

Boom and Bust Gas

2022

TRACKING THE GLOBAL GAS POWER EXPANSION

Jenny Martos and Julie Joly





ABOUT GLOBAL ENERGY MONITOR

[Global Energy Monitor](#) (GEM) develops and shares information on energy projects in support of the worldwide movement for clean energy. Current projects include the Global Coal Mine Tracker, Global Coal Plant Tracker, Global Gas Infrastructure Tracker, Global Fossil Infrastructure Tracker, Europe Gas Tracker, CoalWire newsletter, Inside Gas newsletter, Global Gas Plant Tracker, Global Oil and Gas Extraction Tracker, Global Steel Plant Tracker, Latin America Energy Portal, and GEM.wiki.

ABOUT THE GLOBAL GAS PLANT TRACKER (GGPT)

The [Global Gas Plant Tracker \(GGPT\)](#) is an online database that identifies and maps every known gas-fired generating unit and every new unit proposed since January 1, 2020 (20 MW and larger in the European Union and United Kingdom, 50 MW or larger elsewhere). Developed by Global Energy Monitor, the tracker uses footnoted wiki pages to document each plant and is updated biannually. For further details see the tracker [landing page](#) and [methodology overview](#).

ABOUT THE COVER

Cover photo by Chanin Wardkhian, courtesy of Getty Images.

AUTHORS

Jenny Martos is a Research Analyst at Global Energy Monitor and Project Manager for the Global Gas Plant Tracker. Julie Joly is Oil & Gas Program Director at Global Energy Monitor.

EDITING, PRODUCTION, AND OTHER CONTRIBUTIONS

Editing and/or writing contributions from Ted Nace, James Browning, and Rob Rozansky. Design and page layout by David Van Ness. Maps created by Scott Zimmerman.

PERMISSIONS/COPYRIGHT

This publication may be reproduced in whole or in part and in any form for educational or nonprofit purposes without special permission from the copyright holders, provided that acknowledgement of the source is made. No use of this publication may be made for resale or other commercial purpose without the written permission of the copyright holders. Copyright © March 2022 by Global Energy Monitor.

FURTHER RESOURCES

For additional data on proposed and existing gas plants, see [Summary Tables](#) on the GEM website. To obtain primary data from the GGPT, visit the [Download Data](#) page.

Boom and Bust Gas 2022

TRACKING THE GLOBAL GAS POWER EXPANSION

Jenny Martos and Julie Joly

INTRODUCTION

In January 2022, Global Energy Monitor (GEM) released its first complete dataset for the [Global Gas Plant Tracker](#) (GGPT). The tracker includes information about operating, proposed, in construction, shelved, canceled, mothballed, and retired gas-fired power plants worldwide. It covers plants of 50 MW or greater (20 MW or greater in the EU and UK). The data is open source and comprehensive, including information about status, ownership, technology and fuel type, and location.¹

EXECUTIVE SUMMARY

GEM's survey shows that the global build-out of gas power plants is now larger on a capacity basis than the build-out of new coal capacity. Building all the gas plants currently in pre-construction or construction phases would add more than 615 GW of gas-fired capacity and lock in decades of emissions. These gas expansion plans represent capital expenditures of nearly US\$509 billion. Much of this investment represents a [stranded asset risk](#), since it will need to be retired before the full lifespan of the plants under the IEA's 1.5°C net-zero pathway, according to which unabated fossil gas-fired generation must peak by 2030 and be 90% lower by 2040. Moreover, investments in gas-fired power now face a growing likelihood of underutilization as costs of CEPS (clean energy portfolios including renewables with battery storage and demand-side load management) now out-compete gas in much of the world (see "Renewables are a Viable Alternative to Gas.")

Unlike coal plant [construction](#), the boom in gas plants is not confined to a particular region or a few specific [countries](#). The surge in gas development is nearly ubiquitous. On every continent and in every region, gas-fired power plants continue to be proposed, funded, and constructed at a rapid pace. Contrary to [climate science](#), [political commitments](#), [economic realities](#), and [health consequences](#) for local communities, the world is investing in gas-based power.

1. The [Global Gas Plant Tracker](#) catalogs nearly 4,500 power stations, including 9,300 gas-fired units, across 129 countries and more than 1,900 gas plant owners. The data is updated biannually.

Key Findings:

- Building all the gas power plants currently in pre-construction or construction would add over 615 GW of gas-fired capacity into the world, at an estimated cost of nearly US\$509 billion in capital expenditure.
- Gas power plants currently in pre-construction will cost an estimated US\$380 billion and increase global gas-fired capacity by an additional 454 GW (Table 2).
- Gas power plants under construction worldwide will cost an estimated US\$128 billion and raise global gas-fired capacity by nearly 161 GW (Table 2).
- The 615 GW of gas-fired power plants in development surpasses the [457 GW](#) of coal power plants currently in development.
- The gas expansion directly conflicts with IEA's 1.5°C net-zero pathway, under which unabated fossil gas-fired generation must peak by 2030 and be 90% lower by 2040, compared to 2020 levels.
- The leading five countries constitute 39% of new global gas-fired capacity in development, and the top 20 countries make up 75%. In comparison, the top five countries represent 82% of new coal-fired capacity in development globally.
- In 2020–2021, 14.4 GW of gas-fired capacity was retired.
- At a time when European policy makers are working to decrease the continent's dependency on imported gas, Europe is planning over 65 GW of new gas-fired capacity.
- Renewables are now an economical alternative to gas in most of the world. In Australia and the U.S. recent studies have shown that *firm* renewable power (including the costs of system integration and battery storage), now outcompetes power from gas.
- Investments in gas-fired power capacity represent a stranded asset risk, since they will need to be retired early if governments move to reduce gas capacity to meet a net-zero pathway, and increasingly competitive renewables will cause much of the gas capacity currently in development to be underutilized. There is still time to rein in the gas expansion, since 74% of the 615 GW of gas-fired capacity in development is still in the pre-construction stage.

GAS IS BOOMING

If built, the 615 GW of gas plants in construction will increase the world's gas-fired capacity by one-third. In comparison, the January 2022 update of the [Global Coal Plant Tracker](#) shows [457 GW](#) of coal-fired capacity

in development globally. While the coal-fired expansion is largely centralized in China and India (Table 1), gas-fired power plants are being developed worldwide (Figure 1).

Figure 1. Gas-Fired Power Plants in Development Globally.

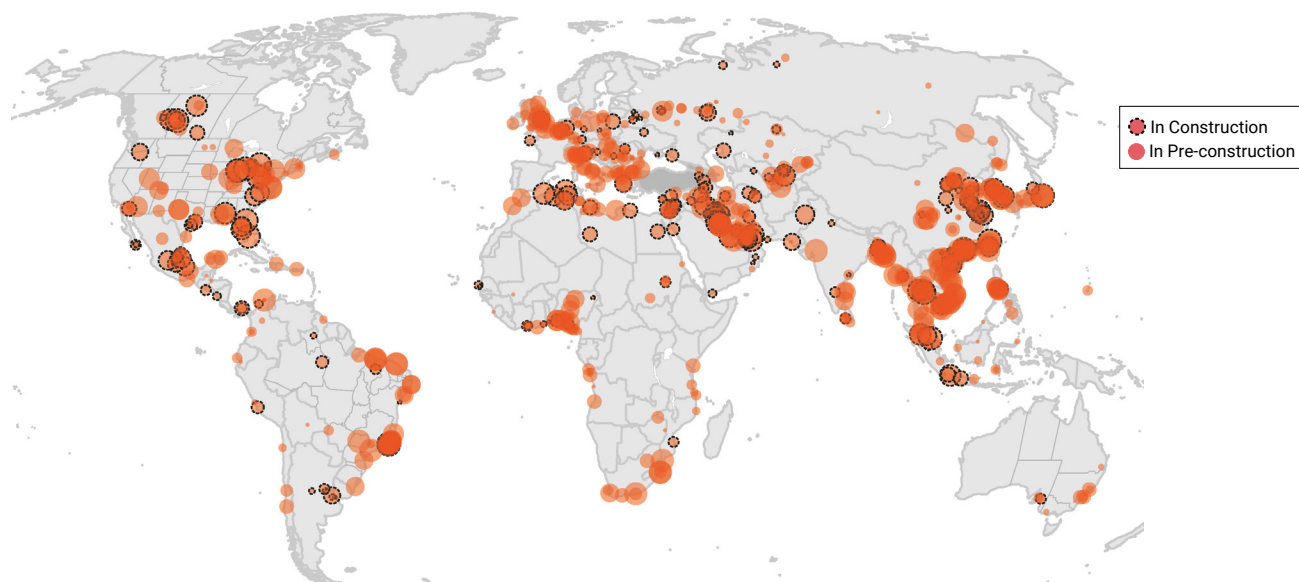


Table 1. In-Development Coal and Gas Power Capacity by Region.

