Planning Of Sharing Wall At Iup Boundaries As A Strategy For Coal Conservation And Compliance With Mining Regulations

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Abstract.

Coal mining activities in adjacent Mining Business Permit (IUP) areas often face technical challenges at pit boundaries. Conventional double-wall pit designs generally lead to pit losses at border zones, increased overburden volume, and higher stripping ratios, resulting in reduced mining efficiency and suboptimal utilization of coal reserves. Meanwhile, Indonesian mining regulations—Law No. 3 of 2020 in conjunction with Law No. 4 of 2025, Government Regulation No. 96 of 2021, and Ministerial Decree of Energy and Mineral Resources (Kepmen ESDM) No. 1827 K/30/MEM/2018—emphasize the obligation to conserve mineral and coal resources through efficient and optimal mine planning. This study aims to evaluate the planning of sharing wall (joint boundary slope mining) at IUP boundaries as a strategy for coal conservation and regulatory compliance. The research methods include analyzing existing double-wall designs, developing an alternative sharing wall model, recalculating overburden volume, coal reserves, stripping ratio, and pit loss potential, and assessing technical results against conservation regulations. The case study was conducted at the boundary of PT Merapi Energy Coal's IUP in Lahat Regency, South Sumatra. The analysis results show that implementing the sharing wall design results in a 70 million bcm deviation in overburden volume, an increase in stripping ratio from 5.39 to 5.94 bcm/ton, and an additional 11.8 million tons of recovered reserves compared to the double-wall design. This strategy supports resource conservation principles as stipulated in Kepmen ESDM No. 1827 K/30/MEM/2018, particularly regarding pit loss reduction and coal recovery optimization. Therefore, sharing wall planning not only enhances technical and economic efficiency but also strengthens compliance with national mining conservation regulations.

Keywords: *Sharing wall; coal conservation; mining regulation; stripping ratio and pit loss.*

I. INTRODUCTION

Resource conservation in the mineral and coal sector represents a strategic mandate within Indonesia's national mining management policy. Regulatory frameworks such as Law No. 3 of 2020 on Mineral and Coal Mining, Government Regulation No. 25 of 2024, and Ministerial Decree No. 1827 K/30/MEM/2018 emphasize the need for efficient resource utilization and reduction of reserve loss (pit loss) through sustainable mine planning practices(Direktorat Jenderal Mineral dan Batubara, 2020). In practical operations, conventional double-wall pit design systems along the boundaries of Mining Business Permits (IUP) often generate technical issues, such as excessive overburden movement, elevated stripping ratios, and the occurrence of coal losses in boundary zones. These conditions reduce operational efficiency and resource recovery, thus requiring alternative design approaches that are more adaptive to conservation principles.

One emerging concept is the sharing wall, a combined pit slope system between two adjacent mining concessions. This approach has demonstrated improved efficiency in coal recovery and conservation by minimizing pit loss and maximizing resource utilization(Cao et al., 2023; Lubis, 2019).However, the correlation between sharing wall implementation and Indonesia's national conservation policy has not been widely studied in an integrated manner. Most previous studies emphasize the geotechnical or design optimization aspects without establishing a clear connection to the official conservation policies stipulated in PP No. 25 of 2024 and technical directives from the Directorate General of Mineral and Coal (Wicaksono & SB, 2021). Therefore, this study aims to evaluate the planning and implementation of sharing wall designs at IUP boundaries as a strategy for coal resource conservation and regulatory compliance, using a case study of PT Merapi Energy Coal, located in Lahat Regency, South Sumatra.

II. METHODS

This study was conducted within the boundary area of PT Merapi Energy Coal (MEC), located in Lahat Regency, South Sumatra. The site was selected due to its proximity to an adjacent IUP, providing an appropriate setting to apply the sharing wall design as a strategy for resource conservation.

