



ANALYSIS

Transitioning away from coal in Indonesia, Vietnam and the Philippines

Overview of the coal sector with a focus on its economic
relevance and policy framework

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Analysis

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Overview of the coal sector with a focus on its economic relevance and policy framework.

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The views expressed in this report are those of the authors and should not be attributed to any of the aforementioned.

Preface

Dear reader,

Southeast Asian countries such as Indonesia, Vietnam, and the Philippines are highly vulnerable to climate change impacts but also still heavily reliant on coal. The three countries have made important policy commitments to accelerating the shift from coal to clean energy in recent years. These commitments play a positive role in global efforts to limit climate change. However, all three countries lack concrete policy instruments to phase out coal. The task is daunting, as the structural changes to transition away from coal represent significant economic and societal challenges.

The international community has committed to financially supporting the transition efforts in the region through the so-called Energy Transition Mechanism and the Just Energy Transition Partnership. These commitments are an initial step toward accelerating financial assistance, technology transfer, and capacity building.

To guide policy decisions, Agora Energiewende, the Institute for Essential Services Reform and the Institute for Climate and Sustainable Cities have examined the political, economic and social dynamics that influence coal use in Indonesia, Vietnam and the Philippines. This publication aims to contribute to filling certain gaps that exist in the evidence base of the clean energy transition to support the development of strategies and mechanisms to phase out coal in a just and speedy manner.

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→ Key findings at a glance

- 1 **Indonesia, Vietnam and the Philippines have committed to phasing down coal but still plan to build a total of 45 GW of new coal power plants. None of them has yet adopted a detailed coal phase-out policy roadmap.** Building all these power plants could generate about 330 MtCO₂ additional emissions in 2030 in the three countries, which would contradict their plans to peak emissions by 2030.
- 2 **The perception of coal power as a reliable and cheap energy source in Southeast Asia is changing, especially in coal-importing countries, and several international investors are moving to cheap renewable alternatives.** In recent years, coal-fired power plants in the region have experienced frequent unplanned power outages or supply constraints, leading to growing concerns about their reliability and economics.
- 3 **The three governments should urgently develop coal phase-out strategies following their public announcements on reducing coal use.** The transition roadmaps should prioritise the scale-up of renewables and energy efficiency, include detailed assessments of the economic viability of the projects in the pipeline and define concrete coal phase-out mechanisms which cover reconversion plans for the coal regions.
- 4 **Inclusive, transparent and concrete just transition policies are required to mitigate the economic, political and social impacts of coal phase-out.** The coal industry is an important employer and source of fiscal revenues in the three countries. Just transition policies should cover topics such as reskilling of workers, regional development and economic diversification.

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Abbreviations

ADB	Asian Development Bank
APG	ASEAN Power Grid Plan
ASEAN	Association of Southeast Asian Nations
BED	Bureau of Energy Development
BOT	Build-Operate-Transfer
CIF ACT	Climate Investment Fund-Accelerated Coal Transition
COC	Coal Operating Contract
DGE	Directorate General of Electricity
DGMC	Directorate General of Mineral and Coal
DMO	Domestic Market Obligation
DOE	Department of Energy
EPIRA	Electric Power Industry Reform Act
ERC	Energy Regulatory Commission
ETM	Energy Transition Mechanism
ETS	Emission Trading System
EVN	Electricity of Vietnam
FABA	Fly Ash Bottom Ash
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GRDP	Gross Regional Domestic Product
GW	Gigawatt
ICI	Indonesian Coal Index
ICMA	Indonesian Coal Mining Association
IDR	Indonesian Rupiah (exchange rate 15 000 IDR = 1 USD)
IPP	Independent Power Producer
IUP	Mining Business Licence
JETP	Just Energy Transition Partnership
kW	Kilowatt
MARD	Ministry of Agriculture and Rural Development
MEMR	Ministry of Energy and Mineral Resources
MJ/kg	Megajoule/Kilogram
MoIT	Ministry of Industry and Trade
MoU	Memorandum of Understanding
MSOE	Ministry of State-Owned Enterprises
Mtoe	Million Tonnes of Oil Equivalent
Mtpa	Million Tonnes per Annum
NEX	Newcastle Export Index
NPC	National Power Corporation
PD	Presidential Decree
PEMC	Philippines Electricity Market Corporation
PEP 2020–2040	Philippines Energy Plan 2020–2040
PetroVietnam	Vietnam Oil and Gas Group
PHP	Philippine Peso (exchange rate 55 PHP = 1 USD)

PJ	Petajoule
PKP2B	Coal Contract of Work
PLN	Perusahaan Listrik Negara
PPA	Power Purchase Agreement
PPP	Public Private Partnership
RES	Retail Electricity Suppliers
SOE	State-Owned Enterprise
TPEC	Total Primary Energy Consumption
TPES	Total Primary Energy Supply
TWh	Terawatt-hour
USD	US Dollar
Vinacomin	Vietnam National Coal and Mineral Industries Group
VND	Vietnamese Dong (exchange rate 23 500 VND = 1 USD)
VRE	Variable Renewable Energy
WESM	Wholesale Electricity Spot Market

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Executive summary

Coal has a significant economic relevance in Indonesia, Vietnam and the Philippines, not only in the mining sector but also in power generation and industrial uses.

Indonesia, Vietnam and the Philippines are among the fastest-growing countries in the world with energy demand expected to increase by between five and eight percent per year until 2030. Coal remains the dominant fuel for electricity generation, comprising around 50 percent of national power production in all three countries. It is also used in heavy industries for heat and as a reducing agent in iron making. Coal-fired power plants are relatively young with an average age of eight years in Vietnam, 11 years in Indonesia and 13 years in the Philippines. The coal industry is an important employer in the three countries, providing a total of 340 000 direct jobs in the mining sector concentrated in just a few regions - Kalimantan and Sumatra (Indonesia), Quang Ninh and the Red River Delta (Vietnam) and Semirara Island (Philippines) - and more than 190 000 jobs in power generation. It is also an important source of fiscal revenues for the state.

Indonesia: the main coal exporter worldwide.

Indonesia is the third largest coal producer in the world and a major coal consumer, with coal accounting for around 40 percent of its primary energy consumption in 2022. It is also the largest coal exporter in the world, exporting two thirds of the coal it produced (465 Mt) in 2022, mainly to China, India, Japan, South Korea, the Philippines and Malaysia. Indonesia has a total of 45.4 GW of coal power plants in operation, with around 52 percent of the fleet in operation for less than ten years. The coal sector employs about 1 million people (directly and indirectly) in Indonesia, including 250 000 jobs in the mining industry. The coal mining industry provides signifi-

cant revenues to the state, corresponding to around two percent of its GDP. Its economic importance is even higher in the coal mining provinces of Kalimantan and Sumatra (where its contribution to regional GDP reaches as much as ten percent).

Vietnam: a coal sector that struggles to meet national demand growth.

Vietnam is a major coal consumer, with coal accounting for 45 percent of the country's primary energy consumption in 2022. The country has 25.8 GW of coal-fired power plants in operation, with about 79 percent being younger than ten years. The country became a net coal importer in 2015, and today imports cover about 47 percent of the total coal consumed in the country. The coal mining industry still represents an important economic sector with about 86 000 jobs, concentrated in the mining regions of the north of the country. In addition, about 120 000 jobs are created in the area of coal power generation.

Philippines: the coal power industry is heavily dependent on coal imports.

Coal accounted for about 40 percent of primary energy consumption in the Philippines in 2022. The country has lower coal reserves than Indonesia and Vietnam and coal production remains largely insufficient to cover its soaring demand. Hence, the Philippines imports nearly half of the coal it consumes, almost exclusively from Indonesia. With a total of 12.1 GW installed capacity, coal covered about 60 percent of the power generation mix in 2021. The economic relevance of the coal mining sector in the Philippines is much smaller than in Indonesia and Vietnam: most jobs in the Philippines' coal industry are concentrated in coal-fired power generation (47 000 jobs) and about 4 000 people in mining.

The perception of coal power as a reliable and cheap energy source is changing in the region, especially in the coal importing countries. This trend is being accelerated by the no-new-coal policy of several international investors.

Over the last few years, coal power in the region has become more costly and less reliable.

Coal was historically seen as a reliable and cheap source of energy in the region. Yet the experiences in recent years of coal-fired power plants in the region encountering frequent unplanned power outages (Philippines) or supply constraints (Vietnam) have led to growing concerns about their contribution to energy security, an impact further exacerbated by rising costs during periods of scarcity. Indeed, volatile coal prices as experienced during the 2022 energy crisis further diminished the attractiveness of coal power and even called into question the financial viability of Philippine and Vietnamese power utilities, which remain heavily dependent on imported fuels. In addition, several coal power plants in the pipeline have been taking longer to construct for reasons that include a lack of committed investments and local community protests (particularly in Vietnam). Finally, the inflexible operation of the coal power fleet hampers the integration of large shares of variable renewables, leading to higher curtailment rates of renewables (Vietnam). With increasing shares of renewables, the cost-effectiveness of coal power generation is no longer guaranteed, either.

Several international investors have announced that they will stop financing new coal power plants in the region; it remains to be seen whether these commitments will actually be implemented, however, and in any case they do not relate to other coal uses, such as in the steel industry.

Financing new coal projects in the region is becoming more challenging: the G7 countries agreed to stop financing unabated coal projects abroad by the

end of 2022, and multiple national and international finance institutions have made dedicated commitments to stop financing new coal power plants. They include China, Japan and South Korea, historically the three largest providers of foreign coal finance in the region. These announcements have yet to be implemented, however, and in principle they do not cover the 45 GW of projects that are in the pipeline in the three countries. In addition, the aforementioned foreign countries continue to have a growing interest in investing in downstream coal products (e.g. coal gasification) as well as in steel production facilities (especially blast furnaces), which risks further lock-in of coal use in the industry sectors.

Amid decreasing long-term attractiveness of coal power, the three countries have pledged to accelerate the shift to clean energy.

The government of Vietnam has set a target of peaking greenhouse gas emissions by 2030 and reducing them to net zero by 2050. The latest Power Development Plan 8 still relies on 30 GW of unabated coal in 2030, representing 20 percent of the country's power generation. Compared to the previous PDP plan, this represents 18.8 GW of coal power plants that were shelved. However, the current PDP is not aligned with the country's commitment to the Just Energy Transition Partnership (JETP), which seeks to limit greenhouse gas emissions from the power sector to 170 MtCO₂ in 2030.

The government of Indonesia has pledged to reach net-zero greenhouse gas emissions by 2060. Several additional targets have been discussed, such as peaking emissions in the power sector in 2030 in the context of the Just Energy Transition Partnership (JETP) negotiations, phasing out coal by 2050 as promised by President Joko Widodo at the Hannover Messe in April 2023, and raising the long-term renewable energy target.

In 2021, the government announced a ban on new coal power plants after 2023, with exceptions for "captive" projects and projects already planned and

under construction (13.8 GW). "Captive" projects are considered power plants that directly power, and are often co-located with, industries of strategic relevance (20 GW) (The Comprehensive Investment and Policy Plan Draft, 2023). Prospective captive projects are not limited to projects in the pipeline, yet some restrictions exist, i.e., a commitment to reducing emissions by 35 percent within 10 years of operation, and retirement by 2050. The government has mandated the Ministry of Energy and Mineral Resources (MEMR) to develop a coal phase-out roadmap, however, progress has stalled since the beginning of the JETP negotiations.

Analysis has shown that up to 5 GW of coal-fired power plants could be retired before 2025. This constitutes a "low-hanging fruit" in view of the ageing conditions of these plants and the severe environmental and health impact they represent (IESR, 2023). MEMR is preparing a draft roadmap, as mandated by the presidential regulation 112/2022 after consultation with key actors including PLN, and should provide more clarity on the CFPP retirement plan. In addition, about 3 GW new coal-power plants under construction by PLN are in a very early stage of construction (less than 15 percent of capital already invested) and could effectively be cancelled with limited compensation.

The Philippines has committed to reducing CO₂ emissions by up to 75 percent in 2030. It is the only country in the ASEAN (Association of Southeast Asian Nations) region that has not adopted net-zero target. In 2020, the Philippines announced a coal moratorium on new coal projects. The coal moratorium puts all planned coal projects on hold, with a couple of exceptions for projects that already have scheduled commercial operation or have received regulatory approval. This represents about 3.8 GW of greenfield projects that are expected to be built, of which 0.7 GW are already under construction.

These commitments have been reinforced in the context of the JETPs adopted between the G7+ countries and the governments of Indonesia and Vietnam, as well as within the Energy Transition Mechanism (ETM) of the Asian Development Bank.

Despite high-level political pledges in the three countries, societal issues, as well as political and economic interests related to the coal industry, pose challenges to the transition away from coal and prevent the adoption of clear transition policies.

As the countries move away from coal, the region will experience important structural changes which will impact employment and coal revenues. This transformation is made more difficult by several political and economic interests in the coal sectors, both at national and regional levels. In addition, the relative opacity of decision-making processes and the lack of available data make the design and adoption of transition policies more difficult. Finally, several decision-makers and SOEs still view coal power as a prerequisite for energy security and power system stability, despite evidence showing that alternatives to coal power exist. The transition away from coal will negatively impact part of society in coal regions. Timely and appropriate measures need to be adopted to reduce this impact and ensure a just coal phase-out.

In this context, and despite high-level political pledges, clear transition policies and instruments are missing in the region, and 45 GW of new coal power plants are still planned across the three jurisdictions. Of these 45 GW, 25.5 GW are currently under construction (Indonesia 19.4 GW, Vietnam 5.4 GW, Philippines 0.7 GW). Some of these power plants are only at an early stage of construction (invested capital below 15–20 percent of the total required capital) and could in principle be cancelled with little compensation. Most power plants are in a much more advanced stage, however, and would require specific phase-out programmes with compensation mechanisms. Indeed, considering its average lifetime of 40 years, any new coal power plant commissioned in the coming years would be expected to generate electricity until well beyond 2050. Building all 45 GW would represent additional emissions of more than 330 MtCO₂ in 2030 in the three countries and risks jeopardising national plans to peak emissions by 2030. In the longer run, such projects represent a significant risk

of becoming stranded assets or of locking their economies onto high emissions pathways that exceed the net-zero emissions commitments defined for 2050 or 2060. This situation calls for the rapid adoption of decommissioning mechanisms (either for old assets or the latest ones).

The role of coal in the energy transition needs to be reassessed in line with commitments to climate action. Policy should focus on concrete transition instruments and the scale-up of renewables rather than on uncertain options such as coal-repurposing.

Some options currently being discussed in the region, such as the repurposing of coal power plants with co-firing (ammonia or biomass) or carbon capture and storage (CCS), are highly uncertain.

Given the young age of the coal power fleets in Southeast Asia (eight years on average in Vietnam, 11 years in Indonesia and 13 years in the Philippines), the proposed solution to repurpose existing (and new) coal power plants in the transition period is high on the policy agenda in the three countries. Several “transitional options” are currently under discussion, in particular the blending of biomass or ammonia in coal power plants and retrofit measures to capture and store carbon emissions (CCS). These options raise several questions regarding technical feasibility, economic effectiveness and sustainability. Another option under discussion is to increase the flexibility of the power plants so as to accommodate higher shares of renewables. The operational flexibility of these power plants does indeed seem much lower than global standards and could – in principle – be improved by changing operating practices and potentially by using targeted low investments to avoid extending the lifetime of the power plants. Besides technical limitations, regulatory and market arrangements (such as long-term power purchase agreements or other market and regulatory barriers) could pose additional constraints to flexible opera-

tion. In any case, all these options (co-firing, CCS and flexibility retrofit) represent a carbon lock-in risk, as they may favour an extension of unabated coal power generation rather than a quicker phase-out.

Policy priority should be given to designing clear transition roadmaps, defining concrete mechanisms to phase out coal and adopting reconversion plans for the coal regions.

A clear energy transition roadmap away from coal should define concrete timelines and include a precise socio-economic impact assessment. These plans should assess in detail the economic viability of the 45 GW of new projects that remain in the pipeline, while also exploring concrete policy mechanisms to phase out coal (e.g. CO₂ pricing, administrative phase-out plan, reverse auctions). They should address all end-use sectors, in particular those industry sectors where coal remains an important heating fuel or reduction agent (in the steel industry), and which are often not directly included in power sector emissions (so-called captive power). Defining fair compensation that covers invested capital will be particularly relevant given the young age of the coal-fired power plant fleet. Without a doubt, such divestment instruments will need to be implemented with the support of the international community (JETP, ADB-ETM). These plans would help develop a more resilient power system in importing countries such as Vietnam and the Philippines, minimising their vulnerability to external shocks such as that experienced during the 2022 energy crisis. In Indonesia, a transition plan would limit the country’s exposure to the expected decline in coal export revenues (since global demand is expected to fall) and support the growth of alternative economic sectors.

The political economy of coal in the three countries – which still reflects the entrenched and complex coal value chains – has not yet fully addressed those fundamental economic reforms that are socially and politically sensitive (e.g. removing fossil fuel subsidies, renegotiating power purchase agreements, reforming low electricity tariffs to ensure they recover costs, abating domestic market obligations etc.).

Ensuring a just transition in the regions will likely require a set of policy measures that support the development of economic alternatives to the coal industry, attract diversified investments and create new job opportunities and revenues for the state. Taking a holistic approach that considers local needs and aspirations by including affected communities in policy discussions, while also supporting the reskilling of the workforce, is essential. This challenge has not yet been systematically addressed in any of the three countries. The JETPs frameworks in Indonesia and Vietnam present, a priori, an opportunity for a just transition dialogue with various stakeholders aimed at jointly tackling the objectives of economic diversification, sustainable development, education and just transition policies. Progress in the context of the JETP has so far been very limited, however.

Renewables, though picking up momentum in Vietnam, Indonesia and the Philippines, remain largely insufficient to meet long-term climate commitments.

While commitments that favour renewable development in the region remain insufficient, solar and wind are increasingly being perceived as economic alternatives that can alleviate some of the financial

and climate risks associated with coal power. In Southeast Asia, the shift towards renewables is happening in the context of rapid energy demand growth that will require massive infrastructural investment, in particular in the transmission grid. This represents an important challenge – given the scale of investment required – but also an opportunity for green growth and for enhancing the resilience of the energy systems. Attracting the necessary investments will require important regulatory and market reforms, however. While the JETP and the ETM constitute initial steps of support from the international community, significantly more financial resources, both public and private, must be provided. In addition, to be credible, the JETP implementation must show real commitment from funding parties and deliver tangible results.

Overview of socio-economic and coal-related indicators in Indonesia, Vietnam and the Philippines

→ Table 1

Indicators	Indonesia	Vietnam	Philippines
Long-term mitigation target	Carbon net zero target by 2060 or earlier	Carbon net zero target by 2050	75 percent ¹⁾ reduction and avoidance of GHG emissions by 2030
2030 mitigation target in the power sector (million tonnes CO ₂)	478	204–254	up to -75 percent (not only power sector)
Population 2021 (million)	273.8	97.5	113.9
GDP 2021 (billion USD)	1186	366	394
Electricity demand 2021 (TWh)	310	265	113
Electricity consumption per capita 2022 (kWh)	1 100	2 500	950
Primary energy coal consumption 2022 (PJ %)	3 282 40	2 000 45	840 40
Production of coal 2020 (PJ)	13 500	1 403	963
Imported coal 2020 (PJ)	247	1 211	660
Exported coal 2020 (PJ) world ranking	9 266 1st	21 16th	166 10th
Share of coal in electricity generation 2022 (%)	61	39	47
Total coal installed capacity 2023 (GW)	45.3	25.8	12
Coal power plants under construction 2023 (GW)	19.4	5.3	0.7
Coal power plants (pre-) permitted 2023 (GW)	14.4	3.9	1.6
Coal rents ²⁾ 2021 (% of GDP)	1.2	0.4	0.1
Total employment in coal mining total employment in power generation and transmission (2020)	250 000 n/a	83 549 131 020	2 955 55 714
Average age of the power fleet (weighted with capacity)	11	8	13

¹⁾ Of which 2.71 percent is unconditional, for the period 2020 to 2030 for the sectors of agriculture, waste, industry, transport and energy.

²⁾ Coal rents are the difference between the value of both hard and soft coal production at world prices and their total costs of production (World Bank, 2023).

Introduction

Coal remains a dominant fuel for electricity generation in many Southeast Asian countries, especially in Indonesia, Vietnam and the Philippines, where it currently accounts for around or above 50 percent of the total. However, important policy commitments have been made in these three countries over the last two years with the objective of accelerating the shift from coal to clean energy. The government of Indonesia has committed to reaching net-zero greenhouse gas emissions by 2060, to phasing out unabated coal by 2050 and to ensuring that emissions in the power sector peak by 2030. The government of Vietnam has committed to reaching net-zero emissions by 2050 and to ensuring that CO₂ emissions in the power sector peak by 2030 (between 204–254 MtCO₂ for an installed capacity of coal power plants totalling 30 GW). The government of the Philippines is the only country in ASEAN that has not yet committed to a net-zero target, though it did announce a coal moratorium in 2020 that prohibits the construction of new coal-fired power plants and the expansion of existing ones.

These commitments are very positive. However, clear transition roadmaps are still missing in Indonesia, Vietnam and the Philippines, and 45 GW

of new coal power plants are planned in the three countries nonetheless. In addition, the region plans to repurpose coal power plants in the transition period, despite high technical and economic uncertainties.

Structural changes to move away from the coal economy represent important economic and societal challenges in the three countries. In this context, the international community committed in 2021 to financially supporting the transition efforts in the region through the so-called Energy Transition Mechanism of the Asian Development Bank (ADB) and the Just Energy Transition Partnership signed in 2022 with the governments of Indonesia and Vietnam.

This analysis examines the political, economic and social dynamics that influence coal use in Indonesia, Vietnam and the Philippines. It provides a status update on the coal value chain in each country. The publication is structured into three country chapters that encompass comprehensive data on the coal industry, its socio-economic relevance and its governance structure, as well as policy advancements pertaining to coal. A comparative conclusion puts these facts into perspective. Hopefully, the information presented here will support the development of strategies, pathways and mechanisms to phase out coal in a just and speedy manner.

1 Coal in Indonesia

1.1 Coal reserves and utilisation

Coal reserves and type of coal

Coal resources in Indonesia are estimated at 110 billion tonnes, around 32 billion tonnes of which are identified as verified reserves. This is equivalent to four times the annual global coal consumption level in 2022. The reserves and the coal industry are located mostly on the two large islands of Kalimantan and Sumatra, despite the fact that 70 percent of coal-fired power generation is concentrated in Java Island.

Based on the Global Energy Monitor (2022), most of the coal resources are classified as lower grade lignite/sub-bituminous coal (<21 MJ/kg) (49 percent) and concentrated in Central and South Sumatra. Medium quality coal 21-25 MJ/kg) represents about 26 percent of the coal resources and is mostly found in East Kalimantan. Coking coal (>25 MJ/kg) accounts for the remaining 24 percent of the coal

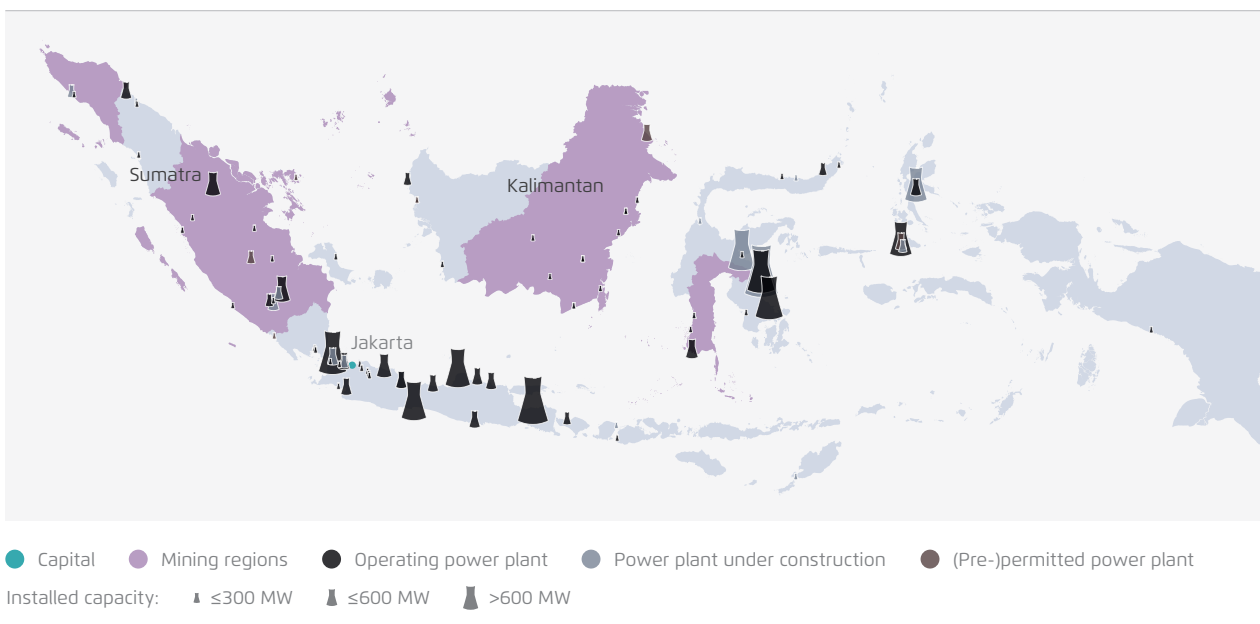
resources. The Indonesian mining companies PT Bumi Resources and Adaro are two of the top 20 coal producing companies in the world, producing 90 and 59 million tonnes of coal per year respectively. Bumi Resources owns the Sangatta mine, the largest open pit mine in Indonesia (East Kalimantan) and the fourth-largest in the world with a production capacity of 51 million tonnes per year (8 percent of Indonesia production). Adaro owns the Tutupan mine (in South Kalimantan) with a production capacity of 38 million tonnes per year (6 percent of Indonesia production).

