

## ANALYSIS OF ENVIRONMENTAL MANAGEMENT STRATEGY BASED ON LIFE CYCLE ANALYSIS IN COAL COMPANIES THAT WON PROPER EMAS IN 2019-2021

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### ABSTRACT

*This study aims to determine the limitations and application of life cycle analysis in the mining industry as well as recommendations for innovation programs and strategies in supporting environmental performance improvements that have an impact on the acquisition of “Proper emas”, the role of internal and external stakeholders as well as the relationship to the implementation of ISO 26000, especially the environment, governance and good operating practices and achievement of environmental SDGs indicators number 6,7 12 and 13. The data used in this study consists of primary data from coal mining companies receiving Proper Emas for 2019-2021, secondary data from sustainability reports, and annual reports of the companies studied. The research object was 4 (four) coal companies getting Proper Emas and sample was selected using a purposive sampling method in order to obtain 12 respondents were interviewed. This study uses descriptive qualitative analysis. The results of the study show that the scope limitations on coal mining use cradle to gate and are still limited to midpoint criteria covering only direct impacts such as carbon emissions produced, hot spots in the coal mining industry are material removal, especially the use of heavy equipment and the fuel used. The innovation program focuses on hot spots and has succeeded in significantly reducing carbon emissions. The role of internal stakeholders is the key to success in implementing environmental improvement strategies and successfully having an impact on the implementation of the core subject of ISO 26000 environment, good governance and operating practices, and the achievement of SDGs 6,7, 12, and 13*

**KEYWORDS** *cradle to gate, mid point, hot spot, innovation program, stakeholders, Sustainability competitive advance. Iso 26000, SDGs*



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## INTRODUCTION

Energy is needed in economic activities, both as a direct human need in daily life and in business activities in producing products, both goods and services. Energy is a need for everyone that must be met and there must be a role for the state in its fulfillment and management. In Indonesia, this is regulated in the 1945 constitution article 33 paragraph 3, "Bumi Air and the natural wealth contained therein are controlled by the state and used as much as possible the prosperity of the people and Law (UU) no.30 of 2007 concerning energy.

In addition to having an impact on economic improvement and national resilience, the presence of energy is also very much needed both in its provision, utilization, and management which of course must be carried out in an equitable, sustainable, optimal and integrated manner. However, an important concern is that non-renewable energy has limitations in reserves so that wisdom and strategy are needed in the development of energy resources to be a guarantee of their availability for a long time so that a comprehensive effort and strategy is needed in its management. This is in line with what was conveyed by Ramadani, T (2018) that energy is an important capital in Indonesia's development so that it must be managed responsibly by paying as much attention as possible to the welfare of the community by creating added value in Indonesian society, namely in the form of increasing job opportunities in the energy sector, expanding the energy sector with the discovery and increase of new fossil energy reserves, carry out New and Renewable Energy (EBT) innovations, environmental rehabilitation after mining and conservation of energy-producing natural resources.

Coal, although as a non-renewable energy, is still a vital energy source until now it is also classified as a class A mining material, which is a mining material that has strategic value for Indonesia's security. BP Statistical Review of World Energy (2022) stated that Indonesia occupies the 2nd position as the largest coal producer in the world and in 2021 ESDM also stated that Indonesia is able to produce 610.03 million tons of coal with an increase of 7.3% from 2020 (ESDM, 2022)

Although batubara is an energy security capital for Indonesia, on the other hand, coal also has a pollution impact on the environment if not managed properly, especially a large contributor to greenhouse gases (GHG). As stated by (Syihabuddin & Ruhaeni, 2022), the results of the use of fossil materials such as coal for industrial activities produce harmful gases for the environment, these gases are trapped in the atmosphere causing greenhouse gases (GHG). GHG contributing elements are CO<sub>2</sub>, N<sub>2</sub>O, methane (CH<sub>4</sub>), and Freon (SF<sub>6</sub>, HFC and PFC).

Indonesia is a country that participated in the 1997 Kyoto protocol, which is a joint commitment of countries in the world to stabilize GHG concentrations at harmless levels for the earth's climate system. One of the proofs that Indonesia holds this commitment is that in 2020 Indonesia has succeeded in reducing GHG emissions by 64.4 million tons of CO<sub>2</sub> by utilizing NRE by 53%, implementing 20% energy savings, utilizing 9% environmentally friendly technology and 4% mining reclamation program.

Dua (2) on the impact side of the coal industry, a joint effort from all stakeholders is needed to mitigate how to increase the positive impact of coal energy management and reduce the impact of pollution and pollution, especially greenhouse gas emissions to below the safe threshold.