Data Used :

Topographic and geological maps
Existing (double-wall) and alternative (sharing wall) pit designs
Overburden and coal volume data from both designs
Relevant mining and conservation regulations [1]–[3]

Analysis Steps

1. Existing condition analysis – Calculating the overburden volume, coal reserves, stripping ratio, and pit loss for the double-wall design.
2. Alternative pit design development (sharing wall) – Constructing a shared boundary pit by merging slope geometries using rock stability parameters derived from the Rock Mass Rating (RMR) method (Cao et al., 2023)
3. Technical comparison – Evaluating deviations in volume, stripping ratio, and coal recovery between the existing and alternative designs (HARDIMAN, 2024)
4. Regulatory and conservation evaluation – Mapping technical results against conservation standards specified in Kepmen ESDM 1827/2018 and Dirjen Minerba Decree 182.K/2020 (Pandjaitan et al., 2023; Wicaksono & SB, 2021)

Each stage employs a **comparative mining design approach**, contrasting the baseline (existing pit) with the optimization model (*sharing wall*) to evaluate its efficiency in both technical and regulatory contexts.

III. RESULT AND DISCUSSION

Coal Conservation Regulations in Indonesia

The regulatory framework for mineral and coal resource conservation in Indonesia is based on three fundamental pillars: technical efficiency, reserve optimization, and resource loss control. Law No. 3 of 2020 mandates that each IUP holder must conduct resource conservation activities, while Government Regulation No. 25 of 2024 reinforces this obligation through mining planning and conservation reporting mechanisms (Peraturan Pemerintah Republik Indonesia Nomor 25 Tahun 2024 Tentang Perubahan Atas Peraturan Pemerintah Nomor 96 Tahun 2021 Tentang Pelaksanaan Kegiatan Usaha Pertambangan Mineral Dan Batubara, 2024) Ministerial Decree No. 1827 K/30/MEM/2018 and Director General Decree No. 182.K/2020 further provide detailed technical guidelines on implementing conservation programs, including the management of marginal reserves, reduction of pit loss, and optimization of ultimate pit limits (Direktorat Jenderal Mineral dan Batubara, 2020). These align with the findings of Pandjaitan (2023) and Nasir et al. (2023), who state that resource conservation is not merely a technical activity but also an element of regulatory compliance and sustainable mining governance (Nasir et al., 2023; Pandjaitan et al., 2023).

The Concept of Sharing Wall

The sharing wall concept is a technical design approach in which two adjacent IUPs jointly utilize a single pit slope, as opposed to the conventional double-wall configuration that separates the pits of each company. By integrating pit boundaries, the sharing wall method optimizes resource recovery and minimizes unmined reserves along concession limits (Lubis, 2019)**.**Technically, the implementation of a sharing wall has been shown to reduce overburden volume and improve recovery rates by 10–30%, depending on pit geometry and rock structure conditions (Cao et al., 2023; Sdvyzhkova et al., 2024). PERHAPI (2022) supports this approach, emphasizing that the sharing wall project represents a tangible form of coal resource conservation aligned with the good mining practice principles defined in Ministerial Decree No. 1827/2018.

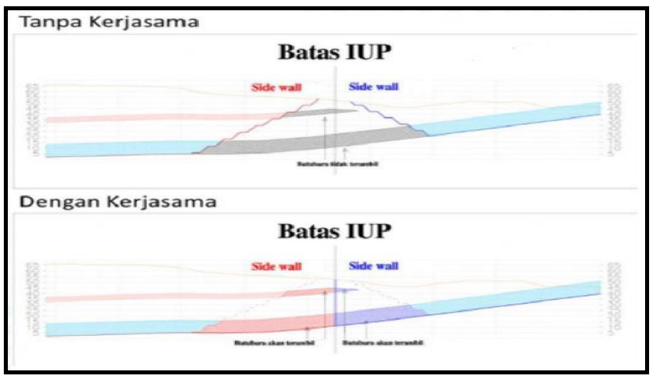

Fig 1. *Sharing Wall Concept*

Resource Conservation in Coal Mining

Resource conservation in mining involves systematic efforts to minimize reserve losses (pit loss) and maximize coal recovery through optimized mine design and economic reassessment (Wicaksono & SB, 2021). An essential aspect of conservation is the management of marginal reserves—previously uneconomic reserves that can become viable through technological advancements and updated economic parameters. Wicaksono and Waterman (2021) emphasized that marginal reserve estimation serves as a key indicator of conservation effectiveness since it reflects the efficiency of coal utilization. Within this context, sharing wall acts as a physical mechanism for exploiting previously inaccessible boundary reserves that were limited by administrative constraints.Studies by Seprizal (2025) and Rifandy et al. (2025) further support that optimizing pit limits using the Break Even Stripping Ratio (BESR) method expands the economically minable area while enhancing resource conservation efficiency. Therefore, sharing wall implementation directly aligns with marginal reserve policies and improved recovery factors(Jhony Maxi Harjadi et al., 2025; Seprizal et al., 2025).