Production and consumption, export and import

Indonesia's coal mining industry, although relatively young, has become a major global player. The country has seen coal production capacity and domestic consumption rise sharply over the last thirty years.

Overview of coal-fired power plants and coal mining regions in Indonesia

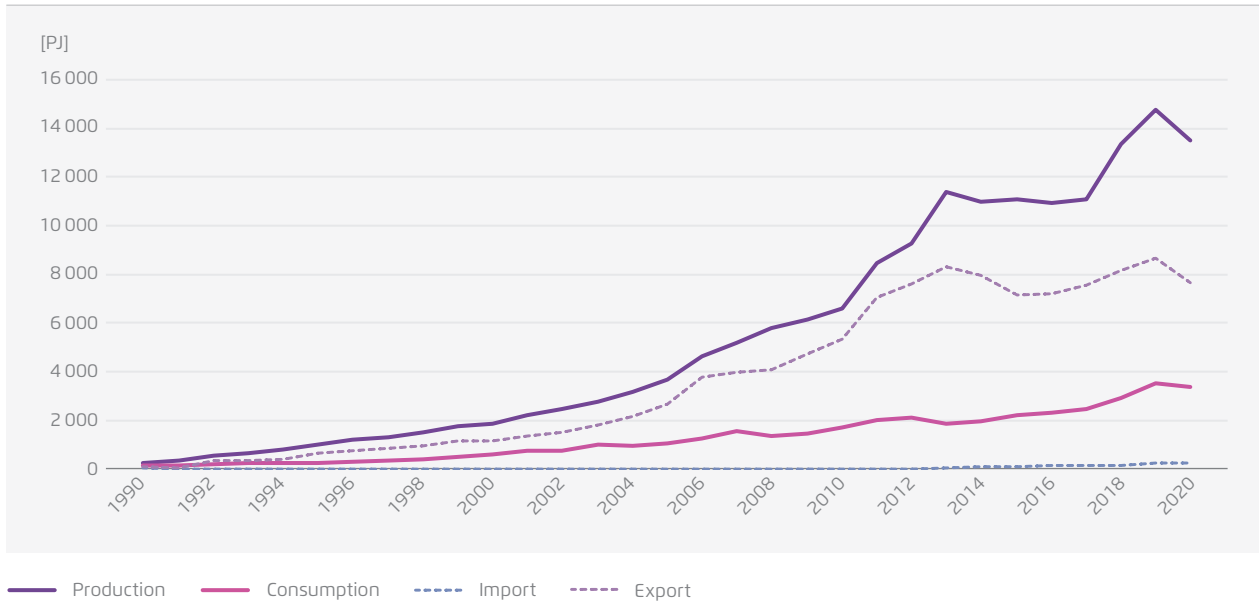
→ Fig. 1



Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

Production, consumption, import and export of coal 1990–2020 in Indonesia

→ Fig. 2



BP (2022), IEA (2021)

National production increased from 260 PJ in 1990¹ to 14 000 PJ, making Indonesia the third-largest coal producer worldwide. Despite having no newly opened coal mines (larger than 1 million tonnes per year of capacity) since 2017, coal production has increased by about 5 400 PJ over the last seven years. National coal consumption is following similar trends, from 150 PJ consumed in 1990 to 3 350 PJ in 2020, as can be seen in Figure 2. Around 20 percent of total production is consumed in the country, while the rest is exported. In addition, only 6 percent of coal consumption, mostly coal briquettes, is covered by imports (around 360 PJ). The priority given to local coal consumption is regulated by a domestic market obligation which requires Indonesian coal suppliers to sell at least 25 percent of their coal production at a fixed price on the domestic market. Over the past decades, Indonesia has become the largest coal exporter in the world and is set to continue to dominate the global coal market. In 2022, Indonesia exported 11 200 PJ (an almost eight-fold increase compared to 2000), accounting for over a third of the world's total coal exports. In the context of the global energy crisis

and high coal prices worldwide, coal exports from Indonesia increased significantly in 2022 and 2023. In January 2023 for example, Indonesian monthly exports reached 60 million tonnes (1.3-fold compared to the January 2022 figure of about 45 million tonnes). This situation resulted in additional revenues for the coal industry.

More than 85 percent of Indonesia's coal exports are shipped to just six countries: China, India, the Philippines, Malaysia, South Korea and Japan. Declining export volumes to other countries are more than offset by increasing exports to China, which constitute around 40 percent of Indonesia's coal exports. Energy policy changes aimed for example at phasing out coal in these countries would therefore significantly affect the future of Indonesia's coal exports and the overall economics of the coal industry, potentially putting greater pressure on local coal consumption.

¹ By comparison, at that time Australia, the US and China were producing 4 800 PJ, 22 540 PJ and 22 610 PJ respectively (BP, 2022).

1.2 Coal use in different sectors

Energy use of coal in total final consumption and GHG emissions

In 2022, 78 percent of Indonesian’s total final energy consumption was met by fossil fuels: oil (42 percent), coal (13 percent), gas (11 percent), biofuels and waste (18 percent), and electricity (16 percent, of which 78 percent was generated using fossil fuels). The share of coal has grown significantly over the last 30 years in the context of rapid energy demand growth, which has tripled during this period. As a result, energy sector emissions quadrupled from 132 MtCO₂ in 1990 to 513 MtCO₂ in 2020 (Figure 3). Energy-related CO₂ emissions mostly originate from electricity and heat production (225 MtCO₂), industry (131 MtCO₂) and transport (126 MtCO₂) (IEA, 2023a).

In 2022, a large proportion of the overall coal was used in the power sector (129.3 million tonnes – 60 percent) and in the industry sector (68.8 million tonnes – 32 percent) (MEMR, 2022). Use in the industry sectors is dominated by the iron and steel

industry (49.4 million tonnes), the cement, textile and fertiliser industries (13.1 million tonnes), and by the pulp and paper industry (6.3 million tonnes). Many of these industries also have their own coal power plants to supply electricity directly on site – often called captive power.

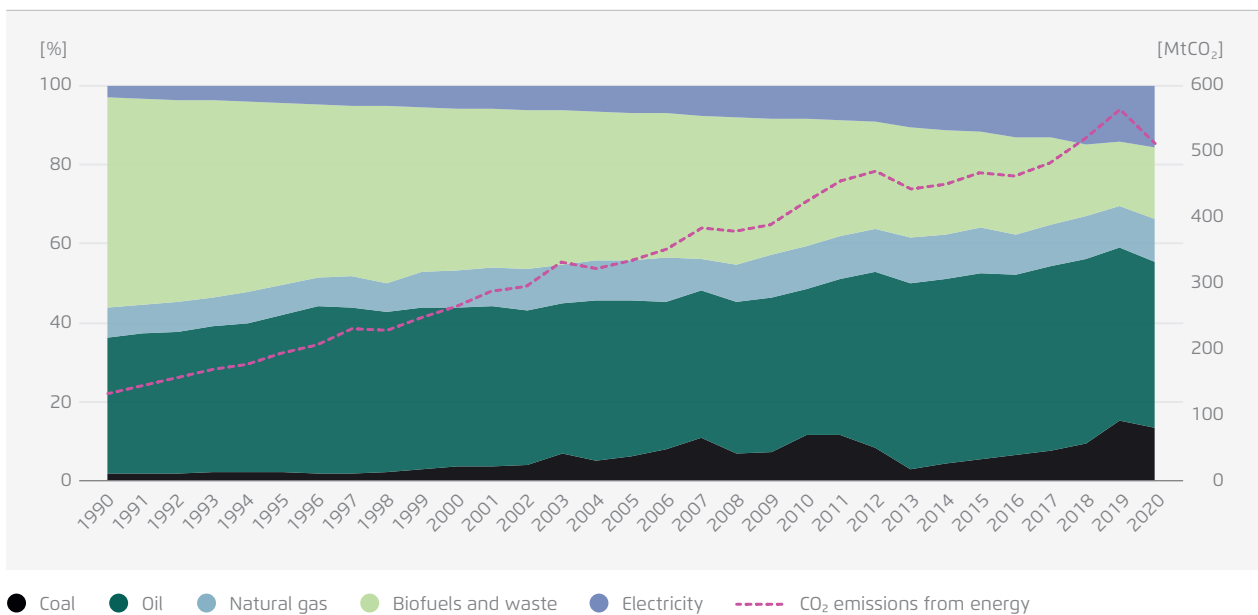
Indonesia currently operates six steel/iron plants, four of which use blast furnaces (BF), one which uses an electric arc furnace, and one which uses direct reduced iron (DRI). Two further plants with BF are under construction and nine plants have been announced, three of which will have BF, one will have electric and one will have oxygen; no information about the four remaining plants has been made publicly available. The steelmaking and iron potential capacity amounts to 14 million tonnes and 9 million tonnes² per annum (Global Energy Monitor, 2023d).

About 131 million tonnes of coal were used in 2020 (MEMR, 2022), of which steel consumption

² Not all iron capacity data available.

Total final energy consumption mix and CO₂ emissions from energy 1990–2020 in Indonesia

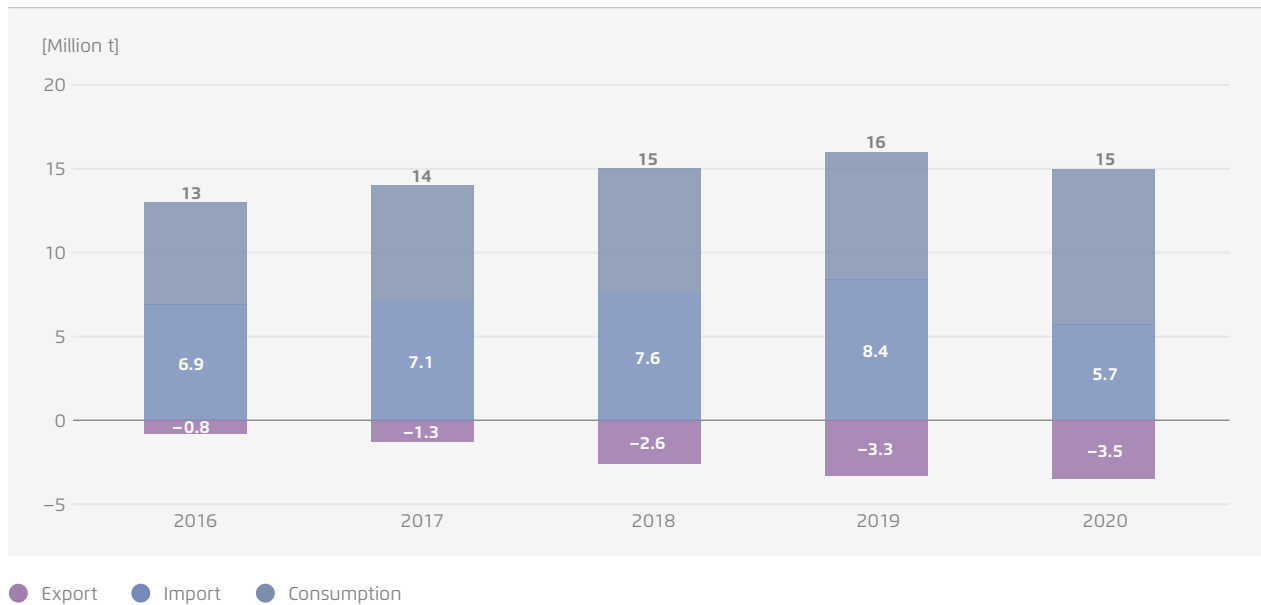
→ Fig. 3



IEA (2021), BP (2023)

Steel consumption, import and export in Indonesia

→ Fig. 4



South East Asia Iron and Steel Institute (2022a)

accounted for around 10 percent, i.e. around 15 million tonnes. 5.7 million tonnes of steel were imported and 3.5 million tonnes exported (see Figure 4) (South East Asia Iron and Steel Institute, 2022).

1.3 Coal in the power sector

The Indonesian power system consists of large systems on the main five big islands (Sumatra, Java, Kalimantan, Sulawesi and Papua). Some systems have 100 percent electricity access, while Papua and other small island systems have an electricity access rate of 92-96 percent. Currently, only the Java-Madura-Bali Island systems are interconnected via 500 kV high voltage transmission lines with 400 MW capacity. Additional interconnections are planned between islands, for example between Java-Sumatra in 2028 (1 GW), and to other neighbouring countries under the ASEAN Power Grid Plan (APG).

The power sector is regulated and controlled by the state. Independent power producers (IPP) participate in electricity generation under the auspices of PLN (Perusahaan Listrik Negara), the state-owned vertically integrated utility, which owns power plants

and acts as single buyer and sole transmission and distribution operator.

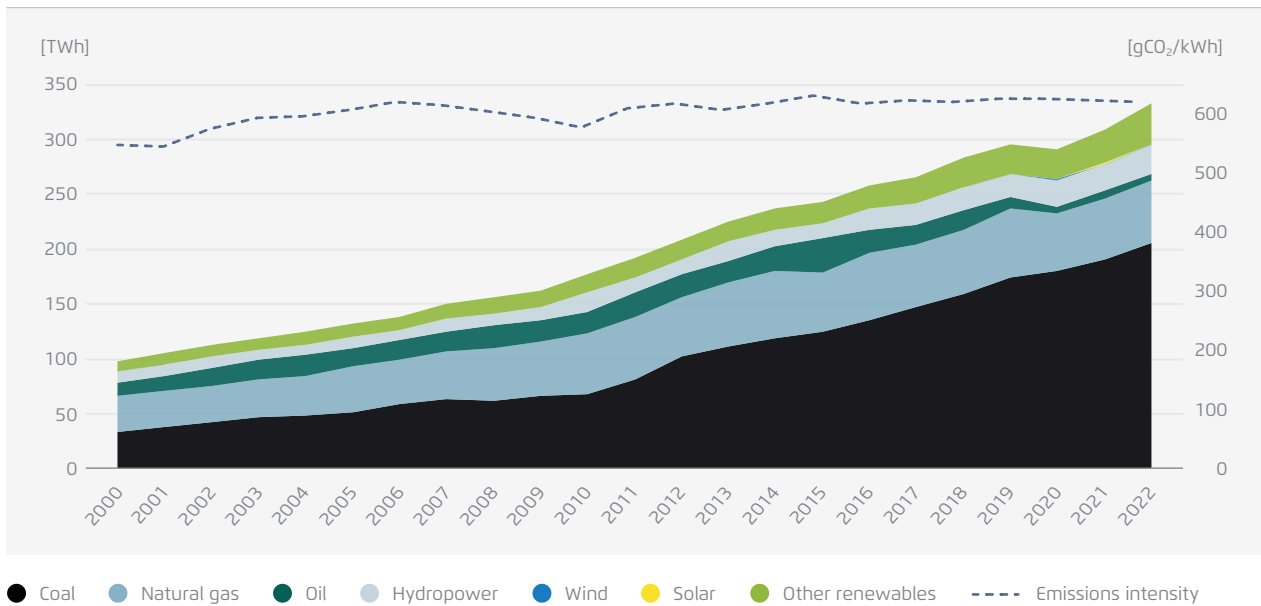
Indonesia's power sector policy is based on three core principles: availability, affordability and environmental sustainability (IEA, 2022a). Availability relates to the adequacy of supply, a key policy being to maintain the power system reserve margin at a minimum of 35 percent of annual peak load, which is considered high by international standards. This is based on a loss of load probability (LOLP)³ of 0.274 percent or on not meeting peak demand for a total of 24 hours in a year (IEA, 2022a).

In addition, power development plans in the past had a tendency to overestimate power demand growth (Agora, 2021), increasing the overcapacity of fossil power plants. In this context, the capacity reserve margin in Java-Bali is forecasted to significantly exceed the 35 percent target (an already very high level)

³ The relationship between LOLP and reserve margin depends on parameters like the outage rate and plant size. For example, a similar LOLP in some US systems means having a reserve margin of around 15 percent.

Electricity generation and emissions intensity 2000–2022 in Indonesia

→ Fig. 5



Ember (2022), MEMR Handbook (2022)

and could reach up to 60 percent of total expected peak demand in the next decade (IEEFA, 2021).

Overview of coal-fired power plants in Indonesia

Indonesia has 45.4 GW of total coal power capacity in operation, comprised of 26 GW of subcritical power plants, ⁴ 5 GW of supercritical, 7 GW of ultra-supercritical technology, and the rest unknown. Around 52 percent of the coal power plant fleet was commissioned less than ten years ago, adding to the financial challenges of an accelerated phase-out in the next 10–15 years. Based on an average technical lifetime of 40 years (without retrofit), 8.2 GW of coal power is set to retire within the next 20 years. Another 11.5 GW will retire within 30 years. Over 43.7 GW will still be operating in 30 years' time and beyond (see Figure 6). In addition, invested capital is usually

amortised over a period of 25 to 30 years, making a quicker phase-out subject to financial compensation.

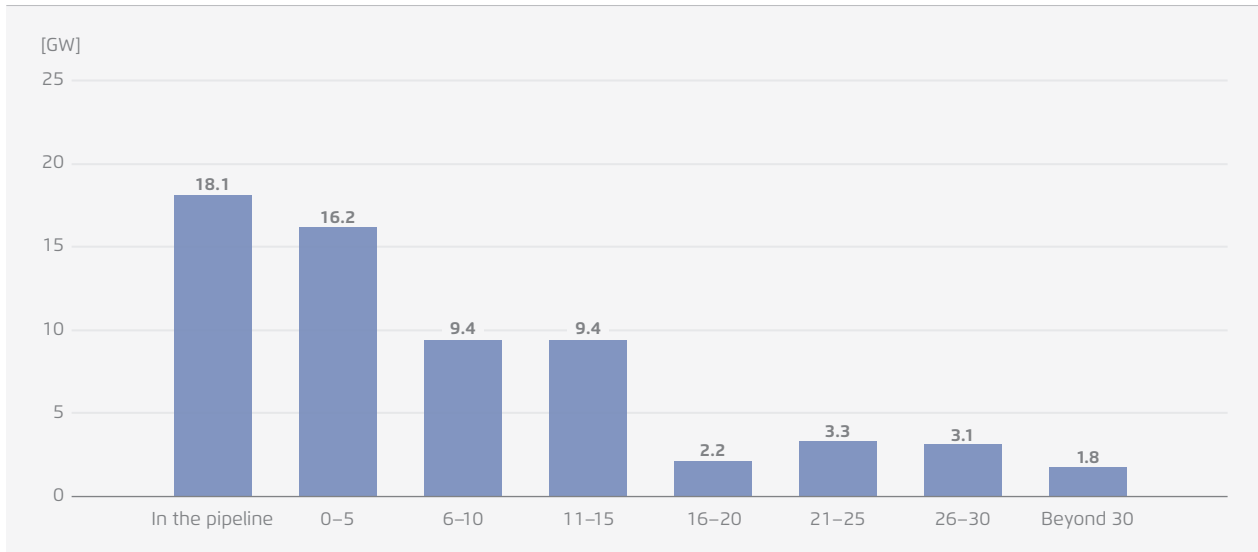
In 2018, the Indonesian government announced that no new coal power plant would be built in Java. Instead, it decided to focus on the development of new mine mouth⁵ coal power plants in Kalimantan and Sulawesi (MEMR, 2018). Four years later, the government adopted a nationwide ban on the development of new coal-fired power plants (Presidential Regulation 112/2022), with some exceptions for projects already in the pipeline (13.8 GW) and strategic projects with high added value for the industry (14.4 GW captive power). In addition, the Presidential Regulation 112 stated that coal power plants would be decommissioned by 2050 and tasked the Ministry of Energy and Mineral Resources (MEMR) with developing a coal phase-down roadmap.

⁴ Subcritical technology is the oldest and least efficient type of coal power plant technology and typically achieves thermal efficiencies of between 33 and 37 percent. Super-critical technology has thermal efficiencies between 38 and 40 percent. Ultra-supercritical technology is the most recent coal power technology, reaching thermal efficiencies of 44 to 46 percent.

⁵ Mine mouth coal power is a type of coal-fired power plant that is located near a coal mine, so it can directly use coal that is extracted from the mine. This eliminates the need for long-distance transportation of coal, reducing overall costs and emissions due to transportation. These plants typically use either super-critical or ultra-supercritical steam cycles.

Overview of the age of coal power plants in Indonesia

→ Fig. 6



Global Energy Monitor (2023b)

Analysis have shown that up to 5 GW of coal-fired power plants could be retired before 2025, a low-hanging fruit due to the aging conditions of those plants and the severe environmental and health impact they represent (IESR, 2023). MEMR is preparing a draft roadmap, as mandated by the presidential regulation 112/2022 after consultation with key actors including PLN, and should provide more clarity on the CFPP retirement plan. In addition, about 3 GW new coal-power plants under construction by PLN are in a very early stage of construction (less than 15 percent of capital already invested) and could effectively be canceled out with limited compensation.

In the context of overcapacity (see section above), the early retirement of ageing power plants, coupled to a moratorium on new capacity investments, should be prioritised. However, the ongoing discussion in Indonesia also favours measures to support the longer operation of coal power, such as promoting coal co-firing with biomass or ammonia as a means of reducing carbon emissions. While ammonia co-firing is still undergoing a pilot phase, biomass co-firing⁶ has been

implemented in 32 units (for a total of 8 GW, with an average blending rate of 5-10 percent),⁷ equivalent to a yearly production of 0.5 GWh of electricity. The rationale behind the development of biomass co-firing is based on the considerable perceived potential of biomass energy from the agriculture sector. The co-firing programme targets a blending rate of 10-20 percent in 52 units by 2025, with a total capacity of 18 GW. Biomass blending in coal-fired power plants counts as “green energy” with respect to the achievement of Indonesia’s 23 percent renewable energy target in 2025 (PLN, 2022).

Energy security and electricity generation

An abundance of coal reserves does not necessarily ensure energy security. While coal has long been considered a reliable energy source, ensuring a reliable power supply involves more than just access to coal. It also requires the electricity flow to be balanced and frequency and voltage to be maintained within operational limits. To guarantee system

6 Similar to ammonia co-firing, blending more than 10 percent biomass entails several risks of damage to the boiler and affects boiler efficiency (Sugiyono et al., 2022). Types and prices of biomass also affect the feasibility of a biomass co-firing programme. In Indonesia, the price of biomass is relatively higher compared to coal; this is due to coal pricing policy and existing limitations on

creating a stable value chain. The use of biomass resources should therefore be prioritised where cheap renewable electricity is not an economically viable option.

7 Some small power plants (10 MW) have been piloted for a 100 percent switch to biomass.

Flexibility parameters of coal power plants in Indonesia and global average → Table 2

Type	Minimum operating level (% of nominal capacity)	Ramp rate (% of nominal load per minute)	Warm start-up time (hours)
Coal power plants in Indonesia	67.5–80% (old sub-bituminous) 59% (sub-bituminous)	1%	6
Global average state-of-the-art coal power plants	37%	1.5–4%	6
Global average after retrofits	20%	3–6%	2.6

Agora Energiewende (2017), IESR (2022b), IEA (2022a)

reliability, the grid infrastructure in Indonesia will need to be strengthened and expanded, its present weakness having been highlighted by the Java black-out in August 2019. On that particular day, transmission outages led to a power failure which lasted for nine hours and impacted approximately 22 million individuals (CNN, 2019). A similar event of cascading grid failure occurred in 2005, underscoring the need to enhance the resilience of Indonesia's grid system (IEEE, 2019).