Gas Power Capacity by Region			Coal Power Capacity by Region		
Region	Pre-construction (MW)	Construction (MW)	Region	Pre-construction (MW)	Construction (MW)
East Asia	77,145	43,561	East Asia	158,946	101,969
SE Asia	101,211	18,835	SE Asia	41,066	24,895
Middle East and North Africa	52,998	39,929	Middle East and North Africa	0	1,850
Latin America and the Caribbean	56,727	16,913	Latin America and the Caribbean	3,066	0
Europe	57,781	7,262	Europe	6,040	1,570
North America	21,961	18,343	North America	300	0
Sub-Saharan Africa	35,281	2,731	Sub-Saharan Africa	10,890	3,390
South Asia	27,701	6,373	South Asia	38,865	41,374
Central Asia	9,505	3,601	Central Asia	7,716	50
Eurasia	7,904	2,745	Eurasia	2,193	335
Australia/New Zealand	3,628	380	Australia/New Zealand	1,000	0
Western Asia	2,298	254	Western Asia	10,480	1,465
Total	454,139	160,927	Total	280,562	176,898

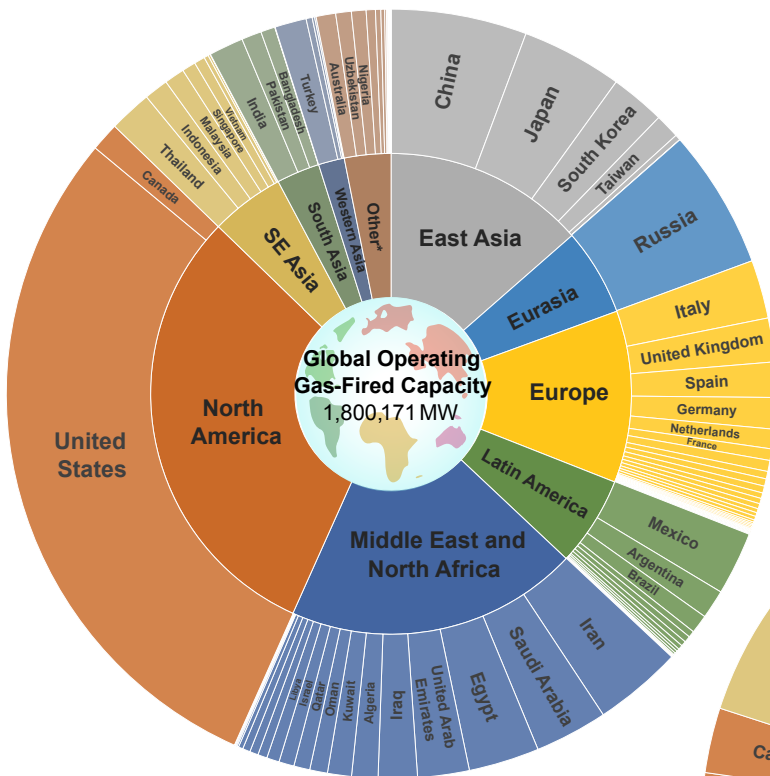
Source: Global Gas Plant Tracker, January 2021; Global Coal Plant Tracker, January 2021

The United States leads the globe in existing gas-fired capacity, with over 29% of the world's total. On a regional level, the Middle East and North Africa region ranks second with 20% of the world's existing gas-fired capacity (Figure 2).

Over 27% of the world's gas plant capacity in construction is located in East Asia, with the majority concentrated in China. A quarter of gas plants currently in construction are located in the Middle East and North Africa region (Figure 3).

Figure 2. Where Are Gas Plants Currently Operating?

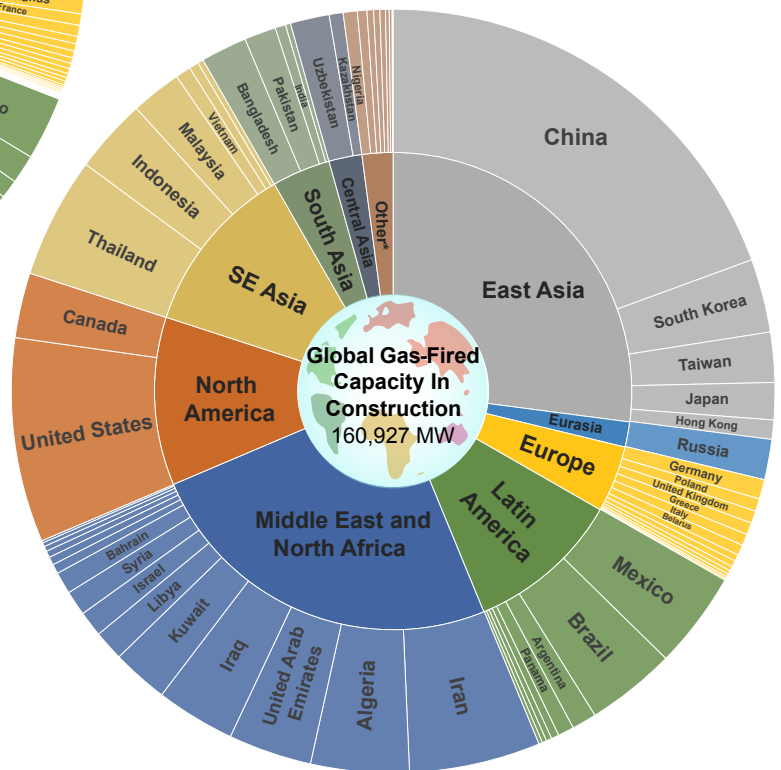
January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)



*Other regions includes sub-Saharan Africa, Central Asia, and Australia/New Zealand

Figure 3. Where Are Gas Plants in Construction?

January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)

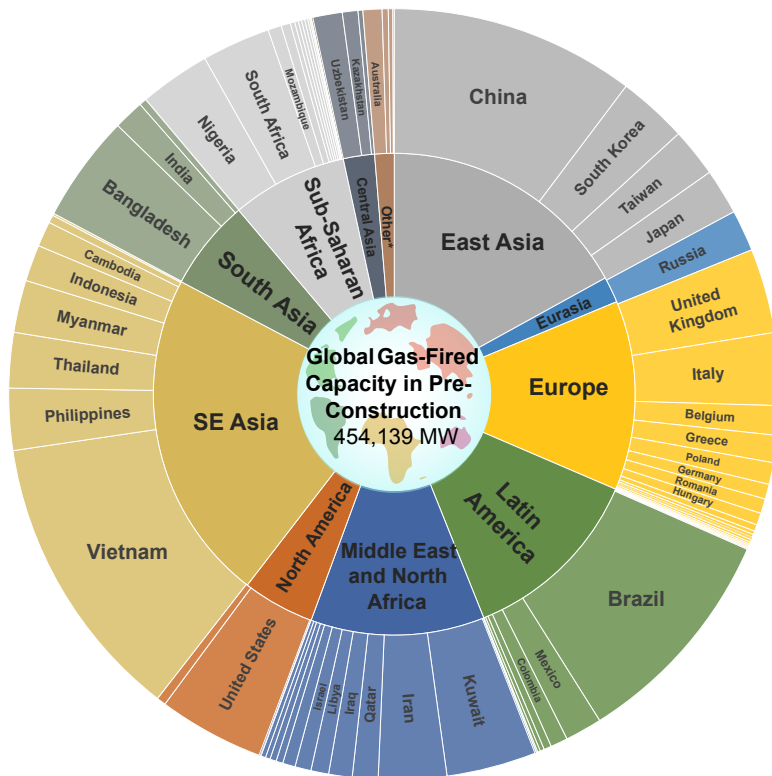


*Other regions includes sub-Saharan Africa, Western Asia, and Australia/New Zealand

While the Southeast Asia region leads the globe in proposed gas expansion, gas plants in the pre-construction phase are found in almost every region of the world. Vietnam, China, and Brazil are the leading countries, accounting for nearly 32% of the world's proposed gas plant expansion (Figure 4).

