Global Energy Monitor

BRIEFING: DECEMBER 2021

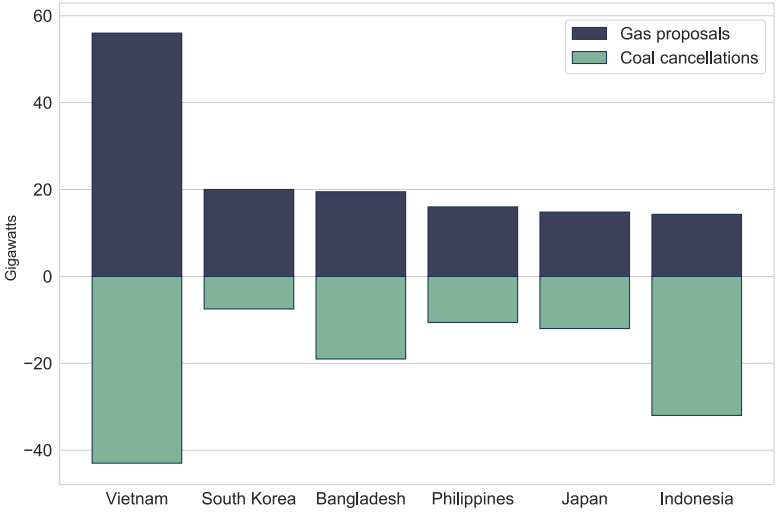
Asia's Coal Bust Risks Being Followed by a Gas Boom

COAL-TO-GAS SWITCHING WOULD THREATEN ECONOMIC AND CLIMATE OBJECTIVES IN THE REGION

Despite numerous climate pledges made at COP26—including a major Global Methane Pledge and new net zero carbon targets—there is a planned US$358 billion expansion of gas infrastructure underway in Asia. In all, there are plans in the region for 285 gigawatts (GW) of new gas-fired power plants, 452 million tonnes per annum (mtpa) of liquefied natural gas (LNG) import capacity, and 63,000 kilometers (km) of gas pipelines, according to a 2021 survey by Global Energy Monitor (GEM). This expansion would double the region's gas power capacity and triple its pipeline capacity, while increasing the world's 910 mtpa of LNG import capacity by 50%.

The planned gas expansion comes as the recently concluded United Nations Climate Change Conference (COP26) in Glasgow ushered in a new wave of international commitments to end the use of coal power signed by South Korea, Vietnam, Indonesia, and over 40 other countries. This commitment follows an unprecedented amount of coal plant cancellations throughout Asia in recent years, due to widespread public opposition, dwindling coal financing options, and ballooning costs. Rather than pivot to zero-carbon renewable power, however, many countries are turning to gas—in fact, proposed gas plant capacity in many countries outnumbers recent coal plant cancellations (Figure 1).

Figure 1: Gas plant proposals in Asia exceed coal plant cancellations

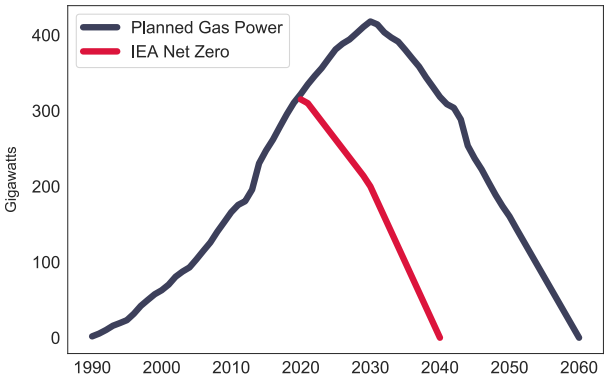


Source: Global Energy Monitor, Global Coal Plant Tracker, Global Gas Plant Tracker, June 2021. Gas proposals include all active proposals, while coal plant cancellations include any projects canceled since 2010.

