

DAFTAR PUSTAKA

- [1] D. Corio *et al.*, *Energi Indonesia: Masalah dan Potensi Pembangkit Listrik dalam Mewujudkan Kemandirian Energi*, Cetakan 1. Yayasan Kita Menulis, 2023.
- [2] J. Aleluia, P. Tharakan, A. P. Chikkatur, G. Shrimali, and X. Chen, “Accelerating a clean energy transition in Southeast Asia: Role of governments and public policy,” *Renewable and Sustainable Energy Reviews*, vol. 159, May 2022, doi: 10.1016/j.rser.2022.112226.
- [3] Y. Ding, D. Mallapragada, S. Patel, and R. J. Stoner, “Repurposing Coal Power Plants into Thermal Energy Storage for Supporting Zero-carbon Data Centers,” in *2024 IEEE Power & Energy Society General Meeting (PESGM)*, IEEE, Jul. 2024, pp. 1–5. doi: 10.1109/PESGM51994.2024.10688708.
- [4] PT PLN (Persero), *Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) PT PLN (Persero)*. Jakarta, 2021. Accessed: Jan. 02, 2026. [Online]. Available: <https://web.pln.co.id/statics/uploads/2025/06/RUPTL-2021-2030.pdf>
- [5] Y. Ding, D. Mallapragada, and R. J. Stoner, “The role of coal plant retrofitting strategies in developing India’s net-zero power system: A data-driven sub-national analysis,” *Energy for Sustainable Development*, vol. 86, Jun. 2025, doi: 10.1016/j.esd.2025.101687.
- [6] D. Chattopadhyay, “Coal Plant Retirement and Repurposing Optimization Model,” *IEEE Access*, vol. 12, pp. 194122–194132, 2024, doi: 10.1109/ACCESS.2024.3519457.
- [7] Kementerian ESDM RI, *Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 10 Tahun 2025 tentang Peta Jalan (Road Map) Transisi Energi Sektor Ketenagalistrikan*. Jakarta, 2025. Accessed: Jan. 07, 2026. [Online]. Available: <https://jdih.esdm.go.id/dokumen/download?id=2025pmesdm10.pdf>
- [8] X. Zhang *et al.*, “Immediate actions on coal phaseout enable a just low-carbon transition in China’s power sector,” *Appl. Energy*, vol. 308, Feb. 2022, doi: 10.1016/j.apenergy.2021.118401.
- [9] X. Zhang *et al.*, “Research on the Impact of Coal Power Economy on Power Supply Guarantee Based on Carbon Emission Dual Control,” in *2024 3rd International Conference on Energy, Power and Electrical Technology, ICEPET 2024*, Institute of Electrical and Electronics Engineers Inc., 2024, pp. 347–352. doi: 10.1109/ICEPET61938.2024.10625866.
- [10] C. Nedopil, L. Ang, M. Carpio, and M. Yue, “Can investors benefit from the early retirement of coal plants: A plant-level analysis of Chinese-sponsored coal stations in Vietnam and Pakistan,” *Energy Policy*, vol. 193, Oct. 2024, doi: 10.1016/j.enpol.2024.114291.

