TransitionZero

Coal Refinancing in the Philippines

Using the Coal Asset Transition (CAT) tool

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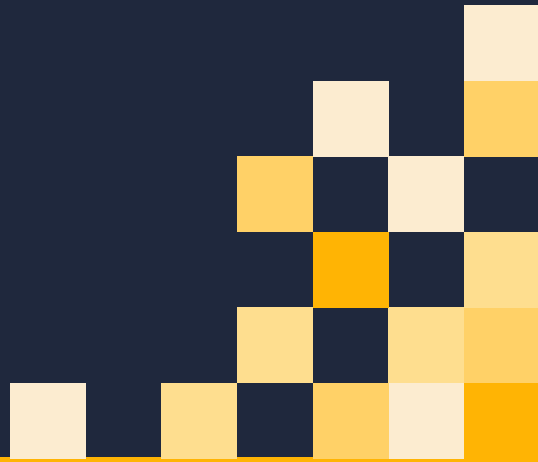
Empowering our partners with open data products to shape a clean energy future

We are a climate analytics not-for-profit established in 2021. We build open energy transition products without usability compromises and partner with mission-aligned organisations to help scale a global standard for energy transition planning.



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About CAT

A background on the who, what, why and how of the Coal Asset Transition (CAT) tool

The Coal Asset Transition (CAT) tool provides foundational economic, financial and environmental plant-level data to analyse the impact and potential for coal plant refinancing.

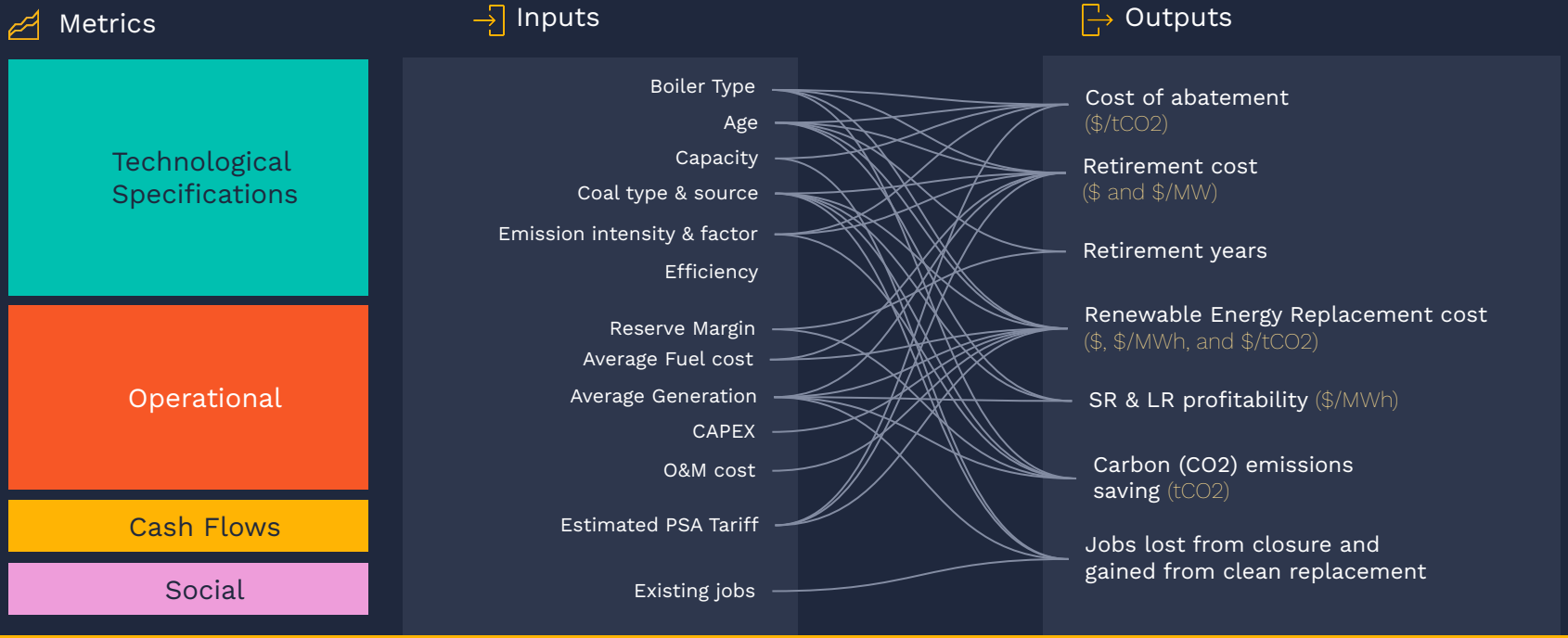

Indonesia: released October 2022, to be updated in 2024


Philippines: released January 2024


Pakistan: under development

CAT tool metrics

CAT provides metrics based on the asset's technological specifications, cash flows, operations, and environmental performance.



Use cases

CAT is a foundational dataset that can support a range of use cases

High-level screening to identify regions to prioritise for phase-out based on various screening metrics

The development of insights and policy recommendations for GFANZ's Managed Phaseout of Coal in Asia-Pacific report.

Asset-level deep dives into financial metrics, operating costs, and environmental and social externalities

Bankers and investors have used CAT data as the starting point for discounted cash flow analysis.

Identifying candidates for coal phase-out at the asset level based on criteria most important to the end user

Carbon Trust's Supporting a rapid, just and equitable transition away from coal report, analysing eligible coal assets in the province of Odisha, India.

Output formats

Learn more about the CAT tool and explore the data in its different forms and functions

Web dashboard updated to facilitate easier user interaction with our data

COMING SOON

Methodology document detailing the sources and methods used for each metric and market

DOWNLOAD HERE

Dataset download (excel sheet) with data points by plant

DOWNLOAD HERE

Key Findings

Analysing CAT data in the current Philippine power market landscape

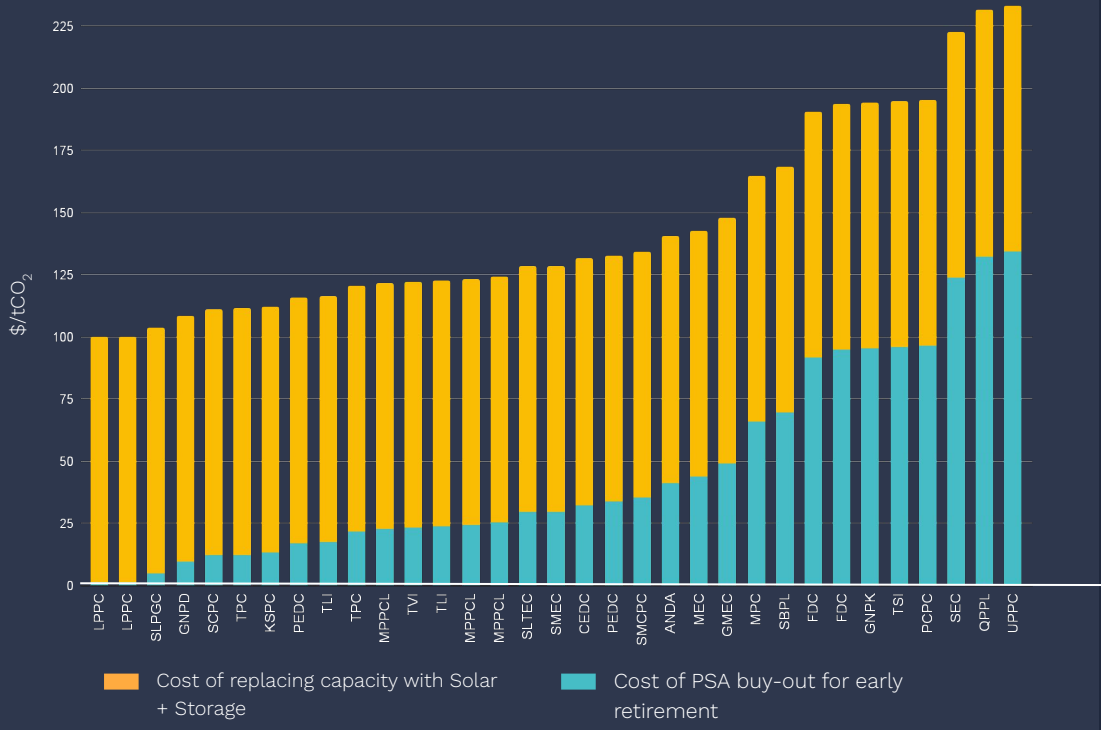
By the numbers

Our analysis of the CAT Philippines dataset found

- **The average abatement cost to buy and replace coal plants is $140/tCO$_2$, comprising $41/tCO$_2$ to 'buy-out' supply agreements 5 years early and $99/tCO$_2$ to replace them with solar plus storage**. The high marginal abatement cost stems from high profitability in Power Supply Agreements (PSAs) within the country's current tariff structure, which include fuel cost pass-throughs that see consumers bearing the cost of high fuel prices and not benefiting from savings when prices drop. TransitionZero's CAT tool shows a wide range in buy-out costs alone, between $0.02 million/MW to $2.8 million/MW, or $1/tCO$_2$ to $145/tCO$_2$. Nonetheless, the primary cost of phasing out coal lies in replacing it with clean, dispatchable alternatives like solar PV and battery storage which are necessary to meet grid stability and increasing demand.

