



Coal lock-in in Southeast Asia

An analysis of existing and planned coal-fired capacity
in Southeast Asia

Hanea Isaad, Research Associate

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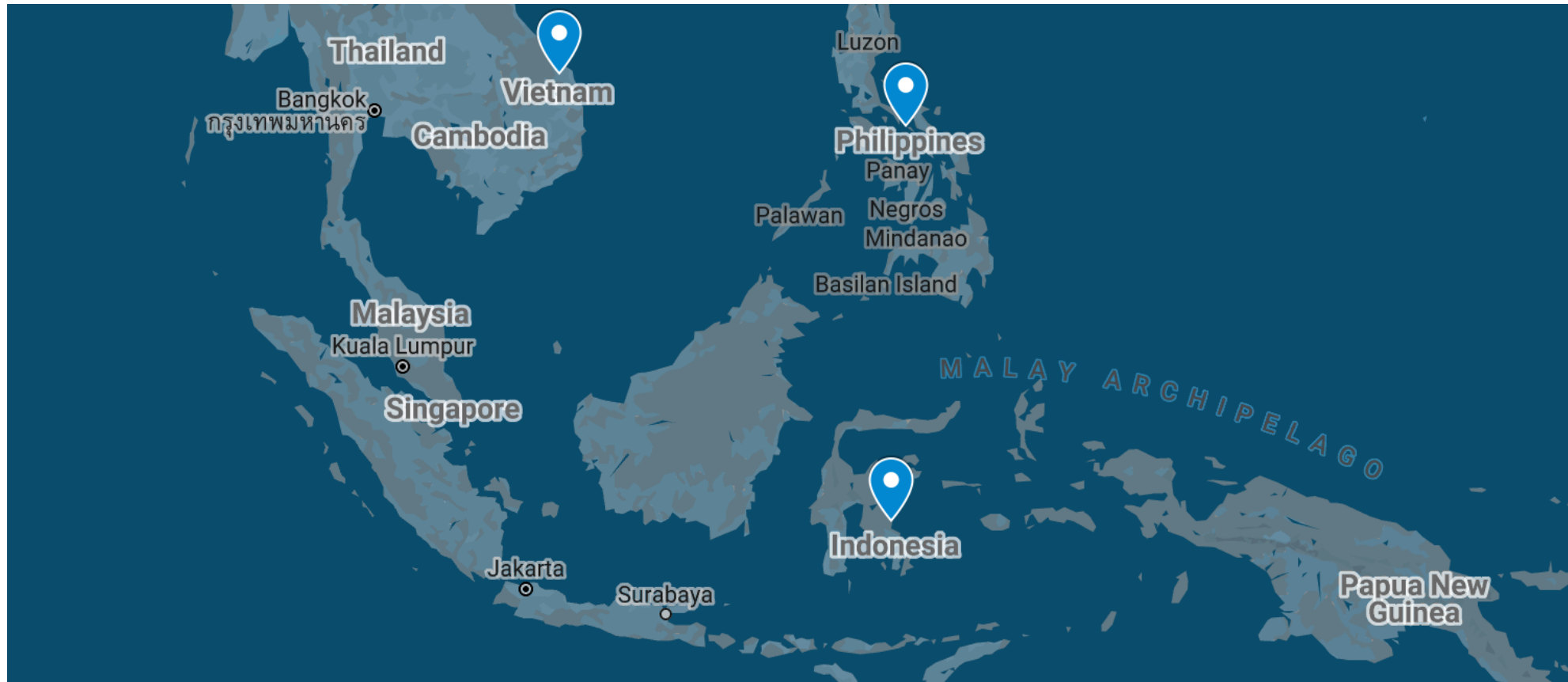
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Geographical scope

Southeast Asia's energy growth markets



Three countries with different market structures

Development indicator	Vietnam	Indonesia	Philippines
<i>Population size (mn)</i>	97	274	110
<i>Per capita consumption (MWh/capita)</i>	2.1	1.1	0.9
<i>Access to electricity (% of population)</i>	99.4	98.8	95.6
<i>Average power tariff (US c/ kWh)*</i>	9.8	8.1	14.9
<i>Total installed capacity (GW)</i>	69.3	63.2**	26.3
<i>% Coal fired capacity</i>	31.1	49.7	41.6
<i>Reliance on imported coal for power generation</i>	Some domestic coal, imports from Indonesia and Australia	Abundant domestic coal	Imports 75 % of its coal mostly from Indonesia
<i>% Renewable energy (non-hydro)</i>	25.3	4.4	14.1
<i>Presence of competitive markets</i>	Competition for new generation - traded electricity is very small relative to total generation.	No competitive markets in place.	The Philippines wholesale market (WESM) covers larger grids - traded electricity is very small relative to total generation.

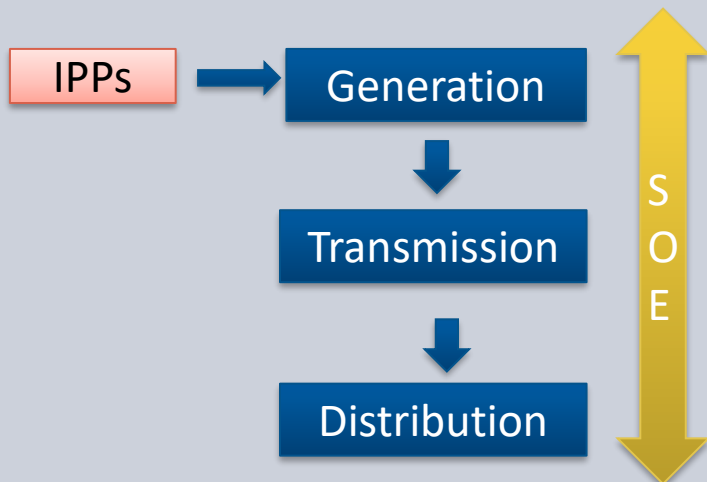
* Average of Residential, Commercial and Industrial Tariffs