The Ministry of Environment and Forestry as a regulator and supervisor in the environmental sector has an annual agenda for the company's performance rating assessment program abbreviated as PROPER. This program is a supervision program from the Government to the business world, so Proper is very important for business actors as an image of the company's face in environmental and community management. There are 5 categories that show the level of obedience, namely black, red, blue, green and gold. Since 2019, environmental performance assessments of green and gold candidates are required to conduct environmental assessments using the life cycle analysis (LCA) method.

In the LCA assessment of an industry, clear assessment boundaries are needed. The limitations of LCA in the coal industry are activities before mining, at the time of mining and after mining (reclamation) (Luthfia, A. et al., 2021)

The LCA assessment is closely related to the company's application to ISO 26000, especially on environmental issues, good governance, reasonable operating procedures

The application of LCA results is also related to the company's fulfillment of the SDGs in quantitative and measurable form, especially in goal no. 12, namely responsible consumption and production and no. 13 for handling climate change.

On the other hand, the challenge in implementing LCA is the company's reluctance to follow up and disclose its environmental performance to the public and even if it is published only to certain parties, even though by following up on the results of the LCA and implementing it as a strategy in improving environmental performance, it has an impact on the company's performance and reputation (Chaerul & Allia, 2020)

This condition can be seen from the number of Propernas participants in 2021 there were 2593 participants, 186 managed to achieve green proper 47 companies won gold, 2 gold winners from the coal industry (menlhk.go.id, 2021). From the ranking data, it can be concluded that not many companies have performed environmental and social performance beyond what is required, only less than 10% so that efforts are needed to increase the involvement of all companies so that zero emissions by 2060, which is Indonesia's net zero target, can be realized.

Referring to the potential and problems above, it is important to analyze more deeply related to the efforts that have been made by gold proper recipient companies, especially coal companies in assessing the limitations of the stages of LCA assessment activities as a basis for determining the priority of improvement recommendations that have a major impact on environmental performance, strategies carried out in following up on recommendations so as to get support both internally and externally. and has an impact on the implementation of ISO 26000 as well as the achievement of SDGs, especially on no. 12 (twelve) on responsible consumption and production and no. 13 (thirteen) on handling climate change.

### **Sustainable Development Goals (SDGs) & ISO 26000**

The concept of sustainability began to be echoed since the 1980s. The definition of sustainability is a socio-ecological process that runs simultaneously and continuously and is implemented for a long time. Sustainability is formulated as sustainable development. Since 2015, the sustainability development of goals has been agreed in 17 goals.

One of the important factors in the SDGs is the environment, development conditions until now have not paid special attention to the consequences that development has on the environment. Social and economic development goals must be aligned with environmental development goals in order to create sustainable development. SDGs relating to the environment and biodiversity are in goals 6, 11, 12,13, 14 and 15. The problem in monitoring the fulfillment of this goal is the availability of data (Setyaningsih et al., 2019). The linkage of this research is related to SDGs no. 12, namely responsible consumption and production and no. 13 in handling climate change.

Coal is an export commodity that contributes to the foreign exchange of the Indonesian state and is used for the development and welfare of the Indonesian people. Coal mining business is one of the natural resource management businesses that will run out and cannot be renewed (non-renewable) and has limited operational time depending on reserves so it is very important to implement the concept of environmental management and sustainable community empowerment in this industry. The role of the government must be very strong in the process of monitoring and implementing environmental management following the rules of *good mining practice* (ESDM, 2021)

ISO 26000 is a reference for companies in carrying out Corporate Social Responsibility or corporate social responsibility or organizations in the form of private or public, in developed and developing countries. Through ISO 26000, corporate social responsibility becomes very strong because it does not only focus on community development but includes 7 core subjects, namely organizational governance, human rights, labor practices, the environment, reasonable operating procedures, consumers and engagement, community development (Lelisari et al., 2021). The core issues related to this research are organizational governance, environment, reasonable operating procedures, human rights and consumers.

### **Limitations of LCA Criteria and Application of LCA**

The Indonesian government through the Ministry of Environment and Forestry (KLHK) since 2021 requires coal companies that participate in the proper program to carry out LCA as an environmental instrument. The Indonesian government has implemented ISO 14040:2006 concerning the Life Cycle into the Indonesian National Standard, namely SNI-ISO 14040:2016 made by the National Standardization Agency (BSN).

