofuels supply does not reach 5% annually. This shows that Indonesia is still lacking in exploiting renewable energies. In fact, when viewed from its availability, renewable energies have great potential to be developed as infrastructure for the country's economic development, due to their unlimited nature. The contribution of this study provides empirical evidence that the disclosure of the GRI 302 Energy standard provides information about an organization's impact on energy, and how companies in Indonesia regulate it (Fiedler, T., Mircea, P.,2012).

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Institutional Theory

Institutional theory is a theory that explains the formation of organizations as a result of organizational environmental pressures (Powell and Dimaggio, 2012). Meyer and Rowan (1977) stated that this theory is based on the premise that organizations require public confidence that the organization is a legitimate entity and worthy of support. The process of adopting institutional practices is known as isomorphism (Dimaggio and Powell, 1983). Powell and Dimaggio (2012), institutional theory is a theory that explains the reasons for the formation of a new system adopted by an organization. There are 3 elements of this institutional theory, namely coercive isomorphism, where the adoption of a new system is influenced by political pressures/government regulations, mimetic isomorphism, the adoption of a new system due to the success of competitors in adopting the system, and normative isomorphism, the adoption of a new system due to the will of the organization itself (Powell and

Dimaggio, 2012). To measure coercive isomorphism, according to Liang et al. (2007), indicators of questions asked are. (1) The government requires companies to implement energy management. (2) Industry associations require companies to implement energy management. (3). Competition conditions require companies to implement energy management. To measure mimetic isomorphism, according to Liang et al. (2007), indicators of questions asked are. 1. The main competitors of companies that have implemented energy management have an advantage.

The main competitors of companies that have implemented energy management are highly favored by other companies in the same industry. 3. Main competitors Companies that have implemented energy management are highly favored by their suppliers and customers. To measure normative isomorphism, according to Liang et al. (2007), indicators of questions asked are. (1) Indicate the level of implementation of energy management by your company's suppliers. (2) Indicate the level of implementation of energy management by your company's customers. (3) To what extent does government promotion influence companies to implement energy management.

2.1.1. Dimensions of institutional theory

Coercive isomorphism is the result of pressure, both formal and informal, given by other organizations where they depend on the expectations of society in the environment the organization is in (Powell and Dimaggio, 2012). Pressure can come from regulations or government regulations or industrial or community environments (Liang et al., 2007). 2.3.2.2. Mimetic Isomorphism According to Powell and Dimaggio (2012) mimetic isomorphism is a company's desire to imitate the organizational practices of other organizations. This concept arises due to uncertainty of guidelines or references and also low knowledge about an organizational practice, so that companies try to imitate other companies that have implemented these practices well (Liang et al., 2007). Normative Isomorphism Normative isomorphism is a company's professional attitude to comply with and adopt applicable standards or rules (Powell and Dimaggio, 2012). Ethics and culture adhered to by employees have an important role in this concept to influence the professional attitude of the company to adopt a situation (Liang et al., 2007). 2.4. Energy Efficiency Energy is a crucial element for national economic development (Ates and Durakbasa, 2012).

However, currently the condition of energy supply and energy consumption is not balanced. Energy supplies are increasingly limited due to massive exploitation, especially non-renewable energy. Meanwhile, energy consumption is increasing as a result of increased activity. Therefore, according to Oh and Chua (2010) in Fernando and Hor (2017), the focus of problem solutions must lie on the supply side and energy-related regulations, because energy consumption is used to increase economic activity which also has an impact on economic development. So that currently the government is focusing on establishing regulations related to energy efficiency. Energy efficiency itself is an action to reduce energy consumption without affecting the quality of the results (Abdelaziz, et al., 2011). Energy efficiency can solve several problems, such as climate change, large energy exploitation 2014). quantity, and securing energy supplies Fernando and Hor (2017) state that energy efficiency can be achieved by managing energy properly through energy management practices (Brunke et al., Energy efficiency has economic benefits for companies in the form of competitive advantage and increased productivity i. (Thollander and Ottosson, 2010) al.(2011), energy efficiency can play an important role in t. According to three aspects (Bunse, et triple bottom line), namely for a sustainable manufacturing system. Energy efficiency role in reducing energy costs (resources), and increasing productivity. The second pillar, namely the environment, where energy efficiency plays a role in reducing carbon emissions and other waste. The last pillar, namely social aspects, where energy efficiency can give a good reputation for the company and build good relations with the government and the community.