Coal off, solar on

Abatement cost from 'buying out' PSAs and replacing coal capacity with solar PV plus four hours of battery storage



By the numbers

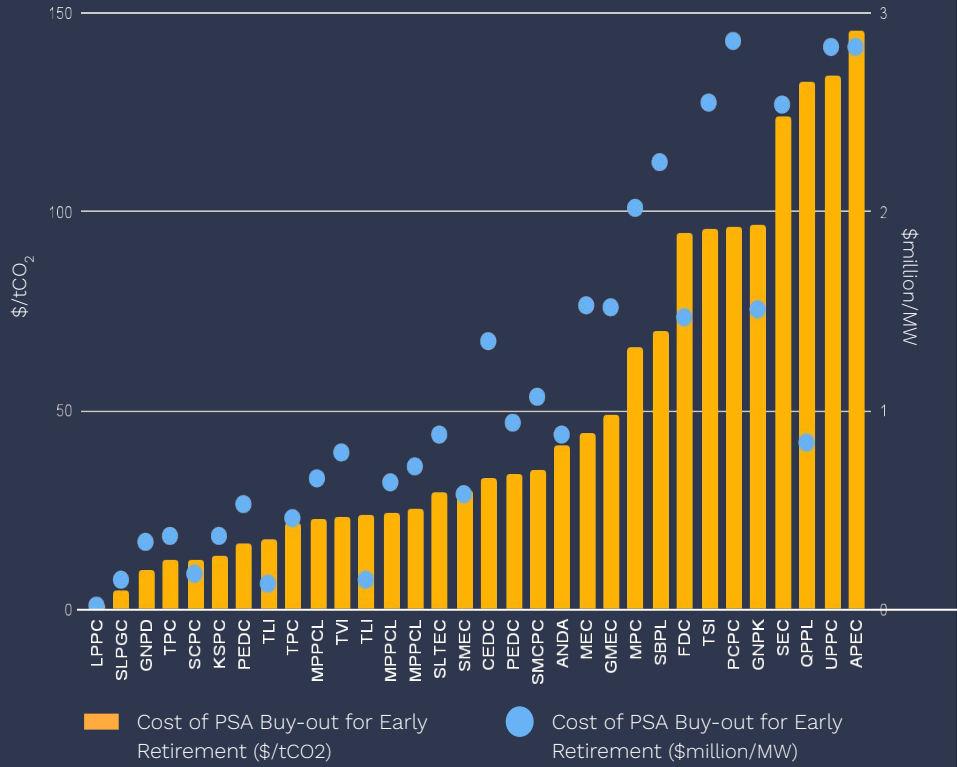
In addition to cost, emissions and reliability of coal plants are key issues

- **Retiring coal plants five years ahead of schedule could prevent 290 million tons of CO_2, almost double the Philippines' annual CO_2 emissions, aligning the country with the Paris Agreement's objectives.** Without policy changes, coal plants will continue operating unabated into the early 2050s. Although the country's fleet is relatively young, retiring coal plants five years early could lead to their decommissioning around 2040. To catalyse refinancing for early retirement, the Philippines will need policy-driven incentives and a holistic transition plan.

- **The forced outage rate for coal plants averaged 9% from 2020 to 2022, debunking the common belief that they provide uninterrupted 24/7 power.** Their unreliability is evident as they often go offline at large capacities, impacting the overall system stability. This underscores the urgency to transition away from coal technology. To facilitate coal retirement, it's essential to diversify the energy mix, enhance flexibility, and improve the health and connectivity of the power grid.

Cost-benefit of early coal refinancing in the PH

Cost of PSA Buy-out per avoided tons of CO2 and per megawatt (MW)



The potential of the Philippine Energy Transition Plan (PETP)

The PETP, which seeks to attract investments in 4 key strategic areas, must consider

- **Structuring deals and refinancing transactions for coal power is a complex task, requiring consideration of characteristics and realities at the plant level.** In the liberalised power sector of the Philippines, it's common for many PSAs to be signed with a single coal plant, each featuring different contracted capacities and remaining durations. Consequently, renegotiating these PSAs involves a complex process with multiple counterparties. Retirement strategies could include options like shutting down one unit first or buying out generation instead of capacity.

- **The Philippine Energy Transition Plan (PETP) needs to incentivise early adopters, ensuring that plant owners view early refinancing as a vital strategy.** Despite their current profitability, coal plants face the risk of becoming stranded assets due to shifts in regulatory, business, and political climates, which are likely to exert increased pressure on ongoing coal operations. It is essential to establish robust selection criteria to accurately determine transition schedules and guarantee that appropriate transition finance is made accessible.

- **The CAT tool is vital to support coal plant refinancing decisions and guide the Philippines' energy transition strategy.** The CAT tool provides reliable historical data to support negotiations regarding asset value and PSA buy-outs. Although determining fair value is subjective, having access to PSA data and understanding the ownership structures of coal plants are key to ensuring that valuations reflect the complexity of the Philippine market. While further due diligence is necessary for financing deals per asset, the CAT tool is invaluable for evaluating coal plants, guiding refinancing schedules, and informing policies during the Philippines' national energy transition.

Methodology and data quality

Breaking down the CAT Philippines methodology, the data collection process, and the data gaps and limitations

The CAT data's Philippine coverage

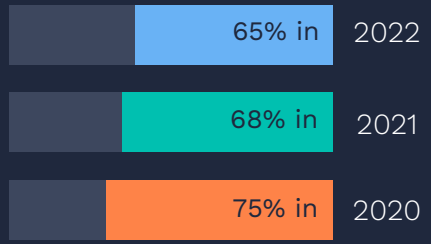
An extensive data endeavour

58 COAL UNITS — **12.2** GW INSTALLED CAPACITY

100% OF OPERATING ON-GRID CAPACITY

209 PSAs SIGNED WITH — **104** of 192 DU and ECs

GENERATION COVERED



Source: TransitionZero (2023)

The Filipino element

Incorporating unique market characteristics

Unlike Indonesia, which has a regulated power market, the Philippines has a liberalised electricity sector. Therefore, adjustments to the methodology have to be made to account for the unique aspects of the Philippine market.

The most critical aspect to consider is the variety of different PSAs tied to one asset. In Indonesia, each coal plant delivers power under only one supply agreement. However, in the Philippines, coal plant operators are free to contract their power to a variety of players. This includes registered DUs, electric cooperatives (ECs), and retail market players. Under this regime, coal assets may have multiple PSAs with differing maturities, counterparties, and pricing structures.

As a result, any refinancing deal will likely need to be calculated on a contract-by-contract basis. To account for this, CAT data for the Philippines provide a cost of buy-out under two scenarios:

- Immediate retirement/Full PSA duration – Due to varying maturities of PSAs, it is assumed that a coal plant cannot retire until the last PSA has expired. We introduced this metric into the CAT Philippines dataset to estimate the costs of buying out all of the remaining PSAs for immediate plant closure.

- Early Retirement – The cost of early retirement on an asset level is the summation of buying out existing PSAs tied to a particular asset, with the years for buy-out capped at 5 years.

Methodology and data

Estimating the cost of buy-out

Buying-out coal is dependent on a variety of factors

Assessing the cost of early retirement for coal-fired power plants in the Philippines is based on the financial value of a plant, which will form the basis for negotiations on buy-out prices.

