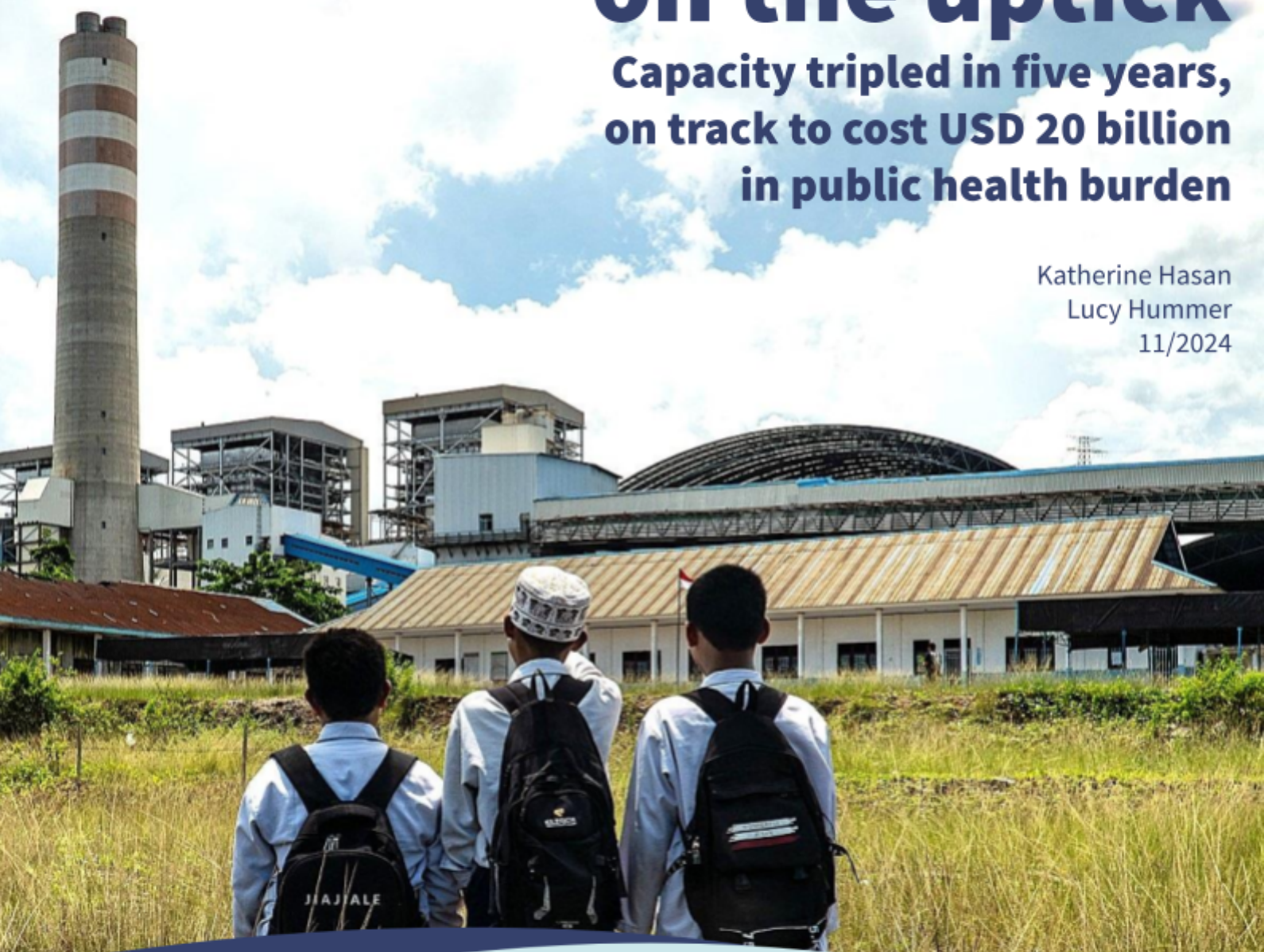


# Indonesia's captive coal on the uptick

**Capacity tripled in five years,  
on track to cost USD 20 billion  
in public health burden**

Katherine Hasan  
Lucy Hummer  
11/2024



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## **Indonesia's captive coal on the uptick**

Capacity tripled in five years, on track to cost USD 20 billion in public health burden

**8 November 2024**

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“Captive coal close to public school in IMIP”

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## About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research, and evidence to support the efforts of governments, companies, and campaigning organisations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the keys to successful policies, investment decisions, and advocacy efforts. CREA was founded in Helsinki and has staff in several Asian and European countries.

## About GEM

Global Energy Monitor (GEM) develops and shares information on energy projects in support of the worldwide movement for clean energy. By studying the evolving international energy landscape, and creating databases, reports, and interactive tools that enhance understanding, GEM seeks to build an open guide to the world's energy system.

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# Indonesia's captive coal on the uptick

Capacity tripled in five years, on track to cost USD 20 billion in public health burden

## Key findings

- Captive coal power in Indonesia is showing no signs of slowdown since CREA and GEM's [last report](#) in 2023 – between July 2023 and 2024, the country's coal power generation has seen a 15% increase totalling 7.2 GW, out of which 4.5 GW was captive, nearly double that of coal for the national grid.
- Combined with the 132 units of operational captive coal fired power plants (CFPPs) totaling 15.2 GW, proposals would put total captive coal capacity at 26.2 GW. To illustrate scale, this is nearly equal to the total coal power capacity of Poland (28.5 GW) or Vietnam (27.2 GW), and greater than all of Australia's (22.9 GW) in 2023.
- Major additions of CFPPs in the pipeline are attributed to Indonesia's metals processing industry. While nickel is a critical metal for EVs and batteries, captive coal plants are among the most carbon-intensive routes to meet this demand.
- Under the current [nickel industry's](#) growth trajectory and without strengthened emission standards, air pollution from coal-based smelters and associated captive coal-fired power plants would cause 5,000 deaths and cost USD 3.42 billion in economic burden in 2030. Beyond nickel, the exclusion of [captive CFPP retirement](#) from a nationwide 2040 coal phase-out target would result in an additional 27,000 deaths and USD 20 billion in economic costs from cumulative health impacts.
- Showing a proactive stance on global climate partnerships like the Just Energy Transition Partnership and being blessed with abundant renewables potential, Indonesia has the capability to pivot from captive coal and become a leader in industrial decarbonisation.
- What's more, the financial benefits of new and renewable energy far outweigh those of remaining reliant on coal – by 2025, solar-storage Levelized Cost of Electricity in Indonesia with preferential financing is projected to be USD 0.01 cents per kWh cheaper than coal. In the next decade, pricing will be even better, with the cost difference anticipated to be even larger at over USD 0.03 cents per kWh.
- In anticipation of the JETP Secretariat's release of Indonesia's captive power landscape mapping, national and global stakeholders will be presented with a collective opportunity. Inclusion of captive CFPP retirement in Indonesia's national plan would not only support the government's energy transition and climate targets, but would also garner interest for clean energy investments.

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# Indonesia's coal capacity jumps by 7.2 GW — new captive capacity nearly doubles that of national grid

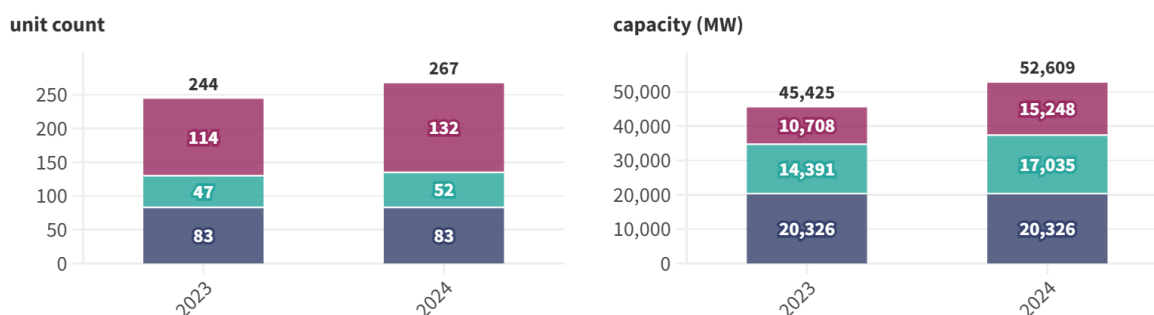
This briefing aims to provide an understanding of the current scale and significance of captive coal power in Indonesia along with key developments that occurred within the past year. References to 2023 values are made against a previously published CREA and GEM analysis, '[Emerging captive coal power: Dark clouds on Indonesia's clean energy horizon](#)'. The comparison is made between the Global Energy Monitor's [Global Coal Plant Tracker \(GCPT\)](#) releases in July 2023 and July 2024, and supplemental data on coal-fired power plants with capacity below 30 MW in the national aggregates.

There has been a 15% increase in Indonesia's national coal-fired power generation capacity over the past year, from 45,425 MW in 2023 to 52,609 MW in 2024. The dataset shows no change for coal-fired power plants (CFPP) owned by PLN, while 2,644 MW of new capacity came online within the past year from CFPPs owned and operated by the IPPs. Higher coal capacity addition at 4,540 MW comes from off-grid power generation – referred to as captive power – owned by industrial or commercial users and dedicated for direct on-site industrial application. Figure 1 provides the summary of these changes by unit counts and capacity.