Figure 4. Where Are Gas Plants in Pre-construction?

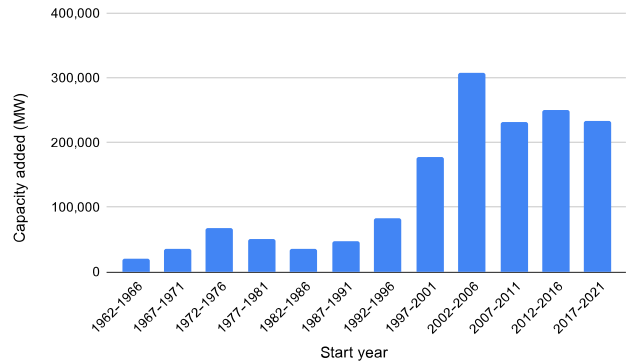
January 2022 (units 50 MW and larger globally; 30 MW and larger in the European Union and the UK)



*Other regions includes Western Asia and Australia/New Zealand

As shown in Figure 5, most gas-fired capacity currently operating worldwide has been built in the past 25 years. The largest cohort is capacity built between 2002 and 2006.

Figure 5. Age Structure of Operating Gas Fleet.



Building all gas plants in development worldwide would amount to an estimated capital expenditure of nearly US\$509 billion (Table 2). Globally, only about 26% of planned gas-fired power plants are in the construction phase, accounting for one-quarter of this

total capital expenditure estimate. A recent Carbon Tracker report [found](#) that more than a fifth of European gas-fired power plants and almost a third of those in the US are operating at a loss.

Table 2. Estimated Capital Costs for Gas Plants in Development (Proposed and in Construction) by Region.

Region	Pre-Construction Capital Cost (USD billion)	In Construction Capital Cost (USD billion)	Total Regional Capital Cost (USD billion)
East Asia	\$55	\$29	\$84
SE Asia	\$86	\$16	\$102
Middle East and North Africa	\$44	\$31	\$75
Latin America and the Caribbean	\$50	\$15	\$65
Europe	\$54	\$7	\$61
North America	\$21	\$18	\$39
Sub-Saharan Africa	\$29	\$2	\$31
South Asia	\$24	\$5	\$29
Central Asia	\$8	\$3	\$11
Eurasia	\$6	\$2	\$8
Australia/New Zealand	\$3	\$0	\$3
Western Asia	\$2	\$0	\$2
Total	\$380	\$128	\$509

The estimate for OECD member countries is based on CCGT capital costs (\$1000/kW) for the U.S. and Europe from [IEA World Energy Model inputs](#)

The estimate for non-OECD countries (except China) is based on CCGT capital costs that average India (\$700/kW) and EU (\$1000/kW) CCGT capital costs from [IEA World Energy Model inputs](#).

China: based on CCGT capital costs of \$560/kW from [IEA World Energy Model inputs](#).

CCGT technology is assumed for gas plants with technology type that is not available.

OCGT capital costs are estimated to be 74.4% of CCGT costs, based on a comparison of costs for "Combustion Turbine H Class, 1100-MW Combined Cycle" to "Combustion Turbine F Class, 240-MW Simple Cycle," as detailed in [2020 EIA Report](#)

OECD member countries as of 2021: Austria, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States

REGIONAL BREAKDOWN

East Asia

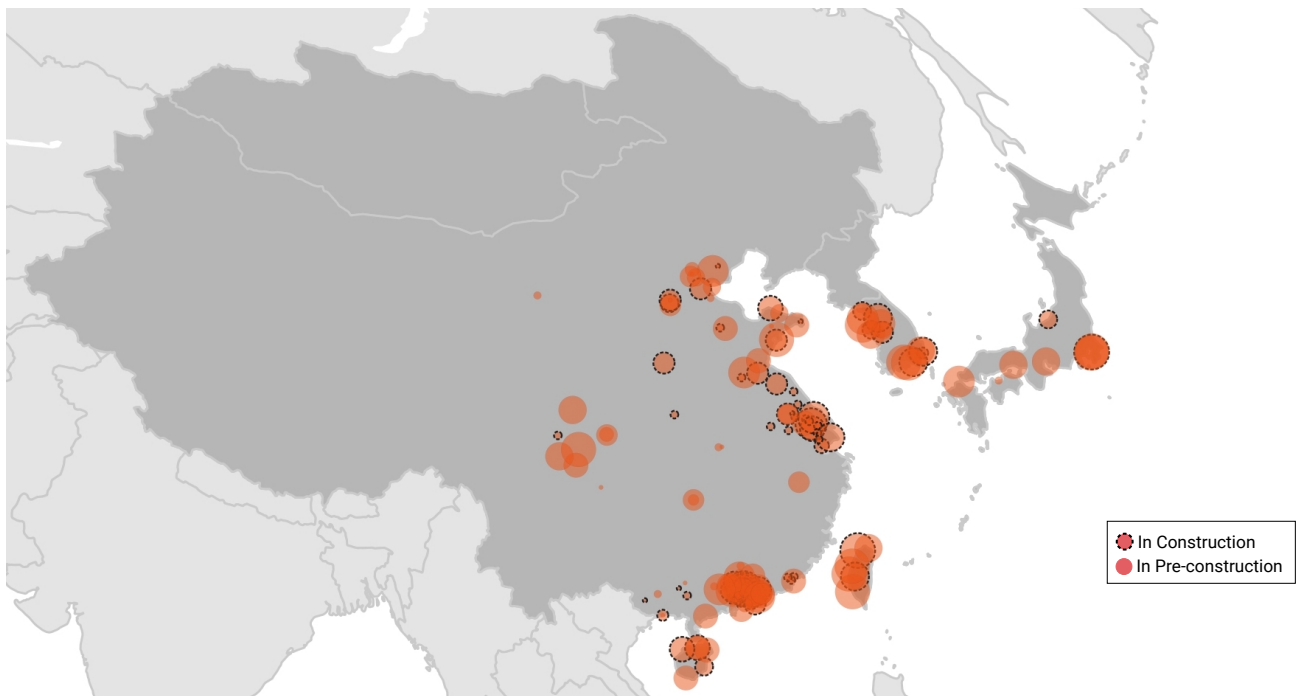
East Asian countries include: China, Hong Kong, Japan, South Korea, and Taiwan.

East Asia has the largest planned gas-fired power plant expansion, with nearly 121 GW of capacity under construction or in pre-construction. East Asia has approximately 244 GW of existing gas-fired capacity which would increase by nearly 50% at a cost of over US\$84 billion if all planned gas expansion is built. Globally, China leads in the development of new gas capacity, with over 77 GW (12.6% of the world's total gas-fired capacity in development) in the pre-construction or construction phase, more than the current operating capacity of Italy and the UK combined. Almost one-fifth of the world's gas expansion in the construction phase is happening in China. This ongoing gas development is [at odds](#) with China's goal of carbon neutrality by 2060.

South Korea has [committed](#) to no new coal plants entering into construction and Japan has [canceled](#) all its planned coal plants not under construction. Yet South Korea and Japan have over 18 GW and 11 GW, respectively, of new gas-fired capacity in development. In particular, South Korea plans to convert 24 of the 30 coal plants that are scheduled for decommissioning into gas plants.²

Japan and South Korea have both signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030. A recent study [examining](#) air pollution from gas plants in South Korea shows that 17,840 premature deaths can be avoided by withdrawing the plans to construct the gas plants in the pipeline and phasing out all gas plants by 2035.