Estimating the financial value of coal plants is typically done from two different perspectives:

01. Assessing the remaining investment value of the asset using un-recuperated capital expenditure
02. Assessing the value of future revenue streams.

Generally, the first view could undervalue the asset by omitting its potential to bring future revenues and supra-normal profits. **The second perspective is employed for CAT, as we feel it gives a fairer value for initial negotiations.** The future revenue streams are underpinned by data from existing PSAs for each plant.

Cost of early retirement =

Year of early retirement x **Annual generation**

x **(PSA tariff - Fuel cost - Carbon cost)**

Year of early retirement = Number of years of buy-out in an early retirement scenario, capped at a maximum of 5 years. Philippine coal plants have many PSAs with remaining durations ranging from 1 to 28 years. The maximum 5 year buy-out is assigned to reflect the possibility that buy-outs will be negotiated per PSA.

PSA tariff = Estimated tariff price per unit of electricity generated ($/MWh), based on PSA data from 2020 to 2023

Fuel cost = Three year average fuel cost ($/MWh)

Carbon cost = Three year average carbon cost ($/MWh)

*Note: The Philippines uses PSA in place of Power Purchase Agreement (PPA). We will use PSA and PPA interchangeably.

Identified data gaps and limitations

Inevitable under-valuation

The CAT tool provides asset-level data for all 58 of the Philippines' coal plants. It is underpinned by data from 209 PSAs, signed with 104 of the 192 registered DUs and ECs.

Given that generation is available under a variety of contracts outside of PSAs, we recognise that we may have excluded between 15% to 25% of coal generation that is covered by bilateral contracts in the retail power markets, assuming that another 15% of generation is sold on wholesale spot market (WESM). This omission is due to data availability constraints, as our data collection relies on publicly available PSAs signed to meet captive customer demand, and which undergo approval from the Energy Regulatory Commission (ERC). Most bilateral PSAs signed with retail suppliers are for the demands of contestable customers and are not publicly available.

This means that the current iteration of CAT data for the Philippines may be undervaluing an asset if it has higher exposure to the power markets. We acknowledge this shortcoming and attempt to provide more transparency by showcasing the percentage contracted under PSAs. This is an indicator of the plant's exposure to the WESM and retail markets, which may result in a potential under-valuation of the asset.

Contestable customers

Power demand by customer groups and year

Source: Philippine Electricity Market Corporation (2023)

Spot market returns

Revenue flows excluded in CAT data should be included in realised deals

We do not attribute any buy-out value to potential returns on the spot market because:

01. Unlike power contracted through PSAs, power sold on WESM does not have a minimum offtake volume. As such, dispatch is not guaranteed, and is subject to changing power demand and a plant's standing in the merit order. Thus, historical performance is likely to be a poor indicator of future prices.

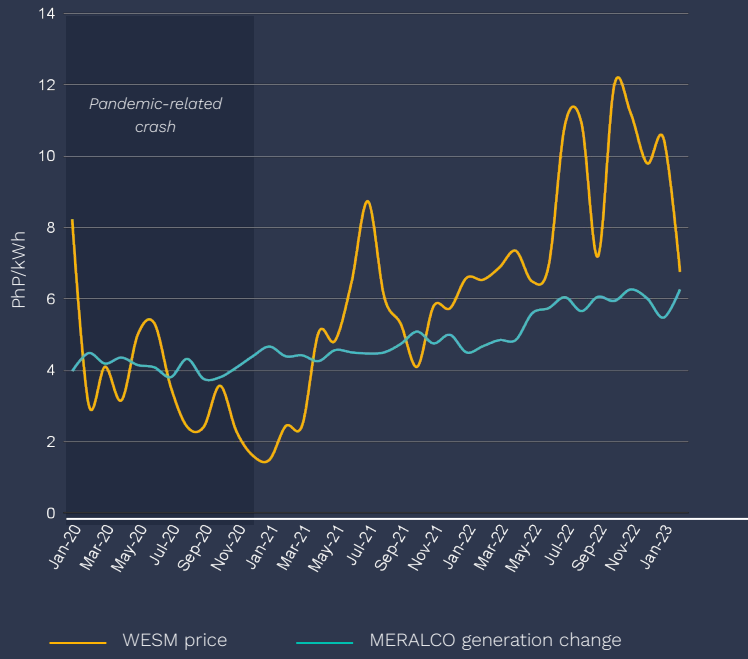
02. Forecasting spot prices, particularly far out into the future, cannot be done in a robust manner and could lead to severe misrepresentation of asset value.

To avoid introducing bias and skewing the data, the CAT data disregard spot market income streams in its asset valuation. Notably, revenues from the WESM would substantially contribute to a plant's profits due to the typically higher tariffs available. This becomes more of a factor for consideration in refinancing deals as WESM shares have also been increasing over time, particularly for plants in Luzon.

In practice, it is unlikely that future revenues arising from exposure to the WESM are totally absent in asset valuation exercises.

Volatility, volatility, volatility

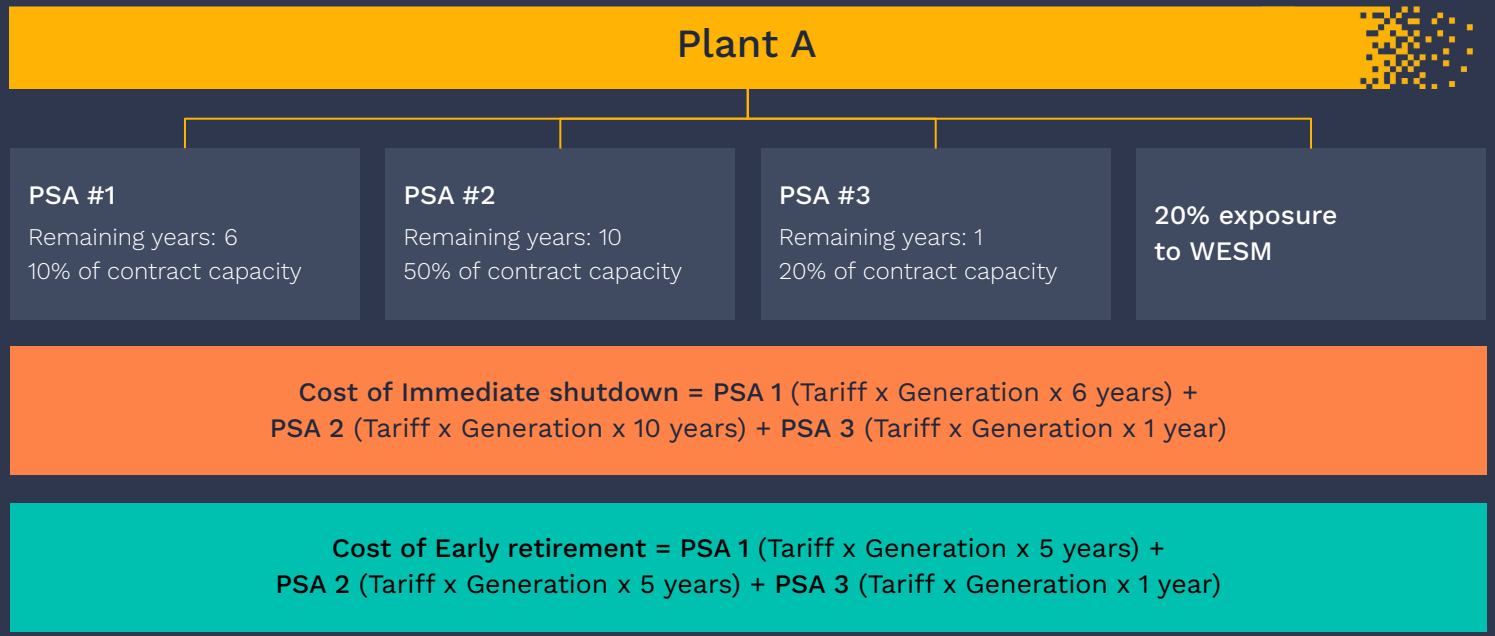
WESM spot prices vs generation charge at Meralco



source: MERALCO (2023)

Accounting for many PSAs to a single plant

The difference between the cost of early retirement and the cost of immediate shutdown



PSA data – filling in the blanks

How we treat missing data points

Data on the monthly generation charge, actual monthly generation, PSA start date, and PSA end date are collected from Power Supply Procurement Plans (PSPPs) and PSAs for the full analysis period.