**Official figures from PLN, MEMR reports the figure to be 72 GW

Sources: Country data, IEEFA estimates, World Bank, Enerdata, Statistica.com

All suffering from coal lock-in

High level of state control



There is usually some IPP participation in generation, but the rest is controlled by an SOE

High coal lock-in

All three countries have a high % of baseload coal fired capacity

Coal pipelines financed by Japanese, Korean and Chinese lenders

Dominated by young, sub-critical plants

Capacity aged under 10 years (GW)



Subcritical capacity (% of coal fleet)



Source: Country data, IEEFA estimates, Global Energy Monitor

Sub-critical capacity entrenched due to underlying factors

Type of coal

Vietnam's domestic coal is mainly anthracite which is hard to burn and is not suitable for super-critical technology, hence much of the coal-fired capacity is sub-critical, uses domestic coal and is located in the north of the country

Over 70% of Indonesia's coal is lignite or sub-bituminous and is more suited to sub-critical power generation. Philippines also imports ~ 75% of its coal for power generation, which is mainly from Indonesia

Geography

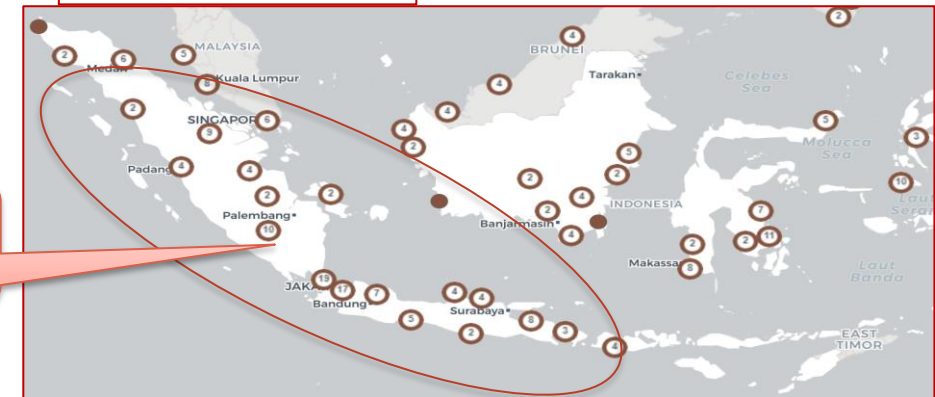
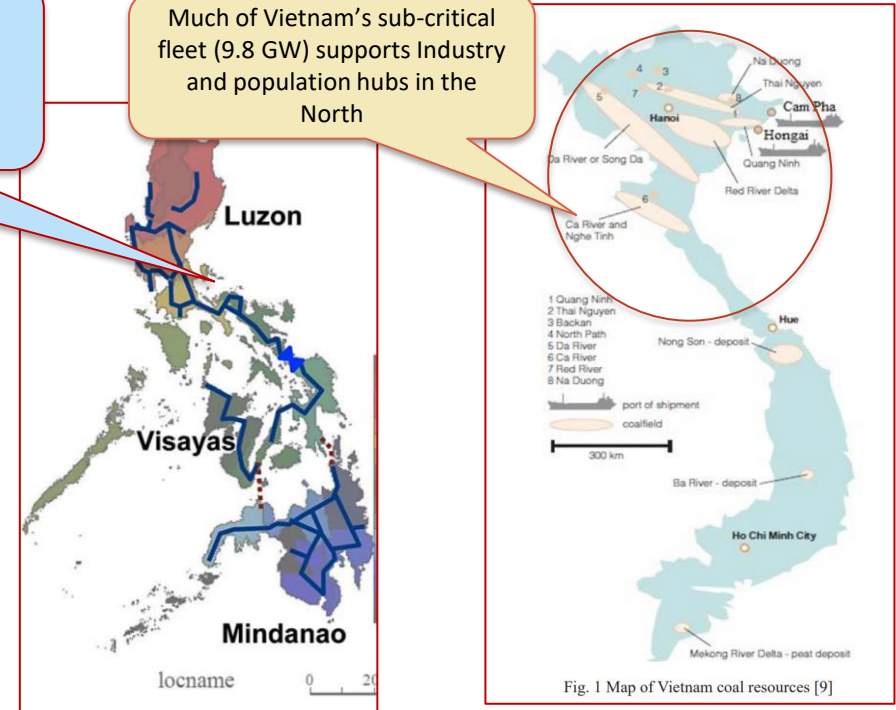
Luzon and Visayas are the only interconnected grids in Philippines and contain 80% (8.7 GW) of the existing grid capacity

Indonesia and Philippines are archipelagos with many small Islands located remotely

Sub-critical capacity is mainly concentrated in the larger Luzon and Visayas grids in the Philippines and Java-Bali in Indonesia. This follows the pattern of historical economic development, which deployed older technology that is now less efficient

In Indonesia, the Java-Bali and Sumatera grids are the major load centres and economic zones with a majority of the existing coal fired capacity (19.6 GW)