Existing Conditions

Analysis of the current pit indicates an overburden volume of 30 million bcm, a coal reserve of 5.7 million tons, and a stripping ratio of 5.39 bcm/ton. This ratio remains higher than the average optimal value for mid-depth coal seams in South Sumatra ((Setiawan et al., 2023). The findings reveal that the current pit configuration is not yet optimized for minimizing reserve losses along the concession boundary. The observed pit loss of approximately 8–10% of total mineable reserves aligns with Wibowo & Rachman (2019), who reported similar inefficiencies in uncoordinated boundary mining under the double-wall system.

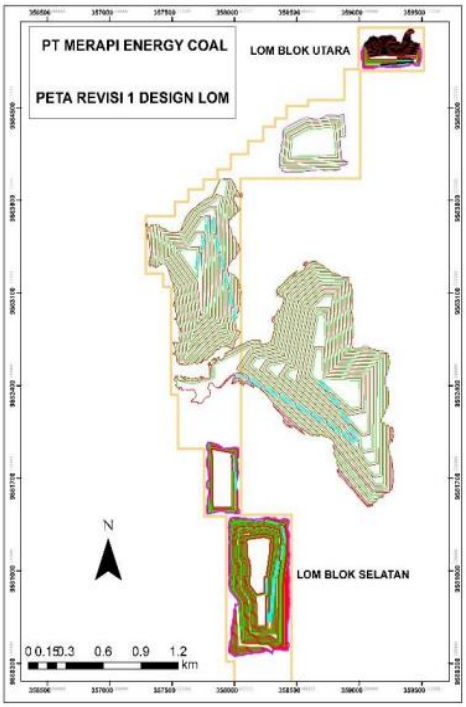

Fig 2. Design LOM without *Sharing Wall*

Alternative Sharing Wall Design

The sharing wall model significantly altered the pit geometry. The overburden volume increased to 104 million bcm, while coal reserves rose to 17.5 million tons, resulting in an average stripping ratio of 5.94 bcm/ton. Coal recovery improved by approximately 307% compared to the baseline scenario.Although the stripping ratio slightly increased, the overall mining economics remained favorable because the gain in coal production outweighed the additional excavation cost. These results confirm the findings of Herry Lubis & Sihombing, who observed that sharing wall implementation enhances resource utilization and reduces losses through coordinated boundary pit development (Lubis, 2019).Furthermore, the modified geometry expanded the recoverable marginal reserves near the pit boundary—supporting the conservation recommendations by (Wicaksono & SB, 2021). This indicates that sharing wall serves not only as a technical innovation but also as a physical manifestation of coal conservation efforts under regulatory compliance.

