

# TIAR

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## THE INDONESIAN ACCOUNTING REVIEW

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## The Indonesian Accounting Review

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# The effect of implementing green accounting on the environmental performance of cement, energy, and mining companies in Indonesia

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## ABSTRACT

This study aims to examine the effect of implementing green accounting on the environmental performance of cement, energy, and mining companies in Indonesia. This study is a quantitative study. The data used are secondary data obtained from sustainability reports of cement, energy, and mining companies listed on the Indonesia Stock Exchange (IDX) during the period of 2017-2020. The data analysis method used in this study is partial least squares using the WarpPLS 7.0 program. The results show that the implementation of green accounting in the form of renewable energy has a negative effect on environmental performance. The implementation of green accounting in the form of recycled waste has a significant positive effect on environmental performance. Meanwhile, the implementation of green accounting in the form of environmental costs has no effect on environmental performance.

## ABSTRAK

Penelitian ini bertujuan untuk menguji pengaruh implementasi green accounting terhadap kinerja lingkungan perusahaan semen, energi, dan pertambangan di Indonesia. Penelitian ini merupakan penelitian kuantitatif. Data yang digunakan dalam penelitian ini adalah data sekunder yang diambil dari laporan keberlanjutan perusahaan semen, energi, dan pertambangan yang terdaftar di Bursa Efek Indonesia (BEI) periode 2017-2020. Penelitian ini menggunakan metode analisis Partial Least Square (PLS). Hasil penelitian menunjukkan bahwa implementasi green accounting dalam bentuk renewable energy berpengaruh negatif terhadap kinerja lingkungan, implementasi green accounting dalam bentuk recycled waste berpengaruh positif dan signifikan terhadap kinerja lingkungan, sedangkan implementasi green accounting dalam bentuk biaya lingkungan tidak berpengaruh terhadap kinerja lingkungan.

## 1. INTRODUCTION

Global warming has become a global concern. The Climate Transparency Report 2020 states that G20 countries are advised to carry out green recovery. Green recovery aims to reduce greenhouse gas emissions, increase future climate resilience, and create a sustainable industry (Climate Transparency Report, 2020). Therefore, Indonesia as part of the G20 countries also plays a role in implementing green recovery.

Green industry can be achieved if the industries pay attention to the environmental

performance and their surroundings. The existence of business process will produce not only products, but also emissions that can have an impact on the environment (Langlois, 2018). The energy sector is the largest emitter of greenhouse gases in Indonesia. This energy consists of 66% fossil fuels such as coal, oil, and natural gas, 15% renewable energy and 19% other energy (Climate Transparency Report, 2020). In 2019 greenhouse gas emissions from fuel combustion were Indonesia's highest emissions and the industrial sector was the highest contributor at 37% (Climate

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Transparency Report, 2020). The main energy sources used by the industrial sector are coal and natural gas (Kementerian Energi dan Sumber Daya Mineral, 2019). The cement industry is the largest user of coal energy at 90% (Kementerian Energi dan Sumber Daya Mineral, 2019) and the carbon intensity generated from its production exceeds the world's average carbon intensity (Climate Transparency Report, 2020). In addition to the energy and cement sectors, there are mining companies that also have an impact on the environment. The main environmental impacts of mining activities occur during exploitation and use as energy whose impacts include water or air pollution and deforestation (Manik, 2020).

The industrial production process will have an impact on the environment. Therefore, an entity, especially a cement, energy, and mining company, is expected to not only focus on profitability and economic performance but also pay attention to environmental aspects and performance. Environmental performance is an effort to create environmentally friendly business processes (Rosaline et al., 2020). Environmental performance can be affected by management's ability to overcome environmental issues and the presence of credible environmental information to strengthen stakeholder trust (Baalouch et al., 2019).