**This Hitam** category means that the company consciously commits negligence that has an impact on environmental pollution, the **Red** category that the company makes efforts to manage environmental conditions that do not meet the requirements that have been regulated in the law, category **Biru** means that it has fulfilling the requirements of the perundangan, category **Hijau** means that it has carried out environmental management efforts that are beyond the provisions

and carried out community empowerment and category **Emas** adalah the company continuously carries out the best activities in ensuring quality environmental management in the production process of goods/services, has ethics in running a business and has a responsibility to the community. LCA is an acronym for Life Cycle Analysis. LCA is an assessment method used to determine the impact of a process of producing goods or services. Through the LCA study, it can be known the amount of energy consumption used, the potential for waste produced and the potential for contamination. Specifically for LCA coal mining activities, it is carried out in 3 stages, namely the stages of pre-mining, mining and post mining (reclamation) (Luthfia et al., 2021)

The application of LCA is carried out through a life cycle impact assessment (LCIA) which will assess the impact on human health and the environment during the process of making products or services in this case the mining process which consists of 3 stages, namely pre-mining, mining and post mining (Latifah et al., 2020).

Minister of Environment and Forestry Regulation no. 1 of 2021 article 16 states that the company's performance exceeds what is required, including carrying out a life cycle assessment (LCA) at all stages of the company's activities to meet green proper documents in order to reduce environmental impacts in natural resource management, including through energy efficiency, emission reduction, reduction and utilization of B3 waste, non-B3 waste treatment, water efficiency and reduced polluted loads.

The Indonesian Coal Entrepreneurs Association (APBI), on behalf of the association also issued a decree APBI-ICMA no 052 / APBI-ICMA / X / 2021 about the limitation of the scope of LCA Proper in the coal mining industry is from **cradle to gate**, namely from the upstream-core unit process.

The upstream process is Land Clearing, which is the process of clearing land and removing materials such as plants and trees or materials on the surface. The next stage is top soil removal or soil stripping of shoots. The stripping of the topsoil is because the topsoil has a high nutrient content so it needs to be moved and stored in a special area so that it can be reused in reclamation activities. Continued with drilling and blasting. Drilling is overburden drilling, while blasting is blasting for hard materials that cover the covering the overburden. Then Overburden Removal. The process of removing and also cleaning large rocks cover, to prepare a mine pit that is ready to take coal.

The core process (core / gate) that is carried out is Coal Getting, a coal mining process that is carried out directly without blasting after removing cover rocks using backhoe-type heavy equipment. Next is Coal hauling, which is the transportation of raw coal using a dumptruck to the Coal Preparation Plant or Wash Plant. Continued Coal crushing, which is the process of breaking coal from large sizes to small sizes so that it can be used in the next process. The tool for the breakdown of such coal is a crusher. Next is supporting activities included in utilities, such as backfilling and reclamation activities, mining utility, wastewater treatment plants, and office operations and workshops. And the last one for core activities is distribution activities from coal crushing to barges in the Coastal Estuary with barging activitiesba tubara to barges

As for the Downstream Process, it consists of coal distribution activities from Muara Pantai to countries that are consumers of the company and the process of using coal products as raw materials for electricity production by consumers, both domestic national consumers and multinational countries (abroad).

In the LCA study, in general there are 2 types of impact categories, namely midpoint categories, categories of impacts that arise directly on the environment, for example the onset of gases. The second category is endpoint categories, namely indirect impacts, for example, tamb ang activities have the potential to have further effects on the biotic environment, abiotic and human health (Luthfia et al., 2021)

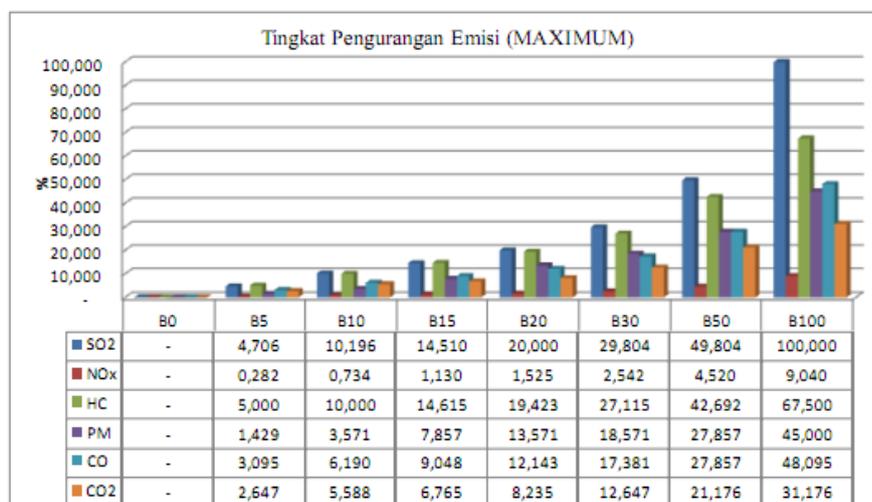
### LCA Recommendations

The potential impact of each mining activity, namely pre-mining, mining and post-mining, has different results. The difference is the basis for the company to focus on the activities that contribute the highest emissions or in scientific terms it is to produce the highest hot spots. (Mahmud et al., 2022).