The most recent event was the energy crisis, when Indonesia imposed a coal export ban in early 2022 to secure supply to its domestic power plants. Both domestic and foreign purchasers were affected and struggled to maintain a secure coal supply.

The operational capability of the existing coal power fleet in Indonesia can contribute to integrating up to about 10 percent variable renewables, despite the fleet having a flexibility parameter that is below the global standard (Table 1) (IESR 2022b, IEA, 2022). Integrating more than 10 percent variable renewables will require additional measures to unlock the flexibility potential of coal power plants (in particular lower minimum loads), both at the technical level (by conducting potential targeted flexibility retrofits) and by changing contractual arrangements. Both measures will allow operation at lower minimum loads.

1.4 Socioeconomic impact

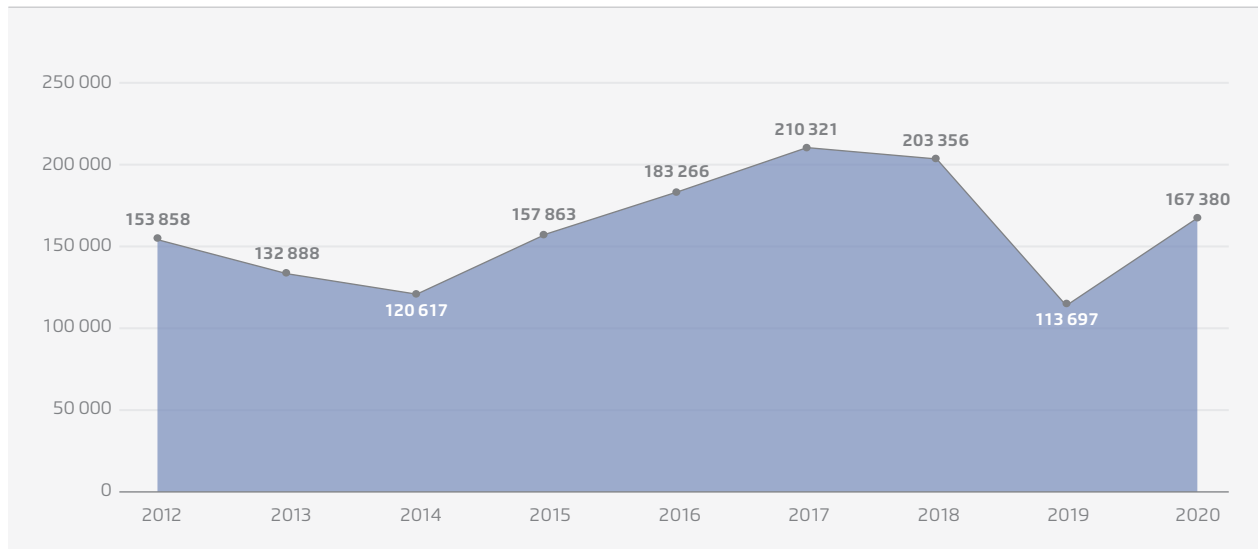
Economic importance

Being the second largest export commodity after palm oil, coal mining contributes around 2 to 3 percent of Indonesia's national GDP. This economic value is concentrated in the coal mining provinces of Kalimantan and Sumatra. It is highest in East Kalimantan, where the coal industry accounts for 30 to 35 percent of gross regional domestic product (GRDP), followed by the other provinces in Kalimantan (8 to 18 percent of their GRDP coming from coal mining). At sub-provincial (regency) level, coal mining contributes almost 80 percent of GRDP. In the coal mining provinces, revenues are also generated directly for the provinces through royalties and land leases. At national level, coal royalty contributes 5 percent of non-taxed total state revenue, while the contribution at provincial level varies from 11 to 33 percent of provincial revenue.

2022 was a windfall year for coal mining due to the increase in global coal prices. The revenues of the coal industry - and their contribution to regional and national GDP - increased significantly. The share of GDP generated by coal mining activities doubled in 2022 (6 percent of GDP) compared to 2021 (3 percent), which represents an increase from 603 trillion IDR (40.2 billion USD) to 1 296 trillion IDR (86.4 billion USD) (BPS, 2023b). At the regional level, East Kalimantan's coal revenue increased from 245.5 trillion IDR (16.4 billion USD) in 2021 to 410.5 trillion IDR (27.4 billion USD), accounting for 44 percent of total

Coal mining employees 2012–2020 in Indonesia

→ Fig. 7



IESR (2020); adapted from MEMR (2015) and Minerba One Data Indonesia (2020). The number excludes several permits reported to regional government (a third of the workforce) and mining services activities.

nominal GRDP (BPS, 2023a). However, this windfall profit is expected to be cyclical for the most part and return to 2021's levels.

Despite its high contribution to provincial revenues, coal mining creates much less value added (for example to household consumption) than other industries such as services, trade and agriculture. Mining activity also exacerbates poverty and inequality due to its tendency to benefit high economic groups like coal mine owners (IESR, 2021; SEI, 2018).

Transforming a coal-dependent region into a diversified economy is vital to bring about a just transition and improved socioeconomic benefits. East Kalimantan, which is poised to host the new capital of Indonesia, offers many opportunities for diversifying its economic basis away from coal mining and developing other sectors (chemicals, pharmaceuticals, transport, construction, food and beverage, and power generation). Furthermore, East Kalimantan also has an important carbon stock from its large forest and peatland and was the first region in Indonesia to receive payments from the World Bank for its carbon emission reduction programme under the Forest Carbon Partnership Facility's Carbon Fund.

1.5 Employment

The coal sector employs about 1 million people (directly and indirectly) in Indonesia, including 250 000 jobs in the mining industry (ILO, 2022). The coal mining sector therefore represents less than 0.2 percent of total employment in Indonesia, though the proportions are significantly higher in coal producing provinces: East Kalimantan (11 percent), North Kalimantan (4 percent) and South Sumatra (3 percent). Figure 7 shows only official national mining employment.

The size of the workforce per coal mine can vary significantly depending on its size, stripping ratio⁸ and overall demand level. For example, jobs declined in 2019 due to decreasing coal prices and stripping ratios.

More than 60 percent of coal employees come from the provinces where the mines are located, as local prioritisation is stipulated by the Law on Mineral and Coal Mining. However, some companies also state a preference to hire workers from other regions due to

⁸ The stripping ratio in coal mining refers to the amount of waste material (also known as overburden) that must be removed in order to extract a given amount of coal.

the limited number of local candidates with suitable qualifications (IESR, 2022c).

Most of the workers are below 50 years old with at least a high school education. Therefore, a significant share of the workforce will be impacted by coal phase-out and phase-out plans. This specific demographic (as well as the level of salaries, skills and workers' interests) will need to be carefully considered when managing the impact of coal phase-down on coal workers.

1.6 Governance structure of the coal industry

Governance of the Indonesian coal industry is characterised by multiple interactions between various stakeholders. The Ministry of Energy and Mineral Resources (MEMR) is responsible for the electricity sector's policies (under the Directorate General of Electricity - DGE) and coal mining policies (under the Directorate General of Mineral and Coal - DGMC). MEMR has been mandated by the President of Indonesia to propose a coal phase-down roadmap. MEMR is hosting the secretariat of the Indonesia Just Energy Transition Partnership (JETP). The JETP process is co-ordinated by the Coordinating Ministry of Maritime and Investment (Kemenko Marves), which is also tasked with formulating an initial comprehensive investment plan for the energy transition and coal phase-down.

The Ministry of Finance (MoF) regulates subsidies, loans and state equity in the sectors. The Ministry of State-Owned Enterprises (MSOE) also plays a key role as a shareholder in PLN and PT Bukit Asam (another state-owned coal mining company). The National Energy Council (DEN), which is composed of representatives of ministries (Energy, Finance, Development, Transportation, Industry, Agriculture, Research and Environment), academia, industry and environmental and consumer groups, formulates a national energy plan and oversees cross-sectional policy implementation.

Power sector

The power sector is vertically integrated through the state-owned utility Perusahaan Listrik Negara (PLN). PLN historically owned most of the generation fleet; since 1999, however, independent power producers (IPPs) have increasingly participated in electricity generation. Of the around 40 GW of coal power capacity installed today in Indonesia, 12.5 GW are owned by PLN, 18.5 GW by IPPs, and 9 GW are captive power plants (owned by industry companies for on-site purposes). In the context of the coal phase-out plan being developed, the government of Indonesia is prioritising the phase-out/-down of the power plants owned by PLN. Power plants owned by IPPs are to be targeted in the second phase of the retirement schedule. These assets are generally newer, larger and more efficient and may require specific compensation and divestment mechanisms.

PLN acts as single buyer and sole transmission and distribution operator. Private-sector investments are allowed only in specific instances where PLN cannot build transmission and distribution grids.

Coal mining industry

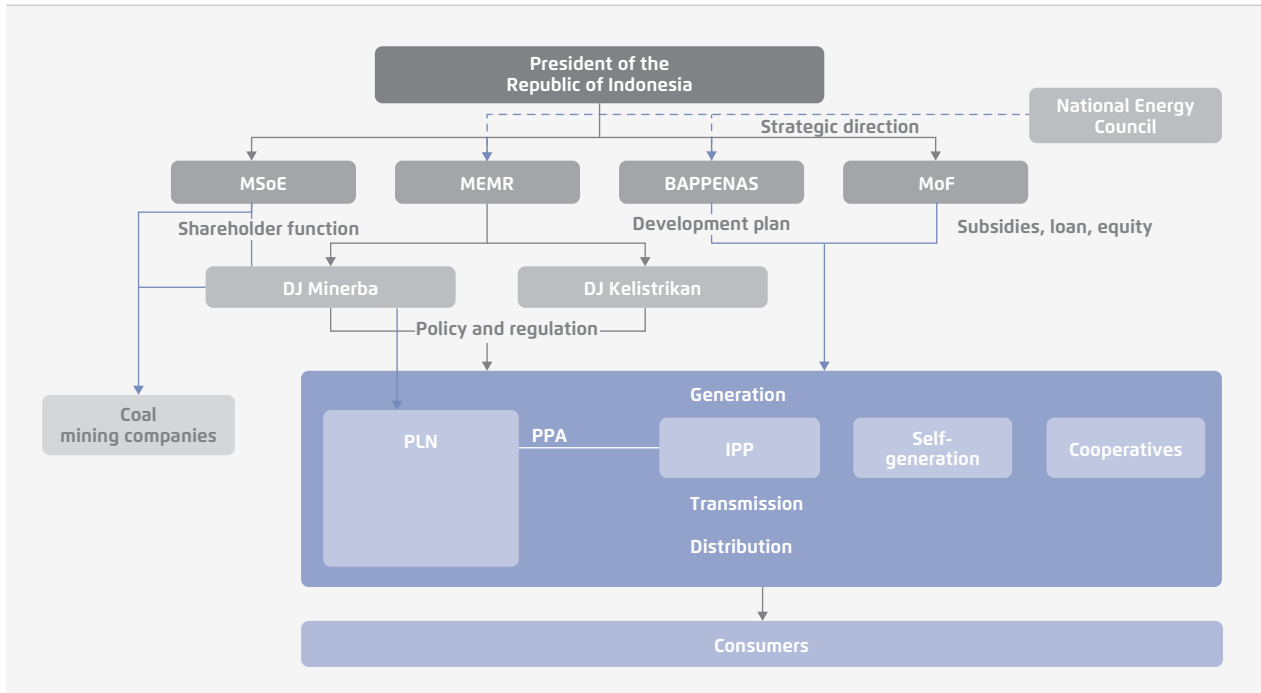
There are about ten major coal producers⁹ in Indonesia, with a production capacity of between 20 and 60 Mtpa. These largest coal producers also own some coal power plants in Indonesia. In addition, there are many small coal mine owners¹⁰. Most of these coal producers are members of the Indonesian Coal Mining Association (APBI - ICMA).

⁹ There are also artisanal coal miners that operate without a licence.

¹⁰ By the end of 2022 there were around 960 coal mining permits, although not all of them are actually producing. In 2017 around half of the total production was produced by 8 major companies (IESR, 2020).

Governance of the electricity and coal sectors in Indonesia

→ Fig. 8



Agora Energiewende (2023). Note: BAPPENAS (Ministry of National Development and Planning), DEN (National Energy Council), DJ Minerba (Coal Directorate), DJ Kelistrikan (Electricity Directorate), MSoE (Ministry of State-owned Enterprises), MEMR (Ministry of Energy and Mineral Resources), MoF (Ministry of Finance), PLN (State-owned Electricity Company), PPA (Power Purchase Agreement).

Planning and approval procedures

Planning and approval procedures in the coal mining sector are characterised by centralisation, by streamlining of policies and licensing procedures, and by nationalisation of assets. Most of the large coal mining companies (covering about 70 percent of national production) hold a coal mining concession work agreement (PKP2B). Recent mining law regulations required assets to be nationalised and eliminated the PKP2B contract model, requiring holders to convert their contracts into a mining business licence (IUP/IUPK) consisting of an exploration licence and a production and operation licence. IUP are initially granted for 20 years and can be extended twice for ten years each time. This licensing mechanism also introduces an incentive to integrate mining processing/refining activities, i.e. promoting the downstreaming of products rather than focusing on exporting raw commodities.

In the power sector, a recent presidential regulation (112/2021) stipulates that no new coal power

plants will be built. Exceptions exist for some coal power plants permitted and under construction, and for captive power. In 2023, this concerned around 13.8 GW that are effectively still planned to be built and around 20 GW of captive power plants still at the planning stage. Before the coal moratorium and accelerated phase-down regulation, only power plants listed under RUPTL were allowed to be built.

Foreign ownership

Foreign ownership/investment in the coal mining sector is possible by establishing an Indonesian legal entity, specifically a foreign investment company (since foreign entities are not permitted to directly hold an IUP). Foreign investment mining companies are also required to gradually sell their shares to

Indonesian parties after a certain period of commercial production¹¹.

Foreign ownership of power plants is permitted but the maximum share of foreign ownership is regulated according to the size of the project. Full ownership is possible for projects above 10 MW via a public private partnership scheme (PPP). However, no such cases currently exist. Foreign ownership is also possible in electricity transmission and distribution infrastructures.

Foreign investments in new coal power plants that are in the pipeline or under construction come from three countries: China (2.9 GW under construction), Japan and South Korea (together 4.8 GW under construction) (IESR, 2023a; Global Energy Monitor, 2023c). Now that these countries have committed themselves to stopping funding coal power plants overseas, however, further changes to the planned expansion may be forthcoming. Nonetheless, there is no evidence as yet that these commitments are being implemented, and in any case they do not in principle relate to projects that have already been contracted. In addition, foreign countries have a growing interest in steel production facilities (especially blast furnaces), which entails the risk of a further lock-in of coal use in the industry sectors.

Subsidies

Indonesia, as a member of the G20, has committed to phasing out “inefficient fossil fuel subsidies” over the medium term (G20, 2009). However, subsidies for fossil fuels are currently still being granted¹².

¹¹ According to the latest governmental regulation no. 96/2021, divestment to domestic owners starts from year 10 and must be completed by year 15 in the case of open-pit mines without integrated downstream activities. The majority of shares should be owned by a domestic entity. For open-pit mines with integrated downstream activities, divestment starts from year 15 to 20. Divestment for underground mines starts and finishes 5 years later than for open pit mines.

¹² Especially in the transport sector where they mainly benefit the upper-middle classes, who usually own a car or more than one motorcycle.

The domestic market obligation (DMO) sets a maximum price for coal sold on the domestic market and as such acts as a subsidy (IISD, 2019). The level of subsidies has grown over the last few years with the increasing demand for coal, and there is a growing gap between the price set in Indonesia and global market prices. The DMO regulation is currently under review. There are proposals to lift the DMO price cap, meaning that domestic users would have to buy the coal at market prices. Instead, a levy would be collected from coal producers to create a kind of pool fund. The pool fund would then be used to compensate (or subsidise) the domestic users. The exact mechanism has not yet been finalised.

In the context of the energy crisis, and with a view to minimising the cost-recovery gap, the government increased the basic consumer electricity rate from 1 447 IDR (0.096 USD) per kWh to 1 669 IDR (0.11 USD) in 2022. In parallel step aimed at maintaining people’s purchasing power, however, the Indonesian government more than tripled the level of energy subsidies for total energy use (including gasoline and LPG subsidies), from 152.5 trillion IDR (10.27 billion USD) to 502.4 trillion IDR (33.8 billion USD) in 2022.

Political economic barriers and challenges to coal phase-out

The fact that coal is an abundant domestic resource in Indonesia which accounts for a very large share of electricity generation poses important structural challenges to the transition away from coal. A wide range of stakeholders and networks have specific economic interests in the coal sector, both at national and regional level. A just coal phase-out roadmap in Indonesia needs to be compatible with these interests and must balance the speed of the transition with the expected economic losses of the industry. Coal is also perceived as a major national resource contributing to energy security, which has strongly influenced electricity and energy planning.

In addition, the current design of power purchase agreements (PPAs) acts as a short-term barrier to

accelerating the coal phase-out. Some PPAs have indeed take-or-pay mechanisms and clauses that define the minimum levels, availability factors and heat rate of coal generation. These contracts, with a term of 25 to 30 years, entail risks of contractually locking in the baseload generation of coal power plants, minimising their ability to reduce their output and emissions more quickly.

Another barrier is the potential losses to the state incurred by the early retirement of coal, based on existing regulations. This applies to PLN-owned assets. Being a state-owned company, PLN is bound by government regulation and spread across different ministries, namely MEMR, the Ministry of Finance and the Ministry of State-owned Enterprises. Hence, any indication that losses to the state could arise would trigger an investigation by the country's auditing authority, BPK (Badan Pemeriksa Keuangan) (IESR, 2023b)¹³.

Given the plan to phase out unabated coal power plants in Indonesia and globally, shrinking coal demand will in the long run pressure upstream coal mining in Indonesia. While some legal and regulatory requirements are already in place for mine closures, a more systematic regulatory approach will be required.

1.7 Recent policy developments and commitments

In the past couple of years, the Indonesian mining sector has undergone several significant changes. These policy changes are intended to stimulate investments, simplify complex procedures, create jobs and increase economic added value.

The government of Indonesia has pledged to reach net-zero greenhouse gas emissions by 2060.

¹³ In 2015, PLN conducted asset revaluation, particularly of its ageing power plants. As a consequence, the economic lifetime of these power plants has essentially been extended by a further 15-20 years, as also mentioned in the RUPTL 2021-2030. This will potentially skew the definition of early retirement as the lifetime has been further extended.

Several additional targets are under discussion, such as peaking emissions in the power sector in 2030 in the context of the JETP negotiations¹⁴, phasing out coal by 2050 as promised by President Joko Widodo at Hannover Messe in April 2023 (CNN Indonesia, 2023) and increasing the long-term renewable energy target¹⁵. However, all these additional targets are still under discussion in different planning processes¹⁶ and have not yet been enshrined in law. To support the transition to clean energy, Indonesia is expected to receive international support through various funding programmes amounting to a total of 24.5 billion USD (Just Energy Transition Partnership, Energy Transition Mechanism (ETM) and Climate Investment Fund-Accelerated Coal Transition (CIF-ACT)). However, this funding is not sufficient to cover the huge investment needs: according to the Indonesian Minister for State-Owned Enterprises, retiring 15 GW of coal power generation over the next three decades and replacing them with renewable energy will require 600 billion USD in capital support (ASEAN Briefing, 2023).

In November 2022, the government of Indonesia launched its ETM Country Platform to lead the country's "just and affordable transition in the energy sector". The platform issued the first Memorandum of Understanding (MoU) between PLN and the Indonesian Investment Authority to explore ways of accelerating the retirement of the coal power plant Cirebon 1 (660 MW in Java). One of the key

¹⁴ This target has been proposed in the context of the draft RUKN (long-term electricity plan from MEMR).

¹⁵ A target of 70 percent renewables in primary energy consumption by 2045 has been discussed in the context of the update of the Long-Term Development Plan – RPJP – that is supposed to be adopted and accommodated after the presidential elections of February 2024.

¹⁶ Indonesia has several planning processes with different targets that are not yet aligned:
 RPJP – Long-Term Development Planning – is the highest-level planning document. In principle, its target is supposed to be reflected in all other planning processes.
 RUEN – National energy plan from the Ministry of Energy and Mineral Resources (MEMR). This plan is supposed to be based on the KEN (national energy policy framework developed by the National Energy Council).
 RUKN – Long-term electricity plan from MEMR.
 RUPTL – Ten-year electricity plan from PLN.
 A ministerial task force has been formed to align the energy transition targets and pathways.

Coal-related policies and regulations in Indonesia

→ Table 3

Policy name	Year of adoption	Issued by	Description
Law No. 4 of 2009, Amended by Law No. 3 of 2020	2020	House of Representatives; President	Main Law on Mineral and Coal Mining; including the centralisation of authority. Delegation to regional government is further regulated in Presidential Regulation 55/2022
Law No. 11 of 2020	2020	House of Representatives; President	Job Creation (Omnibus Law). This streamlines many regulations aiming to boost investments and job creation
Presidential Regulation No. 112 of 2022	2022	President	Acceleration of RE for electricity supply. This regulation also defines the year for coal phase-out and accelerates the phase-out plan
MEMR Decree No. 267 of 2022	2021	MEMR	Domestic Coal Market Obligation
Coal Reference Price	Monthly	MEMR	Monthly coal reference price
Letter 1611/2021 and Letter 165/2022	2021	MEMR	Coal export ban and revocation of the coal export ban in 2022
Presidential Regulation No. 98 of 2021	2021	President	Carbon Economic Value; setting the framework for ETS in the power sector, initially for coal power
Law No. 30 of 2009	2009	House of Representatives; President	Electricity Law. This stipulates state ownership and authority in electricity services
Government Regulation No. 22 of 2021	2021	President	Regulation on Environmental Protection and Management. Fly Ash Bottom Ash is removed from hazardous waste list

Agora Energiewende (2023)

challenges cited in this document is the need for transition finance.

Private power utilities and captive power plants also pose a challenge that needs to be addressed through an agreement on early retirement before 2030.

While Indonesia's goal of 34 percent renewables in the energy mix by 2030 is a good start, it falls short of meeting the Paris Agreement target. The current budget of \$20bn from JETP¹⁷ will not be sufficient to accelerate Indonesia's energy transition and make it Paris-compatible. Additional funding and investment will be required for a fully successful transition.

Law No. 3 of 2020

This law amends Law No. 4 of 2009 on Mineral and Coal Mining, in particular with regard to the authorisation procedures. Mining licences are now issued by the central government, with the possibility to delegate this authority to regional governments under certain circumstances. (Previously, only regional governments had authorisation responsibility). Additionally, the transfer of mining licences, which was initially prohibited, is now allowed subject to approval by the MEMR.

With the strategic goal of increasing value added to natural resources, the amendment also requires companies to develop the coal downstream industry when extending expiring contracts. It clarifies the responsibilities shared between two ministries: the

¹⁷ Just Energy Transition Partnership (JETP) with G7 countries, EU, Denmark and Norway was announced in November 2022.

Ministry of Industry and Ministry of Energy and Mineral Resources. Mining companies that have integrated smelters are now exclusively under the authority of MEMR, instead of having to obtain licences from both authorities (IBA, 2022).

The Omnibus Law

The law for job creation (Omnibus Law) provides an expansive set of rules to boost investments and create more jobs across the economy by streamlining regulations. The law introduced a risk-based business licensing system which requires mineral and coal mining activities (categorised as high-risk in terms of safety, health, environment, and utilisation and management of natural resources) to have a specific business licence, and the mining service business (categorised as medium-high risk) to have standard certificates.

Coal mining companies are obliged to pay royalties at 3 to 7 percent of the coal sale price. The law stipulates a fiscal incentive for coal companies that create additional values beyond coal mining activities, enabling them to receive exemptions on the royalty payment, with approval from the MoF, for example downstream in coal liquefaction or gasification projects (IBA, 2022).

Presidential Regulation 112/2022

This regulation prohibits the development of new coal power plants with exemptions for projects included in the Electricity Supply Business Plan (RUPTL) prior to the enactment of PR 112/2022 (i.e., those already permitted or under construction - 13.8 GW), or if the project meets the criteria for a "captive" power plant of strategic importance. The regulation also sets a deadline to cease coal power plant operations, namely 2050, and mandated the MEMR to develop a roadmap for the phase-down of coal.