Environmental information can be generated from the implementation of green accounting. Green accounting is an accounting process that not only focuses on financial transactions but also pays attention to social and environmental transactions (Lako, 2016). Green accounting consists of quantitative and qualitative information that is useful to economic and non-economic decisions making (Wahyuni et al., 2019). Green accounting in the Environmental Accounting Guidelines is divided into 3 forms, namely environmental costs which are monetary values, benefits from environmental conservation activities which are physical units, and economic benefits related to environmental conservation which are also monetary values (Ministry of Environment Japan, 2002). In this study, the implementation of green accounting is divided into 3 forms: renewable energy, recycled waste, and environmental cost.

Green accounting can provide useful information regarding the company's role in sustainability development and help companies

communicate with stakeholders. This is in line with stakeholder theory. According to Abdullah & Yuliana (2018), company is not an entity that operates individually, but the company's sustainability is also supported by stakeholders so that the company does not only fulfill the interests of the entity but also be able to provide benefits to stakeholders. In addition, based on legitimacy theory, companies must ensure that they operate in accordance with the rules and norms that apply in society and pay attention to the environment in which the company operates (Deegan, 2014).

Green accounting can help companies to realize a green industry and achieve sustainable development by improving their environmental performance. The results of previous study conducted by Wahyuni et al. (2019) show that the implementation of green accounting in the form of renewable energy, recycled materials, and environmental costs has a positive and significant influence on environmental performance. The results are in line with the results of research conducted by Osei et al. (2021) that the environmental accounting will provide environmental information that can improve environmental performance. The results of previous studies conducted by Burhany (2014), Ulupui et al. (2020), and Nuryanti et al. (2015) show that environmental accounting can affect the company's environmental performance. On the other hand, the results of research conducted by Wahyuni et al. (2019) show that green accounting in the form of the allocation of CSR funds has no definite effect on the improvement of environmental performance. Cement, energy, and mining companies have an impact on the environment. The existence of these business processes will produce output in the form of waste and emissions that can affect the environment. Given the importance of the environment and the existence of research gaps, the authors are motivated to conduct this research.

This study aims to examine the effect of the implementation of green accounting on environmental performance. Thus, this study is expected to assist companies in achieving sustainable business processes and reducing environmental impacts.

## 2. THEORITICAL FRAMEWORK AND HYPOTHESIS

This study uses stakeholder theory and legitimacy theory. Stakeholder theory states that



the entity has responsibilities to its stakeholders (Baalouch et al., 2019). Furthermore, legitimacy theory explains that the entity must be able to operate according to the values, norms, and applicable rules (Deegan, 2014). Based on theory and previous study, this study aims to examine and analyze the effect of the implementation of green accounting in the form of renewable energy, recycled waste, and environmental costs on environmental performance. The research model can be seen in Figure 1.

### Green Accounting

Environmental accounting is an accounting practice that includes environmental costs, impacts, and consequences Tarun & Ramu (2018). Meanwhile, according to Lako (2016) Green accounting is the process of recognizing, measuring, recording, summarizing, reporting, and disclosing information on a transaction, event, or financial, social, or environmental object that is useful for users in making economic and non-economic decisions.

The Environmental Accounting Guidelines state that environmental accounting consists of monetary data and physical units where the monetary value obtained is described by the environmental costs and economic benefits derived from environmental conservation, while the physical unit is described by the benefits derived from environmental conservation activities (Ministry of Environment Japan, 2002). It can be concluded that green accounting provides monetary and non-monetary information that is useful for stakeholder in decision making. In this study, green accounting is reflected in form of renewable energy, recycled waste, and environmental cost.

### Environmental Performance

Environmental performance can be measured through environmental damage where the less environmental damage, the better the environmental performance (Putri et al., 2019). Environmental performance in Indonesia can be measured using Corporate Performance Rating Assessment Program in Environmental Management (*Indonesia: Program Penilaian Peringkat Kinerja Perusahaan Dalam Pengelolaan Lingkungan/PROPER*) declared by the Ministry of Environment and Forestry (KLHLK). The existence of this PROPER is aimed at realizing environmental compliance.