2.2. Management Energy

Energy management is an integrated activity to control energy consumption in order to achieve effective and efficient energy utilization to produce maximum output through structured and economical. Abdelaziz et al. (2011) define energy management as a strategy to minimize energy costs or waste without affecting the production process and the quality of environmental outputs while minimizing the impact of operational activities on energy. Brunke et al. (2014) explained that companies can reduce production costs, but can increase productivity and the level of competitive advantage in the long term by implementing energy management. Brunke et al. (2014) explained that companies can reduce production costs, but can increase productivity and the level of competitive advantage in the long term by implementing energy management.

Sa, et al. (2017) new recommendations that must be reapplied by saying that research on energy management is an interesting topic to discuss because the application of energy management is still far from perfect as a result of a lack of company knowledge regarding how to plan good energy management. This energy management can be a distinct competitive advantage for companies if it is implemented in a sustainable manner (Brunke et al., 2014). By implementing energy management, companies can reduce energy consumption, energy costs, and CO emissions (Kannan and Boie, 2003). Porter (2008) enables organizations or companies to achieve competitive advantage. Strategy will determine how companies behave or compete in their environment by utilizing their advantages (Kwasi and Moses, 2008), including by implementing energy management practices. Sa, et al. (2017) explained that the alignment of the energy management program with the company's core strategy is a driving factor that is considered important when companies adopt energy management. Thollander and Ottosson (2008) and Brunke et al. (2014) also stated that the third most important driving factor is a long-term energy strategy.

Institutional theory is a theory that explains how to motivate organizations or companies to adopt a philosophy from external parties (Dimaggio and Powell, 1983). Brunke et al. (2014) has explained about classifying driving factors into internal and external, and the highest ranking of external factors is regulation. Fernando and Hor (2017) explain that energy management

practices affect energy efficiency. Energy efficiency is related to actions to minimize energy consumption in various business activities (Bunse, et al., 2011). The concept of energy management, according to ISO 50001: Energy Management, consists of four processes known as the PDCA process, namely plan, do, check, and act (Pinero, 2009).

GRI 103 describes how to report on the management approach and what information to provide. The reporting organization must report its management approach to energy using GRI 103: Management Approach. When reporting on the management approach for energy, the reporting organization can also specify whether it is subject to country, regional or industry level energy regulations and policies. In addition, organizations can provide examples of these rules and policies.

2.3. Energy Consumption within the Company

2.3.1. The reporting organization must report the following information

a. Total fuel consumption within the organization from non-renewable resources, in joules or multiples thereof and including the type of fuel used.
b. Total fuel consumption within the organization from renewable resources, in joules or multiples, and including the type of fuel used.
c. In joules, watt hours or multiples, total:
   i. electricity consumption
   ii. heating consumption
   iii. Cooling consumption
   iv. Steam consumption
d. In joules, watt hours or multiples, total:
   i. Electricity sold
   ii. Heating sold
   iii. Cooling sold
   iv. Steam sold
e. Total energy consumption within the organization, in joules or multiples.
f. Standards, methodologies, assumptions, and/or calculation tools used.
g. The source of the conversion factor used.

When compiling the information described in disclosure 302-1, the reporting organization must:

Avoid double counting of fuel consumption, when reporting self-generated energy consumption. If the organization generates electricity from non-renewable or renewable fuel sources and then consumes the generated electricity, the energy consumption must be calculated once as fuel consumption;

2.1.2 Report fuel consumption separately for renewable and non-renewable sources;
2.1.3 Report only energy consumed by entities owned or controlled by the organization;
2.1.4 Calculate the total energy consumption within the organization, in joules or multiples using the following formula:

Total energy consumption in the organization = Non-renewable fuel consumed + Renewable fuel consumed + Electricity, heating, cooling and steam purchased for consumption + Self-generated electricity, heating, cooling and steam, which is not consumed (see clause 2.1.1)

Electricity, heating, cooling, and steam are sold.

2.4. Energy Management Disclosure Sustainability Standards

The sustainability standard that can be used by companies regarding energy management disclosure is GRI 302. Table 1 shows that GRI 302 is a standard that can be used by organizations of any size, type, sector or geographic location. The GRI 302 standard consists of two parts, namely management approach disclosure (302-1 and 302-2) and topic specific disclosures (302-3 to 302-5). With this difference, each set of GRI 302 standards can complement each other because GRI 302 can support broad and comprehensive disclosures regarding organizational impacts (GRI, 2021). ISO 50001 energy Management issued by The International Organization for Standardization (ISO). Karcher and Jochem (2015) states that ISO 50001 is a standard used to manage energy performance both for efficiency and energy consumption with a Plan, Do, Check, Action cycle approach for continuous improvement.