MEMR Decree 267/2022 on Domestic Market Obligation

Coal suppliers are obligated to allocate 25 percent of their annual coal production plans to meet domestic needs (DMO). This quota is intended to cover the national electricity supply as well as the production of raw materials/fuel for the industry sector. The Directorate General of Mining and Coal has the authority to force a coal company to fulfil its DMO in the event of an emergency if it is failing to meet its DMO target. Failure to comply with the obligation can result in the government imposing a fine as well as a coal export ban.

Coal export ban and revocation

At the end of 2021, the Indonesian government issued Letter 1611/2021, which essentially banned mining companies from selling coal abroad during the month of January 2022. This decision was taken after PLN warned that mining companies skirting their DMO obligations in order to capitalise on higher export prices might disrupt national coal power generation and jeopardise the reliability of the national electricity system. Both national and international stakeholders responded to the export ban by requesting the immediate revocation of the Letter. From the perspective of the exporter company, the ban is disrupting shipment obligations, which could result in a breach of contract, unless this can be categorised as "force majeure". On 13 January 2022, DGMC issued Letter 165/2022, which periodically lifted the export ban. There have been no further export bans since the beginning of 2023.

Coal reference price

The government (MEMR) regularly sets a coal reference price for the coal sold by Indonesian mining companies to the domestic market. The reference prices are issued monthly and categorised on the basis of coal quality. In the context of increasing global coal prices, the ministry has started re-evaluating its formula to consider not only state revenues but

also a series of national and international coal prices indexes (Indonesian Coal Index (ICI), Platts Index-59, New Castle Export Index (NEX), New Castle Global Coal Index (GCNC)). The change in calculation method is intended to provide Indonesian coal suppliers with a level of royalties comparable to the actual export price (APBI, 2023).

Carbon economic value

This regulation provides a national framework for carbon pricing instruments. In line with this regulation, a voluntary pilot for the introduction of an emissions trading scheme (ETS) was initiated in the power sector in 2021, with a carbon price of 2 USD/tonne CO₂. In 2023, the MEMR announced a mandatory intensity-based ETS which will cover all coal power plants primarily belonging to PLN. In total, around 99 units with a total of 33.5 GW capacity will participate in the ETS phase one (2023-2024). After this phase one, the ETS coverage will be expanded to other power plants (MEMR, 2023; ICAP, 2023).

Law on Electricity

Law No. 30 of 2009 is the main law governing the electricity sector. The law and its regulations stipulate the key role of the state-owned electricity company (PLN) as the provider of electricity to all end consumers. IPPs are allowed to participate in generation. MEMR determines the electricity tariffs for end consumers and regulates the PPA terms that are negotiated with the IPPs (MEMR Decree 10/2017, 49/2017 and 10/2018).

Government Regulation on Environmental Protection and Management

This regulation removes Fly Ash and Bottom Ash (FABA) from the hazardous waste list. FABA is a type of solid waste from the combustion process in coal power plants (and other industrial process) which can be repurposed as raw material (for example in the production of cement). While this modification of status is expected to bring economic benefits, some environmental groups assessed that it will increase environmental pollution and health impacts.

2 Coal in Vietnam

2.1 Coal reserves and utilisation

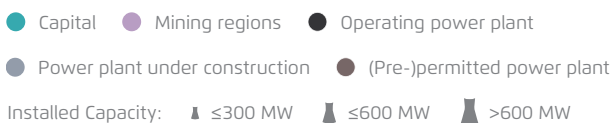
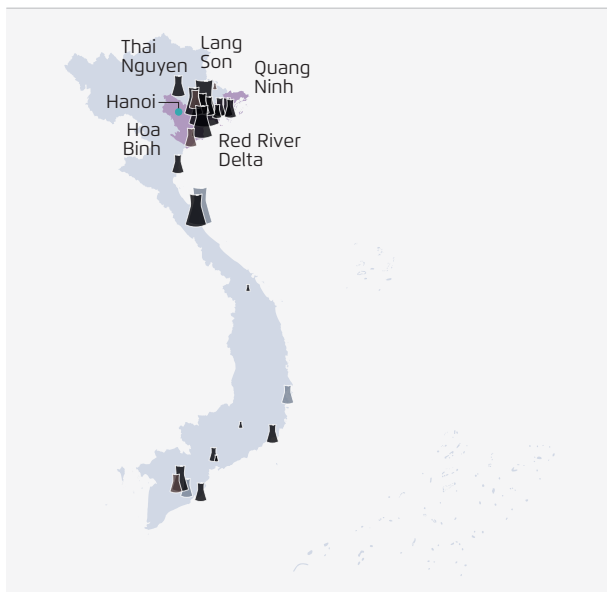
Coal reserves and type of coal

The Vietnamese coal industry is mainly concentrated in the northeastern part of the country. The main types of coal extracted in Vietnam are lignite, peat coal, (sub-)bituminous and anthracite coal, the latter being the most widely used. Quang Ninh Province is the most important coal mining region, with anthracite reserves of up to 3.6 billion tonnes (Tinh Quang Ninh, 2023). This region, where coal exploitation began in 1839, is strategically positioned near the coast, and its proximity to ports like Cam Pha Port and Hon Gai makes it convenient for coal transportation (Binh, 2015). Another coal-rich area is the Red River Delta,

where coal was discovered in 1960. Situated below 2 500 metres underground and close to the largest rice fields in Vietnam, this region has substantial coal reserves amounting to 39.4 billion tonnes (Binh, 2015). It has not been exploited to the same extent as Quang Ninh Province, however. The Red River Delta basin primarily contains sub-bituminous coal. Basins in Thai Nguyen, Lang Son and Hoa Binh provinces are known for the presence of bituminous coal, while peat coal is predominantly found in the peat basin at the Mekong River Delta (Le and Bui, 2019).

More than 80 percent of the coal output is produced by the Vietnamese National Coal and Mineral Industries Holding Limited (Vinacomin) and its subsidiaries. Dong Bac Corporation, under the Ministry of Defense, and Vinacomin are the two big state-owned enterprises in Vietnam.

Overview of coal plants and coal mining regions in Vietnam → Fig. 9



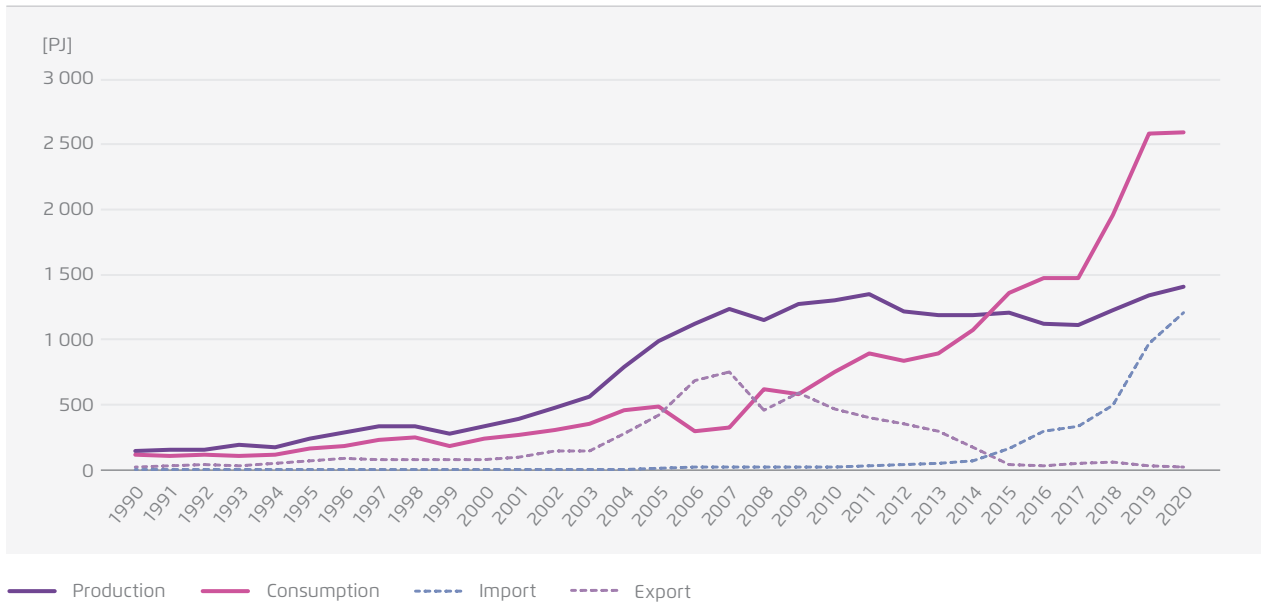
Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

Production and consumption, export and import

Coal production in Vietnam increased sixfold over the period 1995 (196 PJ) to 2021 (1 120 PJ). 99 percent of the domestically exploited coal was produced by the two state-owned enterprises (SOEs) (General Statistics Office, 2021). Domestic coal output is expected to reach 975 PJ in 2023, a decrease of 10 percent compared to last year (MOIT, 2023).

Over the period 1995-2020, coal consumption increased more quickly than national production (from 130 PJ to 2 100 PJ) (Figure 7). And since 2015, Vietnam has produced less coal than it consumes, becoming de facto a net importer. During the period 2015-2020, coal exports from Vietnam declined (representing less than one percent today) and imports increased sevenfold. In 2020, Vietnam's coal imports exceeded 55 percent of its total coal consumption, reaching 972 PJ (General Statistics Office, 2021). In 2021, Vietnam imported 36.29 million tonnes of coal. In the first seven months of 2023, Vietnam imported 34.56 million tonnes of coal, mainly from Australia (12.5 mil-

Production, consumption, import and export of coal 1990–2020 in Vietnam → Fig. 10

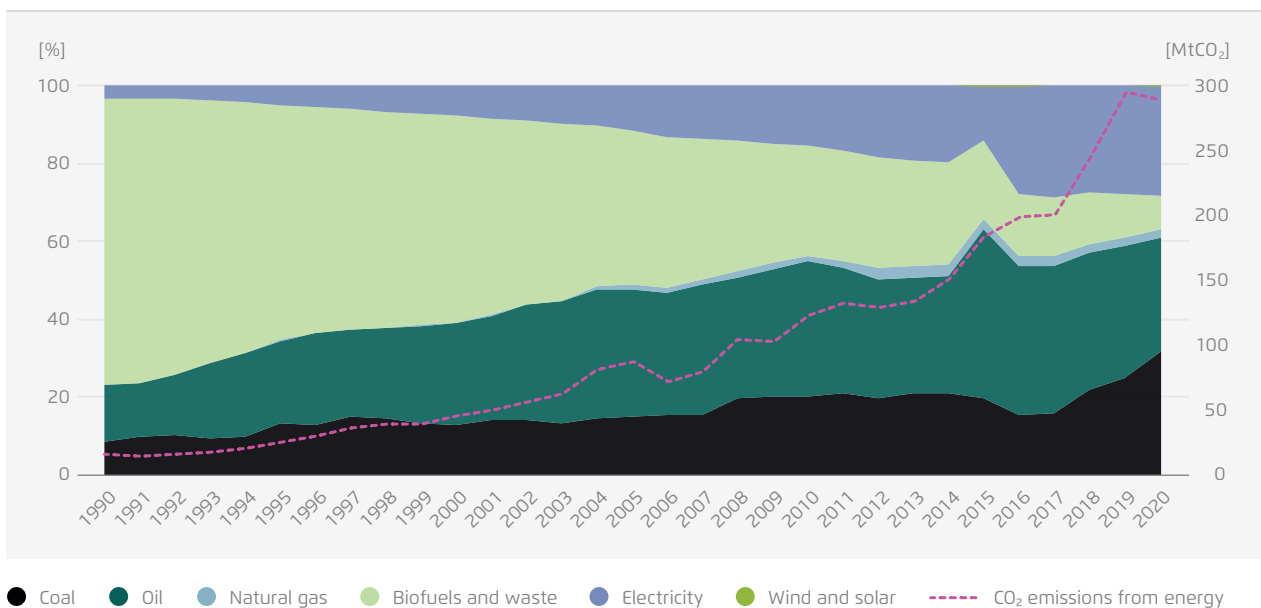


BP (2022), IEA (2021)

lion tonnes), Indonesia (11.4 million tonnes), Russia (2.1 million tonnes) and other countries like China and Laos (ERAV, 2023). This surge in coal imports has been driven by the rapid development of coal-fired power generation. With increasing and fluctuating coal prices on the global market, particularly dur-

ing the energy crisis of 2021 and 2022, the import dependency started to raise concerns in the country. While coal prices witnessed a significant surge, particularly in the beginning of 2022, they have subsequently declined, yet they remain at elevated levels (Figure 17).

Total final energy consumption mix and CO₂ emissions from energy 1990–2020 in Vietnam → Fig. 11



IEA (2023c), BP (2023)

2.2 Coal use in different sectors

Energy use of coal in total final consumption and GHG emissions

The share of coal in the total final energy consumption has increased dramatically in recent decades, from eight percent in 1990 to 32 percent in 2020, while overall final energy consumption more than quadrupled during that period. This translated into a CO₂ emissions increase from 18 MtCO₂ in 1990 to 285 MtCO₂ in 2020 (Figure 11).

The main emitting sectors include electricity and heat production (151 MtCO₂), the industry sector (92 MtCO₂), and the transport sector (37 MtCO₂) (IEA, 2023c).

In 2020, 28 percent of Vietnam’s total final consumption was used in the electricity sector (in which around 50 percent of electricity was generated using coal) and 28 percent direct coal use. 22 million tonnes of this direct coal use were accounted for by the manufacturing industries, followed by non-specified industries (2.5 million tonnes), the household sector

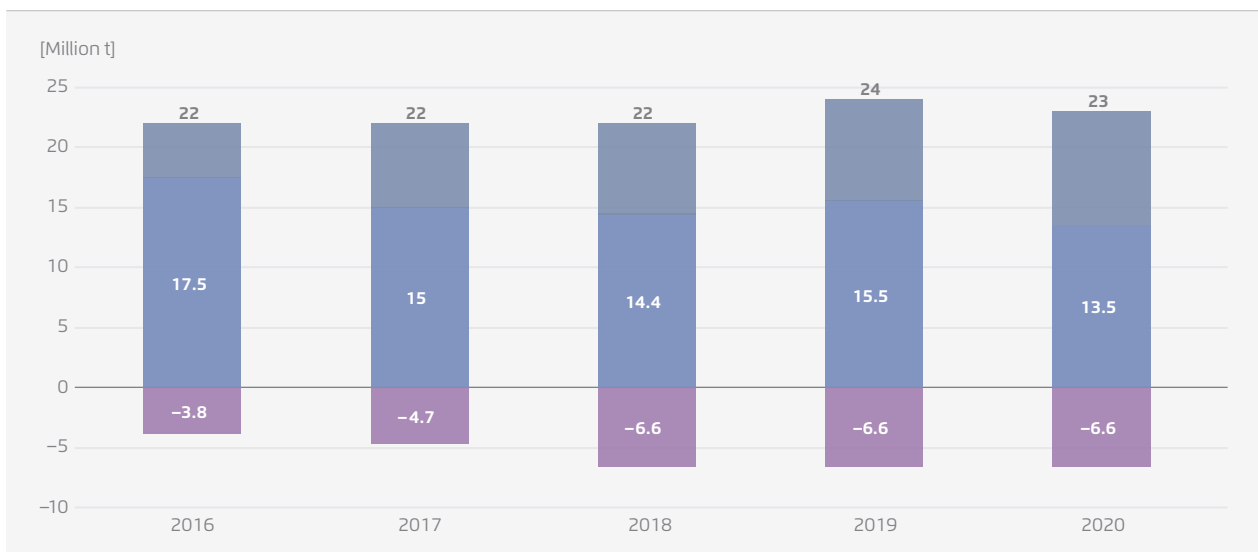
(1.9 million tonnes) and commerce and other services (0.9 million tonnes) (General Statistics Office, 2021).

The Vietnamese steel sector is one of the main industrial sectors consuming coal, particularly in the six facilities that are run using blast furnaces and DRI technologies. In total, Vietnam currently operates 14 steel/iron plants with a total production capacity potential of up to 25 million tonnes per annum of steel and 15 million tonnes per annum⁴ of iron. The other eight plants are electric. One further plant is currently under construction with blast furnaces and DRI technologies, while seven additional plants have been announced, two of which will have BF and one will be electric; no information was made publicly available about the four remaining plants (Global Energy Monitor, 2023d).

In 2020, around 23 million tonnes of steel were consumed in Vietnam, 13.5 million tonnes were imported and 6.6 million tonnes exported (Figure 12) (South East Asia Iron and Steel Institute (2022a).

Steel consumption, import and export in Vietnam

→ Fig. 12



● Export ● Import ● Consumption

South East Asia Iron and Steel Institute (2022a)

2.3 Coal in the power sector

Coal is the dominant electricity generation source in Vietnam, contributing almost 40 percent of power generation in 2022 (against 12 percent in 2000, when hydropower was the main power generation source).

Electricity tariffs are set by the MoIT and typically lie below the cost-recovery rate. Tariffs are lowest for the manufacturing industry (including SOE in energy-intensive sectors such as the steel, fertiliser and cement industries), and for public administration institutions. The highest tariffs are for commercial businesses (EVN, 2023).

(seven units) have been (pre-) permitted. 6.5 GW of coal capacity have been shelved¹⁸. As a result, Vietnam is no longer among the top five countries¹⁹ in terms of planned capacity additions of coal plants in the pre-construction phase (Global Energy Monitor, 2023b). In addition, several coal power plants in the pipeline have been taking longer to construct for reasons that include a lack of committed investments and local community protests (Do and Burke, 2023).

Only 1.1 GW of coal power plants will retire within the next 20 years. Another 3.2 GW will retire within 30 years. Over 30.8 GW will still be operating beyond 30 years (Figure 14).

Overview of coal-fired power plants

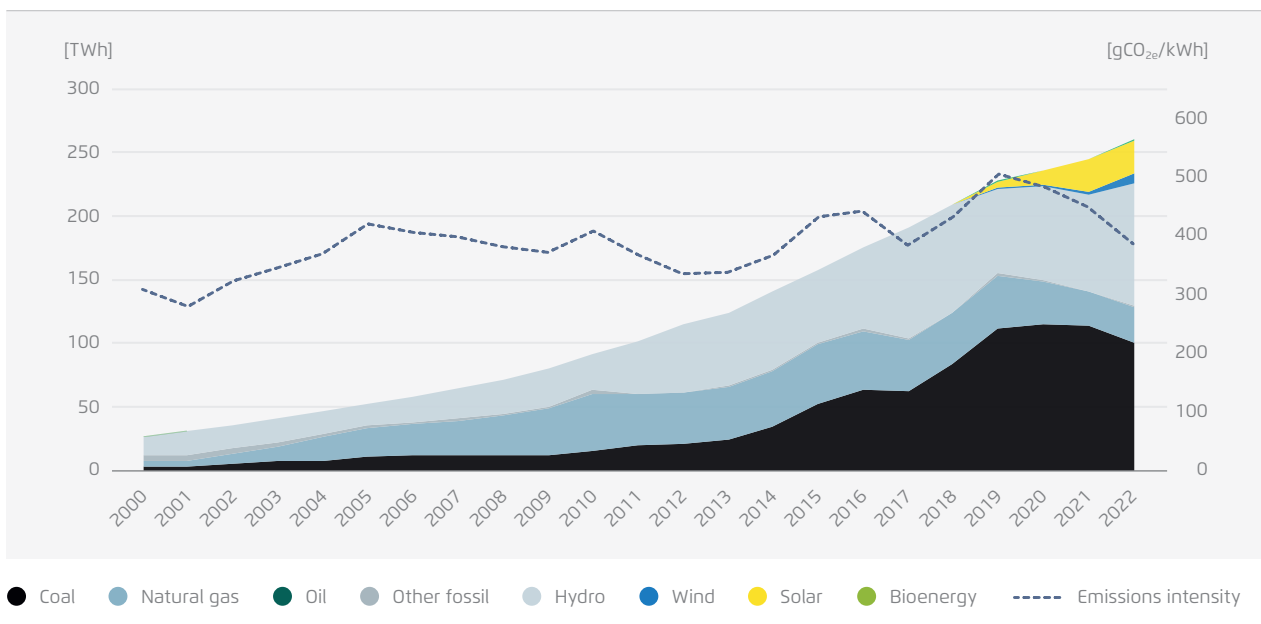
Vietnam has 25.8 GW of operating coal-fired capacity (75 units). 20.4 GW are less than ten years old, accounting for 79 percent of the total installed coal capacity (Global Energy Monitor, 2023b). 5.4 GW (8 units) are currently under construction and 4 GW

¹⁸ Projects where sufficient evidence is found to indicate that a project is no longer moving forward, but not enough to declare it definitively cancelled. Projects where construction has been put on hold are also considered "shelved." A project that shows no activity over a period of two years is categorised as "shelved" unless there is evidence to the contrary.

¹⁹ Top five countries in the pre-construction phase: China (250 GW), India (29 GW), Turkey (10 GW), Indonesia, Laos and Mongolia (each 7 GW).

Electricity generation and emissions intensity 2000–2022 in Vietnam

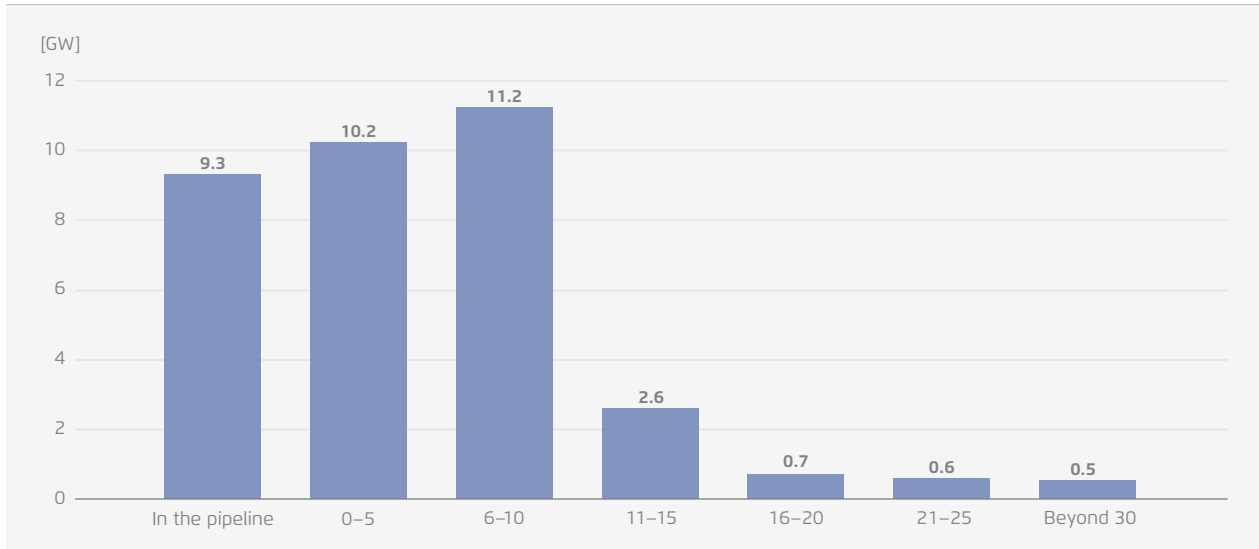
→ Fig. 13



Ember (2022)

Overview of the age of coal power plants in Vietnam

→ Fig. 14



Global Energy Monitor (2023b)

The latest Power Development Plan 8 (PDP 8), approved by the Prime Minister in May 2023, has adopted a GHG emissions peak of 204-254 MtCO₂ in the power sector by 2030. Yet the plan retains coal as a crucial energy source, still accounting for 20 percent of power generation in 2030. Since electricity demand is expected to continue growing (8.5 percent per year up to 2030), the total installed coal capacity in 2030 could increase to up to 30 GW (against 25 GW in 2021). The PDP 8 envisages commercial electricity consumption of approximately 3 350 TWh by 2025 and around 5 052 TWh by 2030. Notably, 2022 stands out as the first year when coal generation decreased (Figure 13).

In addition, Vietnam committed to peaking power sector emissions to 170 MtCO₂ in 2030 in the context of the JETP agreed in December 2022 with the G7 countries, Denmark and Norway. Coal capacities under PDP 8 are marginally lower than those agreed upon in the JETP, at 30.1 GW compared to 30.2 GW. However, the JETP targets are more ambitious than those in PDP 8 and there is no evidence as yet of these objectives being aligned. Considering an average lifetime of roughly 40 years, new coal power plants that start operating in the coming years can be expected to generate electricity well beyond 2050.