	PSA (Full)	PSA (Partial)	TZ methodology
Description	Complete price and monthly generation data for PSA from January 2020 to December 2023	Some available PSA price and generation data points from January 2020 to December 2023	No data points on price and monthly generation available for the period of January 2020 to April 2023
Treatment of Data Gap	–	If rate and generation were unavailable, the month's data is omitted so as to not introduce bias. If one is available, the missing data is calculated using generation cost.	**Average Generation:** Minimum generation listed in the PSA. If unavailable, it is estimated using the typical capacity factors depending on the contract term (baseload: 80%; mid-merit: 45%, peaking: 20%) **Price:** Since the tariff may deviate significantly from the "estimated tariff" at the point of ERC approval, the PSA price is estimated using the average of available PSAs signed under the same coal plant.
Coverage	76 PSAs	108 PSAs	16 PSAs

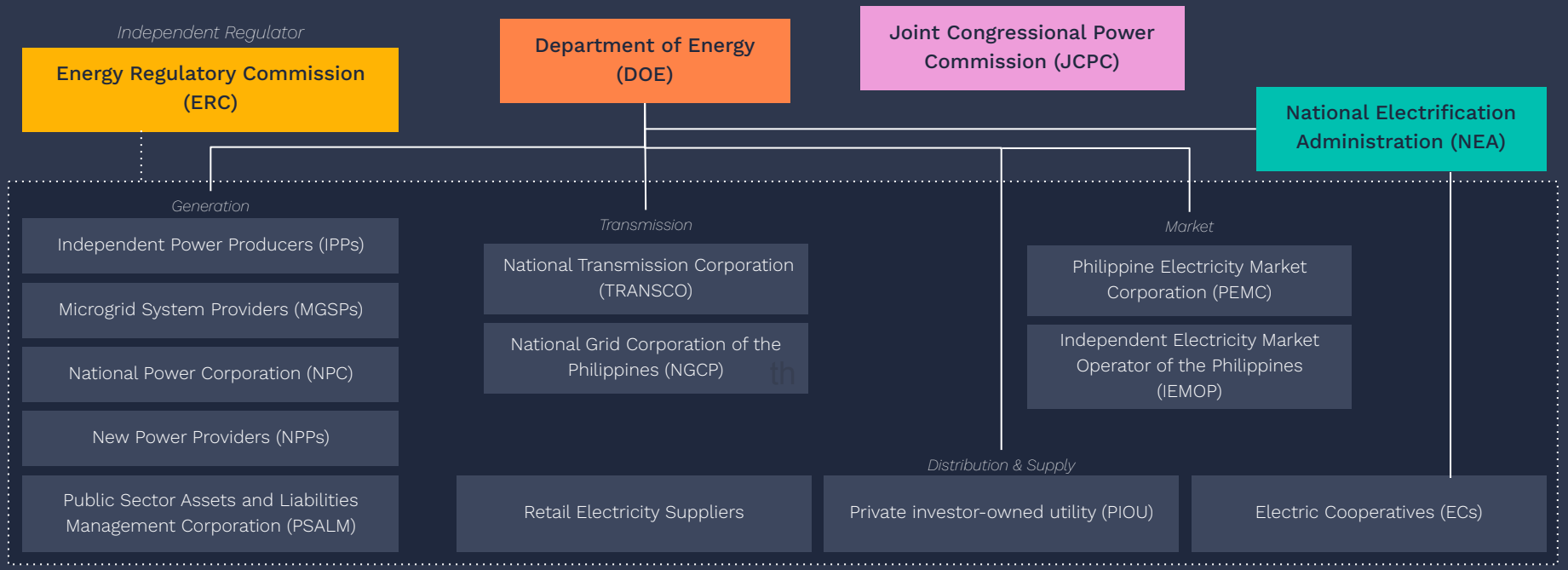
NOTE: 9 PSAs having no reported price or generation despite being include by the DU/EC in their PSPP, are assumed to have not yet entered into force. DUs with only 1 PSA set to expire are assumed to have a 3 year extension.

Brief Background on the Philippine market

Key regulatory players and policies for coal retirement and refinancing

Many Filipino players

A fully liberalized market involves many different players across the electricity landscape



The Philippines prioritising energy security and affordability

However, it remains the only country in Southeast Asia without a net zero target

2001

Electric Power Industry Reform Act (EPIRA)

… is the framework that governs the electric power industry of the Philippines.

The law includes a mandate to "assure socially and environmentally compatible energy sources and infrastructure", and the promotion of the "utilization of indigenous and new and renewable energy resources in power generation in order to reduce dependence on imported energy."

2008

Renewable Energy Act

- **Tariff-based instrument:** Feed-in Tariffs
- **Quantity-based instruments:** Renewable Portfolio Standards (RPS), Net Metering, Green Energy Option Program (GEOP)
- **Fiscal Incentives:** VAT zero rated for RE generation
- **Others:** Must dispatch for variable RE, carbon credits, RE trust fund

2020

A moratorium on greenfield coal-fired power plants was issued.

2021

Revised Nationally Determined Contribution (NDCs) under the Paris Agreement

…targets GHG emission reductions and avoidance of 75% relative to BAU scenario for the period 2020 to 2030 for agriculture, waste, industry, transport, and energy. Only 2.71% is unconditional while 72.29% is conditional on financial support.

National Renewable Energy Program (NREP) 2020-2040

…sets a target for 35% RE in power generation by 2030 and at least 50% by 2040

2023

The Philippine Energy Transition Plan (PETP) was announced in September.

It includes a pillar on the voluntary retirement and/or repurposing of coal.

BSP, the Philippine central bank, released 'Guidelines on the Integration of Sustainability Principles in the Investment Activities of Banks'

…which integrating climate change and other E&S risks such as physical and transition risks in disclosures, risk management framework, and investment activities.

Highlights and findings

Deep-dive analysis of the CAT dataset for the Philippines

Early coal retirement mechanisms are needed

Without early shutdown, existing coal plants will run until 2050

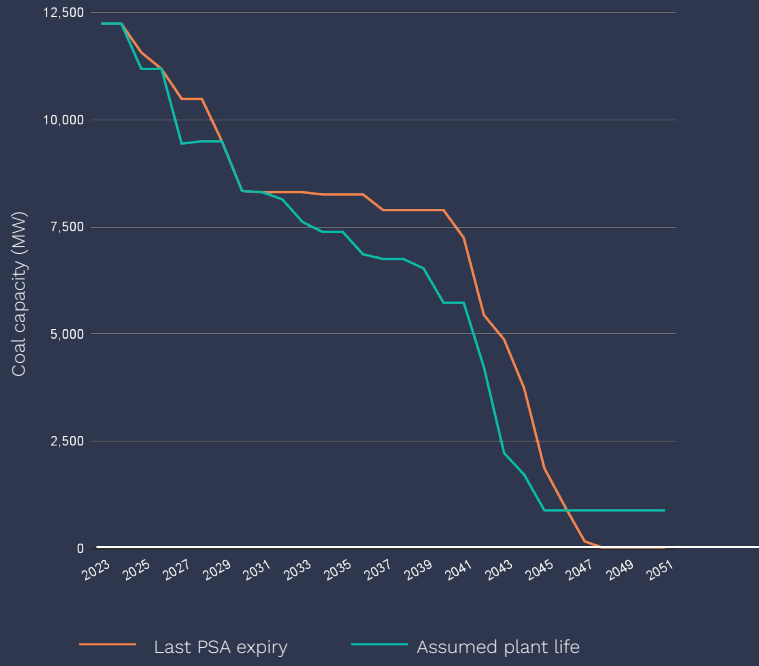
We examine two potential coal retirement scenarios for the Philippines, one assuming coal plants run to the end of their plant life, and another assuming plants will only retire when their last PSA has expired.

Without early coal retirement mechanisms, the Philippines will see the existing coal fleet retire by 2047 or 2051 under the two respective scenarios, which falls short of what is required to meet global climate ambitions. The IEA suggests that to keep Paris Agreement goals alive, developing countries should seek to phase out coal power by 2040.