### The Effect of Renewable Energy on Environmental Performance

Implementation of green accounting in the form of renewable energy can provide useful information for stakeholders. The information is in the form of physical data showing the level of benefits derived from the company's energy conservation and the precautions taken. This is in line with the stakeholder theory, in Abdullah & Yuliana (2018), which states that company is an entity that does not operate individually. The company's sustainability is also supported by stakeholders, so the company must provide benefits for stakeholders.

The implementation of green accounting in the form of renewable energy also shows the company's legitimacy. Related to legitimacy theory, Deegan (2014) states that organizations or companies must ensure that they operate in accordance with the rules and norms that apply in society and pay attention to the environment in which the companies operate. By using renewable energy, it shows that in addition to making environmental protection efforts in the form of source reduction, the company has also carried out its responsibilities towards the environment, which is in accordance with community expectations.

Renewable energy can provide environmental information for companies and help identify the presence of input resources in the form of hazardous energy that has an impact on the environment if it is released or disposed (Ministry of Environment Japan, 2002). The benefits derived from energy conservation are energy efficiency, one of the performance appraisal targets in PROPER issued by the Ministry of Environment and Forestry of the Republic of Indonesia. It is expected that the existence of energy efficiency reduce the environmental impact due to business activities and help improve environmental performance. According to Wahyuni et al. (2019), the implementation of green accounting in the form of renewable energy can improve environmental performance. This is in line with the results of research conducted by Shan et al. (2021) that renewable energy has a negative effect on CO<sub>2</sub> emissions, where increasing renewable energy will reduce CO<sub>2</sub> emissions in the environment. Reducing CO<sub>2</sub> emissions in the environment can help improve environmental performance and achieve sustainable development.

H1: Renewable energy can improve environmental performance

## **The Effect of Recycled Waste on Environmental Performance**

Based on the theory of legitimacy, organizations or companies must ensure that they operate in accordance with the rules and norms that apply in society and pay attention to the environment in which the companies operate (Deegan, 2014). The existence of recycled waste in the company shows that the company has carried out its responsibility to the environment. Recycled waste can provide information about the benefits derived from environmental conservation on emissions and waste (Ministry of Environment Japan, 2002). This shows that the company has carried out good waste management and has complied with the rules or regulations. Providing this information can also increase public confidence in the company. Disclosure of environmental and social issues is the responsibility of the company to increase its legitimacy.

Recycled waste can also provide information on environmental aspects, which are the rights of stakeholders. Based on stakeholder theory, Deegan in Hamidi (2019) states that stakeholders have right to information about the company's environmental performance. The information about recycled waste is a benefit obtained from the waste conservation carried out by the company. That way, companies can produce more relevant and accountable information about the environment.

The implementation of green accounting in the form of recycled waste is also expected to improve environmental performance. According to Burhany (2014), recording and calculating the flows of input (energy, materials and costs) and output (waste and emissions) will improve environmental performance. In the Environmental Accounting Guidelines, the level of recycled waste is measured by comparing the level of recycled waste with the total volume of waste generated (Ministry of Environment Japan, 2002). That way, the company can find out the benefits derived from the conservation of waste. The benefits of this waste conservation can be in the form of reduced waste that is disposed of or released into the environment. With recycled waste, it is expected that company management can make decisions through the physical information presented, so that the company can reduce environmental impacts and improve environmental performance.

H2: Recycled waste can improve environmental performance

## **The Effect of Environmental Cost on Environmental Performance**

It is expected that companies provide not only financial information but also information about the performance of the environment in which the companies operate. This research is supported by stakeholder theory which explains that the company does not only focus on financial performance accountability, but also pay attention to environmental, social, and intellectual performance so that the company can fulfill stakeholders' expectations (Hendratno, 2016). Companies can present environmental information by applying green accounting. Environmental costs can provide monetary information on environmental aspects for stakeholders. With information about environmental costs, stakeholders can know that the company has carried out its responsibilities in protecting the environment. In addition, the stakeholders can also evaluate and make decisions based on the presented monetary data.