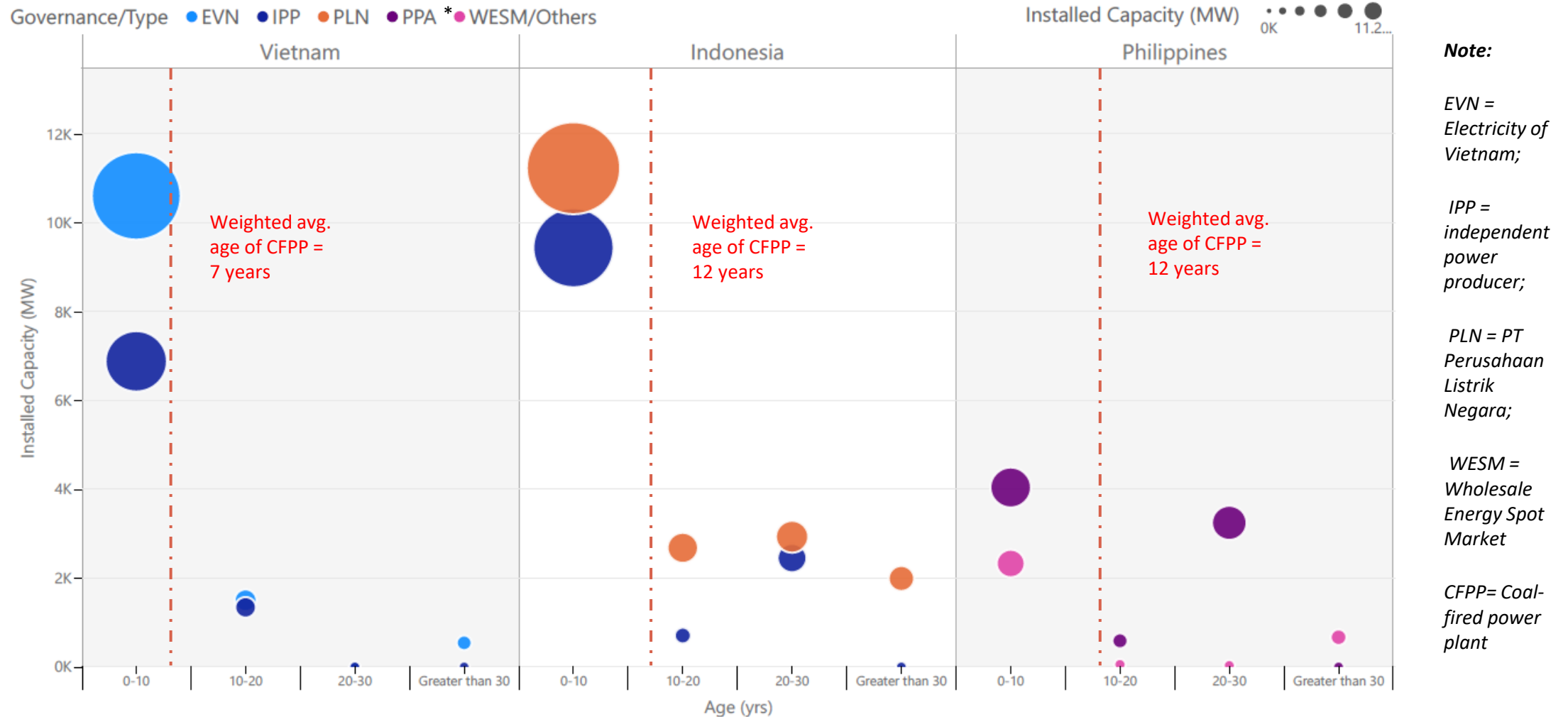
Much of Vietnam's sub-critical fleet (9.8 GW) supports Industry and population hubs in the North



Sources: ADB, World Bank, GEM, DOE, International Centre for Sustainable Carbon

What coal lock-in in Southeast Asia looks like today

Regional coal lock-in in Southeast Asia (2021)



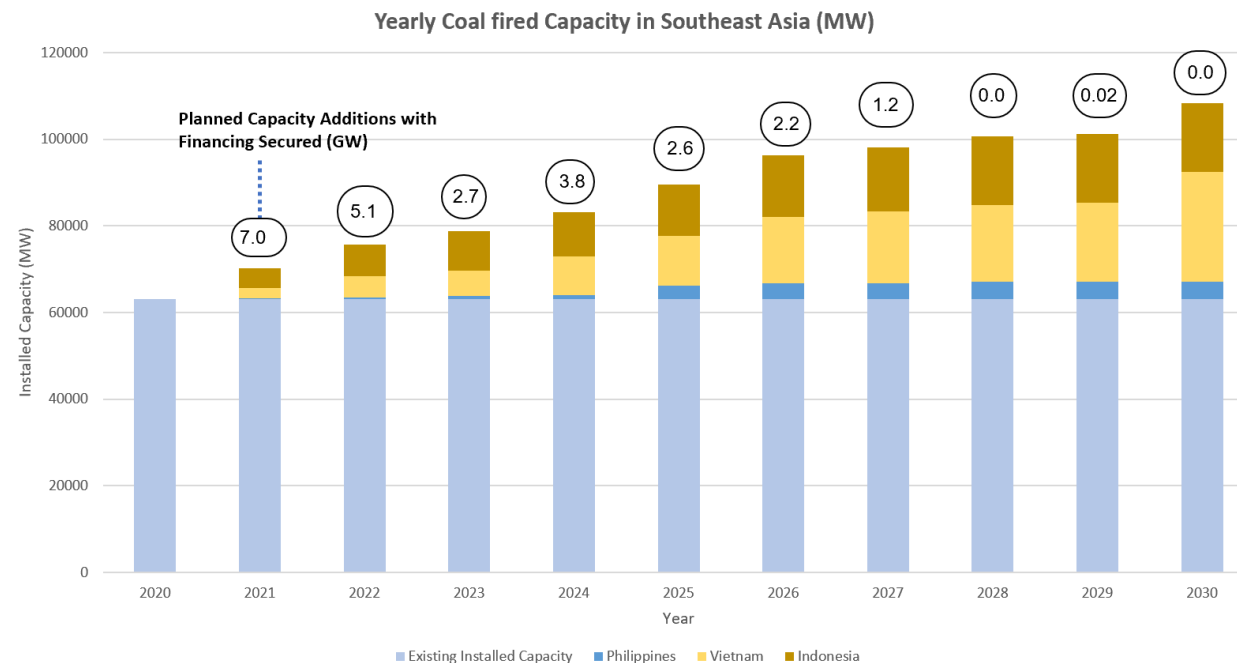
*In Philippines after de-regulation took place, all state-owned coal fired assets were privatized and a Wholesale Electricity Spot Market (WESM) was created. However, despite the WESM being in operation for more than a decade, a majority of the power procured by distribution utilities and electric co-ops is governed by PPAs. Hence instead of a comparison between being a state-governed ownership or an Independent Power Producer (IPP), in the case of Philippines we had to switch to a PPA governed vs. WESM governed analysis.