On an asset level, we notice a disparity in the contractual positions of plants. Some older plants have long-duration PSAs which will extend their operations beyond their technical life, whereas some young plants have shorter PSA durations, which make them ripe for early retirement. This makes the selection criteria more complex. In considering assets for retirement, the unintended consequence of higher grid emissions that may occur when a younger, more efficient plant is phased out must be avoided, as this may push older and dirtier plants to inadvertently increase generation.

Is 2050 too late?

Potential coal retirement schedule under 'business as usual' scenarios



Source: TransitionZero (2024)

Emissions reduction potential is notable

Coal will remain the major contributor to the country's CO2 emissions without early coal retirement

Proactive retirement will also see a significant reduction in coal emissions. Without early retirement, emissions from the power sector will remain high until late 2040's, given coal's dominance in the Philippine electricity mix.

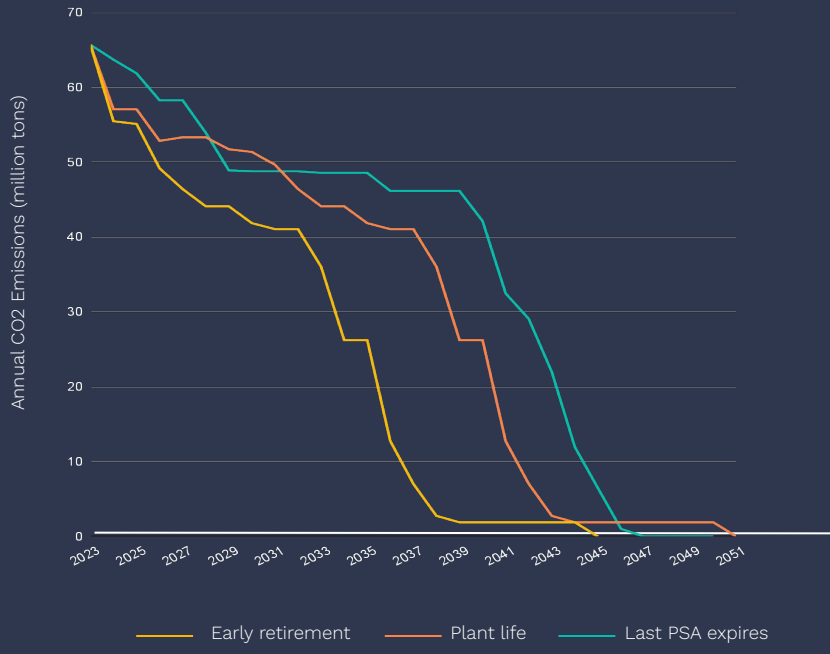
If existing PSAs retire and are not renewed, emissions intensity of coal will come down faster but remain a mainstay carbon emissions contributor until the mid-2040s.

An early coal retirement mechanism is needed to phase out coal emission contributions sooner. Avoided emissions from early PSA retirement of 5 years maximum is estimated at 290 million tons of CO_2 – nearly double the Philippines' annual CO_2 emissions from fossil fuels.

These emissions savings and retirement schedule do not account for committed or indicative plants that may come online at the end of this decade. We also assume a useful life of between 25 to 35 years.

Avoiding emissions

CO2 Emissions from life cycle retirement vs immediate buy-out vs early retirement



Source: TransitionZero (2024)

Re-negotiating PSAs

A challenge that needs creative solutions

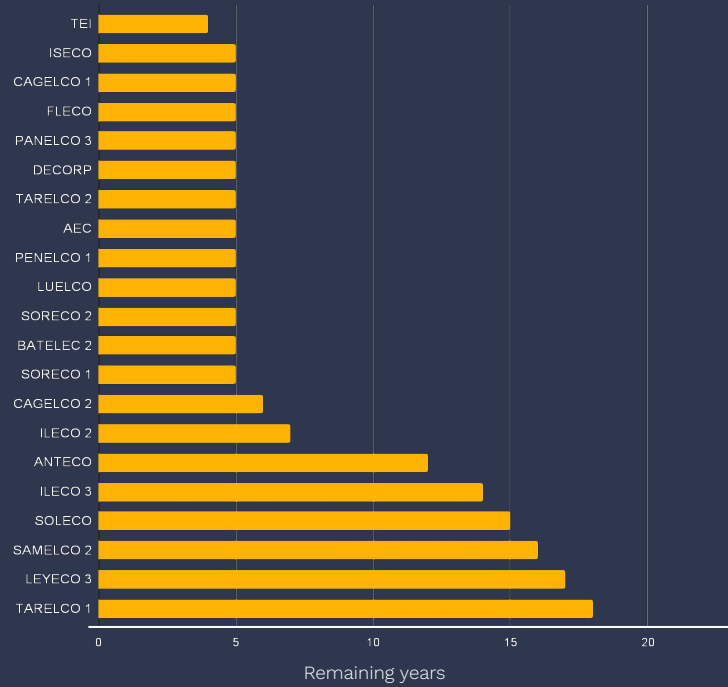
Operationalising early coal retirement is complex when coal plants have varied PSA durations. The GNPower Mariveles plant is a good example. Currently, 63% of its capacity is contracted* through 25 PSAs – all with different DUs. 14 contracts, amounting to 490 MW (70% of plant capacity), will expire by 2030. This presents an opportunity for the plant's early shutdown at 17 years of age, which will entail re-negotiation of the 9 remaining PSAs.

While negotiating with counterparties with differing interests and demands may already be challenging, the unique responsibilities of DUs/ECs further complicates matters. DUs/ECs have a mandate to represent consumer interest and are responsible for securing affordable and reliable power for their captive market. In cases where DUs or ECs have only one PSA to serve full demand and/or where alternative sources of generation are not readily available, negotiations may easily stalemate as interests may be hard to reconcile. Thus, it is important to be targeted in deal structures.

In the case of the Mariveles plant, a deal may potentially allow for the shutdown of one unit first, or allow for the buy-out of generation, rather than capacity. This underscores the difficulty of screening assets, as each deal is unique – at least in its initial stage. This may call upon plant owners to be proactive in identifying opportunities for early shutdown, but may also require refinancing options to be available to bring plant owners to the table.

23 to 1: Too many cooks

Remaining duration of GMEC's current PSAs



Source: TransitionZero (2024)

Notes: PSAs with AURELCO, ISELCO 1 and PELCO 3 have yet to materialise, though all have a remaining duration of more than 10 years. ZAMSURECO 2 in Mindanao contracted 1 MW with GMEC in Luzon but no generation data was available to verify whether the PSA has materialised.

A hefty price tag

High marginal abatement cost due to elevated profitability of PSAs

Steps will need to be taken to incentivize coal plant owners for voluntary coal retirement or repurposing in line with the PETP. The coal business is lucrative in the Philippines. Most coal plant owners are seeing high profits, with long term profitability averaging $65/MWh. This is likely a conservative estimate since we have omitted the higher returns from the spot market.

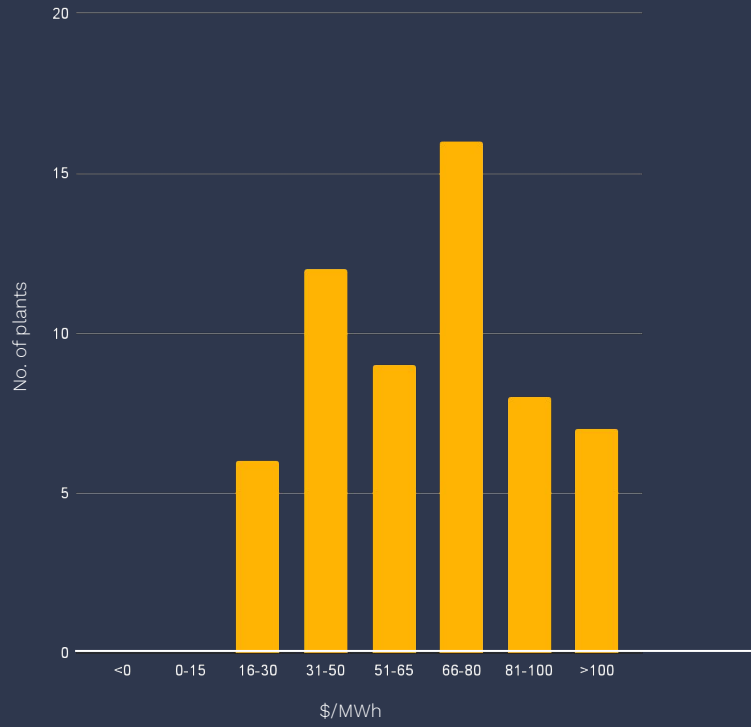
The conversation will need to be nuanced to convince coal plant owners that early retirement is a critical business strategy, and a combined strategy to address energy security and the energy transition will be needed.