- [1] A. Fatana, Sarjiya, and L. Multa Putranto, "Perencanaan Pengembangan Pembangkit Sistem Muna-Buton dengan Mempertimbangkan Sistem Interkoneksi," *Jurnal Nasional Teknik Elektro dan Teknologi Informasi* |, vol. 11, no. 3, pp. 208–214, Aug. 2022.
- [12] A. Moreira, D. Pozo, A. Street, and E. Sauma, "Reliable Renewable Generation and Transmission Expansion Planning: Co-Optimizing System's Resources for Meeting Renewable Targets," *IEEE Transactions on Power Systems*, vol. 32, no. 4, pp. 3246–3257, Jul. 2017, doi: 10.1109/TPWRS.2016.2631450.
- [13] V. Oree, S. Z. Sayed Hassen, and P. J. Fleming, "Generation expansion planning optimisation with renewable energy integration: A review," Mar. 01, 2017, *Elsevier Ltd.* doi: 10.1016/j.rser.2016.11.120.
- [14] K. Karunanithi, S. Saravanan, B. R. Prabakar, S. Kannan, and C. Thangaraj, "Integration of Demand and Supply Side Management strategies in Generation Expansion Planning," 2017, *Elsevier Ltd.* doi: 10.1016/j.rser.2017.01.017.
- [15] O. M. Babatunde, J. L. Munda, and Y. Hamam, "Renewable Energy Technologies for Generation Expansion Planning: a fuzzy modified similarity-based approach," in *2019 IEEE 2nd International Conference on Renewable Energy and Power Engineering*, IEEE, 2019, pp. 216–220.
- [16] B. Han, H. Li, and S. Wang, "Robust spinning reserve scheduling for power systems incorporating building energy flexibility by considering load rebound," *J. Energy Storage*, vol. 114, Apr. 2025, doi: 10.1016/j.est.2025.115910.
- [17] A. A. Adeyemo, F. Marra, and E. Tedeschi, "Sizing of energy storage for spinning reserve and efficiency increase in isolated power systems within a data-driven stochastic unit commitment framework," *J. Energy Storage*, vol. 111, Mar. 2025, doi: 10.1016/j.est.2024.115051.
- [18] A. Aharwar, R. Naresh, V. Sharma, and V. Kumar, "Unit commitment problem for transmission system, models and approaches: A review," Oct. 01, 2023, *Elsevier Ltd.* doi: 10.1016/j.ejpsr.2023.109671.
- [19] R. S. Sari, Sarjiya, and L. M. Putranto, "Realizing National Targets through Generation Expansion Planning: A Transition Energy Case Study of Java-Bali Power System, Indonesia," in *Proceedings of the International Conference on Electrical Engineering and Informatics*, Institute of Electrical and Electronics Engineers Inc., 2024, pp. 130–135. doi: 10.1109/IConEEI64414.2024.10747999.
- [20] B. C. Erbas, N. Manych, K. P. Gallagher, and R. Bhandary, "Sustainability Premium for the Early Retirement of Coal Plants with Evidence from Indonesia," *Global Development Policy Center*, Oct. 2024, [Online]. Available: www.bu.edu/gdp

- [21] N. Maamoun *et al.*, “Identifying coal plants for early retirement in India: A multidimensional analysis of technical, economic, and environmental factors,” *Appl. Energy*, vol. 312, p. 118644, Apr. 2022, doi: 10.1016/J.APENERGY.2022.118644.
- [22] R. J. Davis, J. S. Holladay, and C. Sims, “The Drivers of Coal Generator Retirements,” *Holladay RJDJS*, 2022.
- [23] Tumiran, L. M. Putranto, Sarjiya, F. D. Wijaya, A. Priyanto, and I. Savitri, “Generation Expansion Planning Based on Local Renewable Energy Resources: A Case Study of the Isolated Ambon-Seram Power System,” *Sustainability 2022, Vol. 14, Page 3032*, vol. 14, no. 5, p. 3032, Mar. 2022, doi: 10.3390/SU14053032.
- [24] Tumiran, L. M. Putranto, Sarjiya, and E. Y. Pramono, “Maximum penetration determination of variable renewable energy generation: A case in Java–Bali power systems,” *Renew. Energy*, vol. 163, pp. 561–570, Jan. 2021, doi: 10.1016/j.renene.2020.08.048.
- [25] R. J. Davis, J. S. Holladay, and C. Sims, “Coal-Fired Power Plant Retirements in the United States,” *Environ. Energy Policy Econ.*, vol. 3, pp. 4–36, Jan. 2022, doi: 10.1086/717217.
- [26] N. Maamoun, R. Kennedy, X. Jin, and J. Urpelainen, “Identifying coal-fired power plants for early retirement,” *Renewable and Sustainable Energy Reviews*, vol. 126, p. 109833, Jul. 2020, doi: 10.1016/J.RSER.2020.109833.
- [27] G. Shrimali and A. Jindal, “Cost-benefit analysis of coal-plant repurposing in developing countries,” *SSRN Electronic Journal*, Sep. 2020, doi: 10.2139/SSRN.3646443.
- [28] B. M. Kefford, B. Ballinger, D. R. Schmeda-Lopez, C. Greig, and S. Smart, “The early retirement challenge for fossil fuel power plants in deep decarbonisation scenarios,” *Energy Policy*, vol. 119, pp. 294–306, Aug. 2018, doi: 10.1016/J.ENPOL.2018.04.018.
- [29] R. Lueken, J. Apt, and F. Sowell, “Robust resource adequacy planning in the face of coal retirements,” *Energy Policy*, vol. 88, pp. 371–388, Jan. 2016, doi: 10.1016/J.ENPOL.2015.10.025.
- [30] N. A. Sepulveda, J. D. Jenkins, F. J. de Sisternes, and R. K. Lester, “The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation,” *Joule*, vol. 2, no. 11, pp. 2403–2420, Nov. 2018, doi: 10.1016/j.joule.2018.08.006.
- [31] P. Härtel and M. Korpås, “Demystifying market clearing and price setting effects in low-carbon energy systems,” *Energy Econ.*, vol. 93, p. 105051, Jan. 2021, doi: 10.1016/J.ENERCO.2020.105051.