The implementation of green accounting in the form of environmental costs can also improve environmental performance. This is supported by the results of research conducted by Wahyuni et al. (2019) that the allocation of environmental costs has a positive effect on environmental performance because it shows that companies have carried out their responsibilities to the environment. Burhany (2014) explains that the environmental costs incurred are aimed at achieving zero damage to the environment and improving environmental performance. In addition, Abdullah & Yuliana (2018) also state that the allocation of environmental costs has a good effect on environmental performance. It is because environmental performance is measured based on the calculation of environmental costs which refers to the conservation activities carried out by the company during its operations. The allocation of environmental costs show that the company is making efforts to protect the environment through conservation activities and carrying out environmental management optimally, thus improving environmental performance.

H3: Environmental cost can improve environmental performance

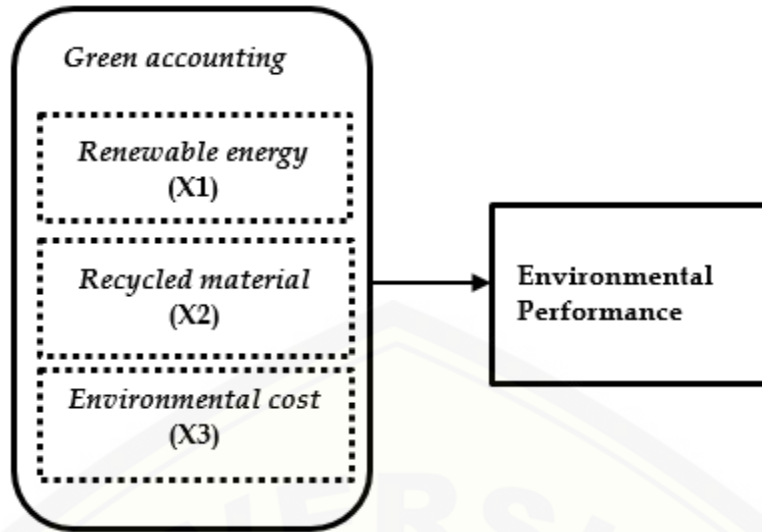


Figure 1  
Research Model

Table 1  
Sample

Criteria	Total
Mining companies listed on the Indonesia Stock Exchange	53
Energy companies listed on the Indonesia Stock Exchange	8
Cement companies listed on the Indonesia Stock Exchange	6
Companies that were delisted during the research year	(6)
Companies that do not publish the 2017-2020 Sustainability Report	(44)
Companies that do not disclose research variables in the Sustainability Report	(9)
Companies that meet the sample criteria	8
Number of Sample (4 years)	32

Source: Data Processed, 2022

### 3. RESEARCH METHOD

This research is quantitative research. This research uses secondary data obtained from the Sustainability Repors or Annual Reports of cement, energy, and mining companies listed on the IDX and the organization’s website. The data collection technique used in this study is a documentation technique by collecting documents related to research as a source of information. The data analysis method used in this study is partial least squares using the WarpPLS 7.0 program.

#### Population and Sample

The population in this study is cement, energy, and mining companies listed on the IDX, and following PROPER. The sample selection technique used is purposive sampling method. The research year used in this study is 2017-2020. The sample selection criteria can be seen in table 1. The list of sample companies is as

follows:

- a. PT Semen Indonesia (Persero) Tbk.
- b. PT Indocement Tunggul Prakarsa Tbk.
- c. PT Bumi Resource Tbk.
- d. PT Bukit Asam Tbk.
- e. PT Vale Indonesia Tbk.
- f. PT Aneka Tambang Tbk.
- g. PT Indo Tambangraya Megah Tbk.
- h. PT Perusahaan Gas Negara Tbk.

#### Operational Definition of the Variables

##### Renewable energy

Renewable energy is energy that comes from sunlight, solar heat, wind power, biomass, geothermal, and hydropower (Ministry of Environment Japan, 2002). The measurement of renewable energy in this study refers to the environmental accounting guidelines of 2002 issued by the Ministry of Environment Japan (2002). The data used in this study are taken from the company’s sustainability report.