While coal plants are cash cows now, the changing business and political climate will see continued coal operations come under immense pressure as renewables start crowding out fossil fuels in the power sector. Notably, RE is already changing the cost game. In the second green auction program launched in 2023, the ERC capped the price for solar PV at PHP3.63/kWh ($65/MWh) – half the average coal tariff of $138/MWh.

Approximately 2.9 GW of coal PSAs – equivalent to 25% of the grid-connected capacity – are expected to expire by 2030. If coal plant owners do not start their transition now, they may face the risk of stranded assets in this decade.

A lucrative business reality

Long-run profitability of coal plants skews high



Source: TransitionZero (2024)

None of the benefits and all of the costs

Impact of coal price volatility and other factors may inflate tariffs

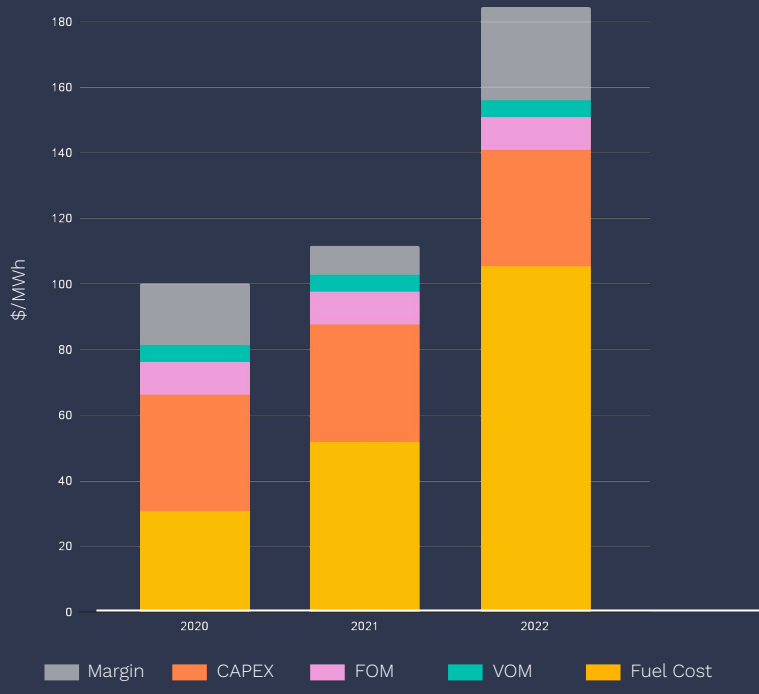
Looking across the average 2020-2023 tariffs, we observe that plant owners often see high profit margins, regardless of spot price fluctuations due to the tariff structure. The base fuel cost charged to consumers is often adjusted based on the spot Newcastle coal prices. This allows coal plant operators to take advantage of cheap spot prices. However, during periods of elevated spot prices, operators have protections baked into their long-term contractual positions vis-a-vis the fuel cost pass-throughs.

This illustrates a key issue in PSAs, as pass throughs are not required for cost savings from dips in coal prices, leaving consumers to bear the brunt of the costs when spot prices are high but none of the savings.

It also highlights the importance of a good set of historical figures to back negotiations on asset-value and PSA buy-out. We note that even with the best data, the idea of "fair value" is subjective, and leaves a lot of room for interpretation and negotiation. Due diligence is important in flagging abnormal returns that may skew valuations. In many circumstances, a high tariff may be due to poor generation performance of an asset. This is because fixed capital recovery fees are spread across lower generation. This is a perverse incentive, which sees poorly performing assets/PSAs being over-valued.

Volatility promotes high margins

All costs considered, the average coal plant has seen significant profits in the last 3 years



Source: TransitionZero (2024)

Rampant plant outages contribute to grid instability

Screening by grids is not a simple exercise for the Philippines

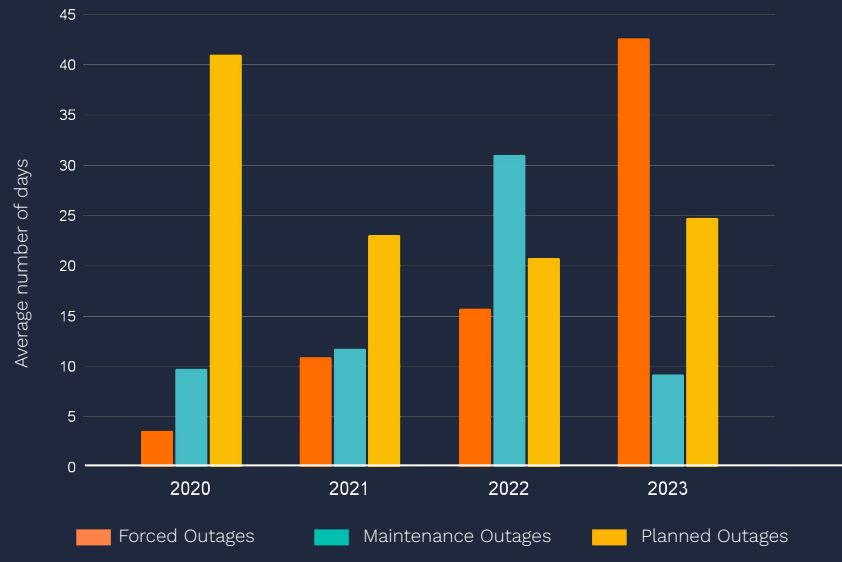
The three main grids all contend with challenges of unreliability and blackouts due to its dependence on coal. The state of main grids differ significantly. For this reason, we have elected not to recommend retirement schedules by grid.

In Luzon and Visayas, yellow and red alerts are not uncommon, though the grids have decent reserve margins of 45% and 50% respectively, Despite reserve margins at 101%, the Mindanao grid remains relatively isolated with nascent access to the WESM and high incidences of outages. Unplanned plant outages occur frequently and in gigawatts due to poor grid infrastructure, insufficient maintenance and suboptimal operations. Ensuring the reliability and improved performance of existing coal plants is needed to support the transition, as outages affect resource adequacy planning and come with increased costs to consumers and the system.

Retirement schedules will need to consider the sensitivities of the system. The Mindanao grid has smaller DUs with more dispersed PSAs. An early coal refinancing deal will have to ensure adequate RE replacement. The retirement of high-emitting diesel and bunker oil generators may also be a pertinent strategy.

Intermittency of coal plants

High coal plant outage rates across the country



Source: TransitionZero (2024)

Case Studies

Showcasing CAT data for screening and shortlisting potential assets for retirement

Potential criteria for plant selection

The CAT tool allows users to screen assets and equips them with an initial set of financial and operational metrics that are important for deal design and negotiations