2.5. Energy Management Policy in Indonesia

The implementation of energy management in Indonesia is regulated through the regulation of the Minister of Energy and Mineral Resources number 14 of 2012 concerning energy management (Ministry of Energy and Mineral Resources of the Republic of Indonesia, 2012). Users of larger energy sources equal to 6000 tons of oil equivalent per year are required to implement energy management. Energy management is carried out by appointing an energy manager, compiling an energy conservation program, carrying out periodic audits, implementing recommendations on the results of an energy audit, and reporting on the implementation of energy management annually to the local minister, governor or regent/mayor (Palm, J., Thollander, P..,2010).

2.6. Prior Studies

Sa et al. (2017) found that the low level of risk and the alignment of the energy management program with the company's core strategy were important driving factors in adopting energy management. This research shows that the company's core strategy can encourage companies to implement energy management, so further research is needed regarding the relationship between the company's core strategy and energy management practices (Anderson, S.T., Newell, R.G. (2004). Fernando and Hor (2017) found that energy management practices have been implemented

	GRI 302
Scope Organization Type Standards	• Disclosure of management approach (this section refers to GRI 103) • Disclosure 302-1 Energy consumption within the organization • Disclosure 302-2 Energy consumption outside the organization • Disclosure 302-3 Energy intensity • Disclosure 302-4 Reduction of energy consumption • Disclosure 302-5 Reductions in energy required for products and services.

Table 1: Previous research

Serial number	Authors	Title	Research method	Result
1	Brunke et al. (2014)	Empirical investigation of barriers and drivers to the adoption of energy conservation measures, energy management practice and energy services in the Swedish iron and stell industry	Quantitative method with descriptive analysis and te Mann–Whitney U-test	The most important obstacles in energy management practices are economic barriers and internal behavior, namely energy service companies, especially third party financing, but a small role. Instead, the most important drivers of energy management practices come from within companies. With energy management practices the cost savings can be 9.7%, which is 2.4% higher than the potential for implementing only cost-effective technologies
2	Thollander Ottosson (2008)	An energy efficient Swedish pulp and paper industry-exploring barriers to and driving forces for cost-effective energy efficiency investment	Quantitative method with descriptive analysis	The biggest hurdles are technical risks such as production disruption risks, cost of production interruptions, inappropriate technology in factories, lack of time and other priorities, lack of access to capital, and lean organization. The driving factors for energy efficiency with the highest rating are cost reduction due to lower energy use, people with real ambition, Long term energy strategy, threat of rising energy prices, electricity certificate system, PFE
3	Fernando Yudi and Hor (2017)	Impact of energy management practice on energy efficiency and carbon emissions reduction: A Survey of Malaysian manufacturing firms	Quantitative method with PLS-SEM analysis	Energy audits and energy efficiency are factors that affect the reduction of carbon emissions. Awareness of energy, knowledge of energy, and management commitment are factors that influence energy efficiency
4	Sa et al. (2017)	Assessing the driving factors for energy management program adoption	Case study method with descriptive analysis (mean)	Low level of risk arising from lack of certainty and awareness) and program alignment with the core business as the main driving factors in adopting energy management programs. On the other hand, industry complexity and access to capital are the main barriers to adopting the program

PLS-SEM: Partial Leas Square-Structural Equations Modeling

and their impact on the environment, such as energy efficiency and reduced carbon emissions. In this study using a survey method with a questionnaire distributed to 111 manufacturing companies in Malaysia that have been ISO 14001 certified. Model testing was carried out using the PLS-SEM (partial least square structural equation modelling) method (Patterson, M. (1996). The results of the study show that energy audits and energy efficiency are important factors for reducing carbon emissions, while energy awareness, knowledge of energy, and management commitment have an effect on energy efficiency and energy efficiency has a positive effect on reducing carbon emissions (Blass et al.,2014).