Figure 6. Gas-Fired Power Plants in Development in East Asia.



2. Ministry of Trade, Industry and Energy, (2020). "Announcement of the 9th Basic Plan for Long-term Electricity Supply and Demand (2020-2034)."

Southeast Asia

Southeast Asian countries include Brunei, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam

The Southeast Asia region ranks second in planned gas expansion with 120 GW of capacity under construction or in pre-construction. If built, this will more than double the 89.5 GW of existing gas-fired capacity in Southeast Asia and cost US\$102 billion.

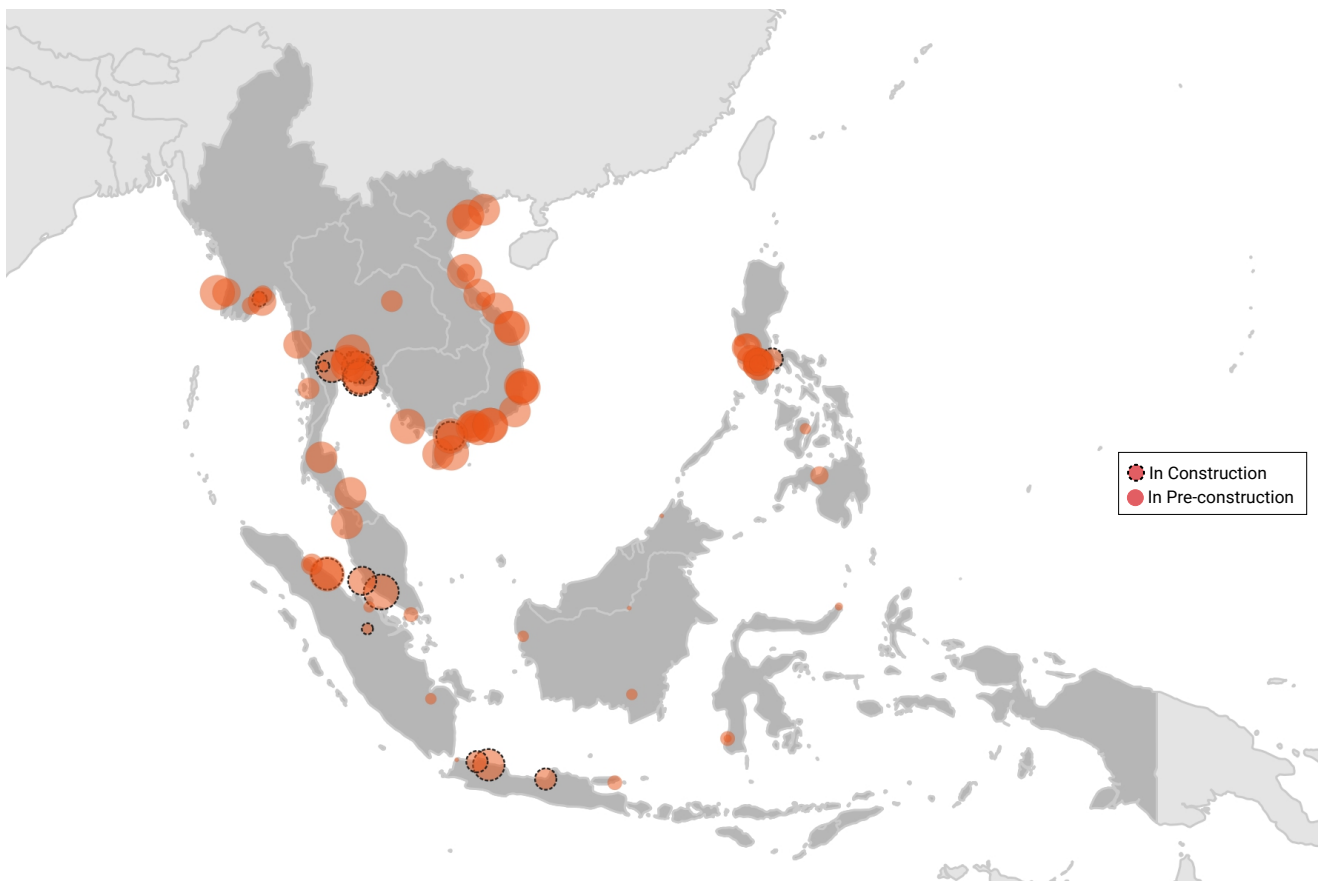
Vietnam has the largest planned gas expansion in the world. As [proposed](#) in the latest revised draft of its Power Development Plan 8 (PDP8), the country will add 22.4 GW of gas-fired power capacity by 2030 and

55.8 GW by 2040, a seven-fold increase over existing capacity. In the current draft of the Power Development Plan, Vietnam's plans have been scaled back by about a third relative to the previous draft, which called for 50 GW by 2030 and 83.6 GW by 2040.

There are plans to build over 12 GW of gas-fired power plants in the Philippines, a fourfold increase over existing capacity.

Notably, Vietnam, Indonesia, Malaysia, and the Philippines have signed the Global Methane Pledge, endorsing its goal of reducing methane emissions 30% by 2030.

Figure 7. Gas-Fired Power Plants in Development in Southeast Asia.



Middle East and North Africa

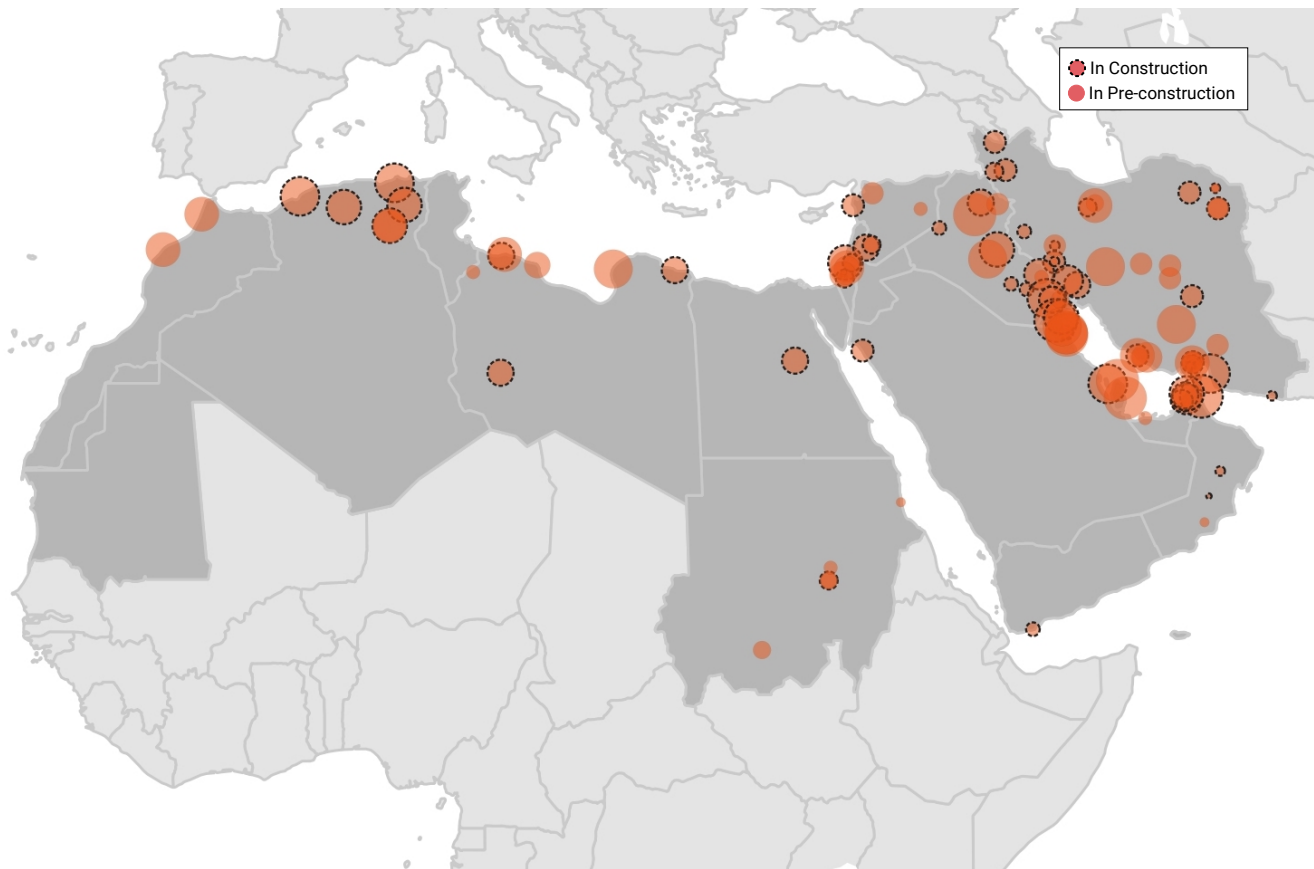
Middle Eastern and North African countries include: Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen.