The recommendations resulting from the use of the LCA method are used as positive input for companies and regulators, namely the Ministry of Environment and Forestry. It is very important that companies know the environmental performance of each part of the production process that will be used as a basis in determining management decision interventions for sustainability improvement (Valero & Van Reenen, 2019), (Roychoudhury & Khanda, 2016)

According to (Wijono, 2017) that the use of biodiesel has an effect on improving environmental quality from the impact of transportation activities and it is predicted that the mixture of B30 biodiesel is the one that produces the most significant positive impact because the price of raw materials is cheap and does not require changes in vehicle engines that use this type of biodiesel such as changing rubber / vehicle gaskets. The impact on emission reduction is also very influential with the use of B30 will reduce the influence of SO<sub>2</sub> and HC emissions by 30%, PM and CO by 20%, 13% CO<sub>2</sub> and 3% NO<sub>2</sub>.

**Figure 1**  
**Biodiesel Blend Emission Reduction Diagram**



Source: Wijono, A (2017)

### **LCA Recommendation Implementation Strategy**

Strategy is an effort of a person or organization in meeting the targets set with the aim of achieving victory from a competition. According to (Hanna et al., 2016), the strategy made by the company is an output of management's reliability in organizing and developing the company. Management is given the responsibility of making something suitable for the company to survive in the business for the long term through the steps taken so that it is able to compete sustainably (sustainability competitive advances). According to F Hanna, 2016 in (Wheelen & Hunger, 2012) that strategy in organizations is divided into 3 levels, namely:

1. Corporate strategy, this is a strategy created by the highest policy setters that is long-term in nature and has an impact on the company and investment directly
2. Business strategy, is the level of strategy in a business unit. Strategies are made by management at the business unit level but must obtain approval or be in line with the corporate strategy.
3. Functional strategy, a strategy carried out on business functions such as production functions, research and development, employment functions. Strategies at this level focus on implementation strategies

Knowledge Management is a variable of resources based view for the purpose of sustainability competitive advances. Knowledge management is a way to get fit purpose knowledge for someone who is right and the right time so that it has an impact on increasing company excellence and competitiveness. H current management knowlegeis cultivated and carried out in a planned manner (Runyan et al., 2007)

According to (Yogaswara & Sari, 2022), the MOEF program that encourages companies to organize environmental management with information instruments is the Company Performance Rating Assessment Program (PROPER), the meaning of the word Proper refers to the MoEF Regulation no. 3 of 2014 and has been amended in the Minister of Environment and Forestry Regulation no. 1 2021 regarding the evaluation of compliance and performance exceeding compliance with business and/or activity liability in the field of pollution and/or environmental damage control and management of hazardous and toxic waste. In the Minister of Environment and Forestry Regulation no. 1 2021, there are 2 new things, namely companies that have been declared as green and gold candidates are required to include an environmental LCA report and a social innovation LCA report. Carrying out impact management efforts from the basic material stage (the cradle), the production process until the product is used by consumers and produces waste (the grave). Become a pioneer in producing environmentally friendly goods/services, limiting as little energy use as possible, reducing water use, emissions, waste and conducting biodiversity conservation and conservation efforts (KLHK, 2021).

### **Setting the Role of stakeholders in implementing strategies - Legitimacy Theory & stakeholders**

Stakeholders are those who have a direct relationship with the company and are internally and outside the company that have an impact on the company's existence (Simbolon et al., 2022).

Information disclosure through voluntary reporting is included in other perspectives of legitimacy theory, stakeholder theory and institutional theory (Deegan, 2010). According to (Afifah & Immanuela, 2021), transparency of company information is very important in order to avoid communication barriers so that the company can support all stakeholders in running the company's wheels. This theoretical approach is important because it is system-based on the consideration that the company as an influential party and that affects the environment (Gray et al., 1996)

### **Previous research**

Research on LCA has been conducted by several researchers previously are (Handayani & Hanaseta, 2022) examines the role of LCA assessments of tin mining companies in obtaining Green Proper, the result is that the acquisition of Green Proper because it has carried out LCA assessments from the mining process to production.

(Mardiana & Wuryani, 2019), the study focused on environmental performance factors against company value with profit power as a coding variable and the results showed that company performance has a good effect on company value.

The LCA assessment of coal-fired power plants in Tidore focuses on coal delivery activities to coal-fired power plants and the results are information on field data on the impact of coal transportation activities and suggestions for improving the environmental performance of coal-fired power plants (Mahfud, 2012).

(Luthfia et al., 2021) also conducted research on how the results of the LCA assessment were used for the selection of technology to reduce the impact of mining activities on carbon emissions.

(Ciroth et al., 2019) examines the importance of data quality in LCA assessments and provides an understanding of the needs, requirements, priorities of challenges faced in generating LCA databases.