Brunke et al. (2014) found that the most important barriers to energy management practices are internal economic and behavioral barriers, namely energy service companies, particularly third party financing. On the other hand, the most important drivers of energy management practices come from within the company. With energy management practices, companies can save costs up to 9.7%, which is 2.4% higher than just implementing cost-effective technologies. Thollander and Ottosson (2008) found that the biggest obstacles come from technical risks such as production disruption risks, production disruption costs, inappropriate technology in factories, lack of time and other priorities, lack of access to capital, and lean organization. The drivers for energy efficiency with the highest rating are cost reduction due to lower energy use, people with real ambition, long term energy strategy, threat of rising energy prices, electricity certificate system, PFE. The findings of this study are similar to those of Brunke et al. (2014) especially in terms of the driving factors for energy management practices in companies (Table 1).

3. RESEARCH METHODOLOGY

3.1. Data Collection Method

This study uses secondary data. Data collection in this study will be carried out using archival data, namely studies conducted using original documents collected and stored by the government, organizations, or families (George, 2008). Data is collected through an annual report or sustainability report published by the company and can be accessed online for the 2018-2020 period. Energy reporting should be reported in sustainability report but companies in Indonesia often incorporate environmental reporting in their annual reports. Therefore, this study uses an annual report to obtain data. The sampling method used was purposive sampling. There are 74 companies in this study that are the research samples.

3.2. Sample Size

Data was collected from companies in the oil and gas industry sub-sector, oil and gas sub-sector listed on the Indonesia Stock Exchange (IDX) in 2023. The research sample that will be used is as follows (Kayo, 2020; Invesnesia.com, 2019) (Table 2).

3.3. Analytical Method

The data analysis method in this study uses the data analysis model of Miles and Huberman (1992) in (Hardani et al., 2020), which consists of:

1. Data reduction, namely data simplification by sharpening, classifying, directing, and organizing data so that it can produce a conclusion. Data reduction is carried out in the following stages:

a. Identify companies in the energy sub-sector that report energy management disclosure
b. Practices consecutively from 2020 to 2022.
c. Search for all disclosures related to energy management and explore energy management disclosure with GRI 302 (energy)

2. Presentation of data, namely the presentation of structured information that can provide the possibility of drawing conclusions and taking action. Presentation of data is carried out in the following stages:
   a. Presents data related to energy management practices, which include in GRI 302 which were disclosed by energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) in a row from 2020 to 2022.
   b. Comparing energy management disclosure practices between years to examine reporting routines.
3. Drawing conclusions and verification, namely the process of answering the formulation of the problem that has been formulated from the start. The conclusions drawn must be relevant to the focus, objectives and findings of the research.

4. DATA ANALYSIS AND FINDINGS

4.1. Company Characteristics

Based on Table 3, it can be seen the frequency and percentage of energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) in 2020, 2021 and 2022. 58 out of 74 companies (78%) registered in 2020 and before 2020 can report Energy practices Management Disclosures for three consecutive years (2020-2022). However, the remaining 16 companies (22%) registered after 2020 did not report Energy Management Disclosure practices for three consecutive years. Nonetheless the disclosure and practice of Energy Management Disclosure on the seventy four listed after 2020 will still be explored.

The Table 4 shows the types of reports published by industry sub-sector companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2022. Data for 2020 was obtained from twenty-four annual reports and twenty sustainability reports. The four companies that did not publish annual reports or sustainability reports in 2018 are companies that have just been registered with IDX in 2021. The four companies have only published annual reports and sustainability reports in 2021. Data for 2021 was obtained from fourteen annual reports and four sustainability reports, while the data for 2022 was obtained by fifty-two companies publishing annual reports and 19 companies publishing sustainability reports (Table 3).

4.2. Energy Management Accountability

In 2020, there are twenty-five companies out of 74 companies (34%) that have reported energy management disclosures. Meanwhile, forty-nine companies (66%) did not report energy management disclosures. In 2021, reporting on energy management disclosure will increase to thirty-three companies (44%). Likewise in 2022, reporting on energy management disclosure will increase to thirty-six companies (49%). Details can be seen in Table 5.