Renewable energy= total volume renewable energy/total energy consumption

**Recycled Waste**

Recycled waste, in the Environmental Accounting Guidelines, is defined as waste that is reused or recycled and recovered (Ministry of Environment Japan, 2002). The measurement of recycled waste in this study refers to the environmental accounting guidelines of 2002 issued by Ministry of Environment Japan (2002). The data used in this research are taken from the company’s sustainability report.

$$\text{Recycled waste} = \frac{\text{total volume recycled waste}}{\text{total waste}}$$

**Environmental Cost**

Environmental costs are costs or investments allocated to prevent and reduce environmental impacts as well as recover from disasters and other activities (Ministry of Environment Japan, 2002). Based on the data observed, environmental costs are not presented in the financial statements but in the company’s annual report or sustainability report and have been presented in one calculation of the overall cost and expressed in Rupiah.

**Environmental Performance**

Environmental performance is a measurable result due to management of the company’s environmental aspects (Hahn in Osei et al., 2021). Environmental performance can be measured by PROPER assessment as shown in table 2.

In this study, the research equation model is as follows:

$$KL = \alpha + \beta_1 RE + \beta_2 RW + \beta_3 BL + e$$

Description:

- KL = Environmental Performance
- = Constant
- $\beta$  = Coefficient
- RE = Renewable energy
- RW = Recycled Waste
- BL = Environmental cost

**4. DATA ANALYSIS AND DISCUSSION**

The dependent variable in this study is environmental performance, while the independent variables are renewable energy, recycled waste, and environmental costs. Table 3 shows the descriptive analysis of this study.

The environmental performance of 32 sample companies has the lowest value of 3 (blue rating) and the highest score of 5 (gold rating). The average value of environmental performance is 3.84 with a standard deviation of 0.72. The average value of 3.84 indicates that the average environmental performance of cement, energy and mining companies is in the blue and green ranks.

Based on the output data generated, the minimum value of renewable energy from 32 research samples is 0.00 or 0%. The companies with the lowest values are PT Aneka Tambang Tbk in 2017-2018 and PT Indo Tambangraya Megah Tbk in 2017. Meanwhile, the company with the highest value of 0.41 or 41% is PT

**Table 2**  
**PROPER Assessment**

PROPER Rate	Score	Environmental Performance
Gold	5	Excellent
Green	4	Good
Blue	3	Adequate
Red	2	Poor
Black	1	Very Poor

Source: The Ministry of Environment and Forestry

**Table 3**  
**Descriptive Statistics**

Variable	N	Minimum	Maximum	Mean	Std. Deviation
KL	32	3.0	5.0	3.844	0.7233
RE	32	0.00000	0.40590	0.0933089	0.13422501
RW	32	0.0321	0.9888	0.697347	0.3259760
LN_BL	32	20.89	27.91	25.2267	1.51527

Source: Data Processed, 2022

Vale Indonesia Tbk in 2017. The average value obtained is 0.09 or 9% with a standard deviation of 0.13. The average value shows that the average renewable energy in cement, energy and mining companies is 9%, which means that the implementation of green accounting in the form of renewable energy is still low and not optimal.

The minimum value of recycled waste from 32 research samples is 0.03 or 3%. The company with the lowest recycled waste value is PT Perusahaan Gas Negara Tbk in 2018. Meanwhile, the company with the highest recycled waste value of 0.988 or 99% is PT Bukit Asam Tbk. in 2020. The average value obtained is 0.697 or 70%, with a standard deviation of 0.33. The average value shows that the average recycled waste in cement, energy, and mining companies is 70%, which means that the implementation of green accounting in the form of recycled waste is quite optimal.

The lowest or minimum value of environmental cost from 32 research samples is IDR 20.89 and the highest value of environmental cost is IDR 27.91. The company with the lowest value of environmental cost is PT Semen Indonesia Tbk in 2017. Meanwhile, the company with the highest value of environmental cost is PT Bumi Resource Tbk.

in 2017. The average value of environmental costs is IDR 25.23 with a standard deviation of IDR 1.51527.