The gas build-out is occurring despite a June 2021 warning by the International Energy Agency that keeping global warming below 1.5°C depends on halting all future fossil fuel development and having a net-zero power system by 2040. If even just half of the proposed gas plants in Asia are built (143 of 285 GW) with an operating lifetime of 30 years, it will postpone developing a net zero power system by decades (Figure 2), while emissions from long-running LNG and pipeline capacity will be operating well beyond 2050–2060 carbon neutral targets (Table 1). In addition, studies show methane and CO_2 emissions from existing gas infrastructure alone are incompatible with international climate goals.

Gas projects in development are also at odds with the Global Methane Pledge (GMP) and its goal of reducing methane emissions 30% by 2030. GMP signatories include Indonesia, Japan, the Philippines, South Korea, and Vietnam. These new gas projects would further jeopardize Asian countries' emissions objectives while worsening the long-term effects of global climate change.

Figure 2: Planned gas capacity in Asia is incompatible with 1.5°C



Source: Global Energy Monitor, Global Gas Plant Tracker, June 2021. "Planned gas power" assumes a 30-year lifetime for gas plants and that half of currently planned gas power capacity in Asia (143 of 285 GW) is built over the next ten years.

Table 1: Estimated Greenhouse Gas Emissions of Imported Gas via Gas Pipelines and LNG Terminals in Development (Gigatonnes CO_2 Equivalent)

	Gas-Importing Infrastructure Lifetime Emissions		
	Proposed	Construction	Total
China	19.0	18.0	36.9
India	4.3	8.7	13.0
Japan	4.8	0.2	5.0
South Korea	3.7	0	3.7
Philippines	2.5	1.2	3.6
Vietnam	3.1	0.2	3.2
Indonesia	1.1	0.5	1.5
Bangladesh	1.2	0	1.2

Source: Global Energy Monitor. Estimates assume that all infrastructure is built and operated at full capacity for lifetimes of 50 years. Since developers will likely abandon some projects in the early stages and projects typically do not operate at full capacity, these are upper-bound estimates. See the Methodology for details.

Economic Risks of Gas

Asia's gas buildout also threatens economic development in the region. In capital costs alone the projects are estimated to cost each country tens to hundreds of billions of dollars to construct (Table 2). In addition, there are the ongoing fuel and operating costs. With extreme volatility in the gas market, many of the planned projects in Asia will become unbankable and could shore up heavy costs to the state in decommissioning. Also, as ever cheaper renewables and clean energy policies increasingly undercut gas-fired generation, many of these new gas projects could be shut down before the end of their useful lifetimes, i.e., abandoned as stranded assets.

In addition, nearly forty signatories have pledged to end new public financing for all unabated fossil fuels by the end of 2022, meaning gas projects may soon face the same difficulties securing financing as coal plants.

GEM's survey of planned gas and coal infrastructure shows how Asian economies are actively transitioning from coal to gas for power, and risking the same issues that have accompanied coal: widespread public opposition, volatile fossil fuel costs, increased competition from renewables, and dwindling financing.

Table 2: Estimated investment for Planned Gas Infrastructure in Asia (US$ Billions)

	Power Plants		Pipelines		Terminals		
Country	Proposed	Construction	Proposed	Construction	Proposed	Construction	Total
China	41.3	13.7	9.2	10.1	32.5	23.8	130.5
Vietnam	32.1	0	0.2	0	5.4	0.3	37.8
Indonesia	5.4	3.3	2.7	0.8	16.6	2.9	31.8
India	0.7	0	7.6	7.3	5.0	8.9	29.5
Bangladesh	10.4	1.9	1.9	0.3	2.1	0	16.5
South Korea	9.6	1.3	2.0	0	3.2	0	16.1
Philippines	8.6	0.4	0	0	2.9	2.1	14.0
Japan	8.7	0.1	2.8	0.5	0.7	0.3	13.0

Source: Global Energy Monitor. Estimates are based on global and regional average capital expenditures for building new gas infrastructure, and may diverge from projected costs at the project level. See the Methodology for details.