What coal lock-in in Southeast Asia could look like in 2025

Planned coal-fired capacity in Southeast Asia

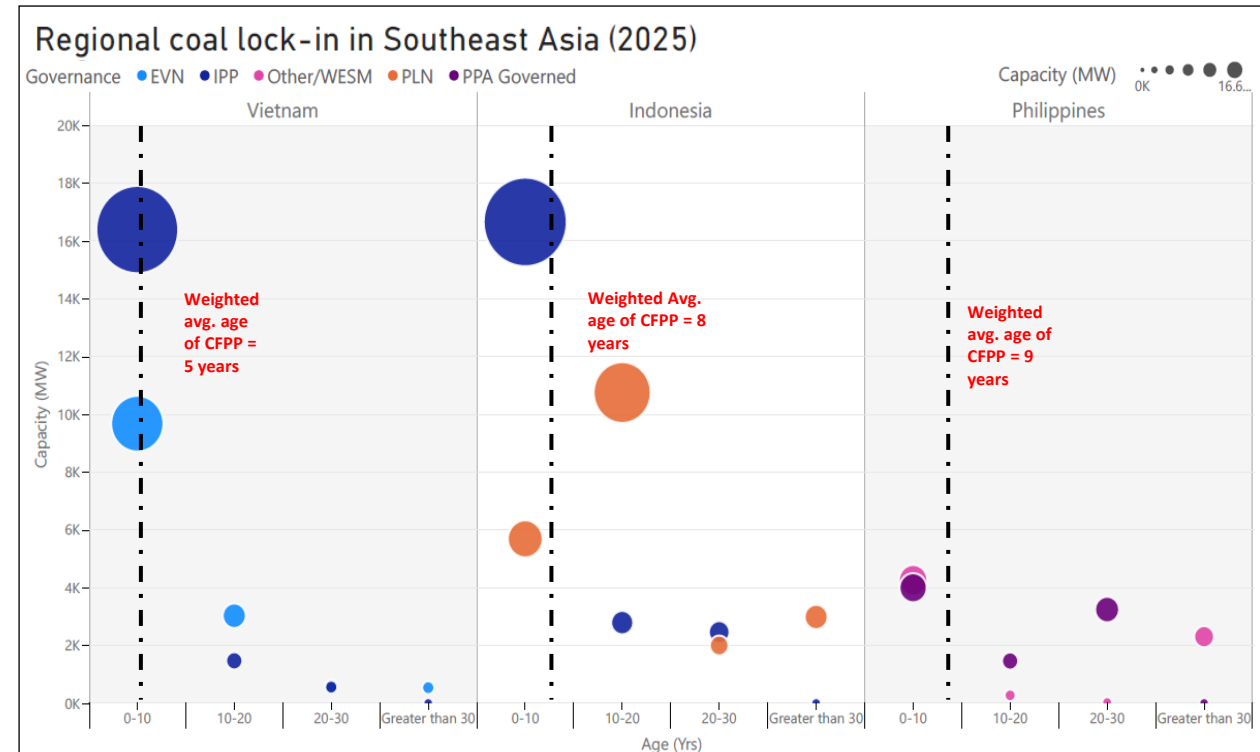
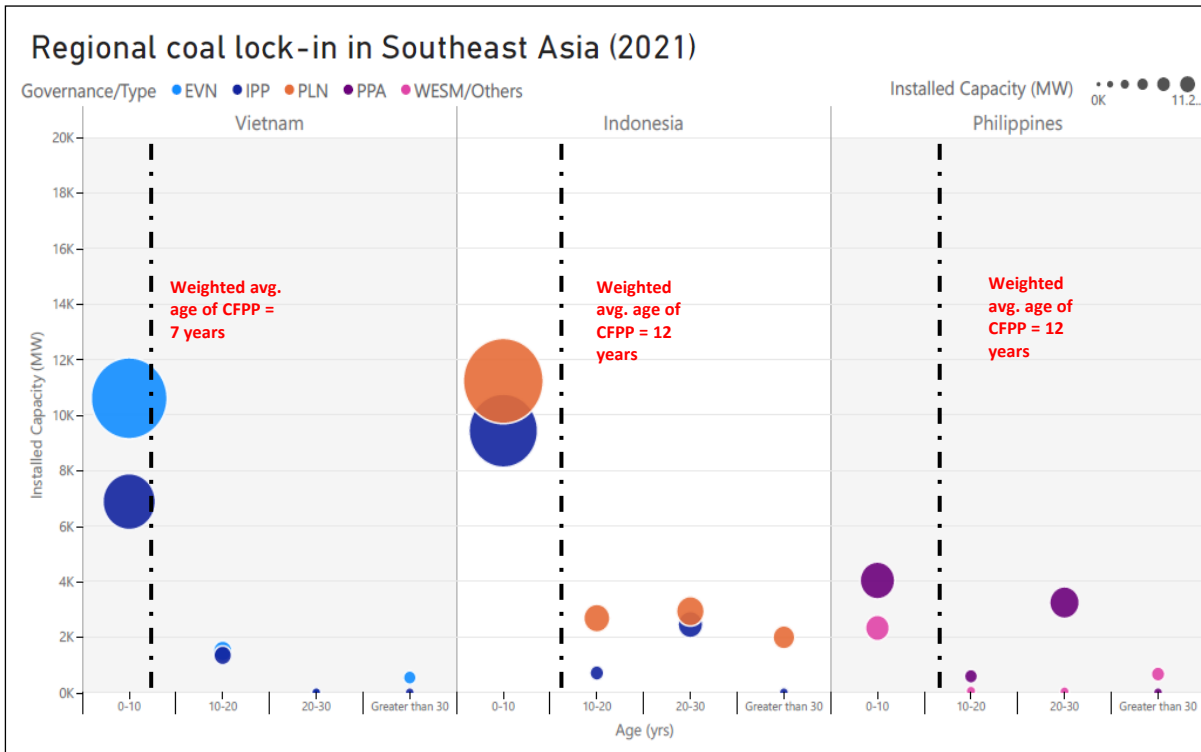
Over 45 GW of coal-fired capacity is in planning for SEA till 2030, but only 25 GW has secured financing.