- [32] C. F. Heuberger, I. Staffell, N. Shah, and N. Mac Dowell, “A systems approach to quantifying the value of power generation and energy storage technologies in future electricity networks,” *Comput. Chem. Eng.*, vol. 107, pp. 247–256, Dec. 2017, doi: 10.1016/J.COMPHEMENG.2017.05.012.
- [33] International Energy Agency, “Accelerating Just Transitions for the Coal Sector Strategies for rapid, secure and people-centred change,” Dec. 2023. [Online]. Available: www.iea.org
- [34] International Energy Agency, “World Energy Outlook 2024,” 2024. [Online]. Available: www.iea.org/terms
- [35] Fiscal Policy Agency Ministry of Finance Republic of Indonesia, “CIF Accelerating Coal Transition (ACT): Indonesia Country Investment Plan (IP),” 2022.
- [36] A. J. Wood, B. F. Wollenberg, and G. B. Sheblé, *Power Generation Operation and Control*, Third. United States of America: IEEE, 2014.
- [37] J. Zhu, *Optimization of Power System Operation*, Second. United States of America: IEEE Press series on power engineering, 1961.
- [38] “Technology Data for the Indonesian Power Sector,” Jakarta, Mar. 2024.
- [39] T. W. Adi, *Ekonomi Energi Ketenagalistrikan dan Efisiensi*, Cetakan I. Malang: CV. Literasi Nusantara Abadi, 2024.
- [40] D. Corio *et al.*, *Perencanaan dan Operasi Sistem Tenaga Listrik*, Terbitan Pertama. Lampung : ITERA Press, 2023.
- [41] I. Renewable Energy Agency, “Power system flexibility for the energy transition, Part 1: Overview for policy makers,” 2018, Accessed: Dec. 21, 2025. [Online]. Available: www.irena.org
- [42] B. Y. Adhinegara, M. Saleh, N. Huda, and L. Monica, *Antisipasi Dampak Ekonomi Pensiun Dini PLTU Batu Bara Studi Kasus pada PLTU Cirebon-1, PLTU Pelabuhan Ratu dan PLTU Suralaya*. Jakarta: CELIOS (Center of Economic and Law Studies) dan Yayasan Indonesia CERAH, 2024.
- [43] International Energy Agency’s Directorate of Sustainable Energy Policy and Technology, “Tracking Clean Energy Progress,” France, 2012. [Online]. Available: www.iea.org/etp
- [44] R. Billinton and R. N. Allan, *Reliability Evaluation of Power Systems*, 2nd ed. New York: Plenum Press, 1996.
- [45] P. Kundur, *Power System Stability and Control*. R.R. Donnelley & Sons Company, 1994. Accessed: Dec. 13, 2025. [Online]. Available: [https://dl.poweren.ir/downloads/PowerEn/Book/2019/Jun/Power%20System%20Stability%20and%20Control%20-%20Prabha%20Kundur%20\(PowerEn.ir\).pdf](https://dl.poweren.ir/downloads/PowerEn/Book/2019/Jun/Power%20System%20Stability%20and%20Control%20-%20Prabha%20Kundur%20(PowerEn.ir).pdf)



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BATU BARA TERHADAP BIAYA
PEMBANGKITAN DAN KEANDALAN SISTEM**

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- [46] H. Muhammad Bintang, *Making Energy Transition Succeed: A 2023's Update on The Levelized Cost of Electricity and Levelized Cost of Storage in Indonesia*. Jakarta: Institute for Essential Services Reform (IESR), 2023.
- [47] A. Bahar, M. Yasirroni, Sarjiya, and M. I. B. Setyonegoro, "Photovoltaic Penetration with MILP Method and Technical Minimum Loading Consideration," *Jurnal Nasional Teknik Elektro dan Teknologi Informasi*, vol. 12, no. 1, pp. 22–28, Feb. 2023.