China

China continues to plan and build far more coal plants than the rest of the world. The country is home to half of the world's operating coal plants and half of its proposed coal plants. Still, newly commissioned coal plants have fallen from the 2005–2015 peak, and in October 2021 China pledged to stop funding coal plants in other countries, though Chinese companies are aggressively developing a number of industrial parks in Indonesia, many of which will house nickel smelters used to produce stainless steel and electric car batteries.

As the country slowly turns away from coal, it is looking to gas to fill some of its heating and power needs. The country has plans to more than double its current LNG import capacity, from 84 mtpa to 203 mtpa (see Figure 3 on the next page). In addition, China has 90 GW of new gas plant proposals, more than the current operating capacity of Germany and the UK combined.

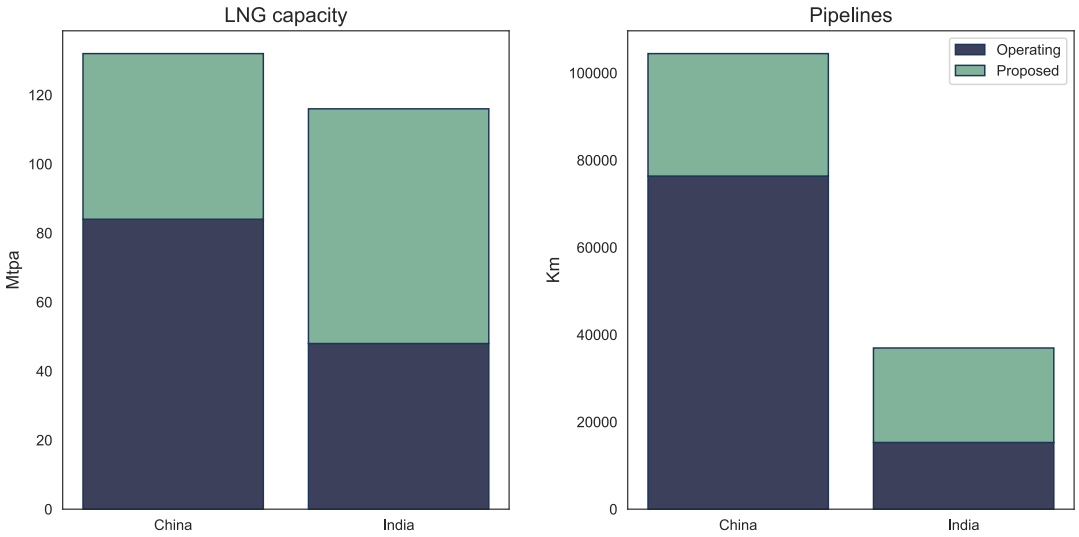
In 2020 China merged several companies to form PipeChina, which is now the third-biggest builder of oil and gas pipelines in the world, according to a 2021 survey by GEM. In total, the country has plans to increase its gas pipelines by 40%, from 76,000 to 104,000 kilometers.

India

In India, new coal plants and mines have faced a concerted opposition campaign. Since 2015, planned coal power in India decreased nearly 90%, from 250 GW to 28 GW, while coal power under construction was more than halved, from 79 GW to 36 GW.

While India currently only has plans to build 1 GW of new gas-fired power, the country has 21,000 km of new gas pipelines and 68 mtpa of new LNG import capacity in development to feed other applications such as the industrial sector. Approximately 11,000 km or 50% of these gas pipelines are under construction.

Figure 3. Proposed LNG and Pipeline Expansions in China and India



Source: Global Energy Monitor, Global Fossil Infrastructure Tracker, June 2021

Indonesia

Indonesia commissioned 25 GW of coal power capacity from 2010 to mid-2021, an amount exceeding that of all other countries except China and India. Indonesia has pledged to stop building new coal plants by 2023 and its new Electricity Supply Business Plan 2021–2030 (RUPTL) converts or cancels over 1.6 GW of coal, and postpones another 3.6 GW.