## National overview of Indonesia's coal power generation capacity by ownership

By unit count and power generation capacity between 2023 and 2024

■ Utility, PLN ■ Utility, IPP ■ Off-grid, Captive

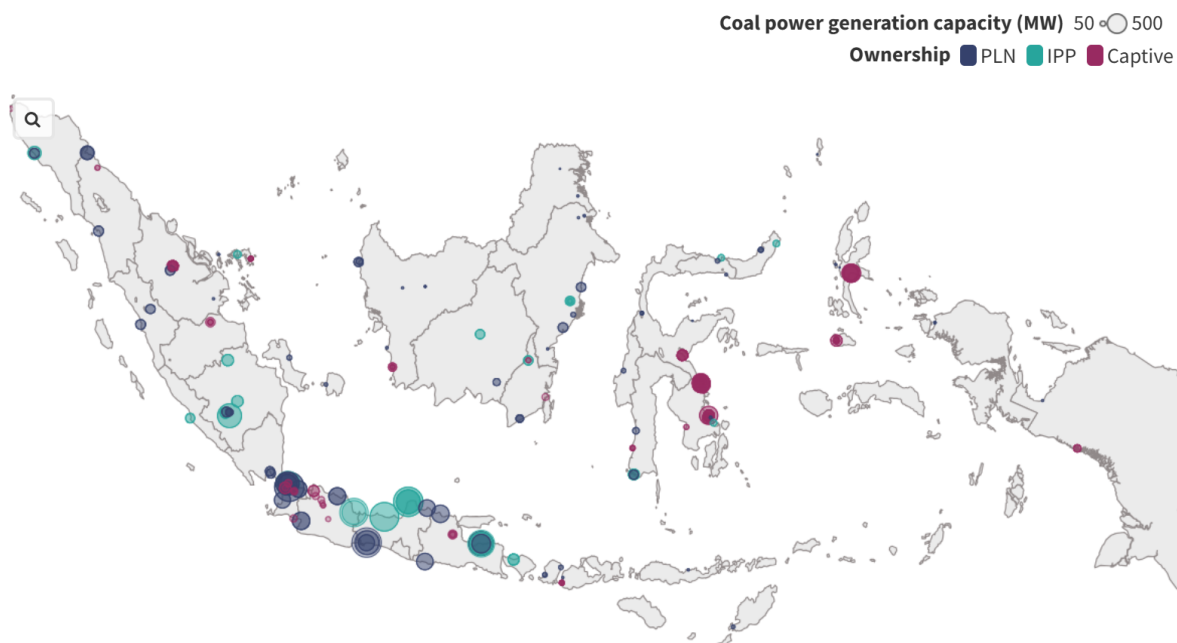


Source: Global Energy Monitor, Global Coal Plant Tracker

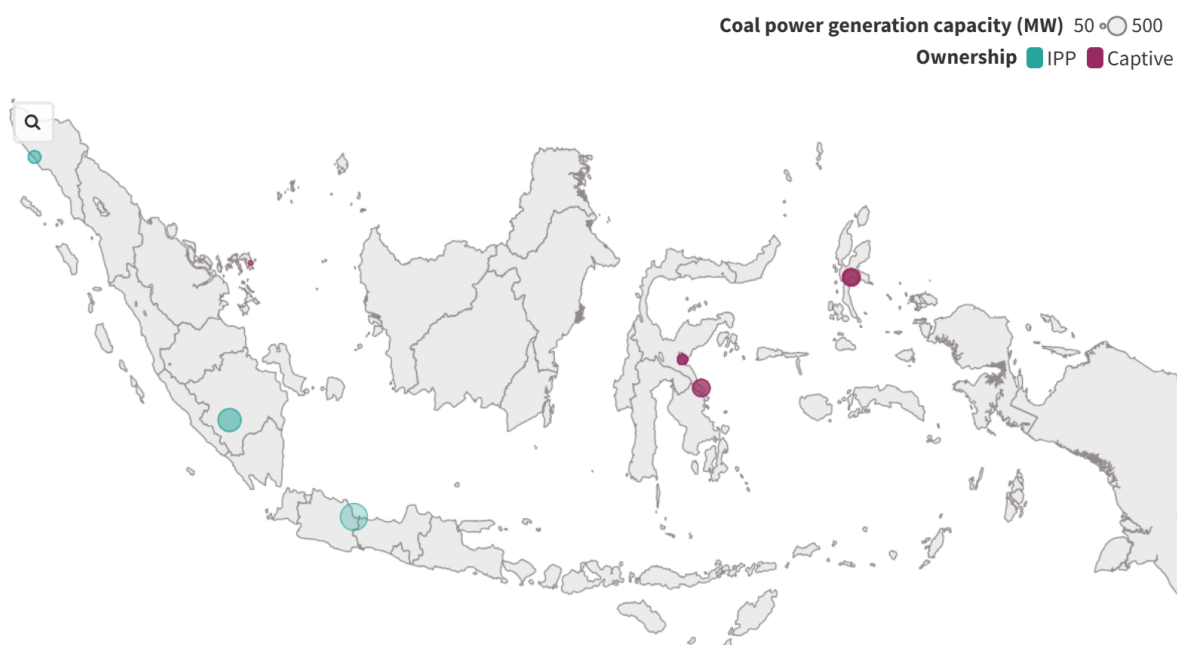
**Figure 1.** Shares between utility and captive coal power generation by unit count and generation capacity in MW for 2023 and 2024

## National distribution of coal power generation capacity across Indonesia

Operational per July 2024



Capacity addition between July 2023 and July 2024



Source: Global Energy Monitor, Global Coal Plant Tracker

**Figure 2.** Distribution map of operational CFPPs as of July 2024 (top), and only the new additions between July 2023 and July 2024 (bottom)

Figure 2 shows the capacity scale of the currently operating units and their distribution across the country. The majority of operational, on-grid CFPPs are located in Java, and the remaining units are spread across Sumatra and Kalimantan. Captive power is mainly centred near the nickel processing industrial areas in Sulawesi and Maluku islands, but other capacities can also be found across Java, Sumatra, and Kalimantan. Newly operating CFPPs can be found in eight locations, namely West Java, South Sumatra, and Aceh for new on-grid CFPPs, and Central Sulawesi, North Maluku, and Riau for additions of captive coal power.

Additional on-grid, IPP-owned CFPPs include **Jawa-1/Cirebon-2 (one 924 MW unit), Sumsel-8 (two 660 MW units), and Nagan Raya (two 200 MW units).**

- [Jawa-1/Cirebon-2 \(Cirebon Unit 2\)](#) in Cirebon, West Java has a 924 MW production capacity. The power plant is reported to have started operations in August 2023 as part of the Cirebon power station complex, which now has a total capacity of 1.6 GW combined with Cirebon-1 (Cirebon Unit 1), which has 660 MW capacity (GEM, 2024b).
- [Sumsel-8 Unit 1 and 2](#) in Muara Enim, South Sumatra, began commercial operations in October 2023 as part of the Bangko Tengah power station. Despite the original plan to supply electricity to Java through an undersea cable system, the supply is being diverted to meet power demands in Sumatra (GEM, 2024a).
- [Nagan Raya Unit 3 and 4](#) is located in Nagan Raya, Aceh, with operations noted to have started in 2023 in June and December, respectively. With these additions, the Nagan Raya power station complex can now reach 620 MW generation capacity (GEM, 2024f).

Newly operating captive CFPPs are hosted in two industrial areas located in Morowali, Central Sulawesi, **Delong Industrial Park (six 135 MW units) and Sulawesi Labota Power Station (four 380 MW units)**; one industrial area located in Weda, North Maluku, **Indonesia Weda Bay Industrial Park (IWIP) (five 380 MW units and one 250 MW unit)**; and one in Bintan, Riau, **Nanshan Industrial Park (two 30 MW units).**

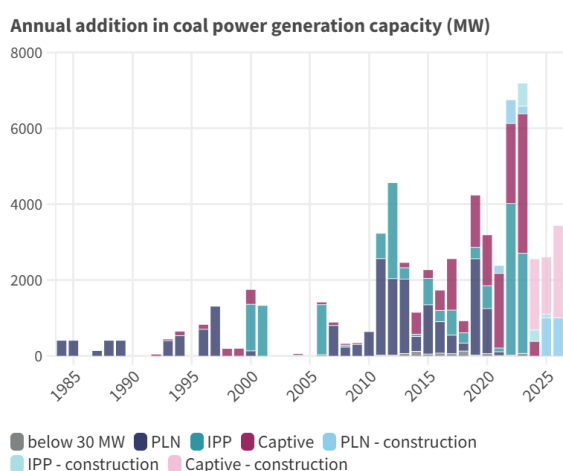
- [Delong Nickel Phase III Unit 02, 03, 04, 05, 06, and 07](#) are part of a 2.3 GW power generation complex, which now has an operating capacity of 945 MW, with the remaining 1,350 MW still in construction (GEM, 2024c). The entire complex is dedicated to the **nickel** smelting processes done by PT Gunbuster Nickel Industry with an annual production capacity of 1.8 million tonnes of **ferronickel**.

- [Sulawesi Labota Unit 5, 6, 7, and 8](#) operations bring the current operating capacity of the Sulawesi Labota power station to 1.9 GW (GEM, 2024i). The total planned capacity is nearly 3.4 GW, and the remaining forthcoming capacity is currently in the construction phase. While the power supply from this complex is likely routed to multiple **nickel** smelting companies, these four units are presumed to be directly linked to PT Sulawesi Mining Investment, which is noted to have an annual production capacity of 0.3 million tonnes of **Nickel Pig Iron (NPI)** and 1 million tonnes of Stainless Steel Slab.
- [Weda Bay Unit 5, 7, 8, 9, 10, and 11](#) are part of a 4.54 GW captive coal power complex, powering **nickel** processing within the Weda Bay power station (GEM, 2024l). With these new additions, 3.4 GW capacity has become operational. The remaining 1.14 GW is shown to have started construction this year. Unit 5 is noted to be linked to PT Huayue Nickel Cobalt's operation, producing 115 thousand tonnes of **Mixed Hydroxide Precipitate (MHP)**. Unit 7 is powering PT Sunny Metal Industry's **NPI** production, with an annual capacity of 400 thousand tonnes. Unit 8 and 9 is linked to PT Angel Nickel Industry, notably having 380 thousand tonnes of **ferronickel (FeNi)** annual production capacity. Unit 10 and 11 are owned by PT Indonesia Weda Bay Industrial Park, the managing company of the industrial park that also owns and manages power generation for the tenants.
- [Nanshan Industrial Park Phase I, Unit 5 & 6](#) are located in Nanshan Industrial Park in Bintan, Riau, dedicated to **aluminium** processing (GEM, 2024g). PT Bintan Alumina Indonesia, initially announced a plan to build a 2.9 GW coal power complex, to power 2 million tonnes of alumina annual production. However, based on recent developments dated September 2022, PLN is reported instead to act as the electricity provider, meeting annual capacity of 300 MW in 2026, 500 MW in 2027, and 1,300 MW by 2050. With this, the first phase is presumably the only phase that will be developed for the project, with a total operating captive capacity of 180 MW, reported to currently power an annual production of 250 thousand tonnes of **Smelter Grade Alumina (SGA)**.

## Industrial captive coal demand on track to double by 2026

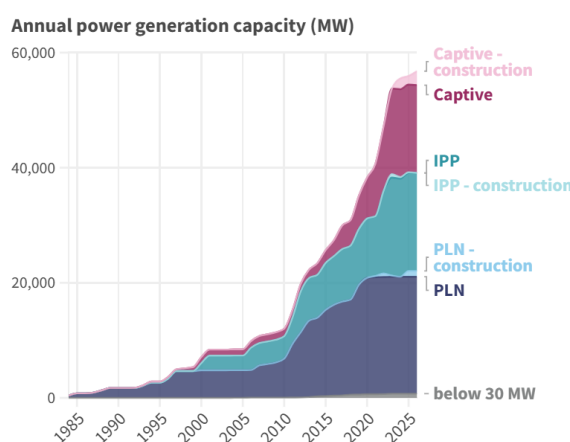
The trajectory of the currently operating and projected coal power generation capacities from the utility providers, PLN and IPPs, and the off-grid captive industrial and commercial users are illustrated in Figure 3.

### Year-on-year additions



Source: Global Energy Monitor, Global Coal Plant Tracker

### National coal power capacity over the years



Note: Projected additions included in the totals



**Figure 3.** Capacity trends over the years in Indonesia's coal power generation - annual additions (left) and national total operating capacity (right)

A rapid increase can be observed between 2010 and 2020 in the on-grid capacity, mostly PLN's, followed by that of the IPPs. While additions for the utilities are substantial at over 6.6 GW across a two-year span between 2022 and 2023 (mainly from the IPPs), growth is expected to decline in the coming years, with only 2.4 GW of new capacity lined up to 2026.

On the other hand, captive coal power has been showing significant growth, particularly since 2019. Indonesia's total operating captive coal power has tripled in just five years, from 5.7 GW in 2019 to 15.2 GW as of July 2024 and an expected capacity of 17.1 GW by the end of the year.<sup>1</sup> Most importantly, sizable growth is still expected, with a total of 11.04 GW up to 2026, including all units in the construction (5.80 GW), pre-permitted (1.64 GW), and announced (3.60 MW) phases.

<sup>1</sup> 15,248 MW tallied up to July 2024, with a remaining 1,870 MW in additions expected if all projected capacities earmarked for 2024 operations are online.

Once all units operate, Indonesia's captive coal power will reach a total capacity of 26.2 GW. To illustrate scale, this falls in the same range as the total coal power capacity in Poland (28.5 GW), Vietnam (27.2 GW), and Australia (22.9 GW) in 2023 (Ember, 2024).