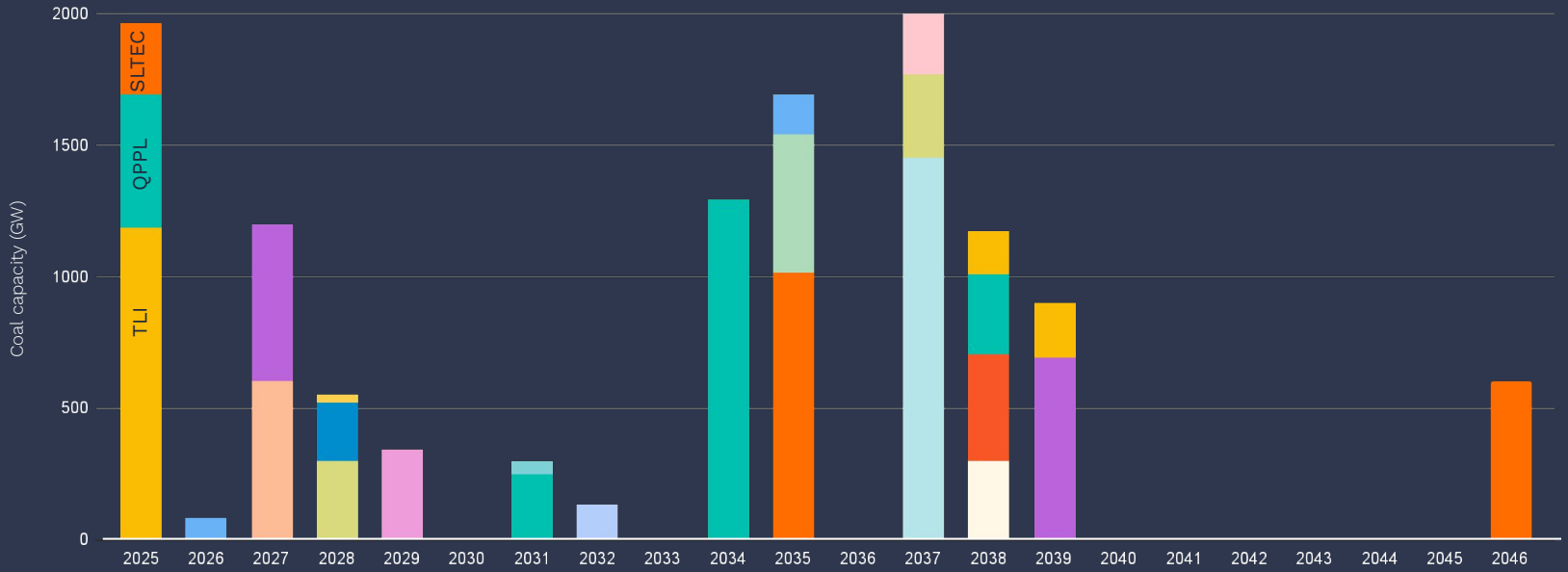
The suitability of assets for early retirement depends on the motivation behind the deal.

Criteria	Description	Considerations	Short-list of plants
Plants that can be retired immediately	Plants with impending expiry of PSAs that can be bought out and shut down immediately	New plants (less than 10 years of age) may be de-prioritised	QPPL, TLI, SLTEC
Emissions intensity	Emission-intensive plants that can significantly decrease annual emissions upon decommissioning	Efficiency, location and age of the plant	CEDC, SBPL
Lowest capacity factor	Low availability factor may be a low hanging fruit due to more affordable $/MW abatement costs	Whether low availability is due to outage or under-contracted capacity	SCPC

Source: TransitionZero (2023)

Retirement by PSA expiry

Prioritising coal plants by their ability to shut down immediately



Source: TransitionZero (2023)

On the way out: QPPL

A plant that can be retired with its PSA

The Quezon power plant (QPPL) plant has only one PSA with MERALCO, which is due to expire in May 2025. An early retirement deal may be structured to (1) buy out the current PSA for early retirement to avoid a renewal, or (2) explore early retirement post-PSA expiry.

QPPL is a highly profitable asset, backed by favourable PSA terms, which consistently saw above-average tariffs. We believe the second option is more likely given that the plant is built under a Build-Own-Operate scheme. This means that following the expiry of the MERALCO PSA, the plant owners would have control over the asset, and can choose to (1) compete in the competitive selection process (CSPs), (2) sign new PSAs or (3) operate as a merchant plant.

It is possible that CAPEX has been fully amortised under the existing PSA due to high profitability margins and the age of the plant. Notably, despite this cost advantage, QPPL has not been able to compete in previous CSPs. This raises the question of whether the asset is suitable for early retirement mechanisms, as the assets seems to have been priced out of the market naturally.

QPPL – fully amortised, ready to earn

Basic information

Plant characteristics	511 MW plant (gross) Sub-bituminous coal imported from Indonesia Subcritical pulverized coal combustion
Plant operators	Quezon Power Philippines Ltd
Ultimate parent	EGCO (100%)
Climate target of parent	Medium-term: Reduce carbon intensity of portfolio by 10% by 2030 Long-term: Achieve carbon neutrality by 2050.
Scheme	Build-Own-Operate
Plant age	Built in 2000 Current age: 23 years
Existing PSAs	90% contracted, 1 PSA MERALCO-QPPL (expiring in 2025)

Source: TransitionZero (2023)

On the way out: QPPL [Continued]

A plant that can be retired with its PSA

While we do not wish to dictate the screening criteria, we anticipate that a deal structure for a QPPL retirement may focus on taking out plant capacity permanently to prevent future operations from servicing generation and ancillary needs. This is pertinent as the plant is a potential site for the introduction of ammonia co-firing with coal in the Philippines, which it is exploring with South Korean firm Doosan Enerbility Co. Such a move would inad prolong the life of the asset.

Given that the valuation of the asset is based on the loss of future revenues, pricing this asset is likely to be challenging. It is important to note the CAT data is potentially over-valuing the asset given the:

01. Abnormal profits under favourable PSA terms.
02. It being fully amortized asset.

A deal for QPPL is likely to be a bespoke one that considers its future revenue prospects.

QPPL – fully amortised, ready to earn

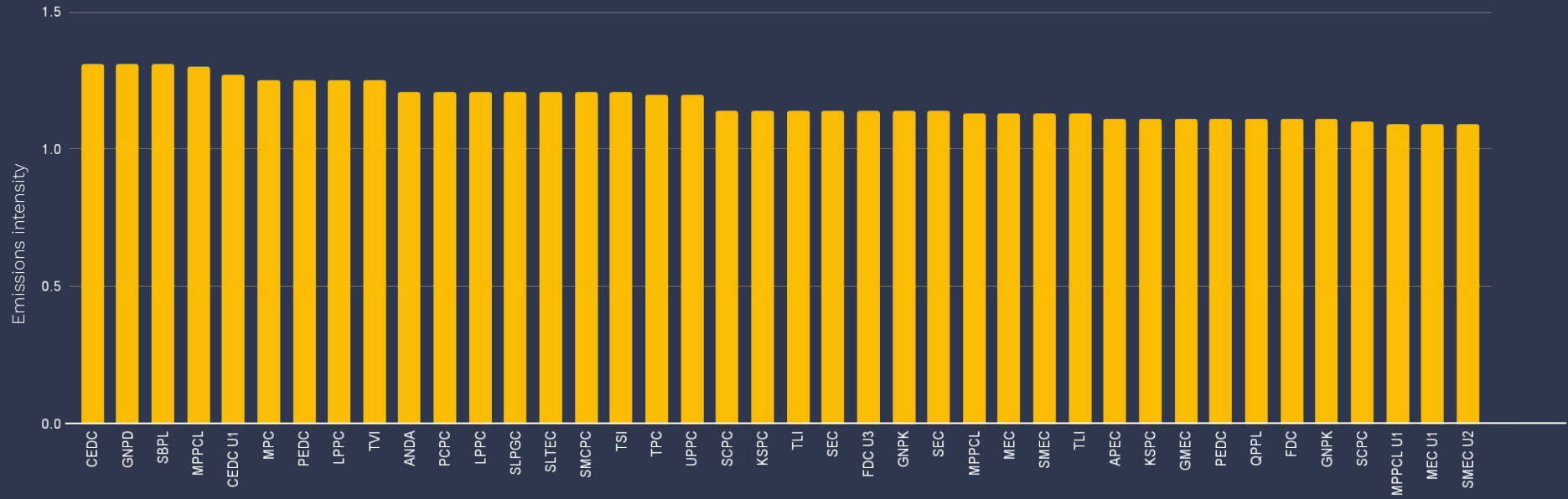
Key metrics from the CAT tool

Cost of Buy-out for Early Retirement	$ 427 million (1 year buy-out)
Cost of Abatement	$ 132.59/tCO_2
Avoided emissions from early retirement	3.22 million tons of CO2
Total Replacement Cost with solar+storage	$ 231.59/tCO_2
Long-run Profitability	$ 120.29/MWh
Average PSA Tariffs	$ 196.40/MWh (Php 10.75/kWh)
Capacity Factor	50%

Source: TransitionZero (2023)

Dirtiest one goes first

Prioritising coal plants by emissions intensity



Source: TransitionZero (2023)

Dirtiest one must go: CEDC

Prioritising highly polluting plants could reduce CO_2 emissions more quickly

Cebu Energy Development Corporation (CEDC)'s three units with Circulating Fluidized Bed (CFB) boiler technology, claim to use clean coal technology, but is unfortunately, one of the dirtiest power plants on the grid. This is due to the poor efficiency of the plant, its smaller size and potentially poor maintenance of equipment.