Indonesia signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030. The RUPTL also proposes 5.8 GW of new gas-fired power as a "clean" source of energy along with renewables such as geothermal. In total, there are plans to develop US$32 billion of new gas-fired power plants, LNG import and export terminals, and gas pipelines in Indonesia.

Vietnam

The coal fleet in Vietnam has grown faster than in almost any other country, adding 60% (12.4 GW) of its current 20.9 GW of operating coal power capacity since 2015. A September 2021 draft of Vietnam's

Power Development Plan 8 (PDP8) proposed continued growth of coal power through 2035. Yet at COP26, the country was a full signatory to the Global Coal to Clean Power Transition Statement to stop

permitting and building new coal power plants, and pledged to become carbon neutral by 2050.

Following the pledges, the Ministry of Industry and Trade was instructed to cut 7 GW of planned coal power from the PDP8. The latest draft of the plan also proposes cutting gas power generation capacity from new imported LNG to 55.8 GW by 2045, a 33% reduction from the 83.6 GW proposed in March.

GEM has identified 21 mtpa of new LNG import capacity also under development in Vietnam. Vietnam signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030.

Bangladesh

Bangladesh's 2016 energy plan envisioned coal as the backbone of the country's power system. Yet just four years later, in November 2020, the Bangladesh Energy Ministry said it was finalizing plans to cancel all coal plants not currently under construction. In 2021, the government canceled plans for 16 coal plants, ten in June and another six in November. In March 2021, the State Minister for Power, Energy and Mineral Resources stated that coal will be a lower priority in its upcoming energy plan, and that the government would be emphasizing LNG imports due to its perceived price stability.

Bangladesh has US$16.5 billion of new gas infrastructure under development, including 8 mtpa of proposed LNG import terminals.

Japan

After being among the top countries with planned new coal plants, Japan canceled all its last planned coal plants not under construction in 2021 over poor future outlooks. The country has also pledged to end new overseas coal plant finance after facing international criticism. Yet earlier this year, Japan pledged US$10 billion in public and private financial aid for "decarbonization projects in Asia including coal-to-gas switching." Japan is also home to 15 GW of proposed new gas-fired power plant capacity.

Japan signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030. In April 2021 Prime Minister Suga pledged that Japan would achieve net zero emissions by 2050, and achieve a 46% emissions reduction by 2030 compared with 2013.

The Philippines

Philippine reliance on coal rose dramatically from 2000 to 2020, with coal power operating capacity more than tripling from 3.4 GW to 10.5 GW. In October 2020, the Philippine Department of Energy declared a moratorium on new coal plants that were not already in the permitting pipeline. The government's energy secretary said in November 2020 that instead it would promote other energy sources such as renewables and natural gas. There are plans to build US$14 billion in new gas infrastructure in the Philippines. These plans include 16 GW of new gas-fired power capacity, which would represent a five-fold increase on existing capacity.

The Philippines signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030. In April 2021 the country raised its emissions reduction goal from 70% to 75% by 2030.

South Korea

South Korea's coal fleet is ranked ninth largest in the world. According to the government's 9th Basic Plan for Long-term Electricity Supply and Demand (2020–2034), the country is planning to cut coal capacity from 36% of total capacity in 2020 (36 GW) to 15% in 2034 (18.8 GW). The government has also committed to no new coal plants entering into construction, and to ending overseas finance for coal plants. Yet South Korea has projects amounting to US$16 billion in the development pipeline, including 20 GW of new gas-fired power capacity in the construction and pre-construction phases. South Korea has not announced a moratorium on financing gas projects abroad, and has funneled an estimated US$23.1 billion in public finance toward shipbuilding of LNG carriers.