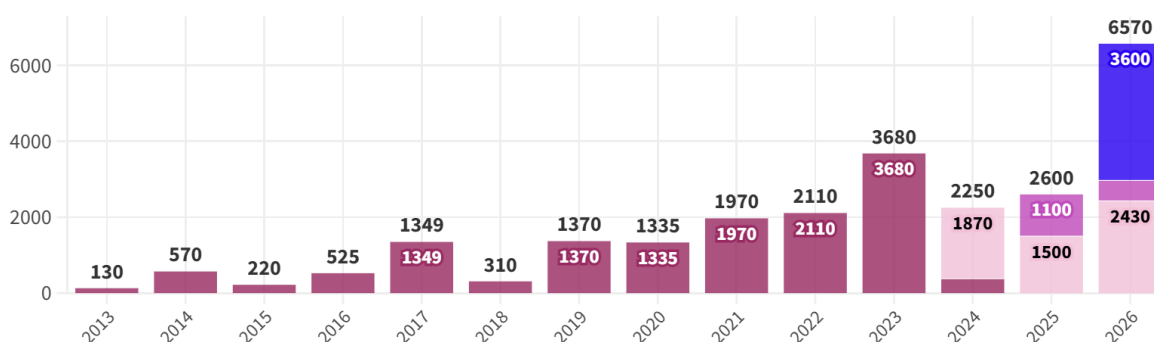
A total of 1.87 GW of additional capacity (7 units) is noted to be in construction at the time of this report's writing, with said capacity expected to be completed by the end of 2024. Beyond these units, an additional capacity of 3.93 GW (14 units) is in construction, of which 1.50 GW (6 units) is earmarked for operation in 2025. What's more, there are five projects (1.64 GW) identified to be in the pre-permitting stage and two projects (3.60 GW) that were recently announced. Most of these five projects are earmarked for 2026.

Figure 4 provides a view of captive coal year-on-year additions – both operating and upcoming – up to 2026. Last year, 2023 (3,680 MW) was markedly the highest year for captive additions since 2017 (1,349 MW). Since then, the trend of year-on-year additions of captive coal power capacity has continued, with a big jump expected in 2026.

### Indonesia's captive coal power, year-on-year additions

■ Captive - operating ■ Captive - construction ■ Captive - pre-permit ■ Captive - announced

Annual addition in coal power generation capacity (MW)



Source: Global Energy Monitor, Global Coal Plant Tracker

**Figure 4.** Annual additions in Indonesia's captive coal power, including projects in the operation, construction, pre-permitted, and announced phases

As outlined in our 2023 analysis, captive coal power in Indonesia is mainly dedicated to powering a select range of energy-intensive industries, with metals such as nickel and aluminium holding major shares, followed by pulp and paper, chemicals, cement, and textiles in descending order. Figure 5 illustrates the sheer magnitude of the captive coal use in industrial activities based on the Ministry of Energy and Mineral Resources' (MEMR)

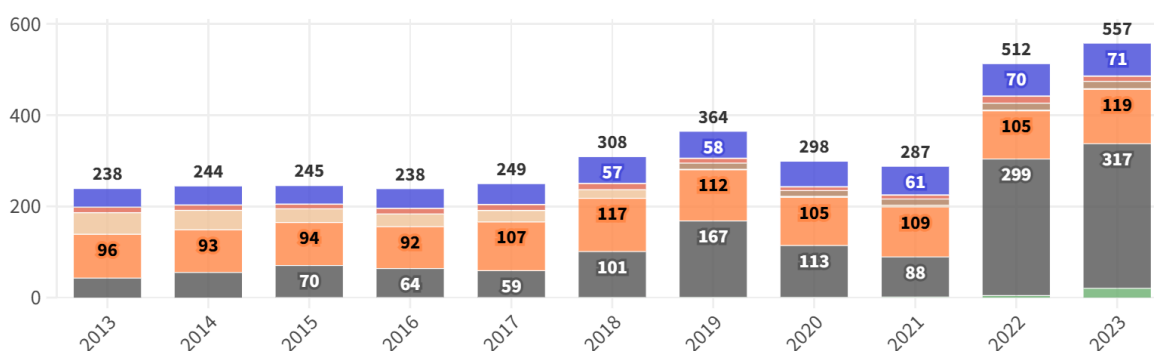
latest release of the Handbook Of Energy & Economic Statistics Of Indonesia (HEESI) for 2023 (MEMR, 2024a).

According to the Handbook, the industrial sector held a 46% share of the national final energy consumption at 557 million barrels of oil equivalent (BOE) in 2023 – a nearly 40 million BOE increase from 2022, and 2.3 times the energy use one decade ago in 2013. Net growth is mainly attributed to coal use at 17.6 million BOE (nearly 40% of the net increase), followed by industrial biomass at 15.9 million BOE (35%), gas at 13.7 million BOE (30%), and lastly a slight increase in biogasoline and electricity use (2%).<sup>2</sup>

### Indonesia's industrial sector final energy consumption

Industrial biomass Direct use of geothermal Coal Briquette Gas Kerosene Gasoil CN48 Biogasoline MDF Fuel Oil LPG Electricity

million barrels of oil equivalent (BOE)



Source: Indonesia Ministry of Energy and Mineral Resources, Handbook Of Energy & Economic Statistics Of Indonesia (HEESI) • Gasoil CN48 - blend of diesel oil and biodiesel with diesel with cetane number 48, limited to 2,500 ppm of sulfur content; MDF - Marine Diesel Fuel



**Figure 5.** Industrial final energy consumption trend by fuel sources, 2013-2023

Indonesia's entire industrial sector consumed nearly 92 million tonnes of coal in 2023, 6% higher than the previous year and nine times the amount used one decade ago in 2013. Currently, there are 132 units of captive CFPPs with a total power generation capacity of 15,248 MW. Linking these values to the captive coal power capacity tallied up to July 2024 (as illustrated in Figure 4), it becomes clear that industrial coal demand will only rise in the coming years, to reach at least double the current demand along with the foreseeable capacity additions through 2026.

<sup>2</sup> Use of Fuel Oil declined in 2023, contributing to -9% of the net difference between 2022 and 2023 figures. Uses of the remaining fuels remained relatively constant, with a negligible change to below 0.5%.

## Captive power across provinces and industries

The distribution of captive coal power capacities across the provinces of Indonesia is illustrated in Figure 6, showing an overview of capacities that are operational and forthcoming, as well as those that have been cancelled.

As previously highlighted, major additions in captive coal power in the past year are attributed to units coming online to power **nickel processing facilities in Morowali, Central Sulawesi and Weda, North Maluku**. Between 2023 and 2024, Central Sulawesi's captive coal capacity increased from 2.86 GW to 5.19 GW, and North Maluku's capacity from 1.87 GW to 4.02 GW. Further additions of 3.16 GW in Central Sulawesi and 3.02 GW in North Maluku are expected between now and 2026.

In Sumatra, particularly the province of Riau, aside from the addition of 60 MW in the past year, **the newly announced 2.5 GW coal CFPP<sup>3</sup> in Rempang, Riau** is seen as a striking development. The coal power complex – which has been proposed by [the Xinyi Group](#) – is planned to power nine factories operating as an integrated solar panel glass industry by 2025 (GEM, 2024). The group's 11.5 billion USD investment commitment can be attributed to the launch of the Rempang Eco City development as a National Strategic Project in August 2023 (Kompas.com, 2023). The decision has since been strongly opposed by the local community due to issues ranging from the relocation of 16 traditional Malay villages, disputes in indigenous land rights, and a lack of transparency in development planning and investment details (WALHI Riau, 2024; BBC News Indonesia, 2023). Despite these issues, the media has reported that construction continues, with aims to start 750 tonnes of glass production per day by the end of 2024 (kumparanBISNIS, 2024).

In North Kalimantan, **the announcement of [two sizeable projects by PT Adaro Power \(two 1,100 MW units\)](#)** signals a new growing demand for coal-powered domestic aluminium processing (GEM, 2024). Announced in September 2022, the Adaro Group's plan is to establish 1.5 million tonnes of aluminium production capacity in three phases. The first two phases are to be fully powered by the planned captive CFPPs, with 500 thousand tonnes capacity by the first quarter of 2025, and additional 500 thousand tonnes by the fourth quarter of 2026. The third phase is set to use hydropower, with operations expected to commence in the fourth quarter of 2029.

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<sup>3</sup> Noted to be a mix of coal- and gas-powered, without further details on gas supply.

The signing of the Memorandum of Understanding (MoU) between Hyundai Motor Company and PT Adaro Minerals Indonesia, Tbk in November 2022 initiated a call for action from global climate advocates spearheaded by Kpop4Planet, which voiced concerns over greenwashing regarding low-carbon aluminium claims, with advocates strongly urging Hyundai to withdraw from the project as long as it used coal (PT Adaro Minerals Indonesia Tbk & Hyundai Motor Company, 2022; Kpop4Planet, 2023).

In April 2024, Hyundai announced its withdrawal from the non-binding MoU with Adaro Minerals (Reuters.com, 2024). Despite strong public pressure and difficulties to secure funding from international banks for new fossil fuel investments, subsidiaries of Adaro Group's USD 2 billion aluminium project still managed to obtain financing from five Indonesian banks – PT Kalimantan Aluminium Industry obtained USD 1.1 billion, and PT Kaltara Power Indonesia USD 0.67 billion (Financial Times, 2023).

Revisions to Indonesia's green investment taxonomy in February 2024 to consider new development as a "green" or "yellow" activity<sup>4</sup> is a clear indication that unless this fundamental gap is addressed, access to coal financing will remain (IEEFA, 2024; Kompas.id, 2024). Indonesia's Financial Services Authority (*Otoritas Jasa Keuangan*, OJK) reviewed 2,733 business sectors in the taxonomy revision effort, but only managed to quantify the environmental impact threshold of 919 businesses (OJK, 2022). Out of these businesses, only 15 met the "green" criteria, while 424 were identified as in "yellow" and 482 in "red", as noted by Climate Policy Initiative (CPI, 2024).

On a more positive note, capacities totaling 1.80 GW that were shelved in July 2023 in North Maluku (220 MW), Southeast Sulawesi (380 MW), North Sumatra (600 MW), and East Kalimantan (600 MW) are now considered cancelled according to the latest developments.

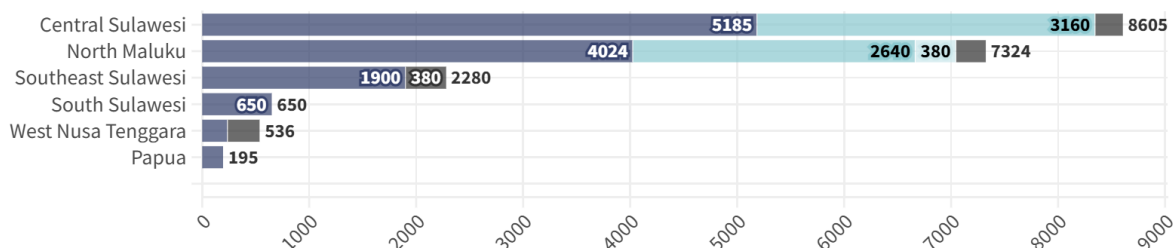
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<sup>4</sup> The colour codes are intended to incentivise green financing, where "green" applies to businesses that bring improvements to the environment and are aligned with national objectives, "yellow" for businesses that do not cause significant harm to the environment and are in transition to better align with national objectives, and "red" for those not aligning with Indonesia's climate targets.