Based on table 4, the p-value of Average Path Coefficient (APC) is 0.010. The research model is said to be fit if the p-value  $\leq 0.05$ . Therefore, the model used in this study is declared fit ( $0.01 \leq 0.05$ ).

In this study, multicollinearity can be measured by Average block VIF (AVIF) and Average Full Collinearity VIF (AFVIF). The research model is said to have no multicollinearity if the value of AVIF and AFVIF  $\leq 3$ . Based on table 4, the AVIF value is 1.112 ( $\leq 3.3$ ) and the AFVIF value is 1.274 ( $\leq 3.3$ ). Thus, it can be concluded that multicollinearity does not occur in this study.

Based on table 4, the R-squared value in this study is 0.240, which means that the independent variables of renewable energy, recycled waste, and environmental costs have an influence of 24% on environmental performance while the other 76% are influenced by other factors not discussed in this study.

Q-squared value can indicate whether there is predictive relevance in the research model or not. If Q-squared value  $> 0$ , the model has predictive relevance, but If Q-squared value  $< 0$ , the model has no predictive relevance.

**Table 4**  
**Model Fit and Quality Indices**

Average path coefficient (APC) = 0.324, P=0.010
Average R-squared (ARS) = 0.240, P=0.035
Average adjusted R-squared (AARS) = 0.158, P=0.085
Average block VIF (AVIF)=1.112, acceptable if $\leq 5$ , ideally $\leq 3.3$
Average full collinearity VIF (AFVIF) = 1.274, acceptable if $\leq 5$ , ideally $\leq 3.3$
Tenenhaus GoF (GoF) = 0.490, small $\geq 0.1$ , medium $\geq 0.25$ , large $\geq 0.36$
Simpson's paradox ratio (SPR) = 1.000, acceptable if $\geq 0.7$ , ideally = 1
R-squared contribution ratio (RSCR)=1.000, acceptable if $\geq 0.9$ , ideally = 1

Source: Data Processed, 2022

**Table 5**  
**Q-squared Coefficient**

	Q-square
KL	0.260

Source: Data Processed, 2022

**Table 6**  
**P-Value and Path Coefficient**

Hypothesis	P-Value	Path Coefficient
H1	0.007	-0.380
H2	0.006	0.392
H3	0.113	0.199

Source: Data Processed, 2022



Based on table 5, the Q-squared value is 0.260 > 0. Thus, it can be concluded that this research model has predictive relevance.

GoF can measure the explanatory power of research models. GoF is said to be small if the value is 0.1, medium if the value is 0.25, and large if the value is 0.36. In this study, the GoF value is 0.490 > 0.36. Thus, it can be concluded that the explanatory power of the model is large and acceptable.

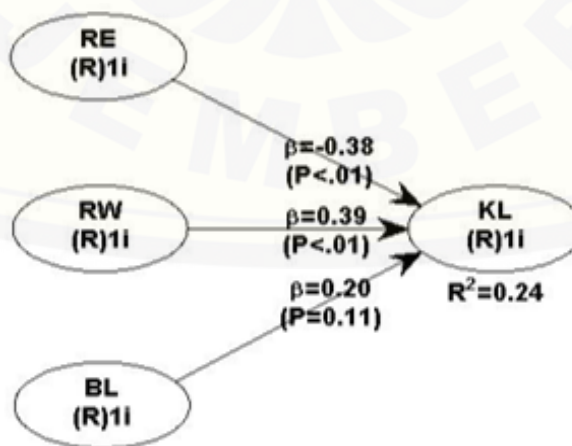
Based on table 6, the path coefficient value of renewable energy (RE) is -0.380. This means that if the RE increases by one unit and other independent variables are assumed to be constant, the environmental performance will decrease by 0.380. The path coefficient value of recycled waste (RW) is 0.392. This means that if the RW increases by one unit and other independent variables are assumed to be constant, the environmental performance will increase by 0.392. The path coefficient value of environmental cost (EC) is 0.199. This means that if the environmental cost increases by one unit and the other independent variables are assumed to be constant, the environmental performance will increase by 0.199. Table 6 also shows that the independent variable with the largest beta coefficient is the recycled waste variable, or 0.392. So, it can be said that the recycled waste variable has the largest influence on the environmental performance of cement, energy, and mining companies in 2017-2020.