South Korea signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030. In September 2021 the National Assembly passed a bill mandating a 35% cut in greenhouse gas emissions by 2030 compared with the 2018 level, with a goal of achieving net zero emissions by 2050.

Conclusion

The world has seen a fundamental shift away from new coal power, with the amount of proposed coal plants shrinking by three-quarters since 2015, and over 50 countries pledging to stop building new coal plants. Yet the coal bust is at risk of becoming a gas boom in Asia. The planned expansion comprises as much gas power as is currently operating in Europe and Russia, enough import capacity to absorb 2020's global LNG trade, and enough pipelines to wrap around the Earth one and a half times. Unless this planned expansion is radically scaled back, new gas projects could follow the same stranded asset path as proposed coal plants, or lock in new greenhouse gas emissions that will bust the Paris climate agreement.

Methodology

The data on gas infrastructure in this report is based on GEM's Global Gas Plant Tracker (power plants) and Global Fossil Infrastructure Tracker (terminals and pipelines), as of June 2021.

To estimate theoretical maximum lifecycle emissions associated with Asian gas infrastructure in development, GEM calculated the total amount of gas that could be imported into Asia through gas terminals and pipelines in development, based on the following assumptions: (1) all Asian gas infrastructure currently in development is built, (2) all infrastructure is used for its full lifetime at full capacity, and (3) the lifetimes of new gas terminals and pipelines are 50 years. There is little data available on gas terminal and pipeline lifetimes because the vast majority that have been constructed have yet to be retired; 50 years is a conservative estimate based on GEM's data. The National Energy Technology Laboratory has modeled the 20-year and 100-year lifecycle emissions associated with scenarios including gas delivered by pipeline from Russia to China, LNG shipped from Australia to China, and LNG shipped from the US to China (NETL 2019). The first scenario was used to estimate the lifecycle emissions associated with gas imported by pipeline, and the average of the two latter scenarios was used to estimate the lifecycle emissions associated with LNG imported through terminals.

To calculate investment in Asian gas infrastructure, the following figures were used to convert power plant capacities, terminal capacities, and pipeline lengths into capital expenditures in US dollars.

Table 3: Costs of Gas Infrastructure used to Estimate Investment

Gas Infrastructure	Type	Cost	Source
Power Plant	Combined-Cycle	$630/kW [a]	(IEA 2020a, p.418)
Power Plant	Other	$482/kW [b]	(IEA 2020b, p.43; IEA 2020a, p.418)
Import Terminal	Onshore	$274/tonne [c]	(IGU 2018, p.53)
Import Terminal	Floating	$129/tonne [d]	(IGU 2018, p.54)
Export Terminal	Onshore (Greenfield)	$1501/tonne [e]	(IGU 2018, p.25)
Export Terminal	Onshore (Brownfield)	$458/tonne [f]	(IGU 2018, p.25)
Export Terminal	Floating	$1501/tonne [g]	(IGU 2018 p.25; OIES 2019, p.16)
Pipeline	N/A	$5033/meter [h]	(Smith 2020, p.2)

Notes

a. Based on the average of (IEA 2020c, p.418) estimates for combined-cycle plants in China and India.

b. Based on GEM's estimate for Asian combined-cycle plants from (IEA 2020c), scaled according to the ratio between mean overnight costs for CC plants and open-cycle/internal combustion plants presented in (IEA 2020b, p.43).

c. Based on average global cost of new onshore LNG import capacity in 2017 per (IGU 2018, p.53).

d. Based on average global cost of floating import terminal capacity in 2017 per (IGU 2018, p.54).