The Middle East and North Africa (MENA) region has almost 93 GW of gas-fired capacity in development, at an estimated cost of US\$75 billion. MENA has approximately 354 GW of existing gas-fired capacity, the second highest in the world. If all planned gas expansion is built, gas-fired operating capacity in MENA will

increase by over 25%. There are plans to build nearly 21 GW of gas-fired power plants in Kuwait, which would more than double existing capacity. While the MENA region is a huge area for gas development, it has relatively little coal-fired power, with less than 2 GW of planned coal expansion and only 10.4 GW of existing coal-fired capacity.

Bahrain, Iraq, Israel, Jordan, Kuwait, Libya, Morocco, Saudi Arabia, Tunisia, and the United Arab Emirates have signed the Global Methane Pledge.

Figure 8. Gas-Fired Power Plants in Development in the Middle East and North Africa.



Latin America and the Caribbean

Latin American and Caribbean countries include: Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Jamaica, Mexico, Nicaragua, Panama, Peru, Trinidad and Tobago, Uruguay, and Venezuela.

Latin America and the Caribbean have 73.6 GW of gas-fired capacity in development, at an estimated cost of US\$65 billion. If built, this will increase Latin America's existing gas-fired capacity, 108.7 GW as of 2021, by over two-thirds. Brazil leads the region's planned gas expansion, with 49.2 GW in development. If built, this will increase Brazil's gas-fired existing capacity by 350%.

The large growth in gas development in Brazil is largely driven by Brazil's New Gas Law, which came into effect in January 2022 and is intended to increase competition in the fossil gas industry. The New Gas Law [opens](#) up gas markets to greater competition and promotes development by companies other than state-owned Petrobras. Additionally, the Electrobras Privatization Act, approved by Brazil's government in July 2021, [mandates](#) the construction of 8 GW of new gas power plants between 2026 and 2030.

Brazil has recently [announced](#) its commitment to net-zero emissions by 2050 and has signed the Global Methane Pledge.

Figure 9. Gas-Fired Power Plants in Development in Latin America and the Caribbean.



Europe

European countries include: Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Isle of Man, Italy, Latvia, Lithuania, Malta, Moldova, Netherlands, North Macedonia, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Ukraine, and United Kingdom.

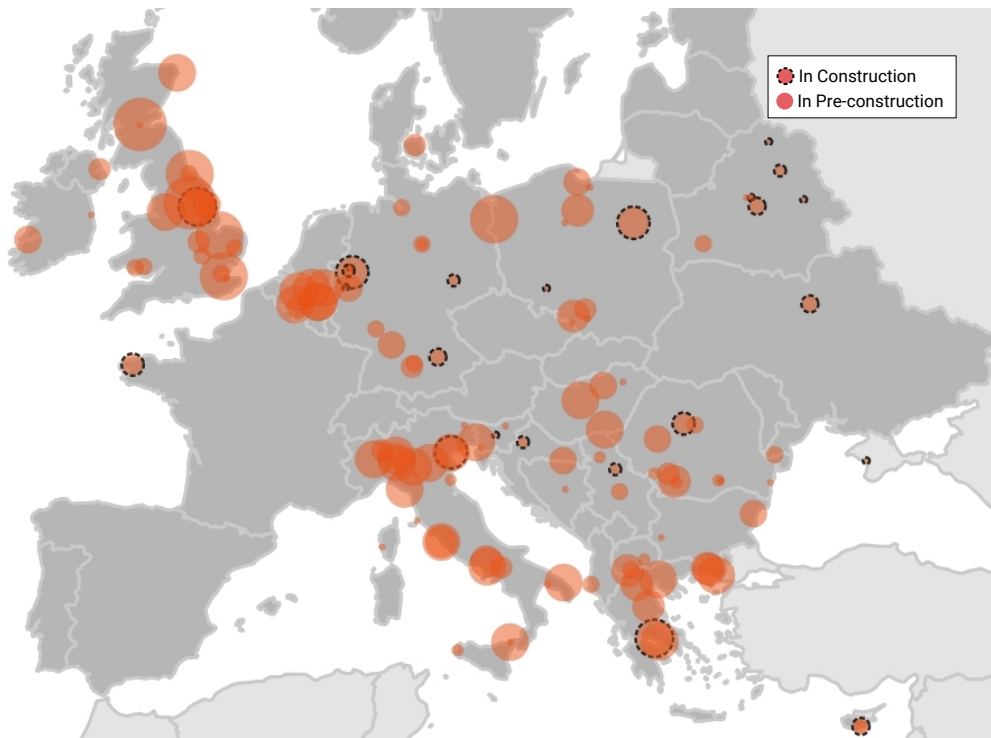
Europe has over 65 GW of gas-fired capacity in development, at an estimated cost of US\$61 billion. If built, this will increase Europe's existing gas-fired capacity of 208.1 GW by 31%.

While most European Union (EU) countries have either completely phased out or announced plans³ to [phase out](#) coal-fired power plants in the next decade, gas-fired power plants continue to be developed. The gas expansion in Europe is led by the UK and Italy.

Together, the two countries account for over 31 GW, or almost half of the region's gas-fired capacity in development. If Italy and the UK's planned gas plants are built, the UK's gas-fired capacity would increase by over 50% and Italy's gas-fired capacity would increase by 33%. Additionally, Greece, Belgium, Poland, and Romania would all at least double their operating gas-fired capacity if all gas expansion plans are built.

The European Commission has recently [proposed](#) classifying gas as a green investment in the EU's energy taxonomy. The decision has been widely [criticized](#) by environmental groups, which have pointed out that under Europe's [Climate Law](#), the EU must cut emissions by 55% by 2030 and achieve net-zero emissions by 2050. In addition, as shown by the current situation of high gas prices and the possibility of short supplies due to the war in Ukraine, expanding the use of gas in Europe poses additional risks that plants built now

Figure 10. Gas-Fired Power Plants in Development in Europe.



3. Phase-out dates: UK 2024, Italy 2025, Greece 2025, Germany 2038.

could be stranded or underutilized before the end of their typical lifespan. For these reasons, critics of gas expansion [argue](#) that now is the time for beginning the gas phase-out. Recent events have reinforced such arguments. As a result of Russia's invasion of Ukraine,

North America

North American countries include the United States and Canada.