Table 2: Sample

Serial number	Code	Companies
1	ADRO	Adaro Energy Indonesia Tbk
2	AKRA	AKR Corporindo Tbk
3	BBRM	Pelayaran Nasional Bina Buana
4	BYAN	Bayan Resources Tbk
5	DEWA	Darma Henwa Tbk
6	DOID	Delta Dunia Makmur Tbk
7	DSSA	Dian Swastatika Sentosa Tbk
8	ELSA	Elnusa Tbk
9	GEMS	Golden Energy Mines Tbk
10	GTSI	GTS Internasional Tbk
11	HITS	Humpuss Intermoda Transportasi
12	HRUM	Harum Energy Tbk
13	INDY	Indika Energy Tbk
14	ITMG	Indo Tambangraya Megah Tbk
15	JSKY	Sky Energy Indonesia Tbk
16	KKGI	Resource Alam Indonesia Tbk
17	LEAD	Logindo Samudramakmur Tbk
18	MBSS	Mitrabahtera Segara Sejati Tbk
19	MCOL	Prima Andalan Mandiri Tbk
20	MEDC	Medco Energi Internasional Tbk
21	MYOH	Samindo Resources Tbk
22	PGAS	Perusahaan Gas Negara Tbk
23	PSSI	Pelita Samudera Shipping Tbk
24	PTBA	Bukit Asam Tbk
25	PTIS	Indo Straits Tbk
26	PTRO	Petrosea Tbk
27	RAJA	Rukun Raharja Tbk
28	RMKE	RMK Energy Tbk
29	SHIP	Sillo Maritime Perdana Tbk
30	SOCI	Soechi Lines Tbk
31	TEBE	Dana Brata Luhur Tbk
32	TOBA	TBS Energi Utama Tbk
33	UNIQ	Ulima Nitra Tbk
34	WINS	Wintermar Offshore Marine Tbk
35	ADMR	Adaro Minerals Indonesia Tbk
36	AIMS	Akbar Indo Makmur Stimec Tbk
37	APEX	Apexindo Pratama Duta Tbk
38	ARII	Atlas Resources Tbk
39	ARTI	Ratu Prabu Energi Tbk
40	BESS	Batulicin Nusantara Maritim Tb
41	BIPI	Astrindo Nusantara Infrastrukt
42	BOSS	Borneo Olah Sarana Sukses Tbk
43	BSML	Bintang Samudera Mandiri Lines
44	BSSR	Baramulti Suksessarana Tbk
45	BULL	Buana Lintas Lautan Tbk
46	BUMI	Bumi Resources Tbk
47	CANI	Capitol Nusantara Indonesia Tbk
48	CNKO	Exploitasi Energi Indonesia Tb
49	DWGL	Dwi Guna Laksana Tbk
50	ENRG	Energi Mega Persada Tbk
51	ETWA	Eterindo Wahanatama Tbk
52	FIRE	Alfa Energi Investama Tbk
53	GTBO	Garda Tujuh Buana Tbk
54	IATA	MNC Energy Investments Tbk
55	INPS	Indah Prakasa Sentosa Tbk
56	ITMA	Sumber Energi Andalan Tbk
57	KOPI	Mitra Energi Persada Tbk
58	MBAP	Mitrabara Adiperdana Tbk
59	MITI	Mitra Investindo Tbk
60	MTFN	Capitalinc Investment Tbk
61	PKPK	Perdana Karya Perkasa Tbk
62	RIGS	Rig Tenders Indonesia Tbk
63	RUIS	Radiant Utama Interinsco Tbk
64	SEMA	Semacom Integrated Tbk

(*Contd...*)

Table 2: (*Continued*)

Serial number	Code	Companies
65	SGER	Sumber Global Energy Tbk
66	SICO	Sigma Energy Compressindo Tbk
67	SMMT	SMMT Golden Eagle Energy Tbk
68	SMRU	SMR Utama Tbk
69	SUGI	Sugih Energy Tbk
70	SURE	Super Energy Tbk
71	TAMU	Pelayaran Tamarin Samudra Tbk
72	TCPI	Transcoal Pacific Tbk
73	TPMA	Trans Power Marine Tbk
74	TRAM	Trada Alam Minera Tbk

Source: Sahamok.com; https://snips.stockbit.com

Table 3: Reports type

Year	Annual report	Sustainability report	No reports
2020	43	28	3
2021	48	23	3
2022	52	19	3

4.3. Energy Management Disclosure

Based on research conducted on the annual report and sustainability report published online, it was found that sixteen energy sub-sector companies (22%) reported energy management disclosure according to GRI 302 for three consecutive years (2020-2022), including: Adaro Energy Indonesia Tbk. – ADRO; AKR Corporindo Tbk. – AKRA;Bayan Resources Tbk. -BYAN; Elnusa Tbk. -ELSA; Harum Energy Tbk. – HRUM; Indika Energy Tbk. – INDY; Indo Tambangraya Megah Tbk. – ITMG; Medco Energi Internasional Tbk. -MEDC; State Gas Company Tbk. – PGAS; Bukit Asam Tbk. – PTBA; Petrosea Tbk. – PTRO; TBS Energi Utama Tbk. – TOBA; Adaro Minerals Indonesia Tbk. – ADMR; Apexindo Pratama Duta Tbk. -APEX; Astrindo Nusantara Infrastructure – BIPI; Indonesian Energy Exploitation Tb - CNKO