(Miras-Portugal et al., 2017) analyzed the success factors of LCA implementation, one of which is the development of human resources as LCA practitioners who conduct LCA assessments to obtain accurate data to then be used as a basis for recommendations for improvements or strategies to reduce the impact of emissions in an activity.

## **RESEARCH METHOD**

Research design. This study uses a qualitative approach to analyze life cycle analysis based environmental management strategies in gold proper recipient companies in 2019-2020 because researchers want to see the impact of using LCA criteria on proper assessments conducted since 2019 on environmental improvement carried out by 4 gold proper recipient companies both in terms of governance, innovation and sustainability strategies using replication research Handayani, L., & Hanaseta, E., (2022) examines the role of LCA assessments of tin mining companies in obtaining Green Proper but modified on gold proper recipient coal mining companies.

Sampling method. Samples were taken from coal companies that implemented the LCA method in environmental performance appraisal. The object studied was 4 coal mining companies receiving gold proper from 2019-2021, supporting information from regulators, the Indonesian Coal Entrepreneurs Association (APBI) and the LCA consultam. With details, 2 GM people, 4 managers, 4 LCA implementation teams, 1 regulator, 1 APBI administrator and 2 LCA consultants. The determination technique using purposive sampling is to determine the criteria for sources / samples based on certain criteria, namely those who know the problems and information that researchers need, among others, the resource person knows to understand and carry out the mechanism for implementing the LCA assessment in the company environment, understands the company's performance and the direction of the company's environmental policy, a service period of more than 2 years at the company

The research variables consist of limitations, application and recommendations of the LCA as well as the role of stakeholders and the linkage to ISO 26000 and environmental SDGs, especially in no. 12, namely responsible consumption and production and no. 13 regarding climate change.

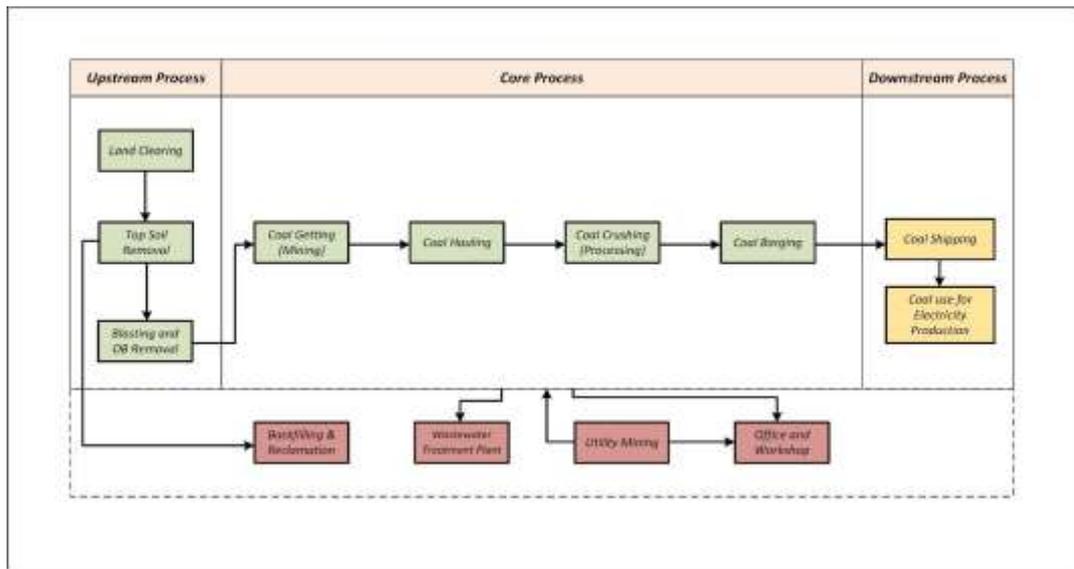
Data Collection Methods. Data collection by collecting data and information in detail by utilizing a variety of relevant data methods including: in-depth interviews, literature studies and field observations.

Analysis Methods. The analysis method in this study uses content analysis (content analysis) (Hsieh 2005).