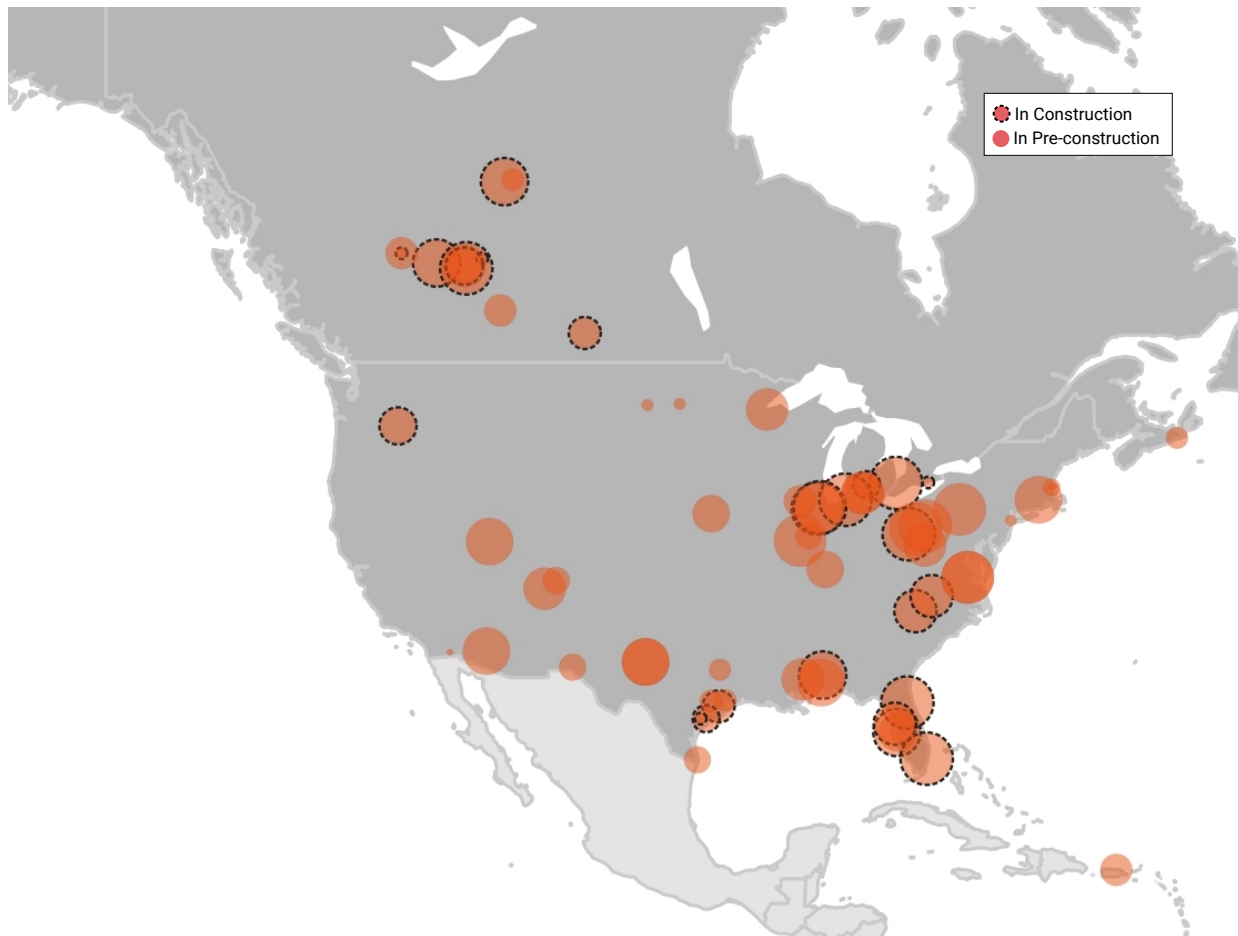
North America has over 40 GW of gas-fired capacity in development, at an estimated cost of US\$39 billion. If built, this will increase North America's existing gas-fired capacity by 7%. At over 528 GW of gas-fired capacity, the United States has the largest existing gas-fired capacity of any other region or country (over 29% of the

the EU is considering a [strategy](#) to eliminate imports of Russian fossil fuels before 2030 with gas as the initial priority. Germany [announced](#) a goal of 100% renewables by 2035.

world's total). (Figures 1–3) While the United States has only [0.3 GW](#) of coal-fired generation in development, it ranks second in planned gas-fired expansion (behind China), with 34.1 GW in development. Gas-fired power plants in development are primarily [concentrated](#) in the Appalachian region, Florida, and Texas.

Both the United States and Canada have signed the Global Methane Pledge.

Figure 11. Gas-Fired Power Plants in Development in North America.



Sub-Saharan Africa

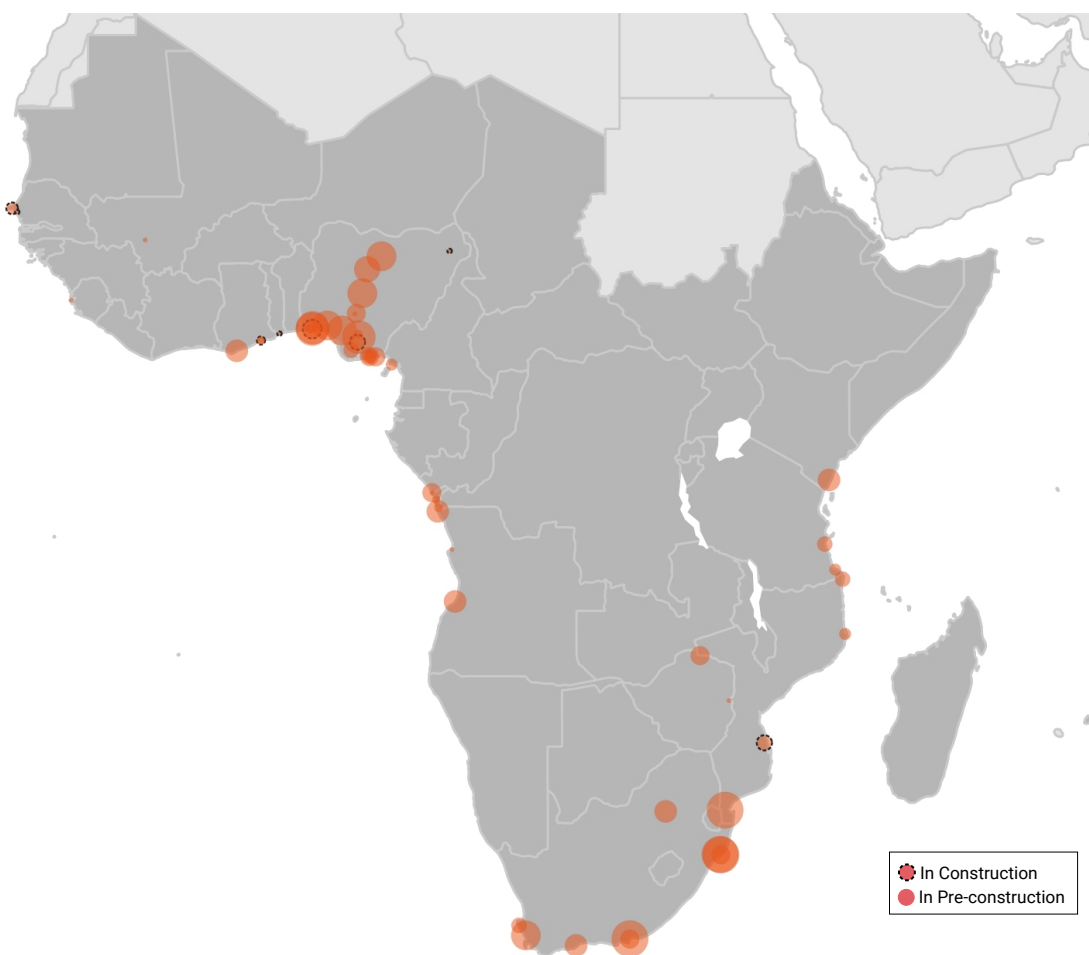
Sub-Saharan Africa countries include: Angola, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Kenya, Mali, Mozambique, Nigeria, Republic of the Congo, Senegal, Sierra Leone, South Africa, Tanzania, Togo, and Zimbabwe.

Sub-Saharan Africa has over 38 GW of gas-fired capacity in development, at an estimated cost of US\$31 billion. If built, this will more than double the 17.2 GW of existing gas-fired capacity in Sub-Saharan Africa. The gas expansion in sub-Saharan Africa is led by Nigeria and South Africa. Together, they account for over 27.5 GW, or almost three-quarters of the region's

gas-fired capacity in development. If built, Nigeria's existing gas-fired capacity would more than double. Currently, South Africa has very little existing gas-fired capacity, but its 20-year [Integrated Resource Plan](#) released in 2019, plans at least 3 GW of new gas-fired capacity to meet electricity demand.