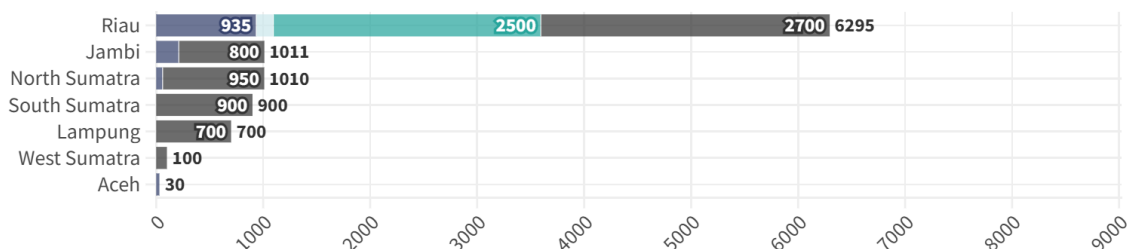
## Distribution of Indonesia's captive coal power by province and status (2024)

Coal power generation capacity (MW)

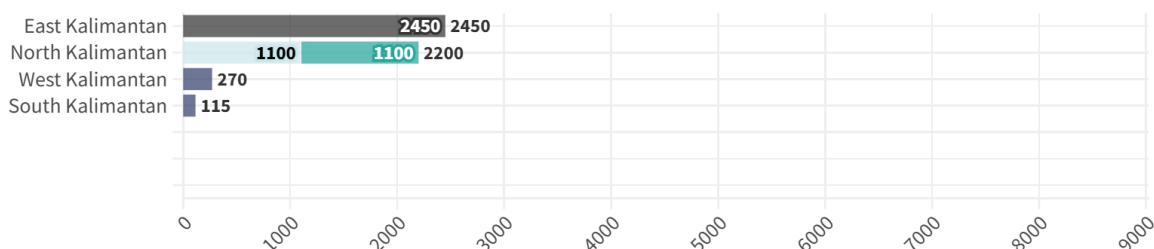
### Sulawesi, Lesser Sunda Islands, Maluku, and Papua



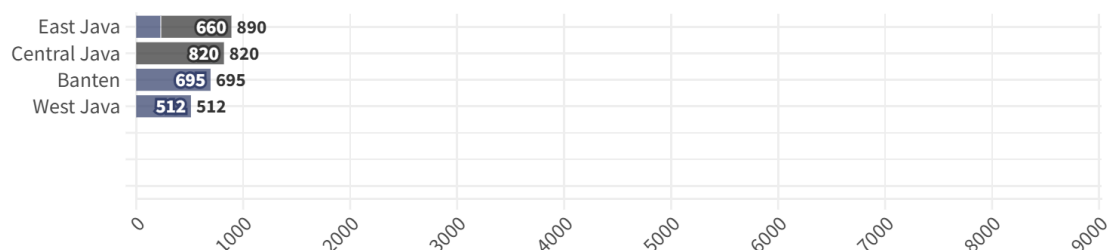
### Sumatra



### Kalimantan



### Java



■ operating ■ construction ■ pre-permit ■ announced ■ cancelled

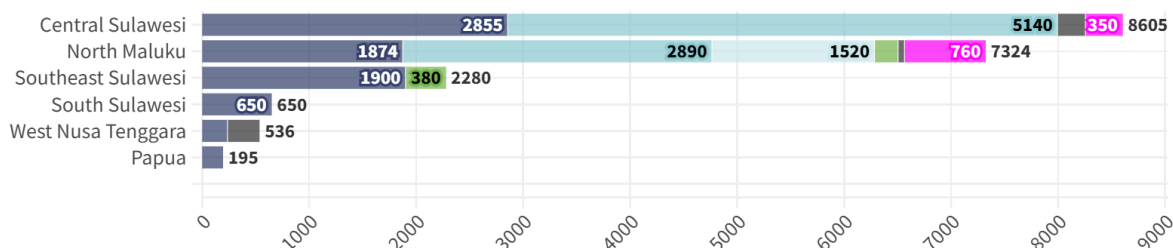
Source: Global Energy Monitor, Global Coal Plant Tracker, July 2024 release

**Figure 6a.** Captive coal capacities across the provinces in Indonesia, grouped by status, per July 2024

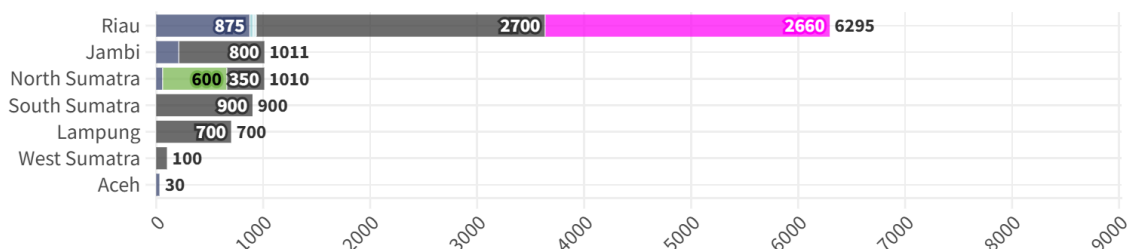
## Distribution of Indonesia's captive coal power by province and status (2023)

Coal power generation capacity (MW)

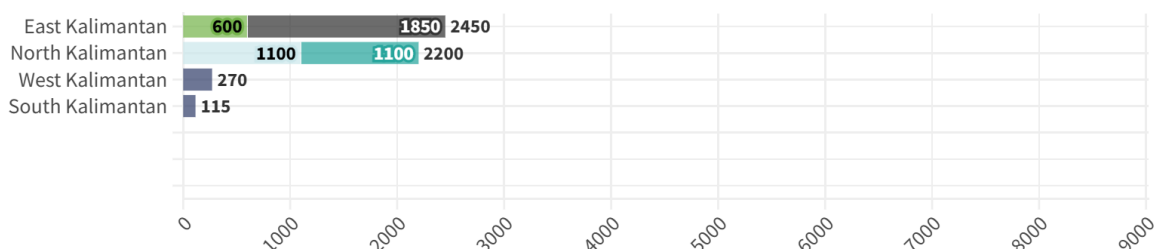
### Sulawesi, Lesser Sunda Islands, Maluku, and Papua



### Sumatra



### Kalimantan



### Java



■ operating ■ construction ■ pre-permit ■ announced ■ shelved ■ cancelled ■ no entry

Source: Global Energy Monitor, Global Coal Plant Tracker, July 2023 release - matched with July 2024 release •  
no entry - referring to entries not available in July 2023 release, and newly referenced in July 2024, noted to match July 2024 stack totals

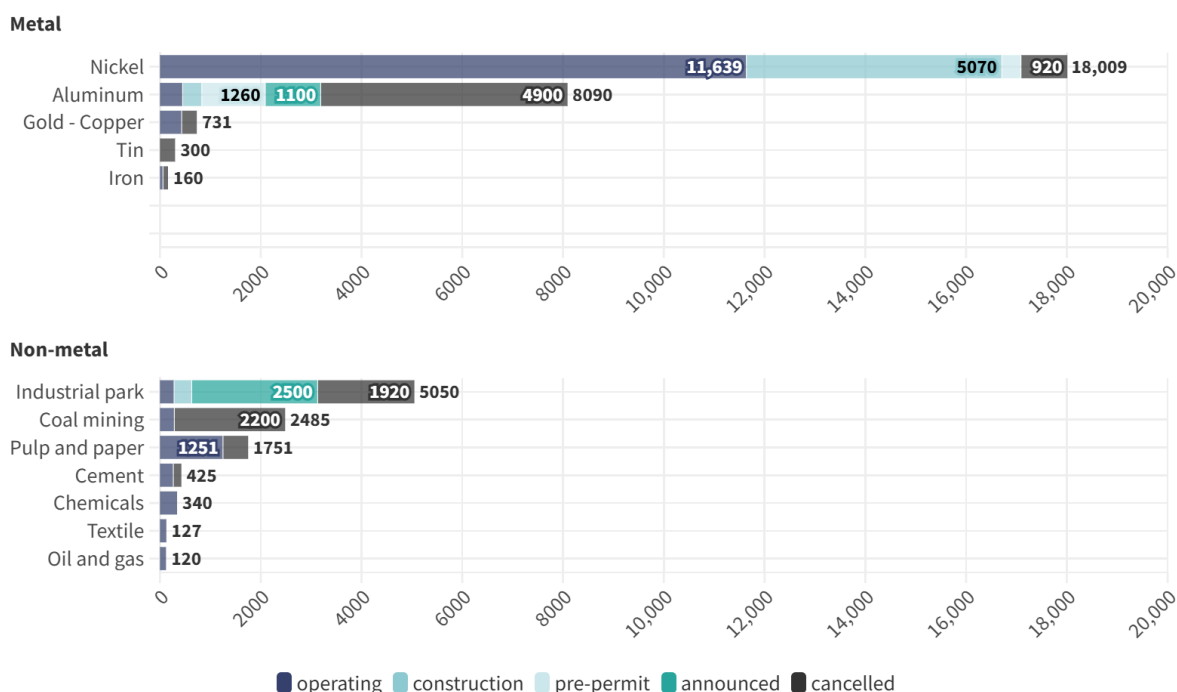
**Figure 6b.** Captive coal capacities across the provinces in Indonesia, grouped by status, per July 2023

Figure 7 below shows the distribution of captive coal power by end use. Again, development over the past year is centred around nickel, with 4.48 GW of capacities in construction in July 2023 becoming operational within the past year.

Out of the currently operating captive coal power capacity of 15.3 GW, 76% is routed to power nickel processing (11.6 GW). Pulp and paper industry is the second largest end user, with 1.25 GW operating capacity. However, if the announced and pre-permitted capacities for the aluminium industry and industrial parks progress, each of these two end users would be linked to 2.5 times the amount of pulp and paper industry's current capacity, at 3.19 GW and 3.13 GW, respectively.

### Distribution of Indonesia's captive coal power by end use and status (2024)

Coal power generation capacity (MW)



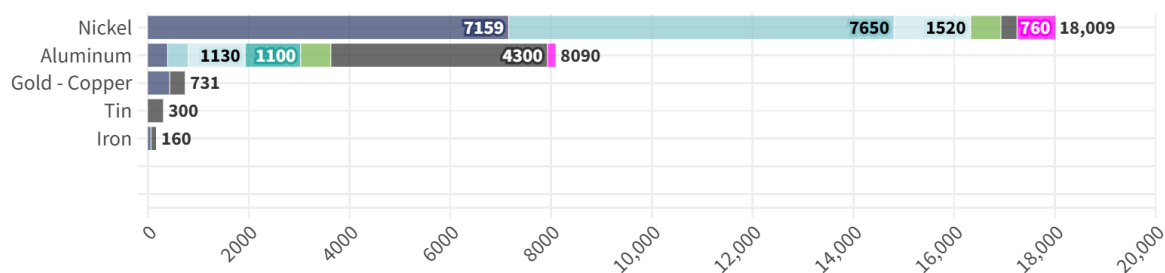
Source: Global Energy Monitor, Global Coal Plant Tracker, July 2024 release

**Figure 7a.** Distribution of Indonesia's captive coal capacities for metal and non-metal industries, grouped by status, per July 2024

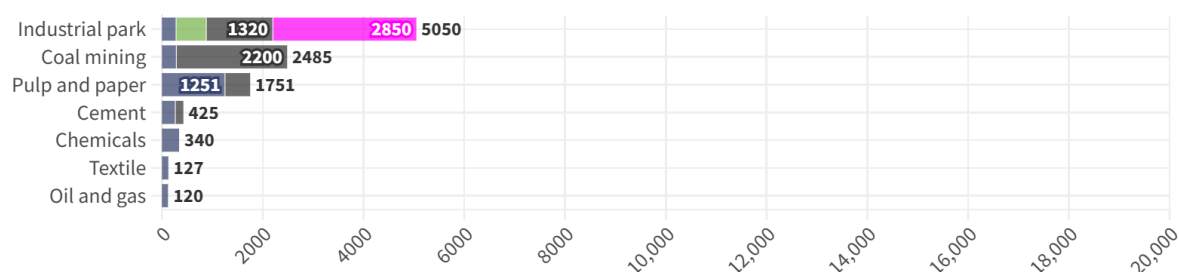
## Distribution of Indonesia's captive coal power by end use and status (2023)

Coal power generation capacity (MW)

### Metal



### Non-metal



■ operating ■ construction ■ pre-permit ■ announced ■ shelved ■ cancelled ■ no entry

Source: Global Energy Monitor, Global Coal Plant Tracker, July 2023 release - matched with July 2024 release •  
no entry - referring to entries not available in July 2023 release, and newly referenced in July 2024, noted to  
match July 2024 stack totals

**Figure 7b.** Distribution of Indonesia's captive coal capacities for metal and non-metal industries, grouped by status, per July 2023

## Metal industries trends show need for close review before adding captive capacity

There are driving factors behind industry players' decisions to invest in captive coal power plants. First, the need to establish a stable electricity supply for facilities located in remote areas where grid infrastructure does not exist or where PLN is unable to meet heavy industrial needs. Second, the abundance of domestic coal supply and the ease of supply chain set up for coal-based operations, particularly with the presence of Domestic Market Obligation (DMO)<sup>5</sup> policy (ADB, 2023).