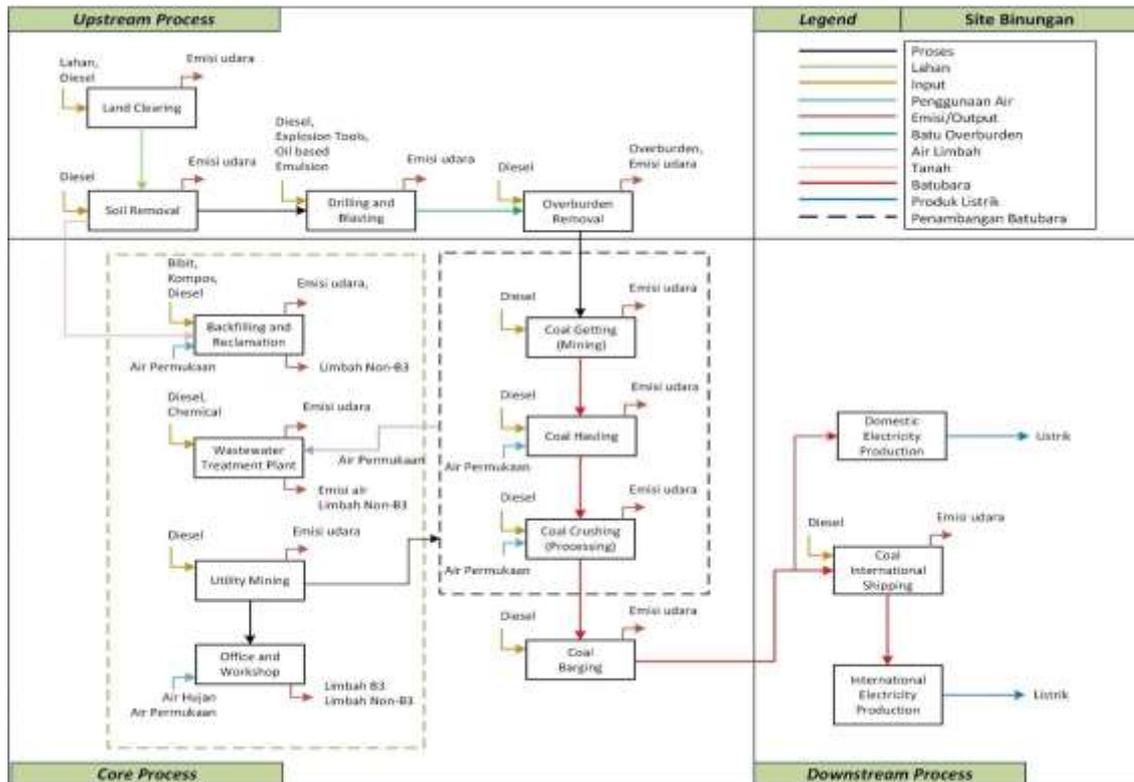
## **RESULT AND DISCUSSION**

### **Limitations of LCA Criteria & their application in the coal industry**

The criteria limits of the 4 companies all use pre-mining, mining and post-mining. The 4 companies are mining businesses that have been operating for more than 20 years so that the entire process has been carried out, namely from exploration activities, land clearing, mining to the rehabilitation of land that has been completed mining has been carried out. However, in the 4th LCA restriction, companies follow more of the provisions of the Minister of Environment and Forestry Regulation no. 1 of 2021 that restrictions in LCA assessment can go through processes from cradle to grave, cradle to gate and gate to gate very much depends on the process carried out by the company whether processing materials from upstream to downstream (end to consumer) or only producing raw materials so that only on the criteria of cradle to gate. The role of the Association in making such provisions is critical to the similarity of the stages of assessment in the same industry. For the coal industry, the Indonesian Coal Entrepreneurs Association (APBI) in 2020 and 2021 issued a decision to limit LCA on the mining industry, yes it is Cradle to gate. This provision is the basis for the assessment of the 4 companies studied, but among the 4 companies there is 1 company doing up to the limit of cradle to grave because in the business process not only coal mining also to the provision of electricity through coal-fired power plants to consumers. In this assessment, it was found that there are limitations or stages of LCA assessment in the mining industry, namely:



**Figure 2**  
**Coal industry Cradle to Gate Limitations**



**Figure 3**  
**Impact of emissions on the Cradle to Gate stage of the coal industry**

In the 4 (four) companies studied, it was found that almost the same business processes were applied consisting of activities that were in the upstream process (upstream / cradle), there was a core process (core / gate) and there was a downstream process (downstream / grave).