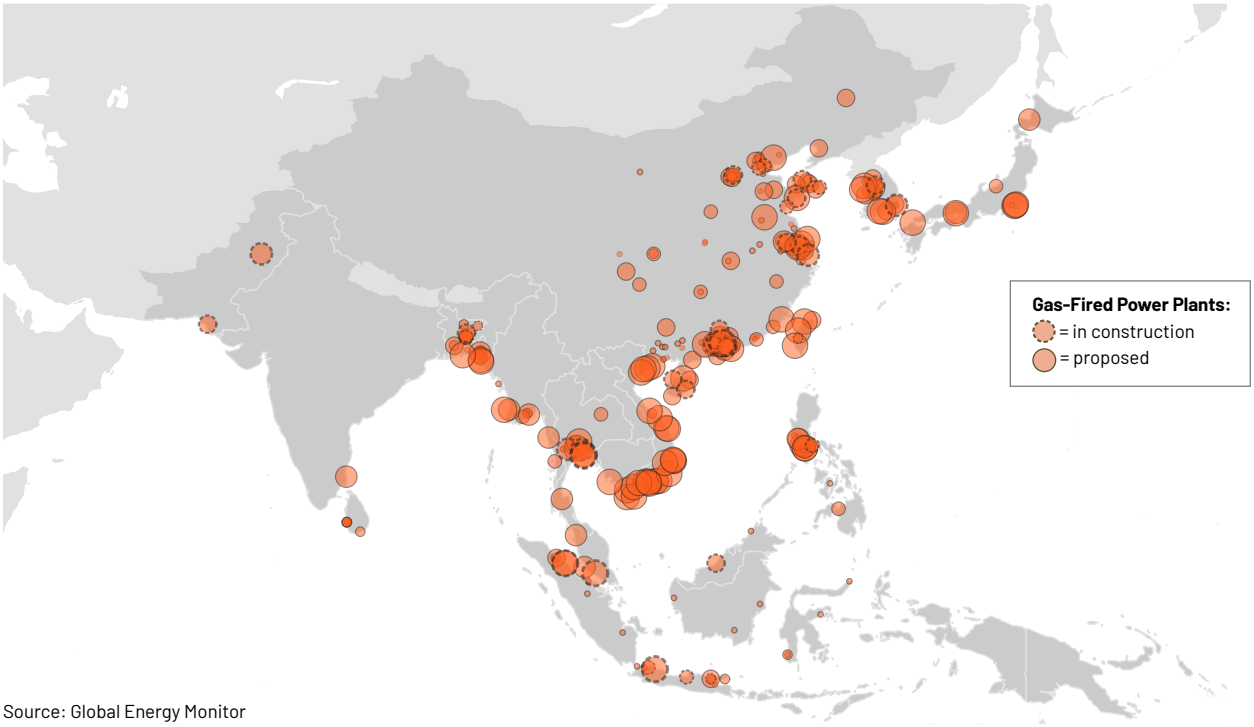
e. Based on average global onshore greenfield export terminal capacity costs in 2017 per (IGU 2018, p.25).

f. Based on average global onshore brownfield export terminal capacity costs in 2017 per (IGU 2018, p.25).

g. Based on average global onshore greenfield export terminal capacity costs in 2017 (IGU 2018, p.25). OIES 2019 (p.16) finds that floating export terminal costs are in approximately the same range as onshore terminal costs, and most new floating capacity is assumed to be greenfield.