The Vietnamese power sector is regulated and historically controlled solely by the state, but the market framework has been evolving recently (see section on Governance structure of the coal industry). Independent Power Producers (IPP) participate in electricity generation under the auspices of the Ministry of Industry and Trade, which supervises the state-owned vertically integrated energy utilities (EVN) that act as single buyers and sole transmission and distribution operators.

Energy security and electricity generation

Coal-fired power represented 39 percent of total power production in 2022, followed by hydropower (35 percent), renewables (13 percent, of which solar 10 percent, wind 3 percent, bioenergy less than 1 percent), natural gas (11 percent) and others (2 percent) (Ember, 2023; VIET 2023b).

Vietnam's electricity system can be divided into three regions - the north, dominated by coal-fired thermal power plants, the centre, dominated by hydroelectricity, and the south, dominated by gas-fired thermal power plants. Over 90 percent of the country's electricity is consumed in the north and south, where population density and industrial activities have

Yearly load factor of coal power generation between 2000–2022 in Vietnam

→ Fig. 15



Ember (2022)

historically been higher, leading to a higher demand for electricity, as well as greater investment in energy infrastructures.

The electricity grid is clustered in three different voltage levels: the extra high and high voltage transmission lines (110–500 kilovolts), the medium voltage (1–52 kilovolts) and the low voltage levels (220 volts). Vietnam has connections with China and Laos primarily for imports and with Cambodia primarily for exports. Vietnam plans between 5 and 8 GW of power import capacity from Laos by 2030. By 2050, the import capacity could rise to 11 GW. By 2030, Vietnam will export between 5 and 10 GW of power (PDP 8, 2023). However, it remains to be seen how demand and generation capacity in neighbouring countries will develop.

In recent years, Vinacomin's inability to meet the increasing demand for coal has caused some coal-fired power plants to operate at lower load factors (Figure 15). This impacts energy security, as these power plants contribute to the adequacy and stability of the power system. The situation worsened at the beginning of 2022, in the context of soaring energy prices and supply disruptions. As a result, coal imports in

Vietnam decreased, exacerbating the shortage of coal supplies. This shortage of coal had a significant impact on power generation in March and April 2022, prompting EVN to reduce operations of its coal fleet (down to 60–70 percent of nominal capacity) and suspend production in some units. This resulted in an unused capacity of 3 000 MW (Nath et al., 2022; Reuters, 2022).

2.4 Socioeconomic impact

Economic importance

Data on the economic relevance of coal in Vietnam are hard to access. In 2020, the mining and quarrying sector accounted for 1.38 percent of total economic output (ADB, 2022b). In 2021, as COVID restrictions were lifted, general industrial production in the coal provinces (Quang Ninh, Hai Duong, Hai Phong, Hung Ye, Thai Binh, Ha Nam, Nam Dinh, Ninh Binh) increased by around 12 percent compared to the previous year (and 8.8 percent for the coal industry specifically), a significantly higher growth than the average national industrial production growth (4 percent) (General Statistics Office, 2021). These trends

show the significant economic role of these regions in the country's overall production. Hence, careful consideration should be given to these regions in the context of restructuring the coal industry in Vietnam so as to facilitate their transition to new industries and businesses.

Interestingly, though energy-related SOEs account for only 0.4 percent of all enterprises in Vietnam, they contribute around 20 percent of the country's GDP (Dang, Nguyen, Taghizadeh-Hesary, 2020).

2.5 Employment

In 2017, the coal-related industries (coal mining and coal-fired power generation) directly employed a total of 207 980 people. Most of the jobs were concentrated in coal-fired power generation (121 581 jobs), while 41 percent were in the mining industry (86 399 jobs) (ILO, 2022). In 2020, coal mining employment decreased to about 84 000 employees, below the peak of 105 000 employees reached in 2012 (Figure 16). This represented about 0.16 percent

of the total workforce in Vietnam in 2020 (Unido 2020, General Statistics Office, 2021).

The increase in labour productivity is one of the main reasons behind the decline in employment in the coal mining sector compared to 2012. Indeed, labour productivity of the mining and quarrying industry increased by about 15 percent between 2015 and 2020 (from 958 million VND per employee (40 766 USD per employee) in 2015 to 1 108 million VND per employee (47 149 USD per employee) in 2020).

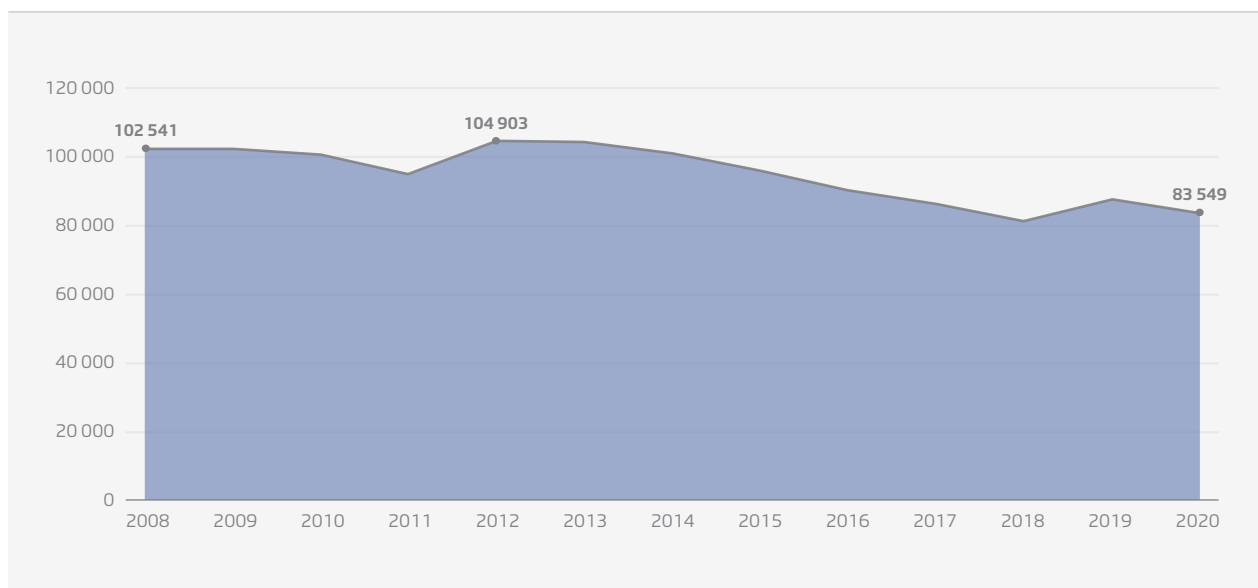
The coal regions (Quang Ninh, Hai Duong, Hai Phong, Hung Ye, Thai Binh, Ha Nam, Nam Dinh, Ninh Binh) account for about 12 percent²⁰ of the entire labour force²¹ in Vietnam (General Statistics Office, 2021). The transition away from coal in the coming decades will therefore significantly impact these regions. In 2021, 63 percent of the workforce in the mining and quarrying industry had attained at least a basic level of education, either vocational training or interme-

²⁰ This number relates not only to the coal industry.

²¹ 15 years and above.

Coal mining employees 2008–2020 in Vietnam

→ Fig. 16



UNIDO (2023)

diate, college or university education, and beyond. 71 percent of the employees in thermal power plants have a university degree. Working hours and days in thermal power and hydropower are reasonable, while shifts in the renewables sector are typically 12 hours/day, often six days a week (Vietnam General Confederation of Labour, 2023).

2.6 Governance structure of the coal industry

Almost all of the important decisions or decrees related to the energy and mining sector are formulated by the MoIT and then signed by the Prime Minister on behalf of the government. The MoIT has policy and supervisory responsibilities for the energy sector and

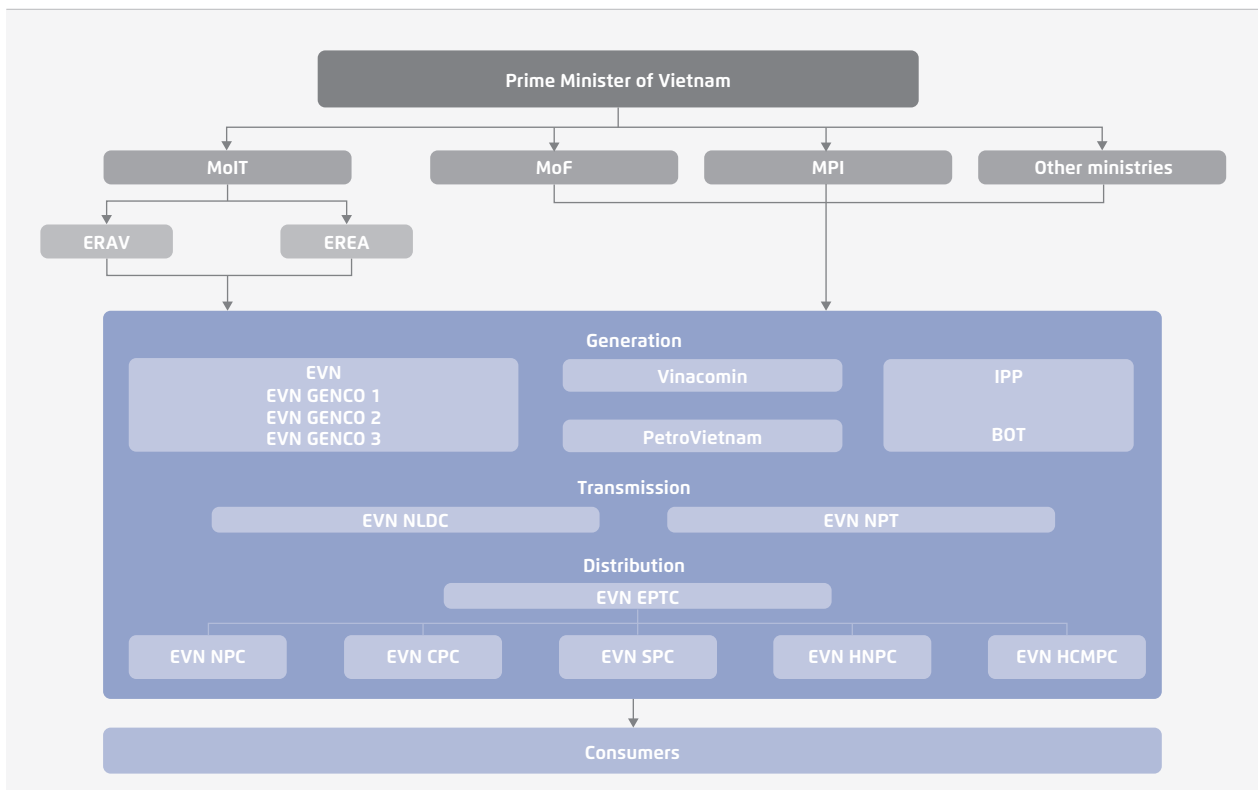
oversight responsibility for the state-owned energy enterprises.

Coal mining industry

Vietnam National Coal and Mineral Industries Group (Vinacomin), one of the three big state-owned enterprises in Vietnam, is responsible for exploring, exploiting, processing and selling coal and other minerals such as aluminium, bauxite and rare earths. In 2020, Vinacomin produced around 35 million tonnes of coal, making it the largest coal producer in Vietnam. More than 80 percent of coal output in Vietnam is produced by Vinacomin, which operates 20 facilities (14 underground mines and six open-pit mines). (Que, Nevskaya and Marinina, 2021).

Governance structure of the power sector in Vietnam

→ Fig. 17



Agora Energiewende (2023). Note: BOT (Build-operate-transfer), CPC (Central Power Corporation), ERAV (Energy Regulatory Authority of Vietnam), EREA (Energy and Renewable Energy Authority) EPTC (Electric Power Trading Company), EVN (Electricity of Vietnam), Genco (Power Generation Corporation), HCMPC (Ho Chi Minh City Power Corporation), HNPC (Hanoi Power Corporation), IPP (Independent Power Producer), MoF (Ministry of Finance), MoIT (Ministry of Industry and Trade), MPI (Ministry of Planning and Investment), NLDC (National Load Dispatch Center), NPC (Northern Power Corporation), NPT (National Power Transmission Corporation), SPC (Southern Power Corporation).

Power sector

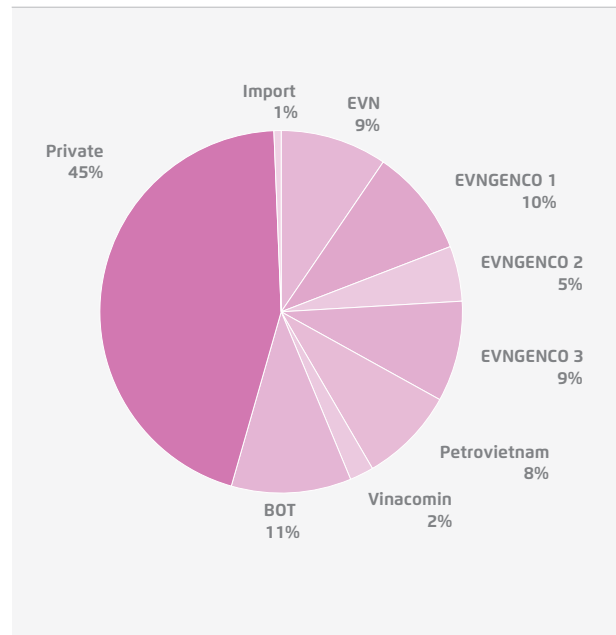
Vietnam has an unbundled single buyer system with an early-stage wholesale electricity market. The government, together with the Ministry of Industry and Trade (MoIT), plans and controls investment, supply and demand in the electricity sector and regulates the entry of IPPs. The state-owned enterprise Electricity of Vietnam (EVN), in close cooperation with MoIT, dominates the generation market and functions as a single buyer of electricity. It also controls most of the transmission and distribution through its designated subsidiaries. EVN is organised as a holding company with a series of wholly owned subsidiaries – three power generation corporations (GENCOs), the National Power Transmission Corporation (NPT), which is responsible for the 500 kilovolt and 220 kilovolt transmission systems, and the five regional power distribution companies. It also owns the National Load Dispatch Center (NLDC), the Electric Power Trading Company (EPTC) that acts as single buyer (power off-taker), and the strategic power plants²². In addition, EVN is the majority shareholder of partially privatised power plants. These take the form of joint ventures or partnerships with private companies to bring in private sector expertise, technology and investment.

EVN, Vinacomin and the Vietnam Oil and Gas Group (Petrovietnam) account for 44 percent of the total electricity generation capacity (Figure 18). The rest is run by other SOEs (e.g. hydropower), IPPs (e.g. renewables) or suppliers under BOTs (build-operate-transfer, e.g. for gas-fired power plants). Foreign investors in large power plants predominantly use the BOT scheme. Domestic investors opt for independent power producer (IPP) models, which permit them to generate electricity alongside the existing integrated utility. Generated electricity from IPPs is sold to EVN under long-term contracts. Part of the generation fleet participates in the Vietnam Competitive Generation Market (VCGM), a compulsory pool market that has been operational since 2012. In 2022, around

40 percent of the power plants participated directly in the competitive market (VIET, 2023b).

Despite being mostly state-owned, the power sector in Vietnam is currently the focus of reforms towards more pro-market features. The electricity sector has indeed been identified as a priority area in which the government wants the private sector to play a bigger role (The Diplomat, 2023).

Share of power capacity based on ownership in 2022 → Fig. 18



VIET (2023b)

Planning and approval procedures

The planning and approval process for new power generation facilities in Vietnam is complex and time-consuming. Obtaining all the necessary licenses normally takes between six and ten years. Financing bottlenecks and bureaucratic delays throughout the permitting process are one of the reasons for the delays in the construction of coal-fired power plants.

New power plant projects first need approval from the respective provincial administration as a precondition to receiving construction and grid connection licenses. Generation facilities larger than 50 MW

²² Strategically important due to their capacity, location and significance in supporting overall energy security.

require additional approval at the national level (Dorband, Jakob, and Steckel, 2020).

In 2021, national and international protests caused some international investors to withdraw their support for the 1 200 MW Vung Ang II coal-fired power plant project in Ha Tinh (central north of Vietnam). Despite these protests, the power plant will be built and is currently under construction with an expected date for operation in 2025.

More generally, a growing number of international investors are reluctant to invest in new coal-based power plants in Vietnam, reflecting a discernible shift in their strategies and priorities. Currently around 6.8 GW of coal power plant projects in the pipeline lack any committed investment (VIET, 2023a).

Foreign ownership

Large electricity infrastructures, including coal-fired power plants, are considered strategic infrastructure in Vietnam. Many are listed as priority projects with strict foreign ownership regulations. In this context, BOT contracts are the most common type of contracts that are concluded, as they represent the most reliable form of investment evidence for independent power producers. This favourable investment climate appeared particularly attractive to government-backed investors and financiers from China, Japan and South Korea before they announced in 2021 and 2022 that they were to stop financing coal abroad. Over the last years, China has invested 4 billion USD in coal power plants in Vietnam, followed by Saudi Arabia (300 million USD), South Korea (214 million USD), Russia (163 million USD), the United States (163 million USD), Japan (163 million USD) and the International Investment Bank (100 million USD) (Global Energy Monitor, 2023c).

The announcements by China, Japan and Korea that they are to stop financing coal projects abroad, as well as the “no new coal” announcement made by Vietnam, do not apply to projects that have already been signed and agreed with financing countries. It

therefore remains to be seen how many coal projects that are still in the planning or construction phase will ultimately be built and operated.

Subsidies

End-consumer tariffs in Vietnam are maintained below cost-recovery levels so as to ensure affordable electricity prices for consumers. The differential is covered by the state budget and represents about 3–4 billion USD in direct support per year for EVN and 1.5 billion USD per year for Vinacomin (Vietnamnet, 2016). In addition, domestic coal prices for thermal power, steel and cement production are maintained at an artificially low level, around 30 percent below import prices in 2015 (Dorband et al., 2020).

Political economy barriers and challenges of the coal phase-out

Phasing out coal assets represents a major transition challenge given the regional relevance of the coal industry in terms of employment and fiscal revenue. In addition, decision-makers and SOEs still consider coal power to be necessary to guarantee energy security and power system stability.

Energy sector decisions in Vietnam are influenced by an incumbent network of SOEs (EVN, Vinacomin, PetroVietnam and their subsidiaries along the energy supply chain) and political elites who rely on the sector as a source of political or economic rent (Dorband et al., 2020). The highest decision-making bodies in Vietnam, including the Communist Party of Vietnam and its advisory committees, rely heavily on the expertise of individuals within the MOIT and EVN. This concentration of expertise, and the relative opacity of decision-making processes, make the adoption of transition policies more difficult.

The Planning and the Finance Ministries openly criticise the low quality of reporting by the SOEs to the government. For example, Vinacomin’s provincial mines do not have to report deals of up to 1 million USD. It is possible that EVN and Vinacomin are also

importing coal at more beneficial conditions, i.e. lower prices or higher exchange rates, or in lower quantities than actually reported.

2.7 Recent policy developments and commitments

At COP26 in Glasgow in 2021, Vietnam pledged to reach net zero emissions by 2050. To facilitate the implementation of this commitment, the government of Vietnam and leaders from the International Partners Group (IPG – G7, EU, Denmark and Norway) adopted, in December 2022, a Just Energy Transition Partnership. In July, Decision 845/QD-TTg of the Establishment of a Secretariat for Implementing the JETP was signed. Currently, MoNRE, in collaboration with IPG, is working on a Draft Resource Mobilisa-

tion Plan to implement the JETP. The JETP targets and PDP 8 (see below) need further alignments.

National Energy Master Plan (NEMP) for the period 2021-2030, with a vision to 2050

The NEMP's overall objective is to ensure the country's energy security, reduce carbon emissions and meet the requirements of economic and social development, industrialisation and modernisation. It aims to develop an independent and autonomous energy industry and establish a comprehensive energy industry ecosystem based on renewable and new energy sources, and contains concrete forecasted figures for demand and expected growth. Vietnam will need up to 4 808 trillion VND (203 million USD) in investment capital between 2021 and 2030.

Coal-related policies and regulations in Vietnam

→ Table 4

Policy name	Year of adoption	Issued by	Description
National Energy Masterplan	2023	MOIT	Concretisation of data and forecast for streamlined planning in the energy sector (compared to PDP 8)
Power Development Plan 8	2023	Politburo	Vietnam's primary energy planning instrument for the period 2021–2030 with a vision to 2050
Decree 06/2022/ND-CP	2022	MONRE	Regulation for reducing GHG emissions and protecting the ozone layer
Decision 263/QD-TTg	2022	MARD	National target programme for new-style rural area building for 2021–2025 to develop rural regions, improve the rural power grid and living standards, promote economic development and support projects affected by the transition away from coal
Law on Environmental Protection	2020	MONRE	New legal requirements and procedures for water protection, air protection, soil protection, waste management and environmental permits
Resolution No 55NQ/TW	2020	Politburo	Orientation of the National Energy Development Strategy of Vietnam until 2030
Decision No. 403/2016 / QD-TTg	2016	MOIT	Adjustment of the master plan on the development of the coal industry in Vietnam to 2020 with a vision to 2030
Decision No. 89/2008/QD-TTg	2008	MOIT	Approval of the strategy on the development of Vietnam's coal industry up to 2015 and orientations towards 2025
Decision No. 563-TTg	1994	Minister of Energy	Establishment of the Vietnam Coal Corporation

Agora Energiewende (2023)

Power Development Plan 8

PDP 8 was adopted in May 2023, despite having been originally planned in 2020. PDP 8 restricts the development of new coal-fired power plants. Only coal-fired power projects that are currently under construction and have already been approved in the revised PDP 7 are allowed to be continued. This includes the completion of 11 coal-fired power plants scheduled to be constructed before 2030. Of these 11 power stations, six – with a total capacity of 6 GW – are currently under construction, while the remaining five projects with a total capacity of 13 GW are still in the process of negotiating financial arrangements with investors and shareholders. If capital arrangements for a project cannot be concluded before June 2024, the project must be halted in accordance with PDP 8.

PDP 8 enacts a stop to new coal-fired power plants after 2030 and outlines a fuel conversion process. After 20 years of operation, coal-fired power plants should convert to alternative fuels such as biomass or ammonia once the use of alternative fuels becomes cost-effective and feasible. By 2050, all coal plants must be converted to alternative fuels or cease operation. There is no evidence as yet of any concrete decisions or plans to implement PDP 8, however.

With the PDP, Vietnam commits to peaking coal power at 30 GW (compared to the previous plan of 37 GW from the Draft PDP 8) and accelerating the adoption of renewables to at least 47 percent of electricity capacity by 2030 (compared to the former planned generation share of 36 percent). While JETP has a peak target of its power sector's CO₂ emissions of 170 MtCO₂ in 2030, PDP 8 has targets of between 204 and 254 MtCO₂.

Decree 06/2022/ND-CP

Decree 06/2022/ND-CP is part of Vietnam's policies on climate change mitigation measures, which are generally provided for under the 2020 Law on Environmental Protection. The Decree provides, among other things, a roadmap for the reduction of

GHG emissions, requirements for certain entities to conduct GHG inventories and prepare plans for GHG reduction, significant measures to mitigate the use of ozone-depleting substances and an ambitious plan for establishing a domestic carbon market in Vietnam. This of course will have a direct impact on the emissions of coal power plants.

Decision 263/QĐ-TTg

This programme was first initiated by the Government in the period 2009–2011 with the aim of developing rural regions. The programme focuses on improving rural living standards and the rural economy by accelerating digital transformation and bridging the gap in service quality between rural and urban areas. To some extent, this includes those affected by the transition away from coal. The programme provides funding and support for projects that promote economic development, such as agribusinesses, tourism and infrastructure improvements.

2020 Law on environmental protection

This law represents the most significant modernisation of the first law on environmental protection adopted in 1993 and replaces the law from 2014. It provides implementation details for improving the environment (water, air, soil, natural heritage site) and defines the rights, obligations and responsibilities of agencies, organisations, residential communities, households and individuals. Coal power plants have to comply with these requirements (wastewater management, dust filtering, managing ozone-depleting substances and GHGs, nuisance control such as noise, vibration, light, radiation, unpleasant odours etc.). However, the law does not provide specific limit values for pollutants. Further decrees should define such limits more precisely.