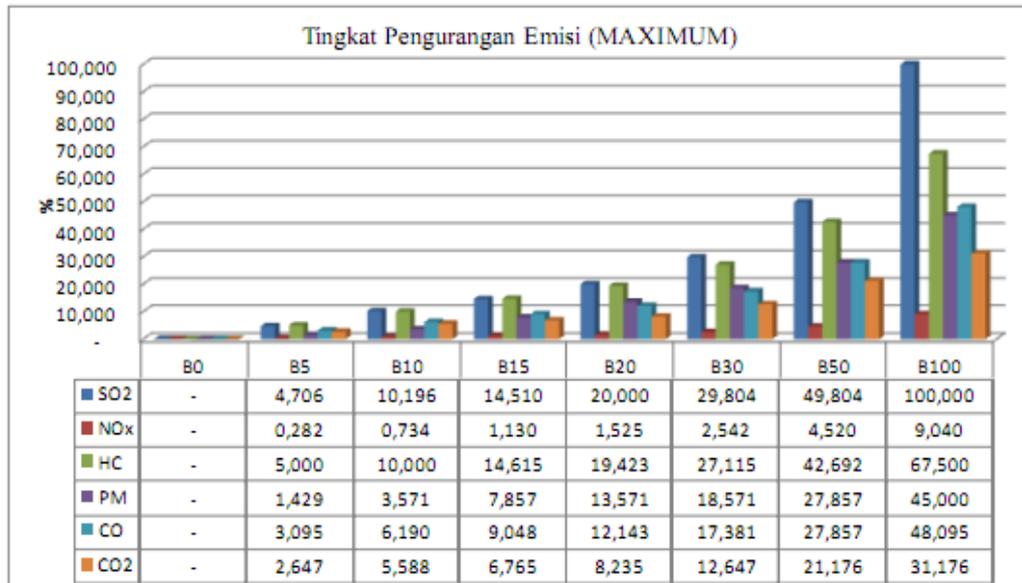
The results of the LCA assessment from the 4 (four companies) resulted in the overburden removal (OB removal) stage, namely in core activities (core / gate) is the highest contributing to the impact of carbon emissions. This happens because of the highest use of heavy equipment and fuel at this stage. The high Streaving Ratio (SR) in the company studied also caused the highest at this stage because it had an impact on heavy equipment and fuel activities.

The application of LCA from the 4 (four) companies all refers to the midpoint category, namely the impact of activities on carbon emissions (CO<sub>2</sub>, SO<sub>2</sub>, CH<sub>4</sub>). In accordance with the Minister of Environment and Forestry of the Republic of Indonesia no. 1 of 2021 yang is not an illustration of the missed threshold value of safety and risk, so it does not predict the endpoint category, namely the impact on human health.

**LCA Recommendations**

The highest carbon emissions are produced at the **material removal** stage so that program innovation focuses on transportation activities and transportation equipment. Of the overall LCA recommendations in 4 (four) companies studied, they focused on recommendations for the use of environmentally friendly fuels, namely using B30 fuel so that they could reduce carbon emissions produced quite significantly. From the research of Wijono A (2017) that with the use of B30, it has the potential to reduce carbon emissions, especially in SO<sub>2</sub> and HC emissions of 30%, PM and CO 20%, 13% CO<sub>2</sub> and 3% NO<sub>2</sub>.

The following is an overview of emission reductions when using biodiesel with a picture of a significant reduction in carbon emissions at the level of use of B100 vegetable fuels.



Source: Wijono, 2017

Optimization Transport vehicles are also the next choice in the 4 companies because they are considered the most significant in fuel use efficiency and naturally have an effect on reducing carbon emissions.

The use of NRE, namely solar power in supporting facilities, is the next choice in the 4 companies studied. The use of NRE in supporting operational areas ranges from 10-15%, namely in office facilities not yet in the main unit of mining operations.

The disclosure of innovations that have been carried out in improving environmental performance, especially the decrease in global warming, is a contributor to the value in the national process. For 2021 the green candidate threshold limit for the coal group of companies is 410, 50 and the golden candidate threshold limit is 554.90. (KLHK, 2022) . Special assessment for LCA reports with a range of 0-100. So it can be concluded that of the 4 companies have a value above 410.50 all because in 2022 all companies are green proper winners and 2 companies are still in gold candidates.

### **LCA Recommendation Implementation Strategy**

Of the four (4) companies have different strategies for implementing LCA results. This condition depends on the level of strategy chosen by each company. PT A and PT B have a corporate strategy in carrying out the recommendation strategy from the LCA assessment because it has an umbrella policy in ESG governance at the corporate level. For PT C and PT D, they have a business strategy, namely an Environmental Performance policy based on business units. The corporate strategy supports the long-term goals of the corporation with regard to Zero emissions while the business strategy scope is still in the short and medium term goals (1-3 years) which is to implement the LCA recommendations that affect the division's KPIs, one of which is the Achievement of Proper beyond compliance (Green)

According to F Hanna, 2016 in Wheelen & Hunger, 2012, that strategy in organizations is divided into 3 levels, namely corporate strategy, business strategy, functional strategy. The choice of strategy is certainly greatly influenced by.