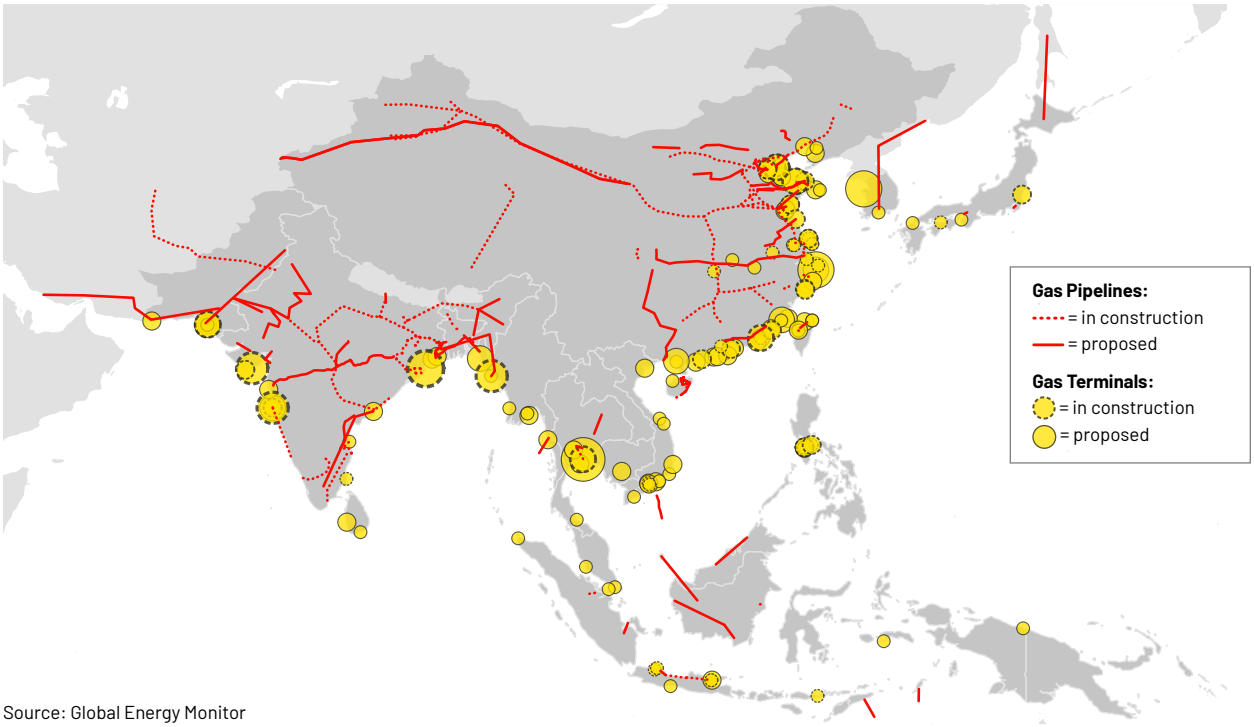
h. Based on Smith 2020 (p.2) estimate for the cost of building new gas pipelines in the US in 2020, and applied to all East Asian countries excluding China. For South Asian countries (and China), a regional estimate of $687/meter was applied, based on an average of known pipeline costs in India. For Southeast Asian countries, a regional estimate of $1330/meter was applied, based on an average of known pipeline costs in Indonesia.

Figure 4: Gas-Fired Power Plants in Development in Asia



Source: Global Energy Monitor

Figure 5: Gas Pipelines and Terminals in Development in Asia



Source: Global Energy Monitor

Table 4: Gas-Fired Power Plants, Gas Pipelines, and LNG Import Terminals in Development in Asia

	Power Plants		Pipelines		Import Terminals	
Country	Proposed	Construction	Proposed	Construction	Proposed	Construction
Bangladesh	16 GW	3 GW	2,740 km	400 km	8 mtpa	0 mtpa
China	69 GW	22 GW	13,440 km	14,650 km	122 mtpa	81 mtpa
India	1 GW	0 GW	11,020 km	10,640 km	28 mtpa	40 mtpa
Indonesia	9 GW	5 GW	2,060 km	630 km	7 mtpa	3 mtpa
Japan	15 GW	0.2 GW	550 km	90 km	3 mtpa	1 mtpa
Philippines	15 GW	1 GW	0 km	0 km	16 mtpa	8 mtpa
South Korea	18 GW	2 GW	390 km	0 km	12 mtpa	0 mtpa
Vietnam	56 GW	0 GW	140 km	0 km	20 mtpa	1 mtpa

Source: Global Energy Monitor.

Sources:

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About Global Energy Monitor

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