Planned coal-fired capacity in Southeast Asia (2021-2030)			
	Planned capacity (MW) according to National Plan	Planned capacity (MW) with financing secured/under construction	% Planned capacity with financing secured
Indonesia			
PLN	3,670	2,470	16%
IPP	12,178	9,358	59%
Total	15,848	11,828	75%
Vietnam			
EVN	3,660	-	0%
IPP	25,250	11,130	38%
Total	28,910	11,130	38%
Philippines			
Other/WESM	4,646	1,606	29%
PPA	835	835	15%
Total	5,481	2,441	45%



Sources: Country data, World Bank PPI, Project Finance International, Refinitive, IJ Global, Various media releases

Lock-in to get worse in future assuming BAU



In 2025, much of the planned capacity will be realized if plants currently under construction are brought into operation on schedule in Indonesia and Vietnam. The scale of the lock in becomes significantly larger as the size of the fleet under 10 years crosses 25 GW in Vietnam, 22 GW in Indonesia and reaches 8 GW in Philippines. Most of the capacity brought online will be through IPPs. The weighted average age of the coal fleet also shifts in favor of younger plants with the weighted average age dropping below ten years in all three markets.

Note: EVN = Electricity of Vietnam; IPP = independent power producer; PLN = PT Perusahaan Listrik Negara; WESM = Wholesale Energy Spot Market, CFPP = Coal-fired power plant

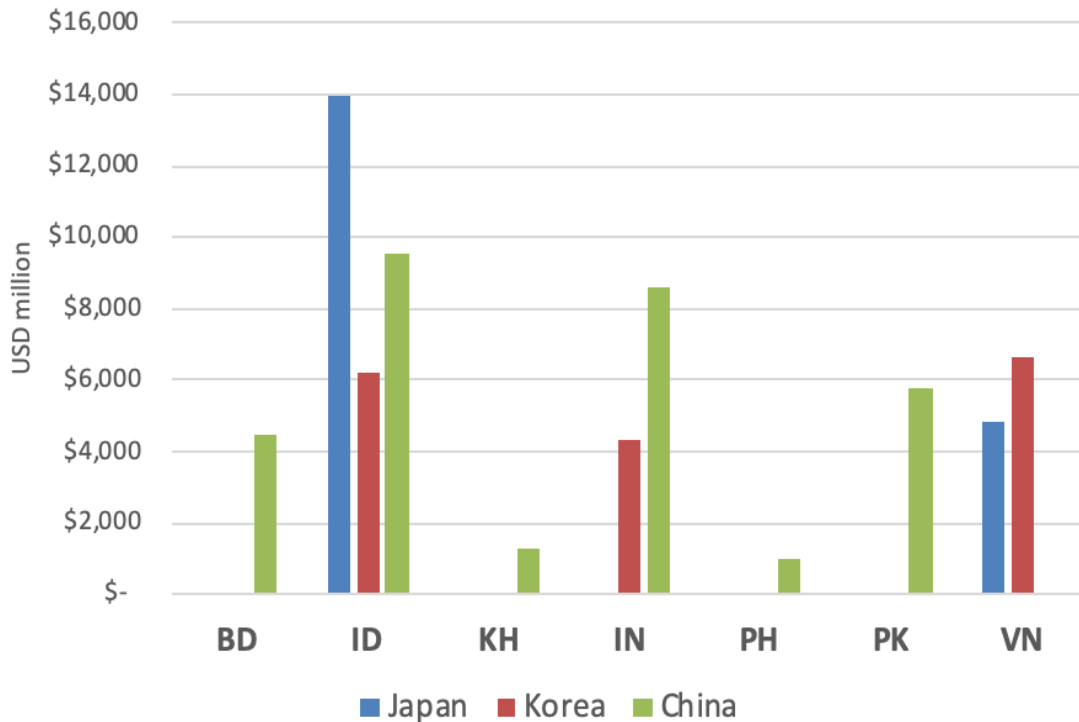
Points to ponder

Financing to be a key issue in realization of planned capacity

Coal capacity in SEA financed by a few key players

Chinese, Japanese and Korean commercial and policy lending has a major role to play

Policy lending for coal-fired investment in Asia by recipient country (2008-2021)

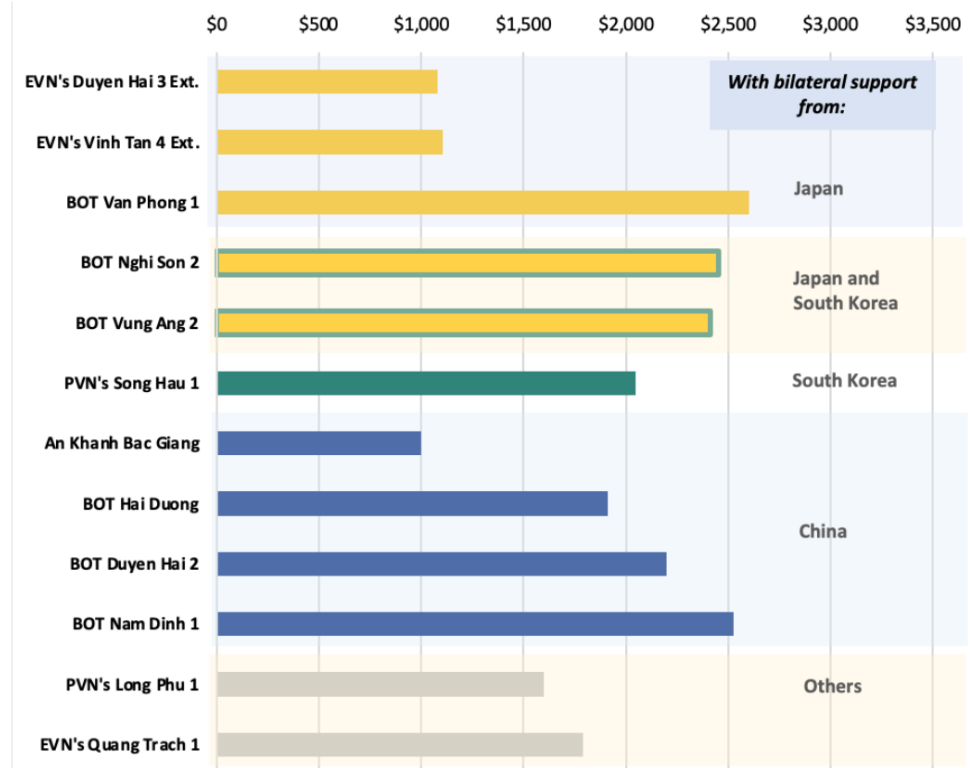


Bilateral Entities:

- China: China Exim, Sinosure, China Development Bank
- Japan: Japan Bank for International Cooperation (JBIC)
- Korea: Korea Exim Bank, Korea Development Bank

Policy lending for coal fired power plants in Vietnam (2015-2021)

Projects With Financial Closure Between 2015-2021 by Total Investment Value (in million USD)

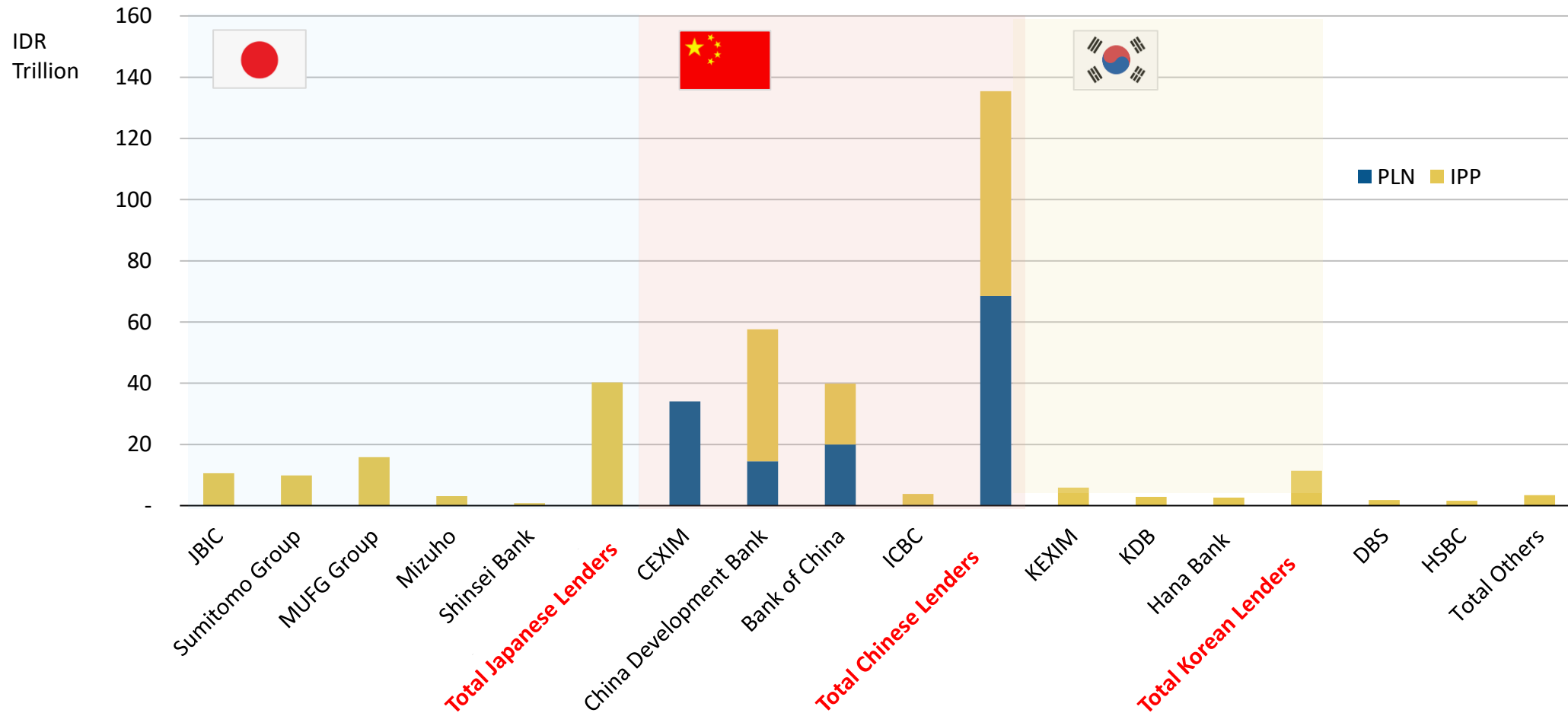


Note: Exact amounts for financial support from these countries are unavailable at the moment. The chart depicts total project costs for these plants.