Knowledge management at each level also determines the chosen policy. If knowledge about the importance of sustainability competitive advantage leads to Environmental, Social, Governance from the corporate level, business unit to functional then the innovation programs designed will get the support of all parties and the overall impact of the corporation including on the reputation of the corporation (Runyan et al., 2007)

### **Role setting of stakeholders**

The most influential role in the implementation of the LCA implementation strategy is internal stakeholders and from the 4 companies studied, companies that bring environmental issues and carbon emissions in the corporate strategy are more measurable in the long term efforts to improve environmental performance and get support from all levels from corporations, business units to operational levels. It is different that raises only on business or functional strategies the impact is given in a limited scope so that support is also limited. The role of regulators is also very decisive in supervising and making clear SOPs in the implementation of LCA assessments. Clear PCR determination in each industry will be very helpful in assessing LCA, recommendations and appropriate strategies for improving environmental performance, especially those related to global warming. The function of the association, namely APBI, is a contributor and facilitator for government agencies for a climate of healthy business competition for investment, including being a facilitator in the socialization of the energy transition and efforts to mitigate global warming and reduce GHG emissions. Some of the problems in the assessment and disclosure of the life cycle (LCA) of coal products include the absence of PCR for the coal mining industry in Indonesia, APBI as an association helps in issuing the scope of boundaries for the mining industry, namely Cradle to gate and this is a reference for all mines that follow proper, especially at the green candidate level.

The role of the LCA consultant will have an impact on companies whose LCA assessment still uses a 3rd party. In this study, there are companies whose LCA assessment is assisted by 3 (three) parties, but there are also those that are carried out independently and it can be seen from the innovations carried out not much different, the whole is the same focus on hot spots.

### **ISO 26000 Implementation Strategy & Environmental SDGs Achievement**

All companies studied have contributed to the achievement of environmental SDGs, namely no. 6,7, 12 and 13 and implemented ISO 26000 related to environmental core subjects, good governance and operating procedures. By running the LCA and disclosed in the green proper document report, based on the Minister of Environment and Forestry Regulation no. 1 of 2021 that the data is used by the Indonesian government in this case LHK as an LCI database managed by BPPT to assist the domestic industry in fulfilling environmental requirements. This is in line with the SDGs which have become a global concern, especially towards

SDGs goal no. 7, namely ensuring access to affordable, reliable, sustainable, and modern energy for all, goal 12 which is to ensure sustainable consumption and production patterns and goal 13 which is to take immediate action to combat climate change and its impacts. LCA can be used as a measuring tool for achieving the SDGs because the LCA can assess the consumption of raw materials and energy, emissions and waste produced. LCA is a baseline data for obtaining Environmental Product Declaration documents. It is of very high importance for the business world, especially mining, considering that global trade trends already require environmentally friendly product certificates so that the role of LCA is a determining factor so that local products can compete in the global and international markets.

## CONCLUSION

Based on the description of the analysis and discussion in this study, the following conclusions can be drawn:

All companies use 2 (two) LCA assessment criteria in their mining business activities, namely based on the business process of obtaining from pre-mining, mining, post mining and cradle to gate and cradle to grave limits, based on the Minister of Environment and Forestry Regulation No. 1/2021 concerning Proper and APBI decree no. 052 / APBI-ICMA / X / 2021 related to the limitation of the scope of proper LCA in the coal mining industry for coal products with function unit 1 Tons of coal for the cradle to gate process, while in the cradle to grave process, a function unit scenario is used based on electrical products made from coal by consumers, namely electric kWh. The application of LCA is still in the mid point category (Global warming Potential) not yet in the endpoint category (human health)

All companies studied have the highest carbon emissions produced at the material removal stage so that program innovations focus on transportation activities and transportation equipment. All LCA recommendations for all companies focus on recommendations for the use of environmentally friendly fuels, namely using B30 fuel so that it can reduce carbon emissions produced quite significantly.

The strategy of implementing LCA recommendations in 2 companies uses a corporate strategy and has a road map for achieving zero emissions by 2050. As for the other 2 companies still in the unit business strategy, the downward planning is carried out every year and there is no zero emission road map

All the companies studied by internal stakeholders have a clear commitment to support carbon emission reductions even in the 2 companies the commitments expressed in the sustainability report. The role of internal stakeholders is crucial in the implementation of LCA recommendations, especially at the highest decision-making level internally. The role of external stakeholders, namely the Ministry of Environment and Forestry as regulators and supervisors, provides regulatory certainty and rules for LCA assessment and provides information on the performance of environmental improvements that have been implemented and have a national impact. The role of the Association is important in determining

the Product Categories Rules so that in the assessment there are the same standards in the coal industry. The role of consultants is important if the company still uses third parties (3) in the LCA assessment.

All companies studied have contributed to the achievement of environmental SDGs, namely no. 6,7, 12 and 13 and implemented ISO 26000 related to environmental core subjects, good governance and operating procedures. By running the LCA and disclosed in the green proper document report, based on the Minister of Environment and Forestry Regulation no. 1 of 2021 that the data is used by the Indonesian government in this case LHK as an LCI database managed by BPPT to assist the domestic industry in fulfilling environmental requirements.

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