during 2020 to 2022, all of the above companies have published sustainability reports that comply with GRI 301 standards. All companies attach their total energy use. All companies attach the GRI Standard Reference to their reports which consist of GRI 302. Disclosure 302-1 Energy consumption within the organization • Disclosure 302-2 Energy consumption outside the organization • Disclosure 302-3 Energy intensity • Disclosure 302-4 Reduction of energy consumption • Disclosure 302 -5 Reduction in the energy required for products and services.

5. DISCUSSION

Reporting on energy management disclosure is an important thing to do because it can be used as a reference in regulating energy policy to achieve better management of the use of energy resources. However, energy reporting is rarely done by companies in Indonesia. Although not all energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) have reported energy management disclosures, 25 out of 74 companies have reported energy management disclosures (75%), whether in accordance with GRI 302 or not. Unfortunately, the reporting of energy management disclosure is not routinely done. Seven

Table 4: Year listed on Indonesia stock exchange

Year listed on IDX	Frequency (%)
<2020	48 (65)
2020	10 (13)
>2020	16 (22)
Total	74 (100)

Source: Sahamok.com. IDX: Indonesia stock exchange

Table 5: Energy management reports

Year	Energy management disclosure	No energy management
2020	25	49
2021	33	41
2022	36	38

out of 33 companies out of 74 companies (44%) have reported water management regularly for three years. Not only energy reporting, but mandatory reporting, such as annual reports and sustainability reports, are not routinely published. This can be seen from Table 3 which shows that there are three to four out of 74 companies in the energy sub-sector that do not publish annual reports or sustainability reports. Thirty-six companies in the energy sub-sector that routinely report energy management disclosures in accordance with GRI 302 from 2020 to 2022 are Adaro Energy Indonesia Tbk. – ADRO; AKR Corporindo Tbk. – AKRA;Bayan Resources Tbk. -BYAN; Elnusa Tbk. -ELSA; Harum Energy Tbk. – HRUM; Indika Energy Tbk. – INDY; Indo Tambangraya Megah Tbk. – ITMG; Medco Energi Internasional Tbk. -MEDC; State Gas Company Tbk. – PGAS; Bukit Asam Tbk. – PTBA; Petrosea Tbk. – PTRO; TBS Energi Utama Tbk. – TOBA; Adaro Minerals Indonesia Tbk. – ADMR; Apexindo Pratama Duta Tbk. -APEX; Astrindo Nusantara Infrastructure – BIPI; Indonesian Energy Exploitation Tb - CNKO

The data used to examine four out of fifteen companies is a sustainability report. Four of the sixteen companies attach GRI 302 (energy) while the other nine companies do not attach GRI 302 references to their reports.

The company has made various efforts to reduce energy use, including the following:

Energy is one of the vital needs of the community to run a business, both in the field/mining location and in the office. Currently, the types of energy used by the Company are electricity and fuel oil (BBM). In the field, fuel oil is used to operate machinery, heavy equipment and operational vehicles. Meanwhile, in the office, electrical energy is needed for lighting, turning on various electronic devices, and so on. For electricity, in addition to obtaining supplies from the state electricity company (PLN), the Company utilizes its own Steam Power Plant (PLTU), and develops solar power plants as an implementation of the Company's commitment to developing new, renewable energy. [GRI 103-1]. As implementation of the Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia No. 13 of 2012 concerning Saving Electricity Usage, the company already has a Policy on Energy Efficiency in Electric Energy and Fuel. To support the policy made in 2017, the Company has a certified energy manager from the National Professional Certification Agency (BNSP)/LSP-HAKE

as the person in charge of implementing the policy. In line with that, PTBA also has a strategic plan with clear goals and schedules as the basis for implementing energy efficiency, and monitoring its implementation by conducting energy audits internally and externally. [GRI 103-2]

In an effort to reduce energy use, the company has made a number of innovations and brought significant results, namely: [GRI 103-3, 302-4]]OJK F.7]