**The Effect of Renewable Energy on Environmental Performance**

In table 6 and figure 2, it can be seen that the P-value of renewable energy is 0.007 < 0.05 (significance level of 5%) and the path

coefficient value is -0.380. This indicates that renewable energy has a negative effect on the environmental performance of cement, energy, and mining companies in 2017-2020. So, it can be stated that H1 is not supported. This can happen because the environmental performance assessment used in this study, or PROPER, assesses energy efficiency based on a broad scope. Therefore, even though the company's renewable energy level increases or gets bigger, but if the company's energy efficiency is considered not optimal, it will reduce the company's environmental performance level. In addition, the average renewable energy of cement, energy, and mining companies in this study is only around 9%. Research conducted by Wahyuni et al. (2019) shows the average value of the renewable energy level of mining and energy sector companies is 79.56% and this value indicates that the implementation of green accounting in the form of renewable energy has been carried out optimally. When compared with the level of renewable energy in previous studies, the implementation of green accounting in the form of renewable energy in this study has not been carried out optimally so it has not been able to achieve optimal energy efficiency and this can reduce environmental performance.

This is supported by research conducted by Zulaicha et al. (2020) which states that the development of energy efficiency and consumption of re-newable energy has not been able to reduce CO2 emissions and an increase in the amount of renewable energy does not always reduce CO2 emissions which can have an impact on the environment. In addition, another study conducted by Rudman



**Figure 2**  
**Result of Hypothesis Model**

Source: Data Processed, 2022

et al. (2017) stated that renewable energy which is considered to have a smaller carbon footprint also has an environmental impact where the main impact is caused by the process of making and developing renewable energy technology so that various aspects must be considered. This is also supported by re-search by Quek et al in Pratiwi & Juerges (2020) which states that environmental sustainability from the renewable energy aspect does not only focus on GHG emissions but also a wider scope. According to Fatona (2011), sustainable energy does not only include renewable energy sources such as solar, wind energy, and bio-energy, but is also supported by technology that increases energy efficiency. Therefore, sustainable renewable energy must pay attention to various aspects to be more efficient and improve environmental performance. It is also explained in PROPER that the energy efficiency criteria for beyond compliance includes 4 scopes, namely: Improved energy efficiency of production processes and supporting utilities, an environmentally friendly machine or process replacement, building efficiency, transport system efficiency.

The results of this study are not in line with the results of previous research conducted by Wahyuni et al. (2019). The results of research conducted by Wahyuni et al. (2019) show that renewable energy has a significant positive effect on environmental performance, while in this study renewable energy has a negative effect on environmental performance.

#### **The Effect of Recycled Waste on Environmental Performance**

In table 6 and figure 2, it can be seen that the P-value of recycled waste is  $0.006 < 0.05$  and the path coefficient value is 0.392. This indicates that recycled waste has a significant and positive effect on environmental performance. So, it can be stated that H2 is supported.

The existence of the recycled waste variable indicates that the company has taken into account the level of waste produced, both B3 and non-B3 waste and takes into account the waste that is recycled, reused, sent to third parties, stored, or disposed of directly. Recycled waste will provide physical information in the form of benefits derived from the existence of waste conservation carried out. That way, companies can sustainably optimize waste management efforts and companies can minimize environmental impacts caused by waste. In addition, based

on the results of statistical analysis, the average value of recycled waste for cement, energy, and mining companies is 70%. This shows that the implementation of green accounting in the form of recycled waste is carried out quite optimally because more than 50% of the company's waste has been recycled and reused. Thus, the higher the level of recycled waste will reduce the waste that is disposed of directly to the environment and will indirectly provide benefits, namely reducing the impact of environmental damage. The smaller the environmental impact produced, the more it will improve environmental performance.