Nigeria has [announced](#) a net-zero emissions target of 2060 and has signed the Global Methane Pledge. South Africa has also set a goal of net-zero emissions by 2050 and recently [updated](#) its climate commitment with more aggressive climate goals.

Figure 12. Gas-Fired Power Plants in Development in Sub-Saharan Africa.



South Asia

South Asian countries include: Bangladesh, India, Pakistan, and Sri Lanka.

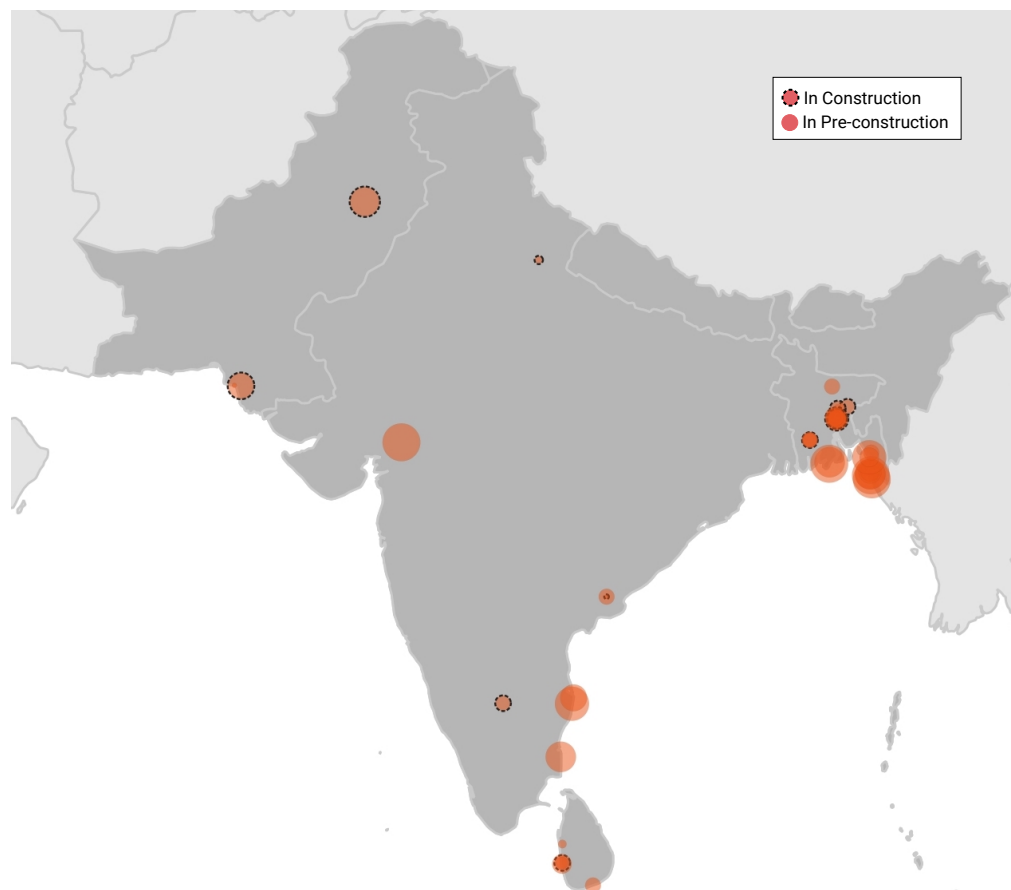
South Asia has over 34 GW of gas-fired capacity in development, at an estimated cost of US\$29 billion. If built, this will increase the 52.3 GW of existing gas-fired capacity in South Asia by 65%. Bangladesh leads the region with over 23.6 GW of gas-fired capacity in development, more than double the current operating capacity of 10.8 GW.

India's existing gas-fired capacity has been largely **idle** or underutilized for the past decade due to insufficient gas availability. This ongoing gas shortage has led to more than 21 GW of gas-fired capacity cancellations.

However, India is now poised to dramatically increase operating capacity as several major gas pipelines are nearing completion, as outlined in GEM's recently released **Pipe Dreams** report. India has **pledged** net-zero emissions by 2070.

Even as Bangladesh's existing gas-fired power plants often sit largely idle, **operating** at 40% capacity between 2019 and 2020, there continues to be planned future gas expansion. A recent **analysis** from IEEFA, which looked at proposed LNG-to-power projects in seven countries⁴, estimated that 61% of gas-fired capacity will not be built due to "unfavorable fundamental project and country-level factors."

Figure 13. Gas-Fired Power Plants in Development in South Asia.



4. Vietnam, Thailand, the Philippines, Cambodia, Myanmar, Pakistan, and Bangladesh

CLIMATE IMPACT OF GAS-FIRED POWER GENERATION

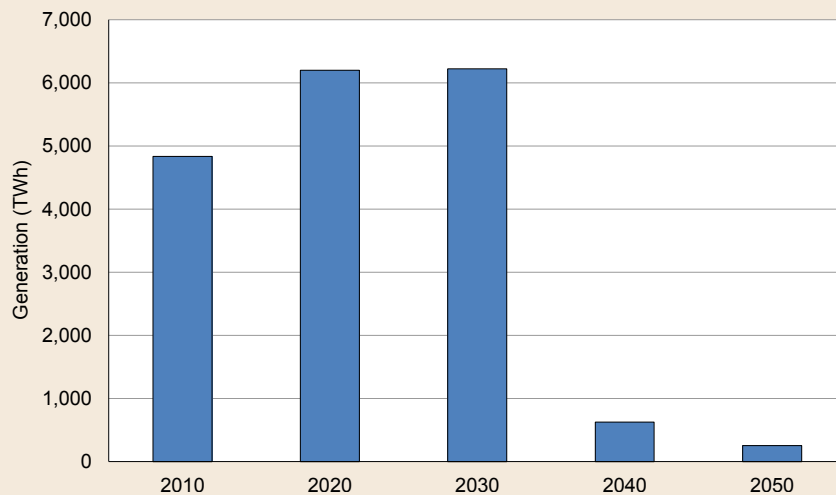
As of November 2021, [over 140 countries](#), covering 90% of global emissions, have announced or are considering net-zero emissions targets, and over 100 countries, representing nearly 50% of global methane emissions, have signed the [Global Methane Pledge](#), endorsing its goal of reducing methane emissions 30% by 2030.

The global gas-fired capacity expansion is occurring despite the International Energy Agency's [warning](#) that keeping global warming below 1.5°C hinges on a net-zero power system and stopping all future fossil fuel development by 2040. IEA's Net-Zero Emissions by 2050 scenario requires

unabated fossil gas-fired generation to peak by 2030 and to be 90% lower by 2040, compared to 2020 levels (Figure 14). IPCC's latest [report](#) warns that climate change is harming the planet faster than humanity can adapt. A recent Climate Analytics [study](#)⁵ concluded: "Natural gas is currently the fastest growing source of CO₂ emissions, and the largest projected source of CO₂ growth over the next decade."

The current gas expansion playing out worldwide is incompatible with IEA's net-zero emissions scenario to limit global warming to 1.5°C under the Paris Agreement and is in direct conflict with the Global Methane Pledge.

Figure 14. Unabated fossil gas power generation under IEA Net-Zero Emissions 2021 Scenario.



5. Using IEA's Stated Energy Policy Scenario (STEPS), which takes account only of specific policies that are in place or have been announced by governments.