1. Diesel Pump Replacement Program for Electric Pumps. Pumping activities in open pit mining such as coal mining carried out by UPTE are absolutely necessary, in addition to pumping water to supply office water in mining areas, it is also used in mining processes such as cleaning conveyor belts, road watering, watering mining areas to reduce dust, and others. most importantly it is used for water drainage in mined basin areas which become water reservoirs caused by groundwater absorption or rainwater. Pumping of mine irrigation at the coal mine of PT Bukit Asam, Tanjung Enim uses 2 types of pump drives, namely pumps with electric drives and pumps with engine drives.
2. Electrification Program (Shovel Electric and Hybrid Dump Truck). One of the operational efficiency programs for cost control and company development is the Electrification Program (utilization of electricity-based mining equipment) where previously mining operations were dominated by fuel-based mining systems. Implementation of the Mining System with electricity-based mining equipment is also designed through stages to adjust to the company's short-term and long-term targets and adjust to equipment readiness. In addition, this program also contributes to environmental sustainability, namely reducing greenhouse gas emissions, in line with the energy company's vision of becoming a world-class energy company that cares about the environment. From the results of the Electrification Program, with the implementation of 7 units of Electric Shovels (PC3000-6E) and 40 units of Hybrid DT (Belaz-75135) to carry out stripping at the West Banko Mine.
3. CHF monitoring and control system digitization program. A program with innovation value that can reduce fuel consumption by 22,795 Liters per year is the Digitization of the Coal Handling Facility (CHF) Monitoring and Control System as the application of the latest Industry 4.0-based technology (Core Elements: ERP and MES, Big Data Analytic, Authentication and Fraud, Smart Sensor, Supervisory Control and Data Acquisition, Machine to Machine Communication, Augmented Reality) which was originally done manually using transportation equipment (mine cars) throughout the mining area. The element of novelty is that PTBA has implemented the latest Industry 4.0 technology in CHF monitoring and control activities which previously used transportation equipment to be without transportation equipment so that the energy consumption previously required for transportation equipment of 1630.8 GJoule per year can be eliminated.
4. Bukit Asam Mining System and Information Program (MISTER BA). One of the latest technology-based mining information system programs uses a smartphone so that reports are real time and can be accessed anywhere using the internet network, originally using e-mail media and using a car facility to check locations at the mine.
5. Engine State Monitoring Program for Hauling Dump Trucks. Engine State Monitoring Low Idle Dump Truck as the application of the latest technology based on Industry 4.0 which previously could not be monitored for low idle in the Hauling Dump Truck unit. The element of novelty is that the energy company has implemented the latest Industry 4.0 technology in monitoring the low idle time of the Hauling Dump Truck unit. The quantification of environmental improvements due to this system change in the form of changes to the value chain of the entire system (changes in methods, changes in behavior, and faster and more accurate data accuracy) is a reduction in fuel consumption of 2,072 GJoule per year (1 liter of fuel ? 0.038 GJoule) equivalent to a reduction in emissions of 282.8 tCO2e (1 liter of BBM? 0.00267 tCO2e) and implementation of energy conservation in Good Mining Practice.
6. Electricity Vulcanizer Program. Electricity Vulcanizer as the utilization of electrical energy from PLTU which was originally from the use of generators that use diesel fuel. The quantification of environmental improvements due to this system change is in the form of changes in the value chain of the entire system (changes in methods, changes in behavior, and faster and more accurate data accuracy) is a decrease in fuel consumption by 207 GJoule per year (1 liter of fuel ? 0.038 GJoule) equivalent to a reduction in emissions of 1 tCO2e (1 liter of fuel ? 0.00267 tCO2e) and implementation of energy conservation in Good Mining Practice.
7. Equipment Health Analysis Program. Equipment Health Analysis as the application of the latest technology based on Industry 4.0 which previously could not be carried out condition monitoring and recording of unit obstructions both main mining equipment and mine supporting equipment. The element of novelty is that PTBA has implemented the latest Industry 4.0 technology in unit condition monitoring activities that have not previously used the system. Through this program, the company was able to reduce costs in 2020 in the amount of IDR 167,863,500 by saving 27,375 liters of fuel (diesel) consumption. fast and accurate) is a reduction in energy consumption of 1059 GJoule (1 liter of fuel ? 0.038 GJoule) equivalent to a reduction in emissions of 73.09 tCO2e (1 liter of fuel ? 0.00267 tCO2e) and the implementation of energy conservation in the Good Mining Principles (Good mining practice).
8. Smart Fuel Flushing Program. The use of B30 fuel has the effect that a lot of soot and impurities in the fuel make it necessary to flush the fuel in the unit's fuel tank every 1000 hours. The equipment used for flushing is connected to a fuel-fired Lube Truck. Flushing activities on fuel on heavy equipment is a routine job that must be done to avoid low power on heavy equipment. The Smart Fuel Flushing Program is a program with an innovation value that reduces fuel consumption by 25,769.24 liters or the equivalent of 996.91 Gjoules as an implementation of changing the use of fuel to electricity, which was originally carried out using Lube Truck