Resolution No 55NQ/TW

This resolution reviews the National Energy Development Strategy of Vietnam until 2030 and extends

its goals until 2045. It aims in particular to foster the development of renewable energy sources by easing the regulatory framework and improving the economic structure of the energy sector in order to foster favourable conditions to encourage all economic sectors, particularly the private sector, to participate in energy development. The resolution further aims to eliminate subsidies, monopolies, opaqueness and unfair competition in the energy sector. For coal-fired thermal power, the resolution aims to develop capacity at a reasonable pace, giving priority to large-capacity and high-efficiency units. At the same time, it aims to ensure full compliance with environmental laws in accordance with international standards. It also requires the development of a plan for existing coal power plants to receive technological upgrades in order to meet environmental protection requirements and for power plants that do not upgrade their technologies in accordance with regulations to be closed.

Decision No. 403/2016 / QD-TTg

This decision adjusts the development plan for Vietnam's coal industry up to 2020, with a perspective towards 2030. It includes specific targets for coal exploration, coal mining output, the reduction of coal losses during mining processes, environmental protection and the meeting of domestic coal demand in combination with exports and imports. Forecasts for coal demand in different industries are included. This decision has not yet been adapted to the latest political decisions and developments since 2016.

Decision No. 89/2008/QD-TTg

This decision approves the strategy for the development of Vietnam's coal industry. It aims to develop the coal industry by mining, processing and using domestic coal resources in an efficient and economical manner. This includes promoting exploration to increase verified coal reserves and upgrade existing reserves, developing coal processing with a view to diversifying products, preventing environmental and water source pollution and closely controlling the

implementation of safety and environmental-related technical processes and standards in coal exploration, mining, transportation and use.

Decision No. 563-TTg

This decision from 1994 establishes the Vietnam Coal Corporation. It includes the main tasks of the organisations and defines their organisational structure.

3 Coal in the Philippines

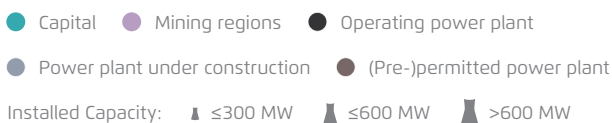
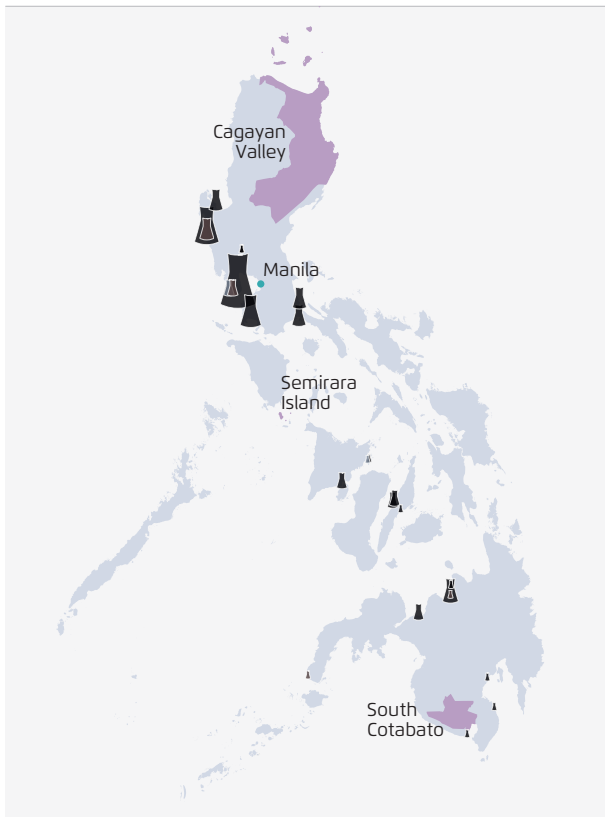
3.1 Coal reserves and utilisation

Coal reserves and type of coal

Compared to Indonesia and Vietnam, the Philippines has lower coal reserves (410 million tonnes) and imports the majority of the coal it consumes (on average around 80 percent) (DOE, 2020b). The proven reserves are to be found in 13 areas scattered across the country. The most important reserves are in Semirara

(171 million tonnes), the Cagayan Valley (70 million tonnes) and in South Cotabato (69 million tonnes), together accounting for 75 percent of total reserves. On the island of Semirara, where 42 percent of the mineable reserves are located, the predominant coal type is sub-bituminous (Semirara Mining & Power Corporation, 2023). Various coal types, including sub-bituminous, bituminous and lignite, are utilised by domestic coal-fired power plants in the region. Bituminous and anthracite coal are consumed in the industry sector (DOE, 2020b) and are mostly imported.

Overview of coal plants and coal mining regions in the Philippines → Fig. 19



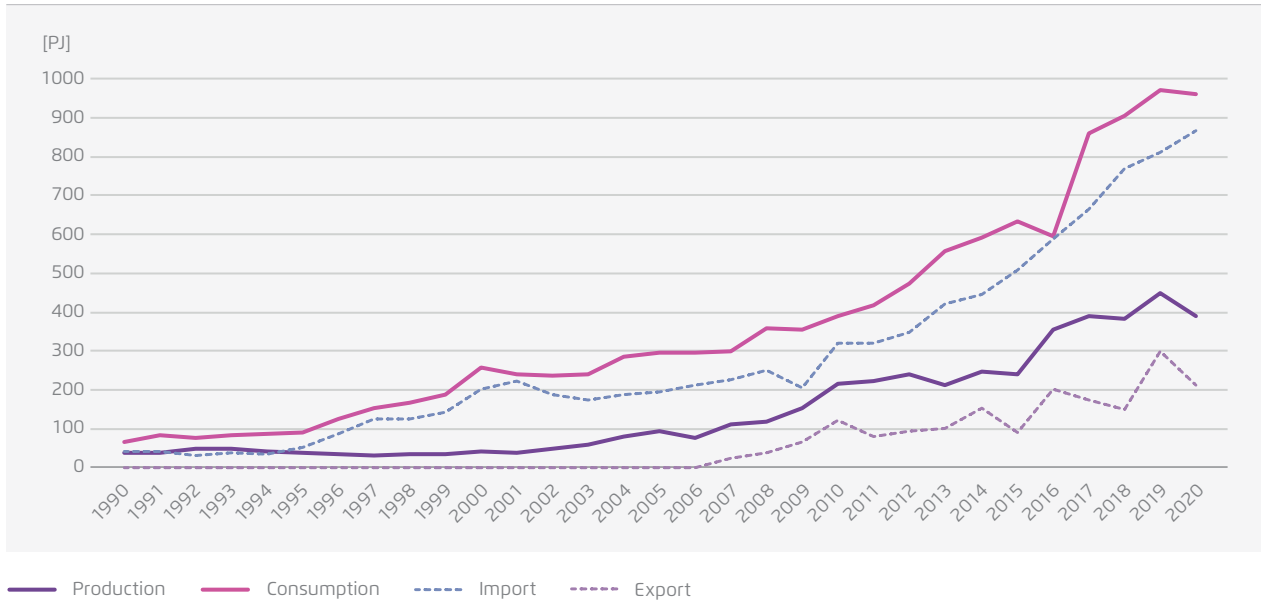
Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

Production and consumption, export and import

Coal production and consumption have risen significantly over the past three decades. In 2021, the Philippines produced about 420 PJ of coal, mostly sub-bituminous coal, extracted almost exclusively from the coal mine of Semirara island. The mine is operated by the Semirara Mining and Power Corporation, the largest coal mining company in the Philippines and accounting for 99.4 percent of total indigenous coal production. The rest is covered by other small-scale coal mining companies. Though it has doubled over the last ten years, indigenous coal production remains largely insufficient to cover the country's soaring coal demand (mostly driven by coal-fired power generation). Coal consumption reached 740 PJ in 2021, almost double the consumption levels of 2010 (380 PJ), leaving an important gap to be filled by imports (44 percent in 2021) (Figure 19). The level of imported coal (31 million tonnes in 2021) has increased fourfold since 2000 and comes almost exclusively from Indonesia (98 percent). In 2021, 86 percent of imported coal was sub-bituminous, 13 percent was bituminous coal and 1 percent was anthracite coal (EIA, 2021).

Despite its inability to cover national demand with national resources, the country exports sub-bituminous coal to other Asian nations. These exports amounted to about 260 PJ in 2021 (9 million tonnes),

Production, consumption, import and export of coal from 1990–2020 in the Philippines → Fig. 20

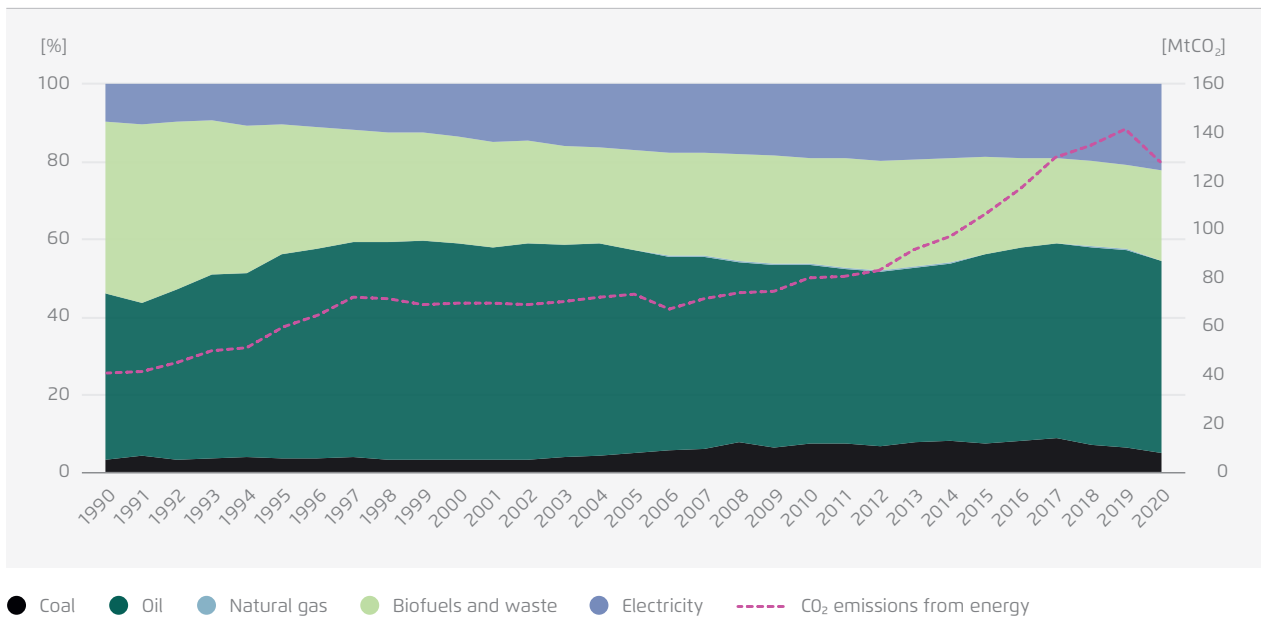


BP (2022), IEA (2023b), DOE (2021c)

peaking at 300 PJ (10 million tonnes) in 2019. Decisions to export are driven by higher export prices and the absence of subsidies for national coal consump-

tion. Coal exports are private transactions and there is no requirement for local coal supply to prioritise domestic use. In 2020, 96 percent of coal exports

Total final energy consumption mix and CO₂ emissions from energy 1990–2020 in the Philippines → Fig. 21



BP (2023), IEA (2023b)

went to China, with 4 percent distributed between Thailand, South Korea, India and Cambodia (DOE, 2023a). However, Chinese demand for coal from the Philippines has dropped by 55 percent compared to 2022 (Philippine News Agency, 2023). To compensate for this and become less dependent on the Chinese market, the Philippines started to redirect its coal exports to Japan and local buyers (Argus Media Group, 2023).

3.2 Coal use in different sectors

Energy use of coal in total final consumption and GHG emissions

Total final consumption in the Philippines has increased 1.7-fold compared to 1990, reaching 1 350 PJ in 2020 (DOE, 2020d). Oil is the largest source of total final energy consumption (50 percent), followed by biofuels and waste (23 percent), electricity (22 percent, of which 78 percent is generated by fossil fuels), coal (5 percent), and natural gas (<1 percent) (DOE, 2020d).

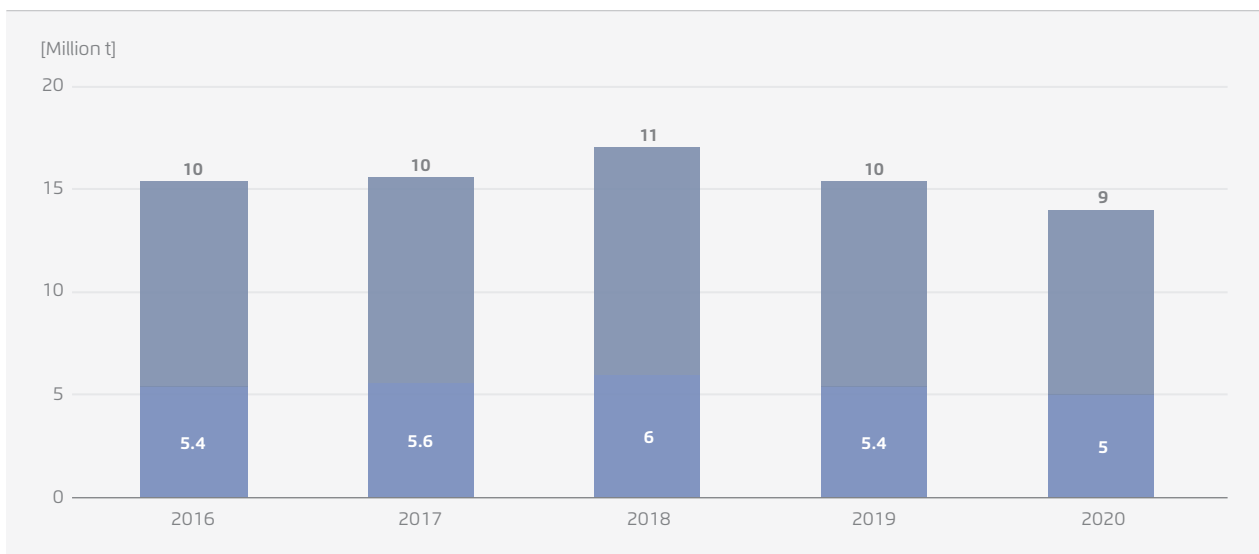
The rise in coal consumption, especially in the power sector, pushed up national GHG emissions from 41 MtCO₂ in 1990 to 128 MtCO₂ in 2020 (Figure 20). The Philippines’s energy-related CO₂ emissions are dominated by power (and heat production) (72 MtCO₂), transport (28 MtCO₂) and industry (12 MtCO₂) (IEA, 2023b). The Philippines has committed to reducing CO₂ emissions by up to 75 percent in 2030.

Non-energy consumption of coal in the Philippines has been mainly driven by the cement industry (4 percent of the country’s coal consumption). The remaining share of coal (6 percent) is consumed in other industries, such as alcohol, sinter, rubber boots, paper and chemical manufacturing, fertiliser production and smelting processes (DOE, 2021e).

The Philippines currently operates one steel/iron production plant which uses electric arc furnaces. Six further plants are under construction and three have been announced, six of which will have electric arc furnaces; no information is available on the rest. The total steelmaking potential capacity amounts to 500 000 tonnes per annum (Global Energy Monitor, 2023d).

Steel consumption and import in the Philippines

→ Fig. 22



● Import ● Consumption

South East Asia Iron and Steel Institute (2022a)

In 2020, around 9 million tonnes of steel were consumed in the Philippines, 5 million tonnes of which were imported (Figure 22) (South East Asia Iron and Steel Institute, 2022a).

3.3 Coal in the power sector

The power sector accounts for the largest share of coal demand in the Philippines (DOE, 2023a; BP, 2022; IEA, 2023b).

Coal-fired power plants dominate electricity generation in the Philippines, with a share of almost 60 percent of the total generation mix in 2022, corresponding to 66 TWh. This represents a 2.6-fold increase compared to 2011 (25 TWh), as can be seen in Figure 22 (DOE, 2021a). Mindanao has the largest share of coal (68 percent) and Visayas the smallest (42 percent). The remainder of the generation mix in 2022 broke down into 16 percent natural gas, 9 percent geothermal and hydropower, 2 percent oil, almost 2 percent solar, 1 percent wind and less than 1 percent biomass.

Overview of coal-fired power plants

In 2022, 12.1 GW of coal power plants were operating in the Philippines. According to the latest PEP (2020–2040), this figure is supposed to increase to 13.6 gigawatts by 2030²³. From 2030 onwards, no new coal-fired power plants will be added.

Coal generation is expected to increase until 2040 (71 TWh) and then level off until 2050 (64 TWh), with natural gas and renewables expected to cover most of the additional electricity consumption growth (Figure 25) (DOE, 2022a)²⁴.

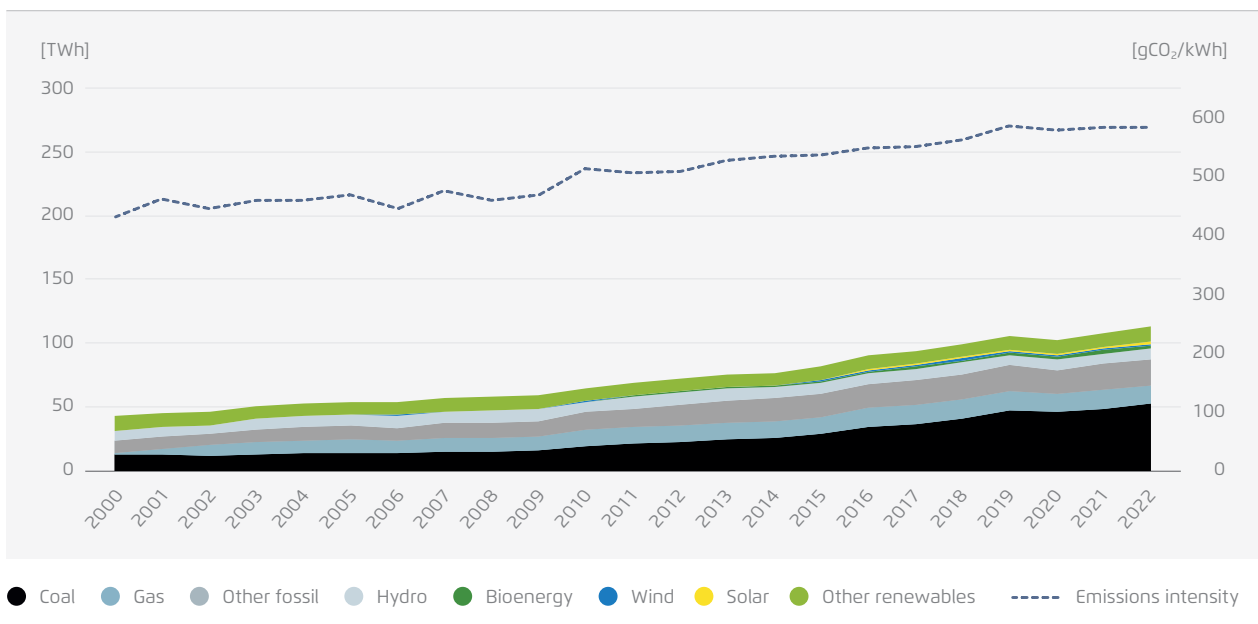
Coal-fired power plants in the Philippines are equipped with different technologies, 6.8 GW using pulverised subcritical coal and 4.7 GW using circulating fluidised bed coal, both usually achieving an

²³ There are some exceptions to the moratorium, namely for plants that have made significant progress on permitting prior to the effectiveness of the moratorium (DOE, 2020e).

²⁴ Preliminary drafts of the new Philippine Energy Plan (2022–2050) stipulate a decrease in coal power generation from 2040 (71.14 TWh) to 2050 (63.77 TWh) through retirement or repurposing for other fuels. However, the final PEP (2022–2050) remains to be decided.

Electricity generation and emissions intensity 2000–2022 in the Philippines

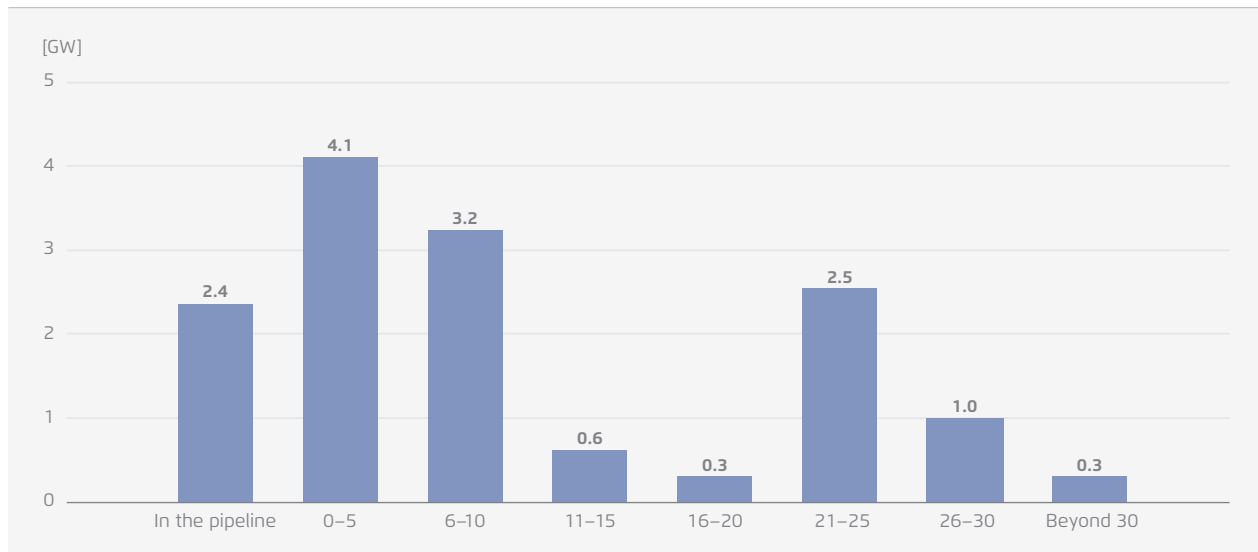
→ Fig. 23



Ember (2022)

Overview of the age of coal power plants in the Philippines

→ Fig. 24



Global Energy Monitor (2023b)

efficiency of between 33 and 37 percent. 0.9 GW use supercritical coal with an efficiency of between 40 and 45 percent (DOE, 2023c).

In 2020, the Philippines announced a coal moratorium (DOE, 2020e) on new coal projects, saying that greater priority would be given to increasing the share of renewables, developing more gas power plants and enhancing system flexibility (DOE, 2020a). The coal moratorium bans all new coal power plants in the pipeline with a couple of exceptions: (1) coal power plant projects that already have a scheduled commercial operation date will be constructed. As of April 2023, this concerned 2.3 GW that are expected to be constructed by 2027 (including 0.3 GW in 2023) (DOE, 2023c). (2) Some power plant projects that have been approved but whose construction has not started yet (and have not received a commercial operation date) may be constructed despite the moratorium. This concerns about 1.5 GW currently at the planning stage that are expected to come online by 2030 (DOE, 2023c).

In total, and despite the coal moratorium, 1.5 to 3.8 GW of coal capacity are therefore expected to be built until 2030. On the other hand, the moratorium cancelled about 10 GW of coal power plant capacity

that was mentioned in the last PEP (see chapter on Recent policy developments and commitments).