Renewables are a Viable Alternative

The rapidly falling cost of renewables has undermined the economic justification for continuing to invest in gas power generation. A Rocky Mountain Institute [study](#) that examined new gas plant projects in the United States found that at least 80% of these projects could be cost-effectively avoided by investing in clean energy instead. Clean energy portfolios (CEPs)—renewables with storage and demand-side management—are gaining momentum as they become increasingly cost-competitive in most of the world. The International Renewable Energy Agency (IRENA) [reported](#) that 62% of all renewable power generation added globally in 2020 had lower costs than the cheapest new fossil fuel option. Rocky Mountain Institute [found](#) that 2019 was the break-even year in the United States when CEPs began to outcompete new gas. The share of renewable generation competitive with fossil fuels [doubled](#) in 2020 with respect to the previous year. BNEF has [forecast](#) that by 2050 the average global levelized costs of electricity for solar PV, onshore wind, and offshore wind will fall by an additional 70%, 50%, and 45%, respectively.

A December 2021 [report](#) by the Australian Government agency CSIRO shows that renewables, including solar PV and wind, are the cheapest new-build power option in Australia and are significantly cheaper than fossil fuel options, even with additional integration costs such as transmission infrastructure and energy storage taken into account and even at high levels of renewables (90%). CSIRO estimates that the current levelized cost of electricity (LCOE) using solar PV

ranges from AUS\$44 to AUS\$65 per MWh (depending on the scale and location of the installation) while wind power costs range from AUS\$45 to AUS\$57/MWh. In comparison, the LCOE for gas generation is between AUS\$65 and AUS\$111/MWh.

In addition to being cheaper and more climate friendly, renewable power has distinct energy security advantages with respect to gas. Volatility in fuel prices or fuel availability can make gas project revenues unpredictable or facilities prohibitively expensive to run during price spikes.

In March 2022, spot prices for LNG in Asia [reached](#) a record high of nearly \$60 per million British thermal units (MMBtu) beating the previous [record](#) of \$56/MMBtu in October 2021. Spot prices for LNG in Asia have [ranged](#) from \$6 to nearly \$60/MMBtu in the last year. Price volatility is [expected](#) to continue as the Russia invasion of Ukraine adds more pressure to a global gas market constrained by increasing demand driven by a global economic recovery, low [storage](#) levels, and colder than average winter. More recently, Pakistan was [forced](#) to purchase LNG for September 2021 at \$15 per MMBtu, the highest prices since it began imports, to avoid blackouts.

Given the steep decline in clean energy costs, renewables are a cost-effective, viable alternative to gas-fired generation. Building gas power plants is financially risky and centered on a dated assumption that gas is the most cost effective option for power generation.

APPENDIX

Gas power capacity in development and operating by country (MW).

January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)

Country	Pre-construction	Construction	All active development	Shelved	Operating
China	45,825	31,327	77,152	17,597	103,480
Vietnam	55,215	1,050	56,265	42,150	8,146
Brazil	43,093	6,103	49,196	7,552	14,090
United States	20,210	13,915	34,125	9,164	528,320
Bangladesh	20,490	3,149	23,639		10,840
Iran	12,990	8,931	21,921	6,489	66,908
Kuwait	17,100	3,835	20,935		18,109
Thailand	10,560	8,240	18,800		32,276
South Korea	13,305	5,002	18,307	1,368	41,349
United Kingdom	16,118	840	16,958	5,078	33,064
Italy	13,830	780	14,610		44,201
Nigeria	13,518	959	14,477	9,846	11,069
Mexico	7,053	6,592	13,645	2,458	47,960
South Africa	13,062		13,062	4,755	280
Taiwan	9,300	3,400	12,700		18,472
Philippines	11,806	650	12,456	4,620	3,316
Indonesia	6,950	5,065	12,015	2,070	18,277
Japan	8,715	2,522	11,237	4,839	76,375
Russia	7,904	2,745	10,649	1,540	105,506
Myanmar	9,980	388	10,368	275	1,659
Iraq	4,476	5,398	9,874	4,989	29,494
Uzbekistan	5,620	2,654	8,274		11,773
Algeria	1,300	6,696	7,996	1,200	19,850
India	5,794	711	6,505	51	26,133
Canada	1,751	4,428	6,179	530	21,668
Greece	5,188	826	6,014		5,571
United Arab Emirates	230	5,676	5,906		38,984
Belgium	5,625		5,625		5,626
Libya	3,390	2,048	5,438	2,700	9,523
Poland	4,140	860	5,000	30	3,106
Malaysia	1,500	3,442	4,942	1,950	15,275

Continued on next page.

Gas power capacity in development and operating by country (MW) – continued

January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)

Country	Pre-construction	Construction	All active development	Shelved	Operating
Qatar	4,900		4,900		12,143
Israel	3,065	1,739	4,804	800	11,464
Cambodia	4,800		4,800	350	
Germany	2,846	1,335	4,181	735	23,694
Australia	3,628	380	4,008	768	14,786
Kazakhstan	2,975	947	3,922	677	4,015
Colombia	3,281	242	3,523		3,825
Romania	2,820	430	3,250		2,833
Mozambique	2,574	450	3,024	75	246
Syria	900	1,690	2,590		5,727
Morocco	2,400		2,400		870
Hungary	2,280		2,280		2,850
Pakistan	54	2,163	2,217		15,079
Angola	1,770		1,770		720
Sri Lanka	1,363	350	1,713		300
Argentina		1,683	1,683	140	21,886
Sudan	1,215	350	1,565		824
Bahrain		1,500	1,500		7,043
Chile	1,435		1,435	540	4,886
Hong Kong		1,310	1,310		4,224
North Macedonia	1,260		1,260		230
Turkey	1,176		1,176	1,150	23,853
Panama		1,095	1,095		381
Ghana	860	194	1,054		2,865
Côte d'Ivoire	372	643	1,015	370	826
Belarus	250	715	965		8,378
Kyrgyzstan	910		910		
Tunisia	900		900		6,408
Azerbaijan	850		850		4,613
Dominican Republic	800		800	145	1,499
Kenya	700		700		
Serbia	500	200	700		360
Ireland	670		670	100	4,098

Continued on next page.

Gas power capacity in development and operating by country (MW) – continued

January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)

Country	Pre-construction	Construction	All active development	Shelved	Operating
Croatia	500	150	650		886
Egypt		650	650	5,700	53,450
Peru	125	520	645		4,781
Tanzania	620		620	1,998	240
Zimbabwe	620		620		
Ukraine	260	310	570		5,227
Republic of the Congo	566		566		534
Bulgaria	550		550		560
Saudi Arabia		550	550		55,070
Ecuador	510		510		130
France	20	446	466		8,672
Palestine		450	450		80
Cyprus	160	260	420		440
Senegal		420	420		436
Singapore	400		400		10,364
El Salvador		378	378		91
Denmark	362		362		502
Nicaragua		300	300		
Albania	297		297	0	
Oman	132	152	284		13,399
Georgia	272		272		1,142
Cameroon	265		265		
Yemen		264	264	400	342
Armenia		254	254	540	1,832
Guyana	250		250		
Democratic Republic of the Congo	200		200		
Slovenia	60	110	170		421
Guatemala	150		150		
Sierra Leone	89		89		
Mali	65		65		
Togo		65	65		
Czech Republic	45		45		1,256
Bolivia	30		30		2,014

Continued on next page.

Gas power capacity in development and operating by country (MW) – continued

January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)

Country	Pre-construction	Construction	All active development	Shelved	Operating
Austria			0		4,209
Bosnia and Herzegovina	0		0		
Brunei			0	500	212
Cuba			0		486
Estonia			0		173
Ethiopia			0	500	
Finland			0		1,747
Honduras			0	300	
Isle of Man			0		87
Jamaica			0		414
Jordan			0		3,446
Latvia			0		1,073
Lebanon			0	2,750	1,200
Lithuania			0		1,080
Macao			0	0	136
Malta			0		205
Mauritania			0		
Moldova			0		1,080
Namibia			0	443	
Netherlands			0		14,797
New Zealand			0	360	1,311
Norway			0		
Portugal			0		3,938
Slovakia			0		765
Spain			0		26,576
Sweden			0		392
Tajikistan			0		186
Trinidad and Tobago			0		1,993
Turkmenistan			0		6,947
Uruguay			0		840
Venezuela			0		3,385
Zambia			0		
Total	454,140	160,927	615,067	150,592	1,800,173