Furthermore, the Government's industrial downstreaming initiatives are strategically implemented to increase domestic production capacity and boost exports of value-added and high-tech products. Industrial growth targets and incentives are linked to successful implementation of regulations that are based on local content valuations<sup>6</sup> (Ministry of Industry, 2020; Ministry of Industry, 2020a). Most of the recent export trends shown in Figure 8 illustrate sustained growth for base metals.

Exports of iron and steel commodities have shown the most prominent growth over the past five years – with a 3.3-fold increase from USD 8.65 billion in 2019 to USD 28.4 billion in 2023, and even reached a record high in 2022 at USD 29.6 billion. Significant growth in ferronickel production in Indonesia over the past several years is driving most of the national base metals growth, making up nearly more than half of the entire iron and steel exports valuation. Growth is also prominent for iron and steel intermediates, with semi-finished steel and stainless steel products combined have grown 7-fold since 2019.

Nickel commodities also show comparable massive growth, currently at 4.3-fold of exports value in 2023 (USD 813 million) compared to 2019 (USD 3.54 billion). In spite of slower growth, aluminium exports have also steadily increased by nearly 50% over the same time period.

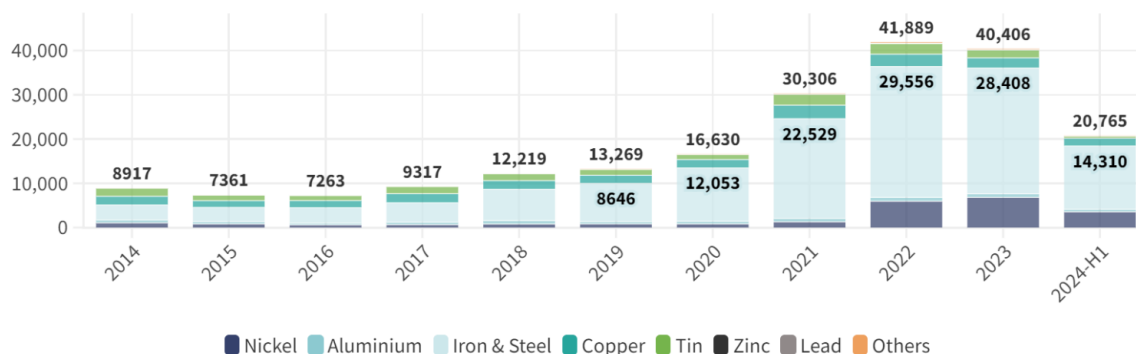
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<sup>5</sup> Indonesia's DMO policy sets 25% of coal mining outputs to be sold domestically at a cap of 90 USD per tonne for all domestic industries except for metal processing and/or refining industry (MEMR, 2022).

<sup>6</sup> Local content valuation includes *Tingkat Konten Dalam Negeri* (TKDN) for valuation of domestic content in goods and services and *Bobot Manfaat Perusahaan* (BMP) for domestic investment valuation as awarded by the government. Measures linked to local content requirements include mandatory TKDN above 40% for public procurement of goods and services, annual weighted TKDN targets set from 2020 to 2024 across priority sectors and nationwide, as well as percentages of the achieved shares in the national public procurement.

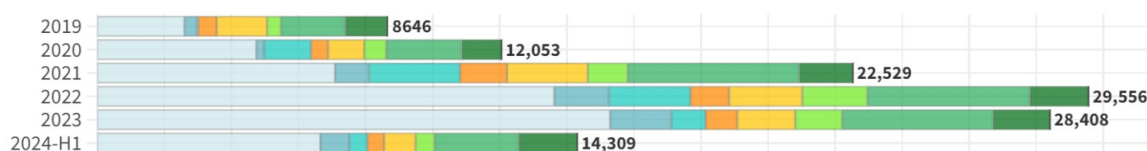
## Exports value of base metal industries in USD million (2014-2023)

By HS2 grouping



By HS6 grouping

### Iron and steel



### Nickel



### Aluminium



720260 721891 721899 721912 721913 721933 72 (remaining) 73 750110 750120 75 (remaining) 76

Source: Indonesia Statistics Bureau - Badan Pusat Statistik (BPS) - International Trade and Balance of Payments, Ministry of Trade - Kementerian Perdagangan (Kemendag) - Non-Oil and Gas Exports (Commodities)

(720260) Ferro-alloys; Ferro-nickel

(721891) Steel, Stainless; Semi-finished Products, Of Rectangular (other Than Square) Cross-section

(721899) Steel, Stainless; Semi-finished Products, Other Than Of Rectangular Cross-section

(721912) Steel, Stainless; Flat-rolled, Width 600mm Or More, Hot-rolled, In Coils, Of A Thickness Of 4.75mm Or More But Not Exceeding 10mm

(721913) Steel, Stainless; Flat-rolled, Width 600mm Or More, Hot-rolled, In Coils, Of A Thickness Of 3mm Or More But Less Than 4.75mm

(721933) Steel, Stainless; Flat-rolled, Width 600mm Or More, Cold-rolled, Of A Thickness Exceeding 1mm But Less Than 3mm

(72) Iron and steel (remaining under HS2 grouping)

(73) Iron and steel

(750110) Nickel; Nickel Mattes

(750120) Nickel; Oxide Sinters And Other Intermediate Products Of Nickel Metallurgy

(75) Nickel (remaining under HS2 grouping)

(76) Aluminum

**Figure 8.** Indonesia's base metals exports value by HS2 grouping (2013-2024H), and a closer look for iron and steel, nickel, and aluminium by HS6 grouping (2019-2024H)

## Nickel

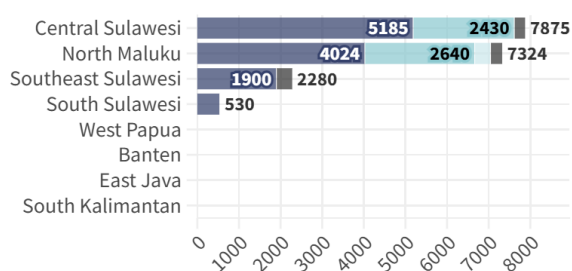
Figure 9 shows the summary of captive power capacities that are linked with the **nickel** industry, as well as the annual production output by commodity type. The data is organised at the provincial level, reflecting regions that currently rely on captive coal, namely Central Sulawesi, North Maluku, and Southeast and South Sulawesi. Production output represents total capacities from operating, construction, and announced facilities.

Nickel industries covered in this analysis are facilities with downstream processing of nickel ores, with product yields of NPI, ferronickel,<sup>7</sup> MHP, Nickel Matte, Nickel Sulfide, Nickel Cobalt, and Nickel Hydroxide.

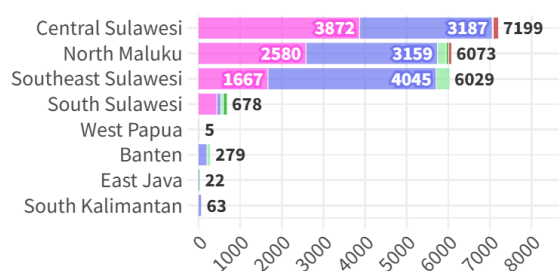
### Nickel industry summary by province

Captive coal capacity by status, and production capacity by commodity type

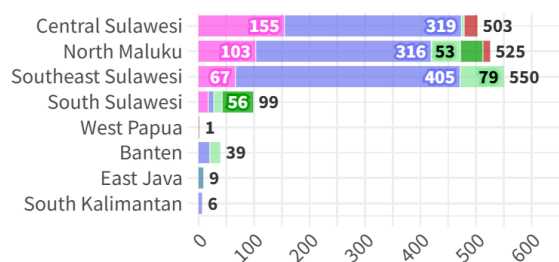
Captive coal power capacity (MW)



Gross production output capacity (000 ton of product/year)



Net production output capacity (000 ton in Ni content/year)



■ operating ■ construction ■ pre-permit ■ cancelled ■ NPI ■ FeNi ■ MHP ■ Ni Matte ■ Ni Sulfide ■ Ni-Co ■ NiOH

Source: Global Energy Monitor, Global Coal Plant Tracker, July 2024 release, CREA analysis - compilation of multiple sources (MEMR Geoportal for smelters linked to mining activities - <https://geoportal.esdm.go.id/emo/#>, official reports, media articles, association) • Production output capacity includes all operational, in construction, and announced capacities - collated from media articles and the Ministry of Industry's platform for domestic product improvement program (*Program Peningkatan Penggunaan Produk Dalam Negeri*, P3DN, <https://tkdn.kemenperin.go.id/>) Assumed Ni content to estimate net nickel output - NPI: 4%Ni, FeNi: 10%Ni, MHP: 25%Ni, Ni Matte: 70%Ni, Ni Sulfide & Ni-Co: 20%Ni, NiOH: 40%Ni

**Figure 9.** Indonesia's nickel industry captive power capacity and production output overview by province

<sup>7</sup> Ferronickel is included here, considered as a downstream product of nickel ore processing.

For **nickel**, the majority of the yields are exported for further refining in the destination countries, specifically China. Nickel processing in Indonesia has increased more than sixfold since 2010, leading to the country's current dominance in global nickel production, accounting for half of the global total at 1.8 million tonnes in 2023. (Statista, 2023; USGS, 2024a). Indonesia is now the leading global producer by a large margin, followed by the Philippines with 400 thousand tonnes of annual nickel production. In terms of reserves, Indonesia also has the largest nickel reserves at 55 million tonnes, followed by Australia at 24 million tonnes.

The massive surge has resulted in a significant shift in the global nickel trading landscape, pushing prices down to 18,000 USD per ton and rendering half of existing global nickel operations unprofitable (Mining.com, 2024). Australia's nickel industry, for example, has been experiencing a dramatic decline, with many operations collapsing or being suspended since early 2024 (Mining.com, 2024a).

The global oversupply has also led to a re-evaluation of planned projects, notably those of BASF and Eramet. In June 2024, the 2.4 billion USD nickel-cobalt hydrometallurgy project planned in Weda Bay, Halmahera, North Maluku was officially cancelled, citing factors such as existing China-led investment plans for high-pressure acid leaching (HPAL) processes in the region, changing dynamics in the battery supply chain, and growing demands for traceability and environmental, social and governance (ESG) assurance – for example, the European Union's Batteries Regulation that came into force in August 2023 (CNN Indonesia, 2024; EC, 2023).

In July 2024, Indonesia's first electric vehicle (EV) battery factory in Karawang, West Java was inaugurated by President Joko Widodo (Tempo.co, 2024). A consortium investment between Hyundai Motor Group and LG Energy Solution, PT Hyundai LG Industry Green Power is part of an integrated EV ecosystem that amounts up to 12 billion USD investment in total. The factory – to be built in two phases – will be the largest of its kind in Southeast Asia, with a total production capacity of 30 GWh. The initial 1 billion USD investment phase began commercial operations in April 2024, producing an estimated 10 GWh of battery cells per year. The second phase involves an additional 2 billion USD of investment, expanding production capacity by 20 GWh.

Expansion of battery production is expected to continue in order to support Indonesia's national target of 600 thousand units of EV domestic production by 2030. Currently, EV automakers have to navigate around supply chain challenges in order to remain cost competitive and benefit from EV tax incentives, as they are linked to local content requirements (VOA Indonesia, 2024).

The product's local content requirement value must reach a minimum of 40% in 2026, and the minimum value will be raised to 60% from 2027 to 2029, and to 80% in 2030. On the other hand, there is still a shortage in battery precursor materials, namely MHP, nickel sulphate, and cobalt sulphate, steering discussions among high-level officials that there should be no new additions of low-grade nickel production, specifically NPI and ferronickel produced with Rotary Kiln Electric Furnace (RKEF) technology (MEMR, 2024b).