Source: IEEFA Analysis

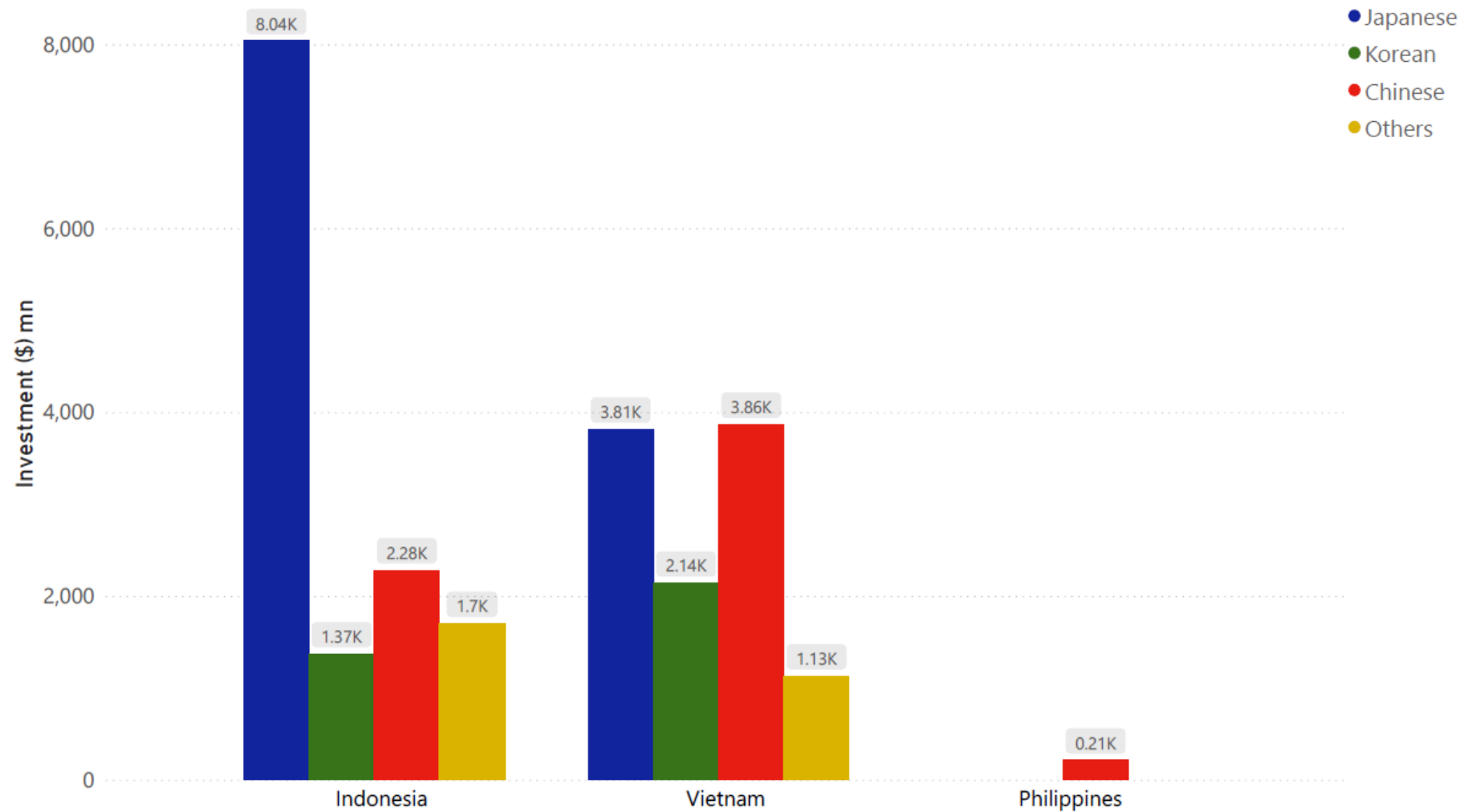
Coal capacity financing in SEA- the Indonesian case

Major lending bodies for existing coal fired capacity in Indonesia
(based on available information)



Source: IEEFA Analysis, Compiled Sources – World Bank, PLN, Refinitiv, Project Finance Institute/JGlobal, China Aid, MoF, Various Media releases

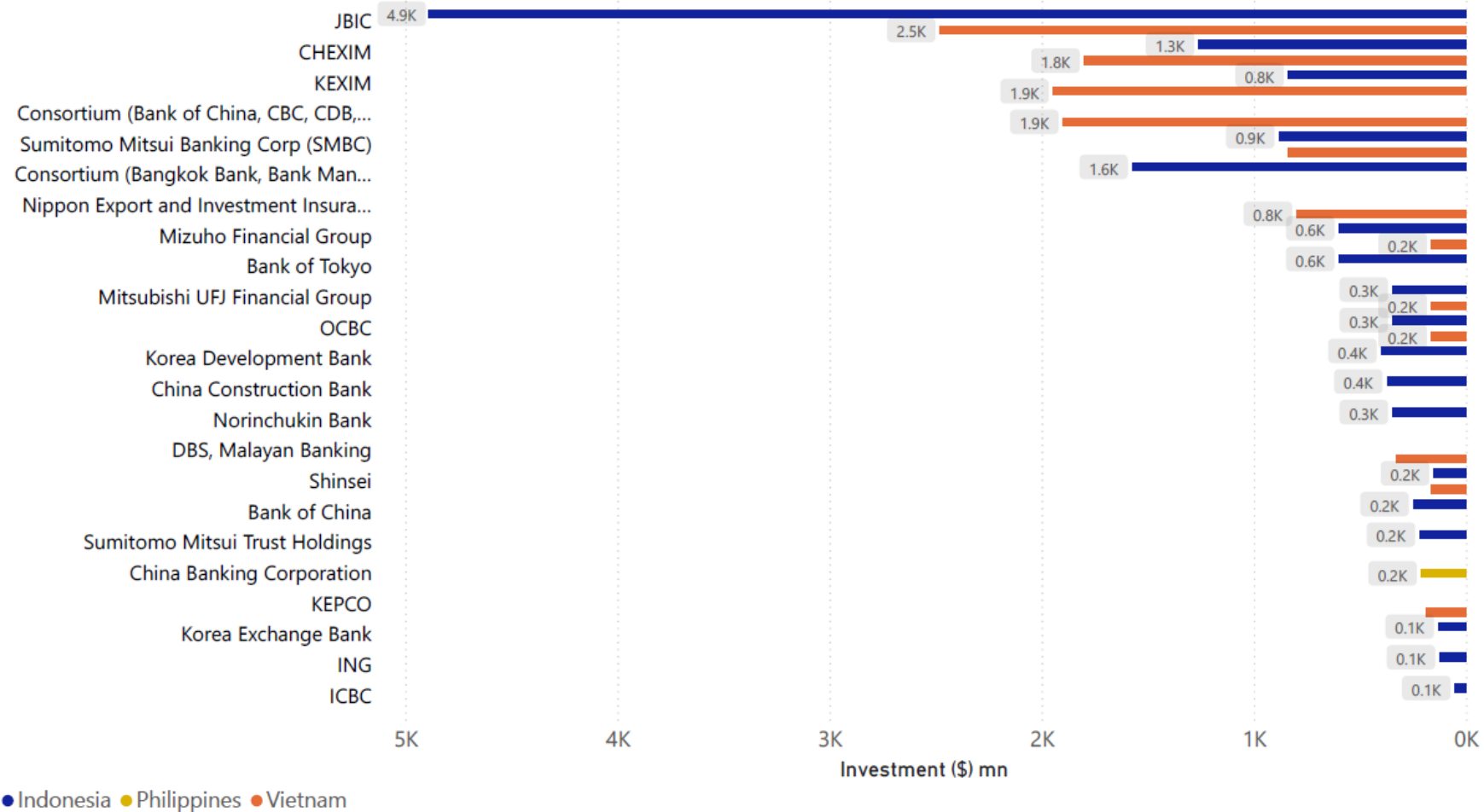
Same players active on future coal projects in pipeline (2021-2030)