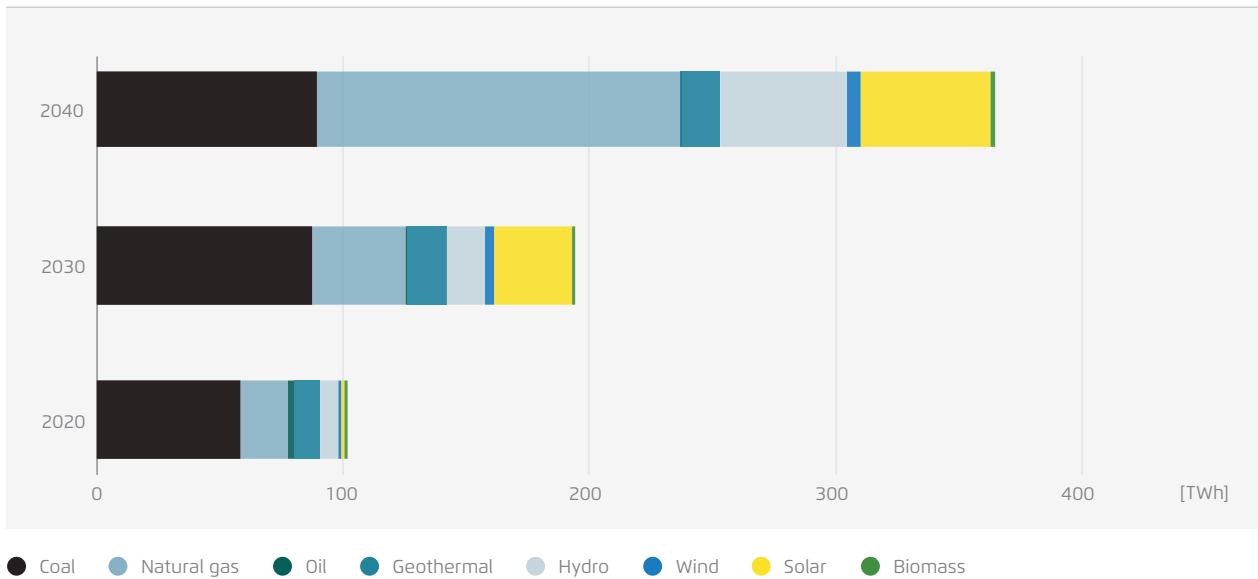
Around 60 percent of the coal power plant fleet has been in operation for less than ten years. Only 3.9 GW of coal power plants will retire within the next 20 years. Another 0.9 GW will retire within 30 years. Over 9.7 GW will still be operating beyond 30 years (Figure 23).

Energy security and electricity generation

Representing 54 percent of the Philippines' total installed capacity, coal-fired power plants are regarded as a key technology to ensure security of power supply. However, coal-fired power plants experience frequent unplanned power outages, leading to growing concerns about their reliability and causing power prices to soar in times of scarcity (ICSC, 2021). This is because coal-fired power plants in the Philippines have been shown to operate as more than baseload plants that cycle in order to cope with variable loads contrary to what they were designed for. This cycling operation leads to a higher frequency and therefore to unplanned outages. In May 2020, coal-fired power units were responsible for 60 percent of these outages (Institute for Energy Economics and Financial

Gross generation output in 2020 and planned output for 2030 and 2040 according to the PEP from 2020–2040 in the Philippines

→ Fig. 25



DOE (2022)

Analysis, 2020). More power from renewable energy could alleviate these concerns, as has already been demonstrated in recent years, with renewable plants having effectively reduced the price of electricity in the spot market by 28 percent in 2019 (ICSC, 2021).

3.4 Socioeconomic impact

Economic importance

The economic relevance of the coal mining sector in the Philippines is much smaller than in Indonesia and Vietnam. Gross value added²⁵ reached 72 billion PHP (1.3 billion USD) in 2022, 5 billion PHP more than in 2020 (Philippines Statistics Authority, 2023).

Coal production in the Philippines provides some royalties to the Filipino government: about 16 billion PHP (290 million USD) was paid in 2022 by Semirara Mining and Power Corporation for the production of 16 Mt of coal (Philippine News Agency, 2023).

²⁵ Value added refers to the combination of employee compensation, tax and operating surplus. Value added also contributes to gross domestic product (GDP).

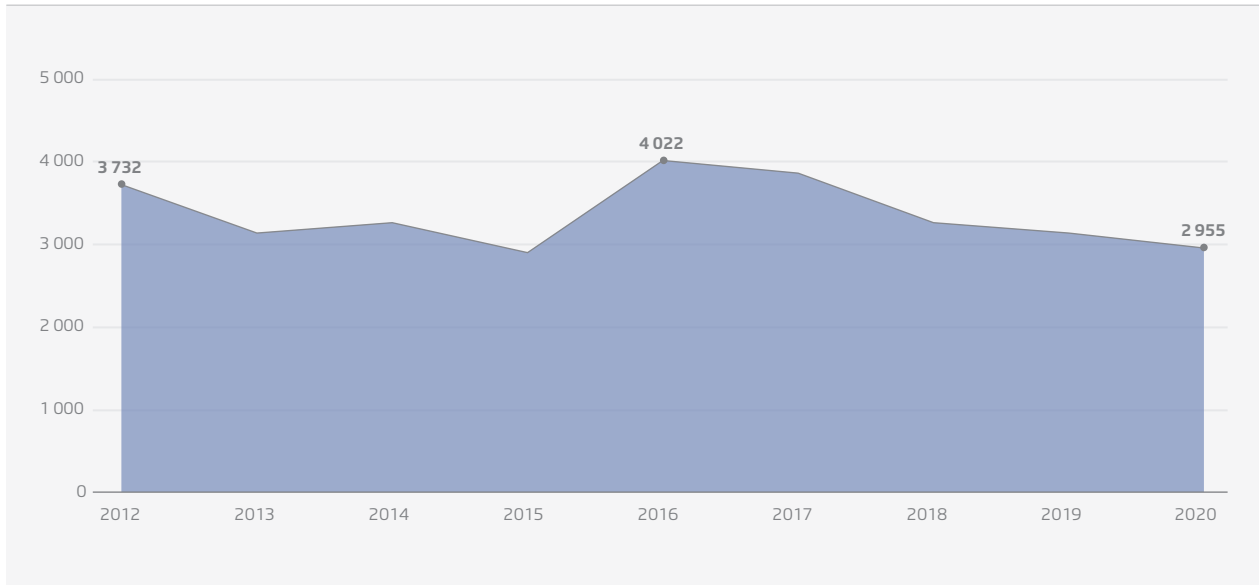
3.5 Employment

In 2016, the coal-related industries (coal mining and coal-fired generation) employed a total of 51 024 people. Most of these jobs were concentrated in coal-fired power generation (47 002 jobs), while only 8 percent were people employed in the mining industry (4 022 jobs) across eight coal sites (ILO, 2022). Employment numbers are expected to rise in line with the planned increase in coal capacity up to 2030.

In 2020, the average annual wage of coal miners was 685 000 PHP per employee (12 450 USD) (Philippines Statistics Authority, 2023), while the average annual wage in the Philippines was 535 000 PHP (9 730 USD). As in Indonesia and Vietnam, jobs in coal mining pay better than the average wage.

Coal mining employees 2012–2020 in the Philippines

→ Fig. 26



Philippines Statistics Authority (2022), UNIDO (2023)

3.6 Governance structure of the coal industry

The Philippines has a liberalised electricity market. The electricity sector and coal mining operation are under the oversight of the Department of Energy (DOE) and the Energy Regulatory Commission (ERC).

Coal mining industry

The coal mining industry in the Philippines is liberalised. Coal operations in the Philippines are governed by Presidential Decree No. 972 or by the Coal Development Act of the Philippines, as amended by PD 1174, which contains guidelines for the exploration, exploitation, development, disposition and utilisation of coal resources in the Philippines. These decrees introduced the Philippine Coal Service Contract System and established guidelines for coal operations. Under these guidelines, the government of the Philippines retains ownership of the mines through a coal contract system (DOE, 2023e).

Large-scale coal mines are operated by companies that receive mining rights through a bidding process that leads to so-called Coal Operating Contracts being

awarded (for around 20 companies) (DOE, 2022b). Small-scale coal producers are local entrepreneurs who obtain an operating permit by applying for a so-called Small-Scale Coal Mining Permit (DOE, 2021d)²⁶. By 2021, Philippines had granted 47 Small-Scale Coal Mining Permits (31 sites located in Surigao, ten in Cebu, four in Zamboanga and two in Albay) (DOE, 2021c).

The Filipino government does not own any mines directly and does not participate in coal mining activities. It only retains "ownership" of the natural resources. It regulates and monitors the sector, while ensuring compliance with environmental regulations.

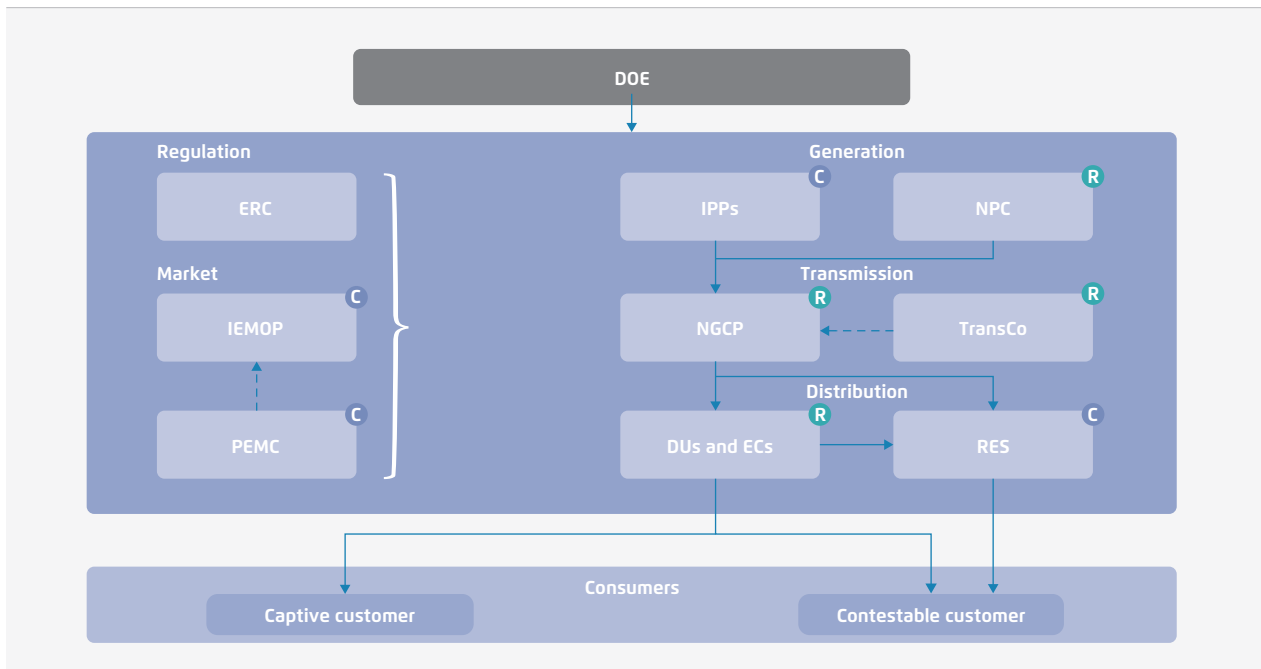
Power sector

Unlike Indonesia and Vietnam, the Philippines has fully liberalised its power market. The Electric Power Industry Reform Act (EPIRA) from 2001 initiated

²⁶ Small-scale coal mining permits are meant for areas that have small deposits of coal whose exploitation will not qualify under the requirements of the Coal Development Act of 1976. Allowed applicants are Filipino citizens who are residents of the area where the coal deposit is located, as certified by a local government authority. Applications are accepted on a "first come, first served" basis (DOE, 2018a).

Governance structure of the power sector in the Philippines

→ Fig. 27



C Competitive but partly regulated R Regulated → Electricity flow - - - Oversight

Agora Energiewende (2023). Note: ERC (Energy Regulatory Commission), DUs and ECs (Distribution Utilities and Electric Cooperatives), IEMOP (Independent Electricity Market Operator of the Philippines), IPPs (Independent Power Producers), NGCP (National Grid Corporation of Philippines), NPC (National Power Corporation), PEMC (Philippines Electricity Market Corporation), RES (Retail Electricity Suppliers), TransCo (National Transmission Corporation)

the liberalisation process, introducing a wholesale electricity spot market (WESM) and paving the way for utility unbundling and the gradual introduction of market competition in all market segments. Under EPIRA, private sector investments are promoted at the generation and distribution level.

The Department of Energy (DOE) is responsible for formulating and implementing energy policies, including for coal mining exploration, development and operation. It is responsible for the power sector, ensuring compliance with energy laws and regulations and overseeing the generation, transmission and distribution of electricity. The DOE processes any submitted documents and entitles government bodies to monitor the market players.

The Energy Regulatory Commission (ERC) is the independent regulator in the Philippines. Its mandate is to promote competition and regulate power market players under EPIRA.

The WESM is operated by the Independent Electricity Market Operator of the Philippines (IEMOP). IEMOP is responsible for day-to-day operations, including the scheduling, dispatching and settlement of electricity transactions among market participants. The Philippines Electricity Market Corporation (PEMC) oversees and governs the overall framework of the WESM and reports to DOE. PEMC is also responsible for producing hourly generation dispatch schedules.

Coal-fired power generators are mostly independent power producers (IPPs) that operate 59 coal-fired power plants in the three main national grids (96 percent of all coal power plant capacity). Contract duration typically varies between 25-29 years (NPC, 2022; ERC, 2023). In addition, the National Power Corporation (NPC) supplies electricity in off-grid and remote areas, mostly through diesel-fired power plants. In 2022, NPC owned only 0.32 GW of coal-fired power plants located in Mindanao (DOE, 2023c).

Operation of the transmission and distribution system in the Philippines is unbundled and regulated. The National Grid Corporation of the Philippines is a private operator composed of three corporations (Monte Oro Grid Resources Corporation, Calaca High Power Corporation, and the State Grid Corporation of China). It operates the transmission grid under an infrastructure concession overseen by the Transmission Corporation (TransCo).

At the distribution level, 150 distribution utilities (DUs) deliver to retail electricity suppliers (RES) and captive consumers (DOE, 2023b). The largest distribution operator, with a share of 52 percent, is Manila Electric Company (Meralco), which operates in 38 cities and 73 municipalities (Meralco, 2018) and supplies 6.6 million customers. Finally, Electric Cooperatives (EC) distribute electricity and develop distribution infrastructure in remote and off-grid areas.

Planning and approval procedures

Operating licences for large-scale coal mines are issued via auctions organised by PNOC Exploration Corporation (PNOC EC). The DOE issues the mining licences, which are valid for between two and twelve years (DOE, 1981). Private sector entities that acquire Coal Operating Contracts through the bidding process are characterised as large-scale coal mining operators. The DOE then awards the contract to the most suitable technical and financial proposal.

Small-Scale Coal Mining Permits (SSCMPs) are issued only to local small-scale coal operators under Circular No. 87-03-001. The assignment of SSCMPs is processed by the Bureau of Energy Development (BED) and is only open to Filipino applicants. The SSCMPs are allocated only for areas of up to five hectares with a coal reserve of below 55 000 tonnes. The licensing procedures must be approved by several government agencies, such as the Coal and Nuclear Minerals Division (CNMD) that is subordinate to the Energy Resource Development and Utilization Division and the Energy Resource Development Bureau (ERDB). (DOE, 2020c).

Electricity producers are selected by the ERC via a tendering process. After the tender is awarded, the IPPs sign a 25-year PPA to operate the power plant. However, following the adoption of the coal moratorium in 2020, the government will not approve any new applications for coal-fired power plants. Only existing power plants, committed²⁷ (2.3 GW) and certain listed indicative²⁸ (1.5 GW) power plant projects are exempted from the moratorium (DOE, 2023f; Eco-Business, 2020).

Foreign ownership

The energy market in the Philippines is open to international investors, albeit with certain limitations (Investment Policy Hub, 1991). In the coal mining sector, foreign ownership is limited to a 40 percent investment share (whereas the rest must be held by Filipino investors).

On the other hand, foreign investors can own up to 100 percent of renewable power plant facilities (ASEAN Briefing, 2023; DOE, 2017).

Subsidies

The Filipino government provides indirect subsidies to coal mining and coal-fired power plants through tax exemptions. The tax exemptions are granted for the importation of mining machinery and equipment used in coal extraction activities (DOE, 2018b). These tax exemptions also extend to electricity generation from coal. As the country relies mainly on imported coal from Indonesia due to its insufficient domestic coal reserves, the government removed an existing coal imports tax in 2022 (National Economic and Development Authority, 2022). This decision was made in response to rising global fossil fuel prices (Manila

²⁷ Secured projects where the investor has already made substantial commitments or investments, and the project is in the advanced stages of development with necessary permits and approvals.

²⁸ Proposed or discussed projects that may be potential investments that have been identified by investors but have not yet reached the advanced stages of development, such as the necessary permits and approvals.

Bulletin, 2022). The aim was to stabilise electricity prices since coal remains the dominant fuel in power generation.

Barriers and challenges of the coal phase-out

The young age of the coal power plant fleet is one of the major barriers to a coal phase-out in the Philippines. In 2022, around 60 percent (7 GW) of the total coal power installed capacity was around ten years old. Without specific regulations and/or compensation mechanisms, this 7 GW of capacity will technically be able to operate for another 40 years, until 2060. On top of these capacities, around 3.9 GW are still in the pipeline despite the moratorium and could in principle also remain in the Filipino power system until 2070. (2.35 GW of committed¹³ coal power projects and 1.52 GW of indicative¹⁴ coal power projects).

In addition, long-term PPAs with conventional IPPs pose another obstacle to a quicker coal phase-down, as these contracts last up to 25 years with the possibility of extension (Gatti, 2013). So far, none of the coal power plants in the country has been retired. The oldest coal power plant, with an operational time of 41 years, is still operating in Visayas (DOE, 2023c).

3.7 Recent policy developments and commitments

Philippines Energy Plan (new version to be released in 2023)

The national Philippines Energy Plan 2020-2040, or PEP2020-2040, is the main planning document that sets long-term energy roadmaps (two different scenarios). These roadmaps, adopted by the DOE together with the ERC (last adoption in 2022), are essential to provide clear signals to power sector investors.

DOE intends to release an updated version of this PEP plan by the end of 2023. The current draft plan 2023 now has the previous Clean Energy Scenario (CES) target as the reference and has a timeline until

2050. CES 1 envisions a share of more than 50 percent renewables with 19 GW of offshore wind and 4.8 GW of nuclear. CES 2 is almost the same as CES 1, but with 50 GW of offshore wind. CES 1 is the operational target, while CES 2 is a potential scenario in the event that all offshore wind service contracts are pushed through. It will probably focus on measures to further diversify the energy mix and accelerate the development of alternative fuel. However, no hydrogen and ammonia are included for now.

Presidential Decree 1174

This Presidential Decree amended Presidential Decree 972 in 1977 and facilitates land access to mining sites for coal operators. It also indicates the tax exemption level which benefits coal operators (Lawphil, 1976).

Energy Transition Mechanism

The Philippines committed to joining the energy transition mechanism (ETM) funded by ADB in 2021, right after COP26, to accelerate the early retirement of coal-fired power plants. Currently, pre-feasibility studies are being conducted by ADB for the Philippines and public consultations are underway (DOE, 2023g). ADB is also working with the government to prepare an investment plan under the CIF-ACT (ADB, 2023).

In November 2022, ACEN, the energy platform of the Ayala Group, completed a full divestment of the South Luzon Thermal Energy Corporation coal plant (244 MW) with energy transition mechanism financing, selling it to a group of institutional buyers of the South Luzon Thermal Energy Corporation.

ADB has been consulted on the deal and has commented approvingly on it; however, the ACEN ETM is not an "official" ETM from ADB, despite being the first use of the structure in the region (Uxolo, 2022). It remains to be seen when the first official ADB ETM will be conducted.

Advisory on the Moratorium of Endorsements for Greenfield Coal-Fired Power Projects In Line with Improving the Sustainability of the Philippines’ Electric Power Industry

This directive – which became effective in October 2020 - is more commonly known as the Coal Moratorium. It is aimed at (1) accelerating the development of renewable energy, (2) promoting new energy technologies, and (3) increasing the flexibility in the

power system. To achieve these goals, about 10 GW of new coal fired power plants were removed from the PEP. However, committed¹³ coal power projects, existing power plants with extension permission, and indicative¹⁴ coal power projects that have land-approved permits and a signed lease agreement will still be built (DOE, 2020a). The directive focuses on diversifying and is interested in repurposing coal plants from 2040 and exploring technologies such as CCS to mitigate emissions.

Coal-related policies and regulations in the Philippines

→ Table 5

Policy name	Year of adoption	Issued by	Description
Philippines Energy Plan (PEP)	2023	DOE	Long-term energy plan of the Philippines. Currently updated for 2022-2050 (DOE, 2022)
Presidential Decree No. 1174	1977	President	Provides guidelines for the exploration, development and utilisation of coal resources for coal mining activities and for exempting coal operators from national taxes (except income tax)
Energy Transition Mechanism	2021	ADB	Programme funded by ADB to accelerate the early retirement of coal power plants in the Philippines (ADB, 2023)
Coal Moratorium	2020	DOE	Directive that bans new coal power plant projects and aims to accelerate alternative fuels, RES and system flexibility (DOE, 2020a)
Presidential Decree No. 972	1976	President	‘Coal Development Act of 1976’. It allowed coal mining establishment, coal exploration and exploitation, and indigenous coal consumption under the administration of the Bureau of Energy Development (DOE, 1976)

Agora Energiewende (2023)

4 Conclusive findings

45 GW of new coal power plants are still planned in Indonesia, Vietnam and the Philippines, despite coal ban or coal phase-down commitments

Despite having adopted long-term commitments to phasing out coal (Vietnam) or to banning the construction of new coal power plants (Philippines and Indonesia), 45 GW of new coal power plant capacity are still planned in total in the three countries (33.8 GW in Indonesia, 9.3 GW in Vietnam and 2.4 GW in the Philippines). Of these 45 GW, 25.5 GW (Indonesia 19.4 GW, Vietnam 5.4 GW, Philippines 0.7 GW) are currently under construction (CREA 2023; Global Energy Monitor 2023). Building all these power plants could generate about 330 MtCO₂ of additional emissions in 2030 in the three countries, contradicting their plans to ensure that emissions peak by 2030. In the longer run, this also entails a significant risk of carbon locking that could jeopardise the achievement of the net-zero emission commitments for 2050 or 2060 (Figure 28). It also

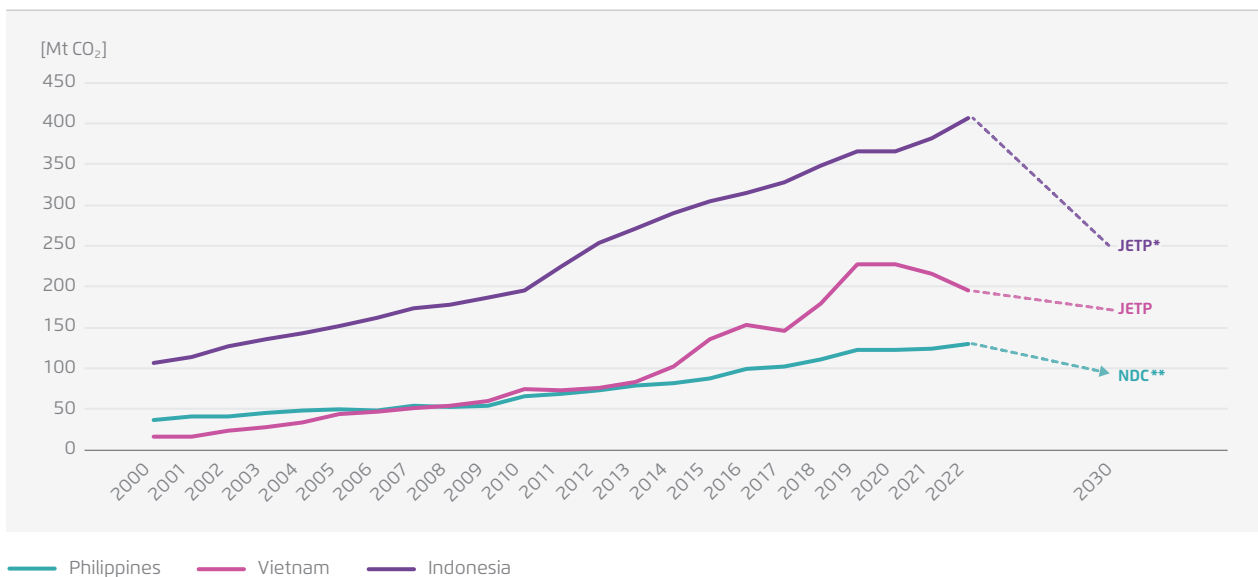
entails a significant risk of stranded assets, given the challenging economic viability of new coal power.

The three countries are committed to phasing down coal, yet none of them has adopted a clear transition roadmap

The three countries still lack a clear energy policy roadmap away from coal. Such a roadmap should define concrete timelines, include a precise socio-economic impact assessment and propose a power development plan that is in line with the CO₂ mitigation commitments. It should also include concrete mechanisms to phase-out coal (e.g. CO₂ pricing, administrative phase-out plan, reverse auctions), as well as potential compensation mechanisms to support the transition away from coal. Defining fair compensation that covers invested capital may be particularly relevant given the young age of the coal-fired power

Power sector emissions 2000–2022 and announced power sector peak emissions by 2030

→ Fig. 28



Ember (2022). *Only on-grid system; **Not specific to power sector.

plant fleet (eight years on average in Vietnam, eleven in Indonesia and 13 in the Philippines)²⁹.