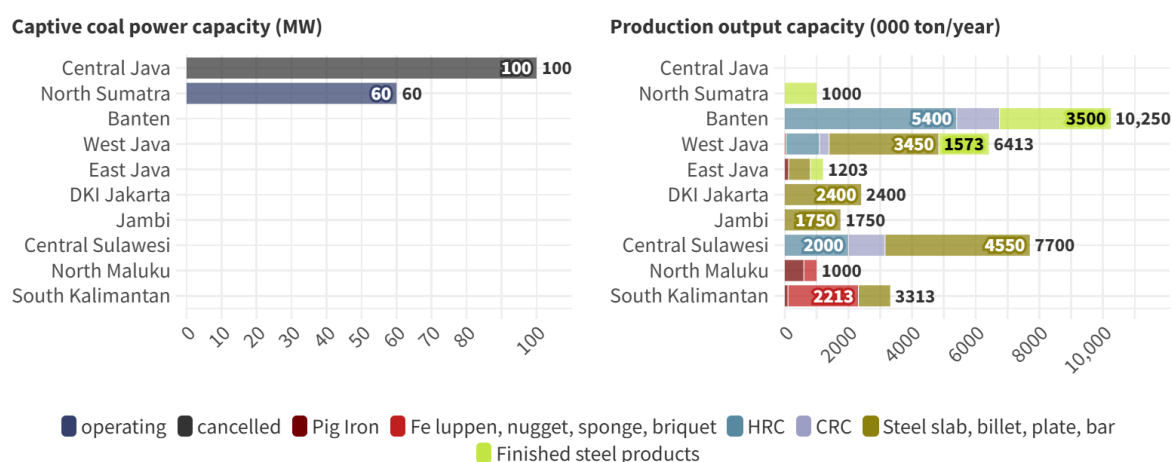
## Iron and steel

Figure 10 below shows the summary of captive power capacities and the annual production output attributed to the **iron and steel** industry. Only one facility in North Sumatra is found to utilise captive coal power, while the remaining facilities that are located in Java (Banten, West Java, East Java), Sumatra (Jambi), and Kalimantan (South Kalimantan) presumably operate using on-grid power supply or potentially coal- or gas-fired power plants with capacity below 30 MW not covered in GEM's database.

Production output represents total capacities from operating, under construction, and announced facilities. Iron and steel industries covered in this analysis are facilities that produce crude iron products from iron ore processing, as well as crude, semi-finished, and finished steel products.

### Iron and steel industry summary by province

Captive coal capacity by status, and production capacity by commodity type



Source: Global Energy Monitor, Global Coal Plant Tracker, July 2024 release, CREA analysis - compilation of multiple sources (MEMR Geoportal for smelters linked to mining activities - <https://geoportal.esdm.go.id/emo/#>, official reports, media articles, association) • Production output capacity includes all operational, in construction, and announced capacities - collated from media articles and the Ministry of Industry's platform for domestic product improvement program (*Program Peningkatan Penggunaan Produk Dalam Negeri, P3DN*, <https://tkdn.kemenperin.go.id/>)

**Figure 10.** Indonesia's iron and steel industry captive power capacity and production output overview by province

Indonesia's crude steel production has grown consistently over the years, making the country the 14<sup>th</sup> largest producer in 2023 (World Steel, 2024). The latest annual production figure is 16.8 million tonnes, nearly double the total capacity in 2019 of 8.57 million tonnes (World Steel, 2024b). Despite this consistent growth, Indonesia is a net importer of steel products. In 2023, the country imported 12.4 million tonnes of steel products and exported 9.6 million tonnes (World Steel, 2024a).

[GEM's Global Steel Plant Tracker](#) records seven steel-making facilities currently operating in Indonesia, making up a total of 19.7 million tonnes of crude steel production capacity. Additions are in planning or underway for four existing facilities, namely PT Krakatau Steel (Persero) Tbk and PT Krakatau Posco located in Cilegon, Banten, PT Gunung Raja Paksi Tbk located in Bekasi, West Java, and Dexin Steel Pte Ltd in Bahodopi, Central Sulawesi, as well as two new facilities, PT Gunung Raja Paksi Tbk located in Medan, North Sumatra, and Fuhai Group in Muaro Jambi, Jambi. Most of these expansions are aimed for 2025, and once completed, Indonesia's crude steel capacity will increase by 24.5 million tonnes, more than double the current operating capacity.

Since the majority of these facilities are located in areas well integrated with the national grid, there is minimal linkage with captive coal power, with only two companies currently powered by captive CFPP. The first, PT Gunung Gahapi Nisco Indonesia, a joint venture between PT Gunung Gahapi Sakti and China's Nanjing Iron and Steel Co, operating in Medan, North Sumatra, has been using two 30 MW units since 2017 (Stainless Steel World, 2014). The second company, [PT Dexin Steel Indonesia](#), located in the Indonesia Morowali Industrial Park (IMIP), Bahodopi, Central Sulawesi, is potentially linked to a 150 MW unit (GEM, 2024d).

In recent years, Indonesia's iron and steel industry has strongly demanded attention from the government due to the overwhelming influx of imports from China, low market absorption, and rising operating costs. Unable to compete with steel imports pricing, the industry became highly underutilised, with utilisation rate ranging between 30-45% in 2019 (IISIA, 2023). During the pandemic, between 2020 and 2021, imports dropped by 35%, which led to improved domestic absorption and higher utilisation of domestic capacity, from 41% to 90% in 2023 (GRP, 2024). In 2022 and 2023, the national trade balance finally showed a positive trajectory as exports grew. Not to mention, import control actions taken by the Ministry of Industry and the Ministry of Trade (IISIA, 2024).

In light of sustained global overcapacity of steel production, Indonesia Iron & Steel Industry Association (IISIA) recently called for action from the government to apply trade measures against steel dumping from China (Kontan.co.id, 2024). Chinese steel exports have been particularly high in the last two years, forecasted to reach 101 million tonnes in

2024, nearly 49% higher than the 2022 record of 68 million tonnes (GMK Center, 2024). Being one of the major export destination countries of Chinese steel, ranked fifth after Vietnam, South Korea, Thailand, and the Philippines, Indonesia continues to face growing influx of low-priced steel imports as well as unfair practices with rising discoveries of illegal imports and non-compliant steel products (Fastmarkets, 2024; Tempo.co, 2024a).

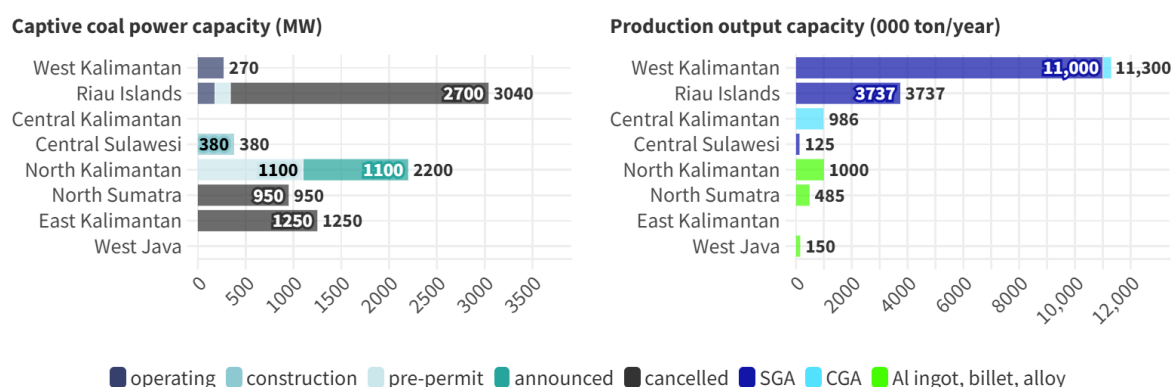
## Aluminium

Figure 11 below shows the summary of captive power capacities and the annual production output attributed to Indonesia's **aluminium** industry. Out of the listed provinces, operating capacities are only found in West Kalimantan and Riau Islands where major aluminium reserves are located. Other provinces, namely Central Sulawesi and North Kalimantan, have relatively large captive coal power capacities in the pipeline of 380 MW and 2.2 GW, respectively. It can be assumed facilities in Central Kalimantan and West Java rely on on-grid power.

Production output represents total capacities from operating, construction, and announced facilities. Aluminium industries covered in this analysis are facilities that produce downstream products of bauxite ore processing, namely Smelter Grade Alumina (SGA) and Chemical Grade Alumina (CGA), as well as Aluminium ingots, billets, and alloys converted from alumina.

### Aluminium industry summary by province

Captive coal capacity by status, and production capacity by commodity type



Source: Global Energy Monitor, Global Coal Plant Tracker, July 2024 release, CREA analysis - compilation of multiple sources (MEMR Geoportal for smelters linked to mining activities - <https://geoportal.esdm.go.id/emo/#>, official reports, media articles, association) • Production output capacity includes all operational, in construction, and announced capacities - collated from media articles and the Ministry of Industry's platform for domestic product improvement program (*Program Peningkatan Penggunaan Produk Dalam Negeri*, P3DN, <https://tkdn.kemenperin.go.id/>)

**Figure 11.** Indonesia's aluminium industry captive power capacity and production output overview by province

In respect to **aluminium**, facilities that have been operating in the country mostly do not rely on captive coal power, except in West Kalimantan and Riau Islands (linkage to 270 MW and 180 MW, respectively). For this, the 2.58 GW capacity in the pipeline in Central Sulawesi and North Kalimantan indicates a new direction for future growth in new captive coal power for the aluminium industry.

Indonesia is ranked sixth for its bauxite ore reserves, having 1 billion dry tonnes potential, and fifth for bauxite production, with up to 30 million dry tonnes current capacity per annum. Nearly 70% of bauxite reserves are found in West Kalimantan, with 20% in the Riau Islands and the remainder in Central Kalimantan (USGS, 2024; Kontan.co.id, 2024a).

At present, there are three operating facilities producing aluminium oxide or alumina, refined from bauxite ores – all located near the reserves. The list include PT Well Harvest Winning Alumina Refinery in Ketapang, West Kalimantan, which is producing 2 million tonnes of SGA, PT Indonesia Chemical Alumina in Sanggau, West Kalimantan, which is producing 0.3 million tonnes of CGA, and PT Bintan Alumina Indonesia in Bintan, Riau, which is producing 1 million tonne of SGA. All of these facilities rely on captive coal for their power supply (MEMR, 2019).

The fourth company, PT Indonesia Asahan Aluminium (Inalum) located in Kuala Tanjung, Batubara, North Sumatra, is the largest state-owned primary aluminium producer in the country, producing up to 250 kilotonnes of aluminium ingots, billets, and alloys per annum. The current production runs fully on hydropower from two hydroelectric power plants; [Sigura-gura](#) with 286 MW capacity, and [Tangga](#) with 407 MW capacity – supplying a total of 603 MW of electricity since 1982 (GEM, 2024h; GEM, 2024k). With this, PT Inalum is able to mark itself as a low-carbon aluminium producer, with the product's carbon footprint being only a quarter of the global average<sup>8</sup> (Nikel.co.id, 2024).

The government has implemented the same downstreaming initiative through the most recent bauxite ore ban to boost domestic processing capacity, which came into force in June 2023 (Presidential Secretariat, 2022). One year since the ban, the Association of Indonesian Bauxite and Iron Ore Entrepreneurs (*Asosiasi Pengusaha Bauksit dan Bijih Besi Indonesia*, APB3I) expressed that it has caused domestic oversupply and has negatively impacted bauxite producers, with 1,500 jobs lost and 12 million tonnes of excess bauxite in the national stock (Katadata.co.id, 2024).