The plant performs on average in terms of profitability, with tariffs aligning with the national average. 42% of its capacity is contracted through 5 PSAs. Its largest PSA is with the Visayan Electric Company (VECO) for 52.5 MW, which will expire in Feb 2036. The remaining 4 PSAs, totaling 51 MW, will expire in 2025. Beyond contracting in the generation market, CEDC also had an ancillary service purchase agreement with NGCP for the Visayas grid, but it has since expired.

Given the relatively young age of the plant, the CAPEX is likely to yet not be fully amortized.

CEDC – dirtiest kid on the block

Basic information

Plant characteristics	246 MW plant (3 x 82 MW) Sub-bituminous coal imported from Indonesia Circulating Fluidized Bed (CFB) boiler
Plant operators	Cebu Energy Development Corporation (56% Global Power Holding, 44% Abovant)
Ultimate parent	Metro Pacific Investments (MPIC) Aboitiz Power Corporation
Climate target of parent	**MPIC (through MERALCO):** 1,500 MW of renewable energy capacity by 2027 **Aboitiz:** increase clean energy capacity from 940 MW to 4,600 MW by 2030
Ownership	Private ownership
Plant age	Unit 1, 2 built in 2010 (12 years) Unit 3 built in 2011 (13 years)
Existing PSAs	42% contracted, 5 PSAs VECO-CEDC (expiring in 2036)

Source: TransitionZero (2023)

Dirtiest one must go: CEDC [Continued]

Prioritising highly polluting plants could reduce CO_2 emissions more quickly

An early retirement deal for CEDC may be structured using a two-tiered approach:

01. Payment to shut down one unit post-2025, as the majority of its PSAs expire
02. Payment to buy out 5 years of the VECO-CEDC contract, to shut down the remaining unit by 2030/2031

This will continue to see one coal plant running to provide ancillary services, which may help to ensure grid stability while covering CAPEX.

A staggered approach, such as the one mentioned above, has several benefits:

01. Reduced grid impact: taking smaller generation units out of the grid will minimize potential detrimental impacts on grid stability/reliability
02. Longer lead time to provide replacement generation: Staggered retirement allows more time to build renewable capacity to ensure lowered grid emissions

However, due to the smaller transaction size, and high due diligence and transaction costs of an early retirement deal, large financial institutions may not be interested in such a deal. In such cases, a fund that supports smaller transactions at higher volumes may be beneficial.

CEDC – dirtiest kid on the block

Key metrics from the CAT tool

Cost of Buy-out for Early Retirement	**$ 110 million** (maximum 5 years of longest remaining PSA))
Average cost of Abatement	**$ 32.41/tCO_2**
Avoided emissions from early retirement	**10.22** million tons of CO2
Total Replacement Cost with solar+storage	**$ 131.41/tCO_2**
Long-run Profitability	**$64.79/MWh**
Average PSA Tariffs	**$ 138.40/MWh** (Php 7.58/kWh)
Capacity Factor	**73%**

Source: TransitionZero (2023)

Out with the broken: SCPC

Accounting for faulty operations in retirement schemes could increase overall reliability

The SEM-Calaca Power Corporation (SCPC) plant is an old coal asset, prone to operational challenges and unplanned outages. The Calaca units were privatized in 2009, after 24 and 14 years of service, respectively.

Post-privatisation, SCPC engaged in a major rehabilitation drive, aiming to overhaul the two coal units, arrest their deterioration and improve their operational efficiency. Despite these efforts, the plant's old age has resulted in continued troubles and outages, contributing to low availability and continued deratings.

In 2021, the two Calaca units saw a low plant availability of 44%, with a long run of outages of up to 290 days. In fact, unit 2's availability factor was a mere 14%. This has contributed to a low capacity factor of 29%. This makes the asset an interesting candidate for early retirement, as it is an old plant, with poor performance. Taking this unreliable asset out of the grid may contribute positively to grid stability and reliability.

SCPC – always out

Basic information

Plant characteristics	600 MW plant (2*300 MW) Using domestically produced sub-bituminous and bituminous coal Subcritical pulverized coal combustion
Plant operators	SEM-Calaca Power Corporation (SCPC)
Ultimate parent	SEMIRARA Mining and Power Corp. (SMPC)
Climate target of parent	None
Ownership	Privatised through EPIRA in 2009
Plant age	Unit 1 built in 1984 (39 years old) Unit 2 built in 1995 (28 years old)
Existing PSAs	4% contracted, 2 PSAs CEDC-CEDC (expiring in Dec 2030) MEPC-CEDC (expiring in Jan 2032)

Source: TransitionZero (2023)

Out with the broken: SCPC [Continued]

Accounting for faulty operations in retirement schemes could increase overall reliability

Regardless of its low generation, SCPC was a financially profitable asset. While only 4% of its capacity bring contracted through PSAs, SCPC's net income in 2022 amounted to PHP 5.1 billion ($92 million) due to its participation in WESM. In fact, its reduced contractual position may be a boon, as it reduces the potential fines associated with violating PSA clauses on maximum allowable unplanned outage.

Motivating SCPC's owners and operators to consider voluntary retirement may be based on swapping volatile performance with stable returns, through a divestment from coal and investment into RE. This deal may also be structured to include the upstream fuel procurement, allowing for compensation to keep the coal from mining underground.

Note: SCPC was slapped with a PHP 4.31 million fine for exceeding the maximum allowable unplanned outages in 2021

SCPC – always out

Key metrics from the CAT tool

Cost of Buy-out for Early Retirement	**$ 52.8 million** (maximum 5 years of longest remaining PSA))
Average cost of abatement	**$ 12.39/tCO_2**
Avoided emissions from early retirement	**8.54** million tons of CO_2
Total Replacement Cost with solar+storage	**$ 111.39/tCO_2**
Long-run Profitability	U1: **$35.56/MWh** U2: **$45.46/MWh**
Average PSA Tariffs	**$ 119.31/MWh** (Php 6.53/kWh)
Capacity Factor	**29%**

Source: TransitionZero (2023)

Policy Guidance

How CAT data for the Philippines can be used for transition planning and coal retirement scheduling

Policy Guidance

Considerations for moving forward with coal retirements

01

Early coal retirement will be required for the Philippines to align with Paris Agreement targets.

Without early coal retirement mechanisms, coal plants in the Philippines will only see retirement around 2050, rather than the IEA's recommendation to target 2040 for developing countries.

This will need to be supported by climate finance, both domestic and international. This may necessitate **a stronger signal from government and the markets that coal is on its way out.**

02

Motivate early action on voluntary retirements. While coal plants are profitable assets now, it will not be long before the risk of asset stranding will arise.

A successful early coal retirement scheme will have to motivate coal plant owners to act early to prevent a chaotic energy transition in the power sector.

At the same time, ensuring fair use of the proceeds and protection of communities are critical to ensure an equitable and effective transition.

03

Any early coal retirement mechanisms will have to reflect country characteristics to be successful. The market dynamics for the Philippines vary significantly from others in the region. Therefore, a one size fits all approach is unlikely to work in Southeast Asia. Accounting for resource adequacy across the Philippines' three main grids will be an additional layer of nuance.

Even within the Philippines, deal structures will differ due to unique plant-level characteristics, as seen in the case studies.

Building on the CAT tool

CAT data can be layered with other datasets to answer key research questions

01

Target coal plants in high RE resource areas to optimize existing transmission lines

Layer geospatial data on RE potential, and grid access with coal plant coordinates to identify coal plants and sites with a high potential for redevelopment as well as existing connection to the grid.

The rights for redevelopment per site will also be relevant to look into.

02

Layer CAT data with coal outage and/or ownership information to aid in targeted engagement and prioritisation.

Grouping the portfolio by large and small asset owners will yield different priority plants and deal structures.

The grid location of the plant is also critically important to avoid further issues with unplanned outages. Unreliable operations resulting in supernormal profits should be accounted for in negotiations.

03

Model by a target coal phase out year

Total emission reduction and cost of buy-out will depend on the country's schedule for coal phase out. Potential scenarios to model and schedule retirements can assume a maximum useful life for existing and in-construction coal plants, or specific phaseout target dates in line with system requirements and considerations.

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