vehicles fueled by BBM to Flushing Tools with electric pumps. With these various savings efforts, overall, the intensity of electricity use at UPTE in 2021 is 0.024 GJ/ton, not different from the previous year, which was 0.024 GJ/ton. This means that programs to support energy efficiency are still carried out continuously. [GRI 103-3, 302-3] [OJK F.6].

9. Energy Audits. Energy audit to determine potential energy savings. allows companies to define optimal actions that will help companies find the most effective solutions to reduce energy consumption, expenses, and the impact these actions have on the environment.
10. Termination of energy-saving processes. change the operating mode or the start of the working time. This method can be used, for example, when operating larger power plants which can be operated at night, evening or early morning outside of these peak hours.
11. Use of a thermostat. Installing a programmable thermostat saves energy and improves efficiency by automatically turning off heating and cooling equipment when no one is working.
12. Consider installing solar panels. Solar energy is a clean and renewable source of energy. Solar panels require no maintenance and will help reduce electrical energy.

For energy consumption outside the company, such as the use of fuel oil (BBM) by suppliers/partners, the company cannot report because the cooperation agreement with suppliers does not contain a clause regarding recording the volume of energy released by partners. However, in accordance with the Corporate Value Chain (Scope 3) GHG (Greenhouse Gas) Protocol Accounting and Reporting Standards, companies identify relevant energy consumption outside the organization, namely the upstream category of business travel, especially travel by airplane. In the report, travel by airplane refers to the journey of the Board of Commissioners and the Board of Directors. The volume of energy or fuel consumed from official travel by airplane in 2021, according to the results of the calculation of the ICAO (International Civil Aviation Organization) carbon emission calculator, is recorded at 1,626,983 kg, equivalent to 2,259,699 liters or equivalent to 77,282 GigaJoule. [GRI 103-3, 302-2].

6. CONCLUSION, LIMITATION AND MANAGERIAL IMPLICATIONS

The existing condition of energy management practices in Indonesia, where the majority of companies do not yet have their own awareness to implement energy management and there is no definite standard regarding energy management systems. This condition causes the government to play a more active role in encouraging companies to implement an energy management system. These results indicate that energy management practices can reduce energy use in companies. A long-term energy strategy is urgently needed to create a sustainable energy management system. Long-term energy strategy can be in the form of investment in operational facilities and employees. Such as investment in operational facilities is investment in power plants that utilize company waste as their main energy. Use of innovative, environmentally friendly technology to support company operations. This technology definitely has the sophistication to minimize energy use and maximize the resulting output. The role of government and industry associations is needed to encourage companies to implement energy management systems. The government can work with companies to build training centers to increase energy management knowledge for each of the company's sub-sectors. The company received ISO 50001 certification: Energy management. This certification serves as a sign that the company has implemented an energy management system according to standards and is motivated to create a better energy management system.

Providing corporate rewards that have implemented energy management properly and as a form of support to continue implementing energy management practices in a sustainable manner. This award is given to having a company management system that manages the best energy in every industrial sector. This award can be in the form of certificates, tax deductions, or electricity bills. In this event, companies that get to explain how to implement the m reward system are required to manage energy properly. The government and industry associations must encourage companies that have implemented energy management to make special reports, such as a sustainability report every year. related to the method and results of implementing energy management that has been done. This is needed to make it easier for companies, governments or industry associations to monitor energy use within the company.

The limitation of this research is only using energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) as research subjects. In addition, the reporting period under study was relatively short, only three years from 2020 to 2022. If the research was conducted using reports with a longer period, the results of the research might be different. Therefore, we hope that future studies can use a longer period.

Based on the research results, there are several suggestions that we can provide as follows:

1. The agency is expected to publish usage according to GRI 302 (energy) which can be accessed periodically so that the community and government can monitor the company's use and use of energy. In addition, the government can also use the report as a reference in regulating energy policy to achieve better management of the use of energy resources.
2. The government is expected to oblige every entity to publish energy use in accordance with GRI 302 (energy) which can be accessed regularly and take firm action against companies that violate the rules on the use of energy resources.

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