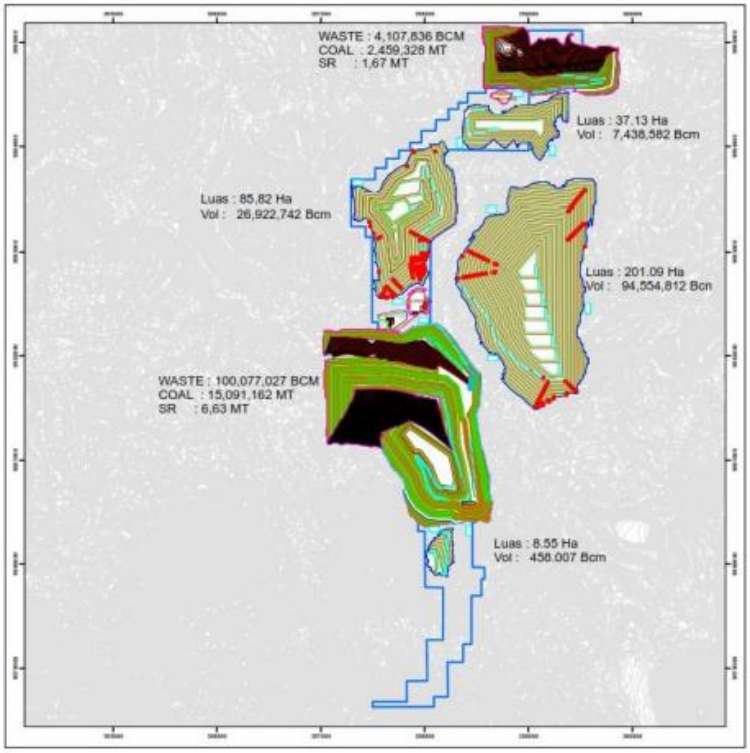

Fig 3. LOM Design Sharing Wall

Coal Conservation Analysis

Table 1. Volume *Reserve LOM Sharing Wall Deviation*

PT MERAPI ENERGY COAL									
PERHITUNGAN RESERVE DESIGN LOM BY MINESCAPE 5.7									
LOM	BLOK SELATAN			BLOK UTARA			TOTAL		
	WASTE (BCM)	COAL (TON)	SR	WASTE (BCM)	COAL (TON)	SR	WASTE (BCM)	COAL (TON)	SR
R0	100,077,027	15,091,162	6.63	4,107,836	2,459,328	1.67	104,184,863	17,550,490	5.94
R1	29,398,449	4,813,706	6.11	1,399,857	904,295	1.55	30,798,307	5,718,001	5.39
DEVIASI	-70,678,577	-10,277,456	6.88	-2,707,979	-1,555,033	1.74	-73,386,556	-11,832,489	6.20
PERCENTAGE	29%	32%	92%	34%	37%	93%	30%	33%	91%

As presented in Table 1. *Reserve Volume Deviation of LOM Sharing Wall*, the alternative pit design resulted in notable conservation efficiency improvements. The recovery factor increased from 85% to 94%, while reserve losses (pit loss) decreased by nearly 50%.This improvement demonstrates successful compliance with the conservation principles defined in Ministerial Decree No. 1827/2018 and Dirjen Minerba Decree 182.K/2020. Similar outcomes were reported by Seprizal (2025) and ULM Geosapta (2024), who validated the use of BESR optimization as an indicator of conservation performance (Putri et al., 2024). From an environmental standpoint, the sharing wall design also reduces disturbed land area due to the elimination of redundant slope zones, consistent with ecological efficiency concepts highlighted by (Bandyopadhyay & Maiti, 2022; Deng et al., 2025).

Regulatory Alignment

Assessment of regulatory conformity confirms that the sharing wall approach satisfies the conservation principles mandated by Law No. 3/2020, Government Regulation No. 25/2024, and Ministerial Decree No. 1827/2018. These regulations require efficiency in mining operations and strict control of resource losses, both of which are achieved through shared-boundary mining systems.This approach also supports the objectives of Indonesia's Grand Strategy for Mineral and Coal (Direktorat Jenderal Mineral dan Batubara, 1 C.E.), which promotes integration, efficiency, and cooperation among mining stakeholders. Rahman (2025) emphasizes that collaborative boundary management improves governance and reduces duplication of mining activities (Rahman et al., 2025).Therefore, the sharing wall concept can be recognized as a policy-supported conservation instrument that bridges technical, economic, and legal dimensions of mining operations.

Strategic Discussion

Strategically, the sharing wall concept offers long-term benefits for both mining companies and regulators. Technically, it improves coal recovery efficiency and optimizes concession boundary utilization. From a governance standpoint, it fosters inter-company collaboration under good mining practice principles, minimizing boundary disputes and data inconsistencies (Nasir et al., 2023; PERHAPI, 2022).Additionally, the concept contributes to Indonesia's broader sustainability agenda. By reducing duplicate slopes and minimizing disturbed areas, land-use impact can be lowered by up to 10–15%, supporting the low-impact mining initiative promoted by the Ministry of Energy and Mineral Resources (Direktorat Jenderal Mineral dan Batubara, 1 C.E.). This underlines that conservation in mining extends beyond reserve management, encompassing land efficiency and environmental integrity (Heditama et al., 2025).

IV. CONCLUSION

The sharing wall design applied at the boundary of PT Merapi Energy Coal increased coal recovery efficiency by 307% compared to the double-wall configuration, improving the recovery factor from 85% to 94%. The implementation aligns with the conservation principles stipulated in Ministerial Decree No. 1827/2018 and Government Regulation No. 25/2024, fulfilling good mining practice standards through reduced pit loss and optimized pit limits. The sharing wall concept represents a strategic conservation mechanism that enables collaborative boundary mining among IUP holders in Indonesia.

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