Slow progress in the development of alumina smelters is quoted as the main barrier. Only three out of 11 new refinery projects have been completed, making up only one third of

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<sup>8</sup> Quoting Scope 1 and 2 greenhouse gas emissions from the smelting process of 3.8 ton CO<sub>2</sub> equivalent per ton of Aluminium (t CO<sub>2</sub>e/t Al) vs. the typical average of 12.5 t CO<sub>2</sub>e/t Al.

total potential domestic demand for bauxite (MEMR, 2023). This situation has led to a call for a lift on the 2023 export ban, as bauxite producers see great demand from the global market, particularly China due to increased prices triggered by the recent supply disruption in Australia and India (Fastmarkets, 2024a). On the other hand, this situation implies that domestic refineries currently operating and beginning operations in the distant future might have to risk sourcing feedstock at higher prices, if the ban is lifted.

Aside from the delayed bauxite refineries, there are several notable projects currently in the pipeline that would bring significant additions to domestic use of bauxite ores (MEMR, 2023). In total, domestic demand for bauxite would increase by 11.3 million tonnes once all projects are completed in 2030. For scale, current operational facilities can process up to 14.4 million tonnes of bauxite.

- PT Hua Chin Aluminum Indonesia plans to take up to 500 thousand tonnes of bauxite inputs, reportedly in construction, and will operate as one of the tenants in IMIP, Morowali, Central Sulawesi (Bisnis.com, 2024). Linkage to captive coal power is expected, but it is not clearly identified.
- PT Bintan Alumina Indonesia in Bintan, Riau is looking to double its production, absorbing additional 2 million tonnes of bauxite, beginning construction in 2027. To date, there is no information on power supply plans.
- PT Borneo Alumina Indonesia, a consortium of PT Inalum and PT Antam Tambang Tbk, both state-owned mining companies, is progressing to complete construction by February 2025 (Bloomberg Technoz, 2024). The facility is located in Mempawah, West Kalimantan and will require up to 5.3 million tonnes of inputs. Past report shows planned linkage to 75 MW captive CFPP for 3.5 million tonnes of bauxite feedstock, which imply nearly 115 MW power needs in scale.
- PT Inalum is looking to expand its operation in Batubara, North Sumatra, which will double input use from the current 500 thousand tonnes to 1 million. Construction will be done in stages in 2024 and 2027. The company will also set up a new facility in North Kalimantan, within the International Industrial and Port Area (*Kawasan Industri dan Pelabuhan Internasional*, KIPi) Tanah Kuning-Mangkupadi. This facility will require 1 million tonnes of input and is tagged for construction in 2030. Recent media reports have mentioned an ongoing coordination with PLN, anticipating demand up to 1 GW to support the expansion (Kontan.co.id, 2024b).
- PT Kalimantan Aluminum Industry, a subsidiary of PT Adaro Minerals Indonesia Tbk, has announced plans to start construction in 2027 (kumparanBISNIS, 2022). The facility will be located in KIPi Tanah Kuning - Mangkupadi, North Kalimantan, and is expected to take up to 2 million tonnes of bauxite.

## Renewables and ESG: initiatives are emerging, but not nearly enough

Well illustrated in prior sections, Indonesia's downstreaming ambition is fueled by coal power. Coal is abundant in Indonesia, but renewables potential is even more so. Institute for Energy Services Reform (IESR) estimates nationwide potentials up to nearly 6,750 GW from solar power, 6.3 GW from micro to small-hydropower, 25 GW from onshore wind power, nearly 190 GW from biomass, and over 7,300 GW from Pumped Hydro Energy Storage (PHES) (IESR, 2024). As pressure grows for Indonesia to set out a roadmap for industrial decarbonisation, renewables integration becomes prominent and should be hastened in order for the country to meet its climate goals.

Currently, the only driver for low carbon development for captive power generation is the requirement specified in the Presidential Regulation No. 112 Year 2022 (MEMR, 2022). Captive CFPPs under the national strategic projects permitted after the year of the regulation's issuance must commit to reduce greenhouse gas emissions by at least 35% within ten years of operation against the 2021 national average of CFPP emissions. Disclosure of such plans or commitments is unfortunately not yet available, so review of existing mitigation measures or plans in development may serve as a reality check.

### RE and ESG initiatives in Indonesia's industries

The [Aluminium smelting project by the Adaro Group](#), located in Kalimantan Industrial Park Indonesia (KIPI), is a notable initiative that has garnered attention for the strong pushback it's received against the announced plans for a 2.2 GW captive coal power development to support 1 million tonnes of annual aluminium smelting (GEM, 2024). Aside from this, **the development of the 1.1 GW hydropower plant** aimed to support the additional 0.5 million tonnes capacity shows some alignment with KIPI's designation as a green industrial park. The groundbreaking ceremony of the plant – Mentarang Induk Hydropower Plant – was held in March 2023. The 1,375 MW hydropower plant, which is located in Malinau, North Kalimantan, is claimed to be the largest hydropower plant in Indonesia, expected to employ 5,000 workers, and involves USD 2.6 billion of investment. Construction will begin in the first quarter of 2024, targeting to operations by the end of 2029 (Adaro Energy, 2023).

[Tabalong Wisesa power station](#) is owned by a subsidiary of the Adaro Group, PT Makmur Sejahtera Wisesa (GEM, 2024j). The two 30 MW units are located in Tabalong, South Kalimantan, dedicated to power mining operations. As noted in the company release,

carbon reduction strategies include **biomass co-firing and solar photovoltaic (PV) installation** (Adaro Energy, 2024). Between October 2022 and September 2023, the units took up 5 tonnes of biomass daily. The amount was increased to 17 tonnes in the last quarter of 2023, replacing 6% of coal use. In 2023, the company reported installation of 35 kWp solar PV capacity to reduce utilisation of the captive CFPP. In May 2024, the regional government of Tabalong signed an MoU with the company on **utilisation of organic waste as co-firing feedstock** (Antaranews.com, 2024).

**Kalimantan Cement Works power station** is located in Tarjun, South Kalimantan, a 55 MW captive CFPP linked to PT Indocement Tungal Prakarsa Tbk's cement production (GEM, 2024e). As of August 2022, the unit – which had been operating since 1998 – has been **phased-out**. The company announced **direct supply from PLN**, and noted appreciation for **strengthened grid interconnection in Kalimantan** with 39% (849 MW) reserve margin in South Kalimantan, Central Kalimantan and East Kalimantan grid system (Antara Sulut, 2022).

**Harita Nickel Group, operating under its subsidiary, PT Trimegah Bangun Persada**, announced a plan in April 2024 to **build a 300 MWp solar PV** within the group's nickel processing hub in Obi island, South Halmahera, North Maluku (Jakarta Globe, 2024). Harita Group reports a current use of 960 MW captive coal power to support the three nickel processing facilities<sup>9</sup> (Harita Nickel, 2024). However, documentation on environmental assessment and permitting from June 2023 indicates a total planned power supply produced by 25 CFPPs at 2.54 GW, 77 units of diesel power plants at 50 MW, and a 1,300 MW solar power installation<sup>10</sup> (MOEF, n.d.)

**Nickel Industries** is an Australian-listed company with extensive nickel operations in Indonesia.<sup>11</sup> Out of **the 3.4 GW of Weda Bay captive coal power station** currently

<sup>9</sup> Information collected from Harita Nickel's 2023 annual report as follows: PT Halmahera Persada Lygend (HPL) has been operating since the end of 2021, producing 37,000 tonnes of MHP initially, and added 18,000 tonnes of capacity in January 2023. PT Halmahera Jaya Feronikel (HJF) and PT Megah Surya Pertiwi (MSP) produce 95,000 tonnes and 25,000 tonnes of FeNi, respectively. MSP has been operating since 2016, and HJF since 2023 (Harita Nickel, 2023). No explicit mention of moisture content, and no specification on product weight or in nickel content. Assuming weights in nickel content.

<sup>10</sup> *Analisis Mengenai Dampak Lingkungan* (AMDAL) No. 6666822eae44a, as the environmental permit approval based on the Decree of the Minister of Environment and Forestry of the Republic of Indonesia Number SK.639/MENLHK/SETJEN/PLA.4/6/2023 granted to PT Trimegah Bangun Persada. Accessed through AMDALnet, <https://amdalnet.menlhk.go.id/>.

<sup>11</sup> Information collection from Nickel Industries' company website for 2023 outputs as follows. Hengjaya Nickel produced 19.9 thousand tonnes of FeNi, Ranger Nickel 19.6 thousand tonnes, Angel Nickel 49 thousand tonnes, and Oracle Nickel 39.9 thousand tonnes. Huaye Nickel Cobalt has a nameplate capacity of 60 thousand tonnes of nickel in MHP, and Excelsior Nickel Cobalt at 72 thousand tonnes. RKEF projects under Hengjaya Nickel, Ranger Nickel and Oracle Nickel in IMIP and Angel Nickel in IWIP, as well as HPAL projects under Huayue Nickel Cobalt and Excelsior Nickel Cobalt (in construction) in IMIP (Nickel Industries, 2023). No

operating to support nickel processing in IWIP, two 380 MW units are owned by PT Angel Nickel Industry (GEM, 2024l). Unfortunately, the exact share of Nickel Industries' subsidiaries coal power supply for the 4.8 GW captive coal power generation dedicated for the entire IMIP complex is unavailable. However, it is worth noting that **the management of IMIP has stated that it plans to integrate 506 MWp of solar power capacity by 2026** (IMIP, n.d.).

Separate from IMIP's commitment, Nickel Industries reported the successful installation of 395 kWp solar power capacity and 250 kWh Battery Energy Storage System (BESS) in 2022 to support the mining operations of PT Hengjaya Mineralindo (SESNA Group, 2024). Following this success case, the company plans to install **255 MWp of solar PV and 80 MWh of BESS** to supplement the energy demands of their subsidiaries operating within IMIP (AntaraNews.com, 2024a).

The project is to be built on 200 hectares of ex-mining land and expected to be the largest solar installation in the country – will start in October 2024 with the target of being completed by March 2026. PT Hengjaya Mineralindo's efforts beyond general compliance were recognised by Indonesia's Ministry of Environment and Forestry (MOEF) with a Green PROPER award in 2022 and 2023. The firm was one of only two nickel mining companies to have ever received the award<sup>12</sup> (MOEF, 2023).

**PT Vale Indonesia Tbk (INCO)** emphasises sustainable practices as integral to the company's operations (Vale, 2024). Three hydropower plants with a total capacity of 365 MW in Sorowako, South Sulawesi are powering laterite nickel ore mining and nickel matte processing (Indonesia Business Post, 2024). Furnaces run entirely on hydropower, and dryer and kilns on a mix of hydro and coal. INCO claims limited access to renewables in other project locations in Bahodopi, Central Sulawesi and Pomalaa, Southeast Sulawesi. The group has announced a target to **reduce emissions by 33% in 2030 and achieve net zero by 2050, opting to rely on Liquefied Natural Gas (LNG)** – which the firm has quoted as a “proven technology” – to lower emissions by half as compared to coal (Argusmedia, 2022; Bisnis.com, 2024a).

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explicit mention of moisture content, and no specification on product weight or in nickel content. Assuming weights in nickel content.

<sup>12</sup> *Program Penilaian Peringkat Kinerja Perusahaan (PROPER)* is MOEF's monitoring program designed to encourage improved environmental management performance, foster collaboration between the government and the business sector to address environmental issues and empower local communities (MOEF, 2024).

## Where current efforts are not nearly enough

Highlighted by *Aksi Ekologi dan Emansipasi Rakyat* (AEER), despite the presence of an ESG index rating for companies listed in Indonesia Stock Exchange and MOEF's PROPER, nickel producers in Indonesia lack transparency and openness in ESG risk disclosure. Out of five publicly listed companies, three are classified under high ESG risks while the other two are not listed in the database.<sup>13</sup>

AEER's further analysis of the 2023 PROPER certifications for 15 tenants of IMIP and 3 tenants of IWIP shows that there were two companies receiving certifications reflecting efforts at compliance ("blue"), and one company reflecting efforts beyond compliance ("green"). For the remaining 15 companies, seven companies received "red" certifications which indicate violations to laws and regulations, three were under suspension, and five not at all found in the annual PROPER certification listing (AEER, 2024).