Source: IEEFA Analysis

Financing sources are a mixed bag

Bilateral funding from JBIC, KEXIM and CHEXIM critical to enable the realization of these projects



Source: IEEFA Analysis

Exit announcements from SK, JP and CN to have implications

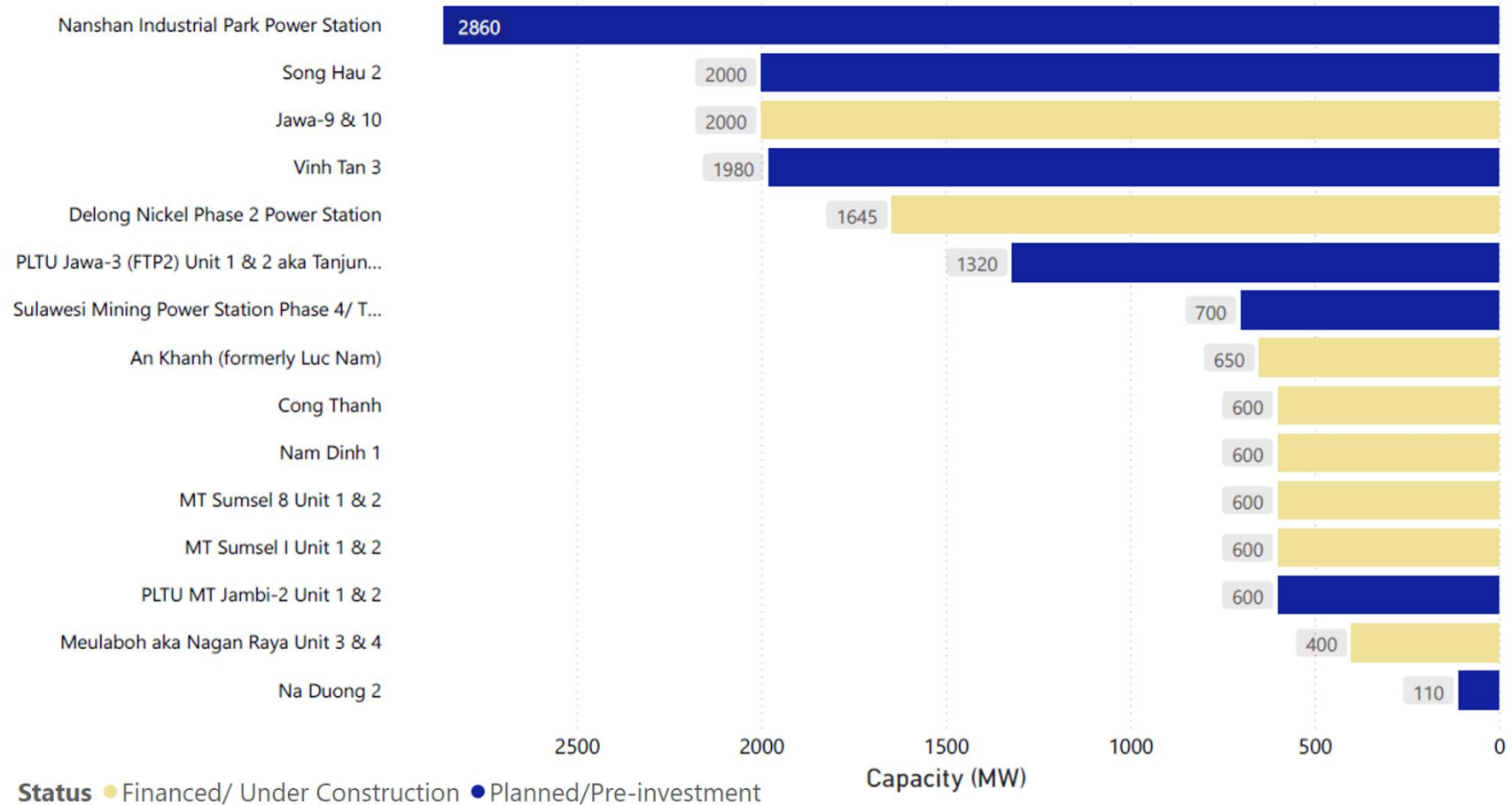
6.6 GW still in pre-investment stage could be shelved after China's announcement

Note:
Chinese involvement in these projects has been in the form of lead/co-financing, equity investments and EPC contracts.

Shortly after President Xi's announcement in September, the Tsingshan Group also announced an exit from overseas coal financing however it didn't mention how this would affect the Sulawesi Mining Power Station Phase 4 at the Tsingshan Nickel Iron Complex in Morowali Industrial Park, Central Sulawesi.

For Nanshan Industrial Park Power station, although updates can be found on the construction progress of the Aluminum complex, equity investment by Shandong Nanshan Aluminum and purchase of steam turbines by Dongfang electric (EPC contractor), no specific info could be found on the amount of debt raised.

Chinese backed planned coal fired capacity in Indonesia and Vietnam



Source: IEEFA Analysis, Global Energy Monitor (GEM), AidData, Zawya

Can early retirement mechanisms such as the ADB ETM program alter the reality of coal lock-in in Southeast Asia?

Has the ADB proposal focused on the right issues?

Southeast Asia is not a one-size-fits-all region

The SOEs, power companies and IPPs in Indonesia and Vietnam have different interests. Will the IPPs opt for early exit? Would the SOEs bid against themselves in reverse auctions which are necessary for price discovery?

Most operating coal fleets are young and unlikely to retire

Ownership of older, inefficient asset lies with the SOEs

Risk of offering national power companies incentives to prolong life of least cost-effective, carbon-intensive assets