The reduced environmental impact of business activity is in line with the theory of legitimacy where the company has paid attention to the environment and obeyed the norms and rules that apply in the community in carrying out its business activities. In addition, green accounting in the form of recycled waste can provide information disclosure on waste management and company environmental performance that is useful for stakeholders to make decisions.

This study is in line with the results of research by Burhany (2014) which states that the implementation of environmental accounting has a positive and significant effect on environmental performance. Companies that implement environmental accounting by doing physical calculations and recording input flows in the form of materials, energy, and costs and outputs, namely waste and energy, will improve their environmental performance (Burhany, 2014). This research is also supported by research by de Oliveira Neto et al. (2016) whose research uses the Clean Production (CP) concept and states that the presence of recycled waste can reduce environmental impacts on abiotic, biotic, water, and air.

#### **The Effect of Environmental Cost on Environmental Performance**

In table 6 it can be seen that the P-value of environmental costs is  $0.113 > 0.05$  and the path coefficient value is 0.199. This indicates that environmental costs have no effect on the environmental performance. So, it can be stated that H3 is not supported.

Based on the definition of environmental costs mentioned above, environmental costs are investments or costs allocated for environmental conservation. Investments, in the Environmental Accounting Guidelines 2002, are described as capital investments



used for environmental conservation and will provide long-term benefits, while expenses or costs are part of all expenditures used by companies for environmental conservation. By calculating these costs, information about the costs incurred and the benefits obtained in the current period can be obtained (Ministry of Environment Japan, 2002).

It can be said that through this concept, environmental costs do not affect environmental performance because the company's environmental costs are classified as long-term investments allocated to the environment. Thus, the impact given on the environment is long-term and has not been able to provide significant benefits to environmental performance in the current period. This is supported by the research of Bartolomeo et al. (2000) which states that environmental investments are often accompanied by long-term impacts and potential improvements are easier to identify if they show short-term values. Identifying environmental costs does not adequately describe the environmental impact. In order to have an impact on the environment, environmental costs must be allocated. In addition, according to Sawitri (2017), environmental costs are divided into 4: prevention costs, detection costs, internal failure costs, and external failure costs. Not all of these cost allocations have a positive impact on the environment, for example, external failure costs. External failure costs are the costs the company incurs for the disposal of the generated waste. That way, the environmental costs incurred can still have an impact on the environment because it is followed by the disposal of waste that can damage the environment.

This study is not in line with the research conducted by Wahyuni et al. (2019) which states that green accounting in the form of environmental costs has a significant positive effect on environmental performance. This study also has different results from research with qualitative methods conducted by Abdullah & Yuliana (2018) which states that disclosing and allocating environmental costs will have a good impact on the company's environmental performance.

## 5. CONCLUSION, IMPLICATION, SUGGESTION AND LIMITATION

### Conclusion

Based on the results of the study, it can be concluded that the implementation of green accounting in the form of renewable energy has a negative effect on the environmental performance of cement, energy, and mining companies. The implementation of green accounting in the form of recycled waste has a significant and positive effect on the environmental performance of cement, energy, and mining companies. Meanwhile, the implementation of green accounting in the form of environmental costs has no effect on the environmental performance of cement, energy, and mining companies.

### Limitation

The limitations of this research are the research data is taken from the sustainability report where the data is less reliable because there is no audit on the company's sustainability report. In addition, the environmental costs in the sustainability report are presented in large numbers and are not categorized based on the concept of environmental costs.

### Suggestion

It is suggested that further research add and use different variables that are not studied in this study, such as waste emissions. That way the variables can explain more broadly the concept of green accounting. In addition, further research can also compare environmental costs with the company's total costs so that a percentage or ratio of environmental costs is obtained from the total costs.

### Implication

The implication of this research is that companies can minimize the environmental impact of operating activities by implementing green accounting so that companies can play a role in achieving a sustainable industry.

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