Climate Rights International's report provides a glimpse into the harms that are impacting local and indigenous communities living near nickel processing hubs in the Sulawesi and Maluku islands (CRI, 2024). The decision to continue investing in coal to power the nickel industry is seen to be mainly driven by the low cost of domestic coal and remoteness of the mining sites (Financial Times, 2024).

Initiatives to prioritise ESG include a green nickel premium, considering the need to expand Indonesia's infrastructure to integrate renewables and other energy alternatives. On the other hand, a recent assessment shows little evidence of consumers paying for low-carbon premiums. This current disconnect can be resolved through collaborative efforts to promote carbon pricing, green procurement, and technological innovation in processing and energy supply (Fastmarkets, 2024b).

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<sup>13</sup> Accessed through Indonesia Stock Exchange ESG Index platform. (1) NCKL, PT Trimegah Bangun Persada Tbk, 38,4; (2) INCO, PT Vale Indonesia Tbk, 30,5; (3) ANTM, PT Aneka Tambang Tbk, 42,06; (4) DKFT, PT Central Omega Resources Tbk, not available; (5) IFSH, PT Ifishdeco Tbk, not available (Indonesia Stock Exchange, n.d.).

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## **Beyond ESG and compliance: the immense potential of RE**

Det Norske Veritas's recommendations of conceptual decarbonisation pathways for RKEF and HPAL outlines great potential for interventions in energy supply. In Sulawesi and North Maluku, where most nickel facilities are located, hydropower, bioenergy, geothermal, solar PV, and PHES have the most promising potential capacities (DNV, 2024).

RKEF, which currently leads the country in nickel processing capacity, can be feasibly decarbonised in the near future through the import of on-grid electricity using the recently constructed 275-kV Sulawesi backbone transmission. Benefits from gradual grid decarbonisation can then be multiplied in future years through the installation of local solar farms – for example, the concept for 707 MW floating solar PVs in Lake Towuti – and a 0.4 GW capacity and 20 GWh PHES facility. PLN will need to play a pivotal role in accelerating this effort, through strategic planning in generation and transmission.

As for HPAL, in addition to process design and improvements, diversification of renewables has the potential to remove over half of total emissions. An example of DNV's conceptual solution entails a mix of 5 MW of local geothermal power, 50 MW of biomass cogeneration, 186 MWp solar PV, and a 10 MW/40 MWh lithium-ion battery storage.

A consistent finding is also highlighted in a study on solar-storage solutions to replace captive coal needs in Kalimantan – the present and future Levelized Cost of Electricity (LCOE) of solar-storage solutions are competitive with captive coal. By 2025, solar-storage LCOE with preferential financing is projected to be USD 0.01 cents per kWh cheaper than coal. With normal financing, LCOE of solar-storage and coal is presently about the same, close to USD 0.07 per kWh. In the next decade, pricing will be even better, with the cost difference anticipated to be even larger at over USD 0.03 cents per kWh (Chojkiewicz et al., 2024).

## Reform urgently needed in national policies and plans for captive coal and key industries

October 20, 2024 marked the passing of the baton from President Joko Widodo “Jokowi” to President-elect Prabowo Subianto. It has been made clear that downstreaming initiatives set up during President Jokowi’s era will continue. The new administration has affirmed its commitment to push for sustainable development of nickel downstreaming in order to achieve 8% economic growth (Presidential Secretariat, 2024; Kompas.com, 2024).

This analysis illustrates that such growth will be almost solely fueled by captive coal power, with operating capacity tripling in just five years. While national coal capacity growth slowed down by over 75% in the last decade, over 11 GW of additional captive capacity is planned to begin operations by 2026. By the time these additions are realised, Indonesia’s captive coal will hold the largest share of the national coal generation at nearly 40% (26 GW).

Calls from environmental advocates are loud and clear, calling for a roadmap for the transition away from coal, accelerated deployment of renewable energy, and strategic industrial development placing people at the centre through environmental, social, and governance frameworks. Civil society coalition for a just energy transition, *Koalisi Transisi Energi Berkeadilan*, submitted eight quick win recommendations for the first 100 days of the Prabowo-Gibran administration (Jawapos.com, 2024). *Koalisi Sulawesi Tanpa Polusi*, which advocates for a Sulawesi without pollution, submitted a request for the President to revise or revoke the provisions<sup>14</sup> in the Presidential Regulation No. 112 of 2022 that allows new CFPPs to be built for minerals processing (WALHI Sulsel, 2024).

In September 2024, the Minister of Energy and Mineral Resources along with all factions in Commission VII of Indonesia’s House of Representatives approved the Government Regulation Draft on National Energy Policy (*Rancangan Peraturan Pemerintah Kebijakan Energi Nasional*, RPP KEN) (MEMR, 2024c). RPP KEN notably includes significant revisions of renewables share targets in the primary energy mix, from 23% in 2025 and 31% in 2050 in Governmental Regulation No. 79 Year 2014, to 17-19% in 2025 and 70-72% in 2060, in addition to emission peaks in 2035 and net zero emissions (NZE) by 2060. As of 2023, the realised share is 13%.

These revisions have been heavily criticised by civil society as a significant step backward that would hamper energy transition efforts. IESR calls for a commitment to phase out 80% of Indonesia’s coal power generation capacity by 2040 and 100% by 2045, as well as

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<sup>14</sup> Article 3 Paragraph 4 in the Presidential Regulation 112 of 2022.

for keeping the current target of 23% by 2025, in order to align with the 1.5-degree pathway outlined in the Paris Agreement (Antaranews.com, 2024b).

*Koalisi Transisi Energy Berkeadilan* urged the government to set a target of 60% renewables by 2030, and to not prolong the use of fossil fuels and false solutions that do not meaningfully reduce emissions, such as co-firing of coal and other fuel blends, fossil fuel derivatives, land-based biomass and energy crops, nuclear power, Carbon Capture Storage (CCS) and Carbon Capture Utilisation and Storage (CCUS) (Kompas.com, 2024a).

RPP KEN also specified targets for the final energy consumption from coal, at 58.6-62.9 million tonnes of oil equivalent (MTOE) in 2030, 85.8-87.8 MTOE in 2040, 79.5-81.8 MTOE in 2050, and 45.4-57.0 MTOE in 2060 (Kontan.co.id, 2024c). In 2023, the realised use was 46.3 MTOE (MEMR, 2024a). In essence, RPP KEN implies a heavier reliance on coal through the transition decades, with significant reduction only occurring between 2050 and 2060.

Meanwhile, the JETP Secretariat's efforts to map out captive power use as well as potential clean energy transition investments has been ongoing since May 2024 (JETP, 2024). The findings will inform an update to the Comprehensive Investment and Policy Plan (CIPP) initially released in November 2023 (JETP, 2023). With transparent mapping of the current and future captive landscape, the Red and White cabinet under President Prabowo, along with all national and global decision makers, enters a crucial window of opportunity to identify pathways for industrial decarbonisation, face these challenges head on, and to truly seek solutions to catalyse efforts towards net zero emission (WRI Indonesia, 2024).

In August 2024, Indonesia released the Second Nationally Determined Contribution (SNDC) draft for public consultation. The Minister of Environment and Forestry emphasised commitments to harmonise with the 1.5-degree targets, aligning scenarios outlined in the Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050), NZE by 2060 or sooner, and implementation of Just Transition aspects (MOEF, 2024).

A civil society coalition provided sector-specific recommendations on the SNDC draft. Under the energy sector, IESR highlights the urgency of mapping coal power generation capacities linked to industries, specifically the scale, the direction of development, and the targets for energy conservation and renewables integration (Madani Berkelanjutan, 2024). In addition, the rapid growth of Indonesia's nickel industry is also highlighted, especially for being more energy- and emissions-intensive compared to other nickel producing countries. Ranked second after China, greenhouse (GHG) emissions per tonne of nickel produced in Indonesia is currently 22% higher than the global average (BGR, 2024).

Reliance on captive coal, processing routes, and use of metallurgical coal are the main drivers behind this. Nickel emissions intensity varies widely, ranging from 20 to 80 tonnes

of CO<sub>2</sub> per tonne of nickel (tCO<sub>2</sub>/tNi). Comparing GHG emissions intensity of four major nickel producers in Indonesia for their nickel matte and/or ferronickel production, Vale's is currently the lowest (28.7 tCO<sub>2</sub>/tNi) due to hydropower use. Other companies emit more than double of Vale (MBMA 56.9, TBP 68.4, Antam 69.9 tCO<sub>2</sub>/tNi). TBP, the only one out of the four companies with MHP production, reports half of Vale's emissions (13.4 tCO<sub>2</sub>/tNi). MHP is produced through hydrometallurgical route, namely HPAL, emitting down to one third of GHG emissions compared to pyrometallurgical route, namely RKEF (IEEFA, 2024a).

## Policy recommendations

**Citing policy recommendations in our 2023 briefing, the path forward is and will always be clear.**

**Addressing coal's role in the energy transition cannot be limited to the power sector.**

Outlined in the initial JETP commitments, Indonesia will aim to reach a power sector emissions peak by 2030 (on-grid and off-grid), cap carbon dioxide emissions levels at 290 MTCO<sub>2</sub>e (about one-fifth lower than the previous baseline), achieve 34% renewables share in all power generation by 2030 through the acceleration of clean energy deployment, and reach NZE in the power sector by 2050. However, nearly all of these targets are being threatened by the presence of this seemingly ever-growing captive capacity, powering industries that require investments and strong governance to decarbonise.

**Inclusion of captive CFPP retirement in the national plan is crucial for a meaningful and just energy transition**, since captive power is responsible for one-fifth of all health impacts of CFPPs in Indonesia. Exclusion of captive CFPP retirement from a 2040 coal phase-out target would cause an additional 27,000 deaths and IDR 330 trillion (USD 20 billion) in economic burden from cumulative health impacts (CREA, 2023). Meanwhile, the nickel industry alone would lead to nearly 5,000 deaths in 2030 due to exposure to air pollution emitted from captive coal power and smelting processes, and cause IDR 56 trillion (USD 3.42 billion) in economic burden (CREA, 2024).

**As a leading supplier of critical minerals for the global clean energy supply chain, the Indonesian Government's firm and proactive stance is crucial in advancing efforts to decarbonise energy intensive industries.** There is urgency to set out a clear pathway for all captive power facilities. Clear and ambitious intervention for early retirement scheduling and renewables integration would not only support the government's energy transition and climate targets, but would also garner interest for clean energy investments, crucial to ensure sustained progress during the energy transition decades and to secure a strategic position in the global clean energy technology supply chain.

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## Methodology

This study utilises comprehensive datasets to track and analyse coal-fired power generation trends and heavy industry developments.

GEM's Global Coal Plant Tracker (GCPT) provides information on coal-fired power units from around the world generating 30 megawatts and above. The GCPT catalogues every operating coal-fired generating unit, every new unit proposed since 2010, and every unit retired since 2000. The GCPT uses a two-level system for organising information, consisting of both a database and wiki pages with further information. The database and wiki pages are updated bi-annually. Coal plant data is validated and updated through government data, reports by power companies, news and media reports, local non-governmental organisations, on-the-ground contacts, and satellite imagery.

CREA compiles company-level information on various industries' processing capacities, ranging from aluminium, copper, gold, silver, iron and steel, lead, zinc, manganese, nickel, cobalt, and power supply of industrial parks. Sources include reports released by government agencies, companies, trade associations, news articles, interviews, research papers, local advocacy groups, social media releases, and other publicly available documents.

This study links the two datasets to provide an overview of Indonesia's growing heavy industries that rely on captive coal-fired power plants, which are solely operated to meet electricity demands from industrial and commercial users. Provincial-level aggregates are provided to illustrate the concentration of growth, which varies widely across industries.

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