The three countries envisage prolonging the use of coal power plants using technologies that are highly uncertain in technical and economic terms

Given the young age of the fleets, the question of repurposing existing (and new) coal power plants is high on the policy agenda in the three countries. Several “transitional options” are currently under discussion, in particular the blending of biomass or ammonia in coal power plants and retrofit measures to include carbon capture and storage (CCS). These technical options are not consensual and raise several questions regarding technical feasibility, economic and sustainability criteria. Another option under discussion, especially in Indonesia, is to increase the flexibility of the power plants in order to accommodate higher proportions of renewables. The operational flexibility of these power plants does indeed seem to be much lower than the global average and could – in principle – be improved by a change in operating practices and potentially targeted investments (Agora, 2017). It is however not clear if this inflexibility is related to technical constraints or rather to regulatory or market arrangement barriers. In any case, all these options (co-firing, CCS and flexibility retrofit) entail a lock-in risk, as they may favour an extension of coal power generation rather than a quicker phase-out.

In this context, dialogue between national and sub-national governments, or directly with power plant owners, can lead to individual or bilateral agreements. For example in Java, Indonesia under the Energy Transition Mechanism, such dialogues succeeded in addressing concerns related to captive contracts by renegotiating power purchase agreements that reduced coal generation and fostered early retirement (Asian Development Bank, 2022).

²⁹ The second version of the ASEAN taxonomy could help ensure an initial classification and schedule a suitable roadmap with clear conditions under which coal phase-out could obtain transition financing.

Inflexible power purchase agreements (PPAs) for coal power limits the growth potential for renewables

Power Purchase Agreements seek to guarantee a steady income flow irrespective of actual electricity production. All three countries rely heavily on such agreements: Vietnam (80 percent), Indonesia (66 percent), and the Philippines (72 percent). It is especially such inflexible PPAs that include generous capacity payments which, when combined with overly optimistic predictions of future electricity demand, has led to an overbuild of coal power plants. Indeed, the average utilization rate of coal power plants in the three countries is often below 50 percent (ESCAP, 2023).

None of the three countries comprehensively addresses the coal transition in the industry and other coal intensive sectors

In Indonesia, Vietnam and the Philippines, coal is predominantly used as a fuel for power generation. It is also used as heating fuel, feedstock or a reduction agent. In Indonesia, about 40 percent of the coal was consumed in industry and other sectors besides power in 2022, up fourfold compared with previous years. About 10 percent of Vietnam’s coal is consumed in the household and commerce and other services sector. The relevance of coal in those sectors, while not the focus of much policy attention, must not be underestimated, particularly in the context of growing industry production. The industrial sector with the highest risk of coal lock-in is the steel sector. Blast furnace-based steelmaking capacity in South-east Asia could grow by 25 percent over the next few years (South East Asia Iron and Steel Institute, 2022b).

The industrial structure of the three countries (with a predominance of low to medium temperature heat consumption) offers great potential for fuel switching towards electrification. Comprehensive policy roadmaps that address all end-use sectors will be required to effect a sound transition away from coal.

Structural change away from the economy of coal mining represents an important challenge, in particular for Indonesia

Coal mining has high economic relevance in Indonesia; this is also the case to some extent in Vietnam and to a lesser extent in the Philippines. In the mining regions (Kalimantan, Sumatra, Quang Ninh, Red River Delta and Semirara Island), coal mining is often the main contributor to GDP, an important source of revenue for the government and an important employer. As the countries move away from coal, the region will experience important structural changes which will impact employment and coal revenues. This will be especially challenging in Indonesia, given the relevance of the coal mining industry.

Ensuring a just transition in the regions requires a set of policy measures that will support the development of economic alternatives to the coal industry, attracting diversified investments and creating new job opportunities and revenues for the state. Taking a holistic approach that considers the needs and aspirations of the local communities, and also supports the reskilling and training of the workforce, is essential in enhancing the value of coal regions. This holistic challenge has not yet been systematically addressed in any of the three countries. The implementation of the JETPs in Indonesia and Vietnam presents an opportunity not only to tackle issues relevant to the power sector but also to jointly address the objectives of economic diversification, sustainable development, education and just transition policies.

Financing new coal projects in the region is becoming more challenging as international finance moves away from coal

Financing new coal projects in the region is becoming more challenging because multiple national and international finance institutions have made dedicated commitments to stop financing new coal power plants. They include China, Japan and South Korea, the three largest providers of foreign coal finance in the region. There is still no sign that these announcements are being implemented, however; further-

more, they do not in principle relate to the 45 GW of projects that are still in the pipeline.

In the context of long-term climate commitments, it is becoming clear to all involved stakeholders that coal projects that are still in the pipeline may not be viable in the long term. In such cases, cancelling projects in the early phase and developing clean alternatives may be a more prudent approach to avoid financial losses and locking in to a carbon-intensive energy source. The latest developments in Vietnam, which have resulted in a lack of investment support to build about 6.8 GW of the coal power plants approved in the latest PDP 8, demonstrate clearly that financiers are moving away from coal. The political economy of coal in the three countries does not yet appear to fully reflect these trends, above all because this would require more fundamental economic reforms that would probably be highly sensitive in social and political terms (e.g. removing fossil fuel subsidies, reforming low electricity tariffs to ensure they fully recover the costs of production, reducing domestic market obligations for coal etc.).

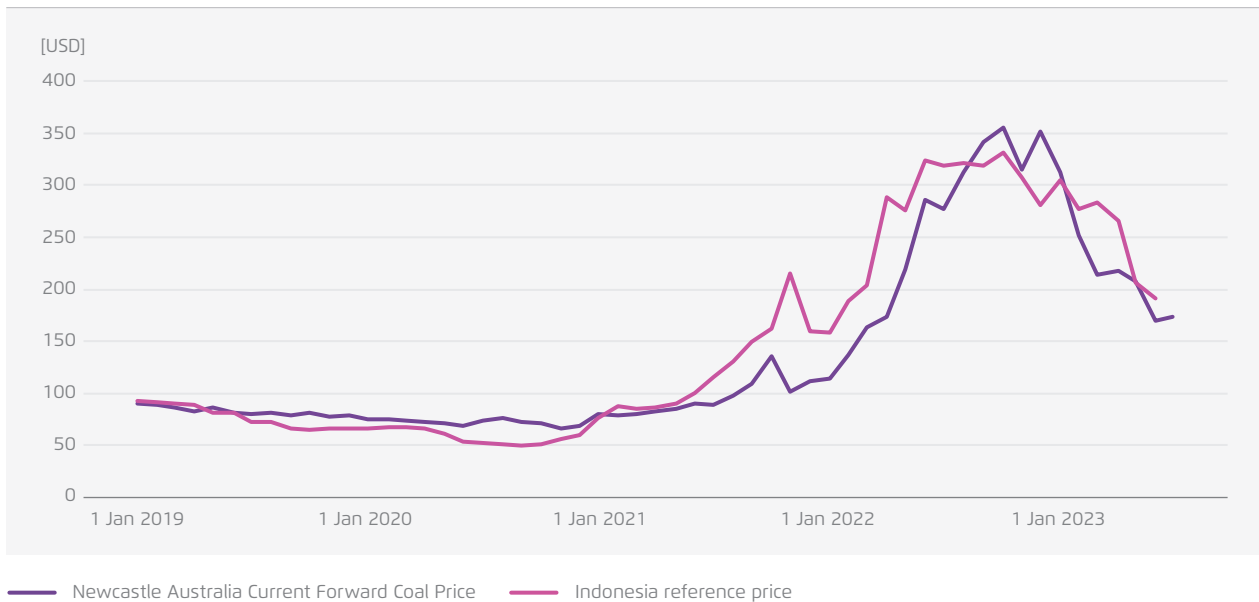
The perception of coal power as a reliable and cheap energy source in the region is changing, especially in coal-importing countries

Coal is historically seen as a reliable and cheap energy source. However, this perception is starting to change globally as heavily coal-reliant countries experience increasing outages and costs. In addition, the inflexible operation of the coal power fleet hampers the integration of large proportions of variable renewables, leading to high curtailment rates of renewables. Studies in the Philippines have also shown that coal is neither a reliable energy source nor cheaper than clean alternatives (ICSC, 2021). With increasing shares of renewables, the economics of coal power generation – which is forced to operate more flexibly – is no longer guaranteed, either.

In addition, volatile and increasing coal prices further diminish the attractiveness of coal power. Coal prices rocketed after the energy crisis in 2022 (Figure 29). Vietnam and the Philippines, which are largely

Development of coal prices from January 2019 until June 2023

→ Fig. 29



BP (2022), Climate Action Tracker (2022)

reliant on importing coal (46 percent import rate in Vietnam and 100 percent in the Philippines), have been particularly affected by increased import costs, putting additional pressure on the financial viability of the utilities. Even the Indonesian domestic market was affected by the widening gap between the regulated and the market price.

Renewables are picking up momentum but remain largely insufficient to meet long-term climate commitments

In recent years Vietnam has installed a total renewable capacity of 21 GW (17 GW solar and 4 GW wind), whereas Indonesia and the Philippines lag behind and have an installed capacity of less than 2 percent each.

Though there is still insufficient commitment to developing renewables in the region, they are increasingly perceived as an economic alternative that can alleviate some of the financial and climate risks associated with coal power. In Southeast Asia, the shift towards renewables is happening in the context of rapid energy demand growth, which is forecasted to double by 2035, and the need for massive invest-

ment in infrastructure, especially in the transmission grid. To cover this demand, additional solar and wind power amounting to 4 GW/year in Vietnam, 5 GW/year in Indonesia and 3 GW/year in the Philippines will be needed by 2030. This represents an important challenge – given the scale of investment required – but also an opportunity for green growth and for enhancing the resilience of the energy systems. Besides the supply shock related to the global energy crisis, recent local blackouts and outages in Indonesia, the Philippines and Vietnam have indeed underscored the importance of strengthening the power system, and in particular the transmission infrastructure, to ensure stable energy supplies. Attracting the investments needed will require important regulatory and market reforms, however. While the Just Energy Transition Partnerships (JETP) and the Energy Transition Mechanism (ETM) constitute initial forms of support from the international community, significantly more financial resources, both public and private, will have to be provided, especially to enable the early retirement of coal. In addition, to be credible, implementation of the JETP must show genuine commitment from funding parties and deliver tangible results.

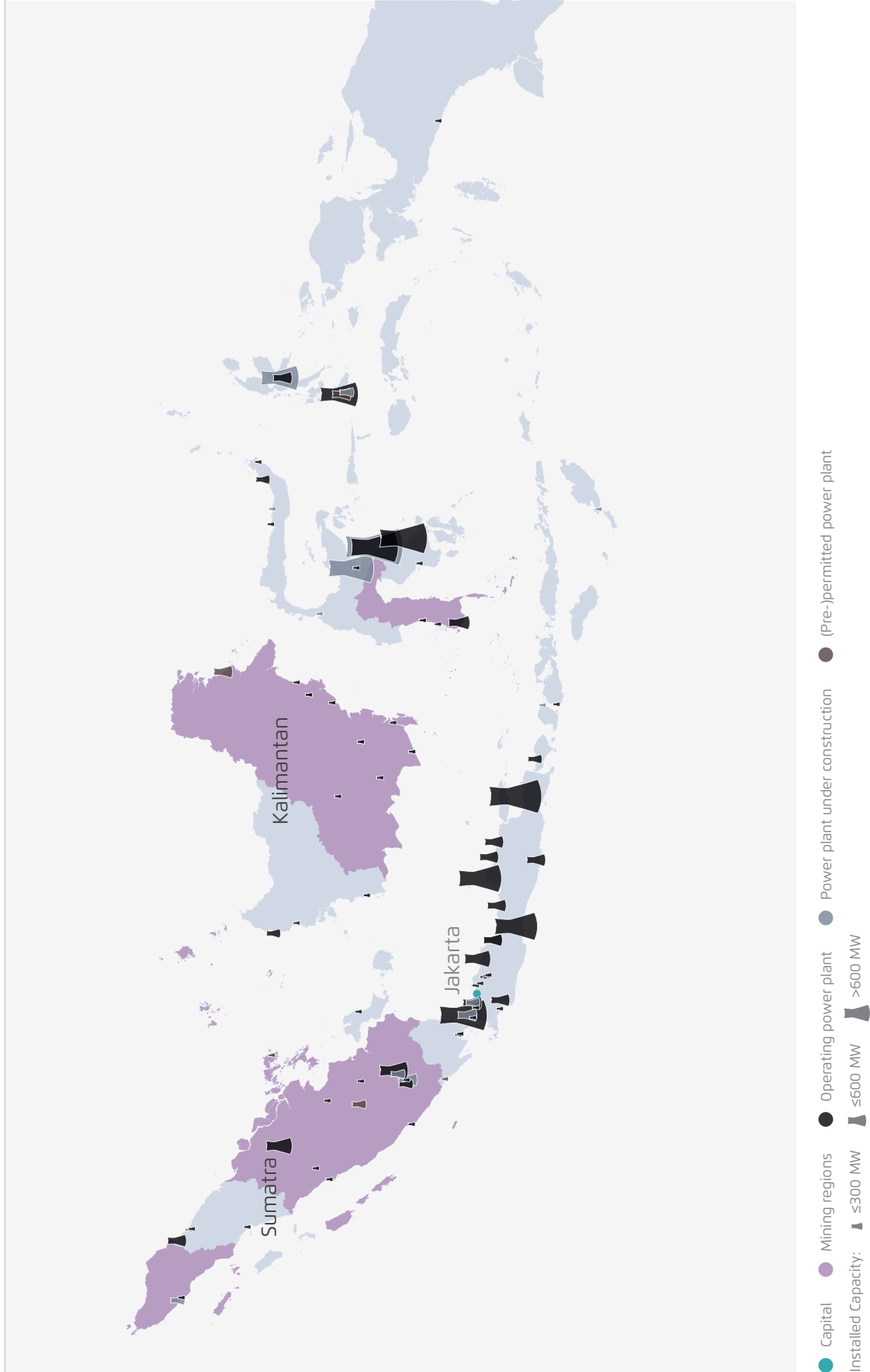
Conversion of units

For Indonesia, the calorific value of 24 MJ/kg is used when converting tonnes of coal into joules. This is because 49 percent of the coal resources are classified as lower-grade lignite/sub-bituminous coal (<21 MJ/kg). Medium quality coal (21-25 MJ/kg) represents about 26 percent of the coal resources. Coking coal (>25 MJ/kg) covers 24 percent of the coal resources.

In Vietnam and the Philippines, the standard calorific value of 29 MJ/kg is used because no detailed information on the coal mix is given.

Overview of coal-fired power plants and coal mining regions in Indonesia

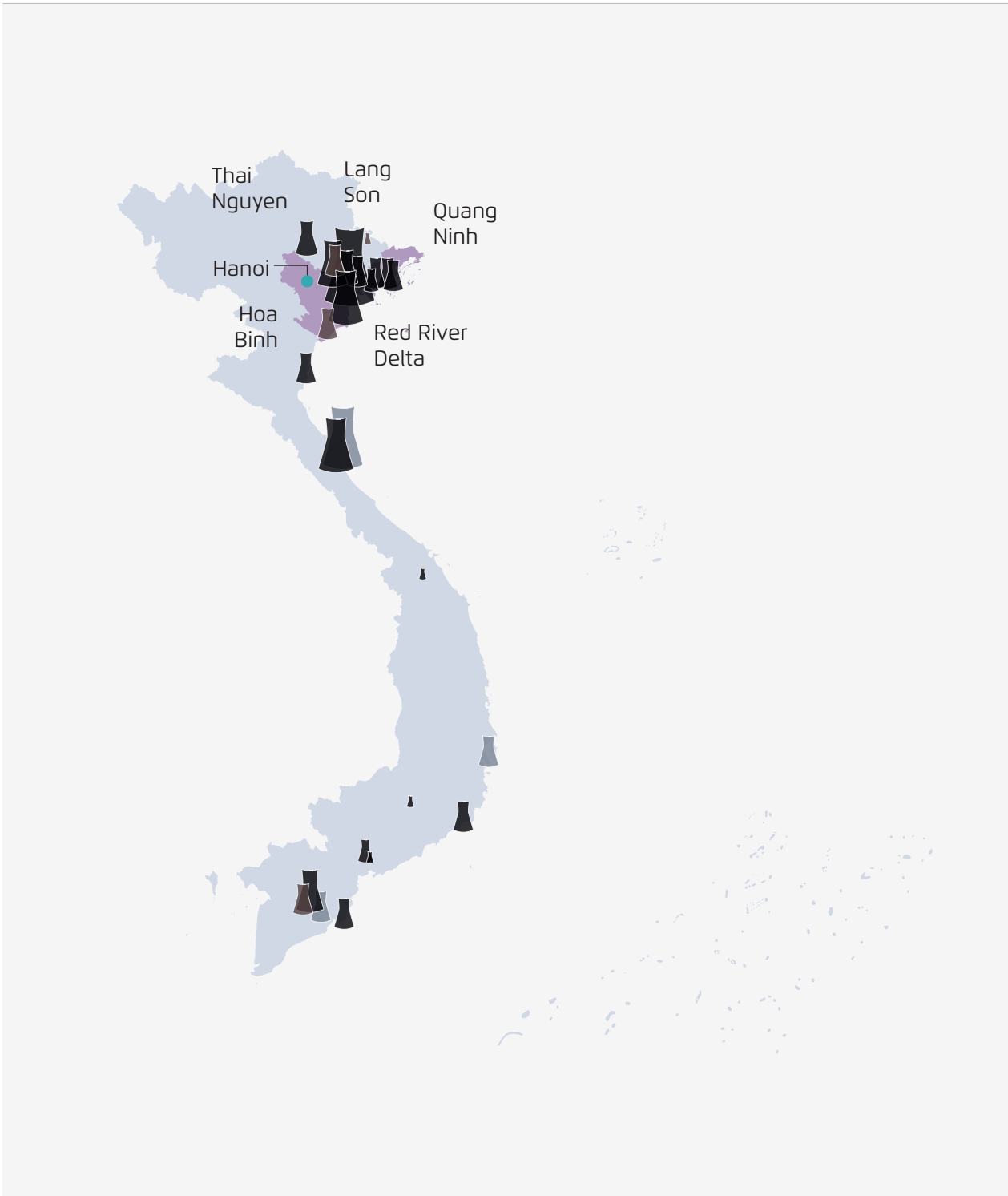
→ Enlargement of Fig. 1



Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

Overview of coal plants and coal mining regions in Vietnam

→ Enlargement of Fig. 9

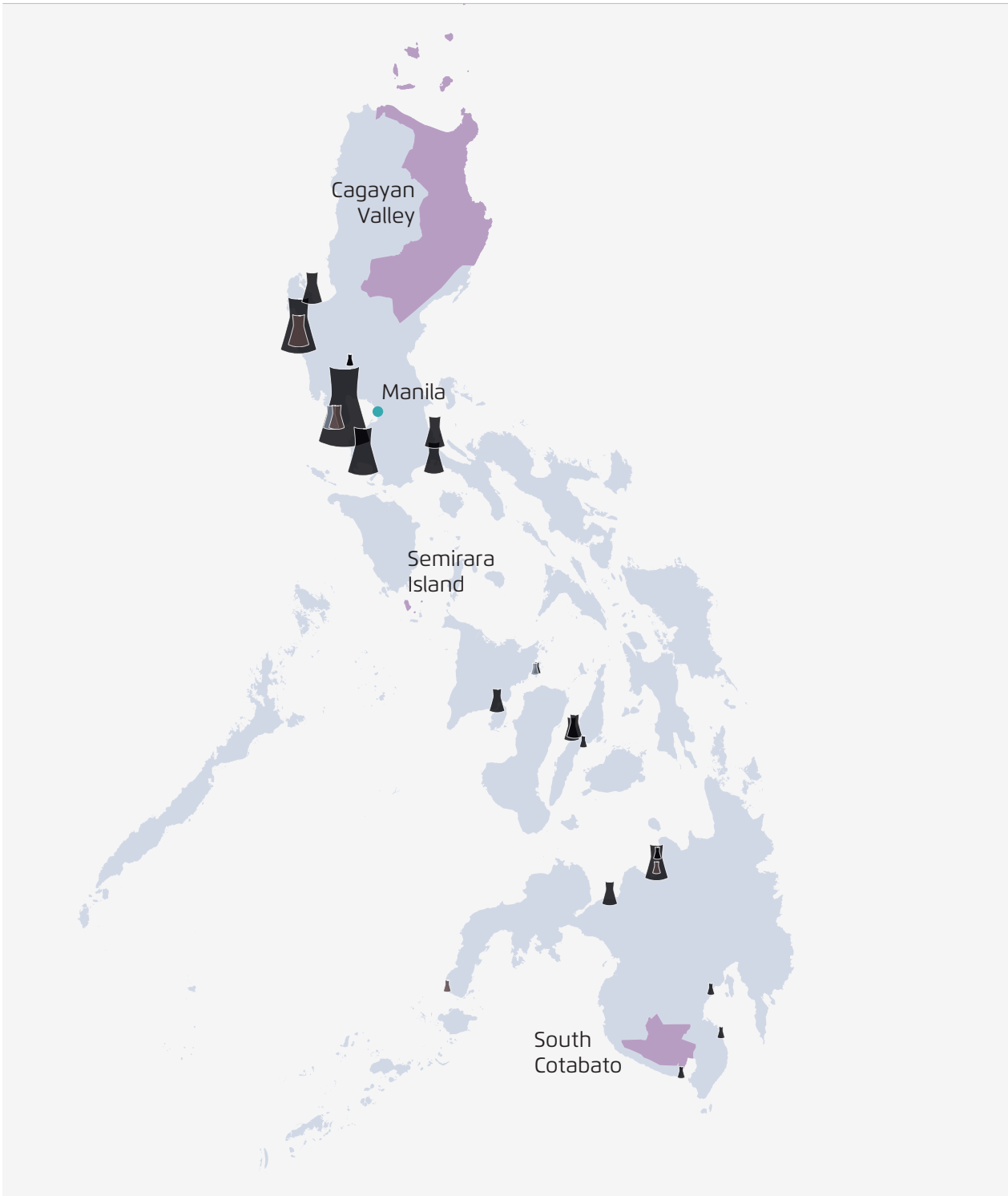


● Capital ● Mining regions ● Operating power plant ● Power plant under construction ● (Pre-)permitted power plant

Installed Capacity: ▲ ≤300 MW ▲ ≤600 MW ▲ >600 MW

Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

Overview of coal plants and coal mining regions in the Philippines → Enlargement of Fig. 19



● Capital ● Mining regions ● Operating power plant ● Power plant under construction ● (Pre-)permitted power plant

Installed Capacity: ▲ ≤300 MW ▲ ≤600 MW ▲ >600 MW

Global Coal Plant Tracker with interpretation from Agora Energiewende (2023)

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Indicators	Indonesia	Vietnam	Philippines
Long-term mitigation target			
2030 mitigation target in the power sector (million tonnes CO ₂)	RUKN (2019)	Baochinhphu (2023)	Department of Finance (2021)
Population 2021 (million)	The World Bank (2021a)		
GDP 2021 (billion USD)	The World Bank (2021b)		
Electricity demand 2021 (TWh)	Ember (2021)		
Electricity consumption per capita 2022 (kWh)	Our World in Data (2022)		
Primary energy coal consumption 2021 (PJ %)	IESR (2022)	Statista (2022)	Statista (2022)
Production of coal 2020 (PJ)	IEA (2021), BP (2022)		
Imported coal 2020 (PJ)	IEA (2021), BP (2022)		
Exported coal 2020 (PJ) world ranking	IEA (2021), BP (2022) The Global Economy (2021)		
Share of coal in electricity generation 2022 (%)	Ember (2022)		
Total coal installed capacity 2023 (GW)	Global Energy Monitor (2023)	Global Energy Monitor (2023)	
Coal power plants under construction 2023 (GW)	IESR (2023), CIPP Draft (2023)		
Coal power plants (pre-) permitted 2023 (GW)	IESR (2023), CIPP Draft (2023)		
Coal rents 2021 (% of GDP)	The World Bank (2021c)		
Total employment in coal mining total employment in power generation and transmission (2020)	UNIDO (2020)		
Average age of the power fleet (weighted with capacity)	Agora Energiewende based on Global Energy Monitor (2023)		

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