Global Energy Monitor

# Boom and Bust Gas

2022

## TRACKING THE GLOBAL GAS POWER EXPANSION

Jenny Martos and Julie Joly

Global Energy Monitor

## 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.

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## 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.

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## TRACKING THE GLOBAL GAS POWER EXPANSION

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## 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.**

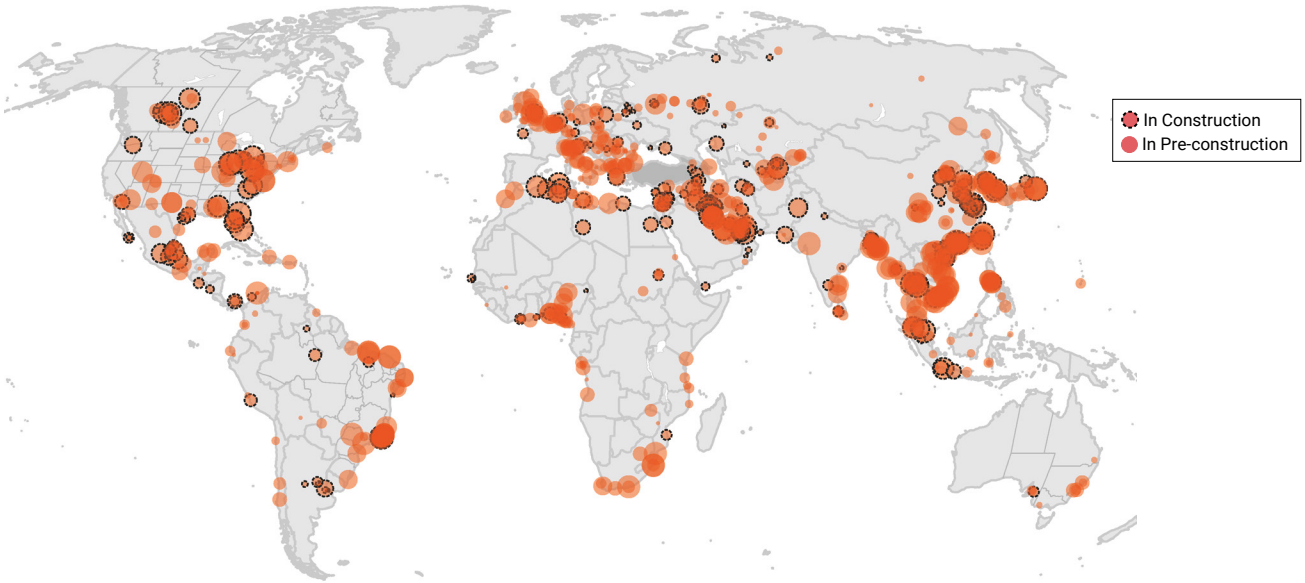



**Table 1. In-Development Coal and Gas Power Capacity by Region.**

| Gas Power Capacity by Region | | |
|---|---|---|
| **Region** | **Pre-construction (MW)** | **Construction (MW)** |
| East Asia | 77,145 | 43,561 |
| SE Asia | 101,211 | 18,835 |
| Middle East and North Africa | 52,998 | 39,929 |
| Latin America and the Caribbean | 56,727 | 16,913 |
| Europe | 57,781 | 7,262 |
| North America | 21,961 | 18,343 |
| Sub-Saharan Africa | 35,281 | 2,731 |
| South Asia | 27,701 | 6,373 |
| Central Asia | 9,505 | 3,601 |
| Eurasia | 7,904 | 2,745 |
| Australia/New Zealand | 3,628 | 380 |
| Western Asia | 2,298 | 254 |
| **Total** | **454,139** | **160,927** |

| Coal Power Capacity by Region | | |
|---|---|---|
| **Region** | **Pre-construction (MW)** | **Construction (MW)** |
| East Asia | 158,946 | 101,969 |
| SE Asia | 41,066 | 24,895 |
| Middle East and North Africa | 0 | 1,850 |
| Latin America and the Caribbean | 3,066 | 0 |
| Europe | 6,040 | 1,570 |
| North America | 300 | 0 |
| Sub-Saharan Africa | 10,890 | 3,390 |
| South Asia | 38,865 | 41,374 |
| Central Asia | 7,716 | 50 |
| Eurasia | 2,193 | 335 |
| Australia/New Zealand | 1,000 | 0 |
| Western Asia | 10,480 | 1,465 |
| **Total** | **280,562** | **176,898** |

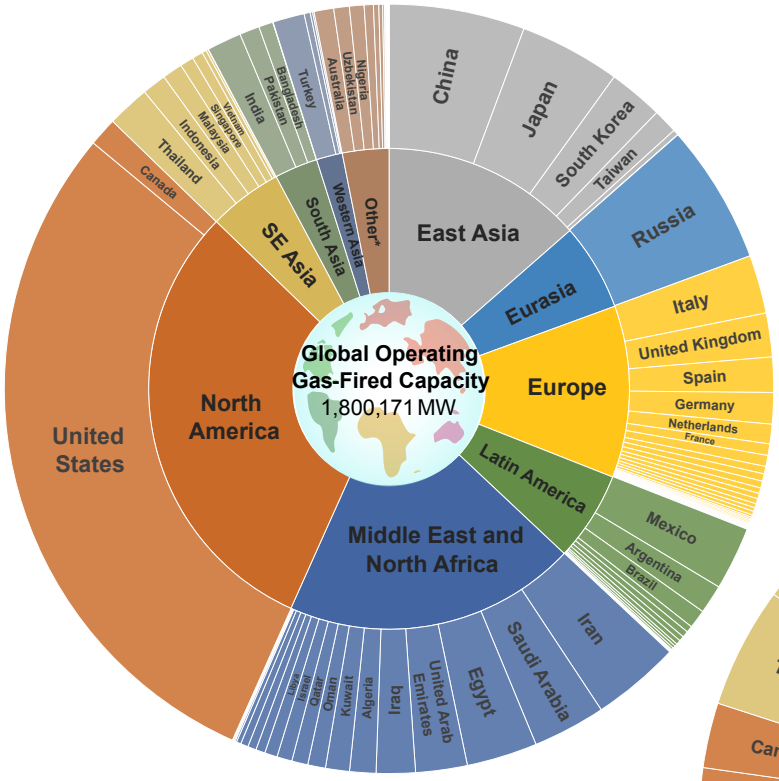
Source: Global Gas Plant Tracker, January 2021; Global Coal Plant Tracker, January 2021

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?**

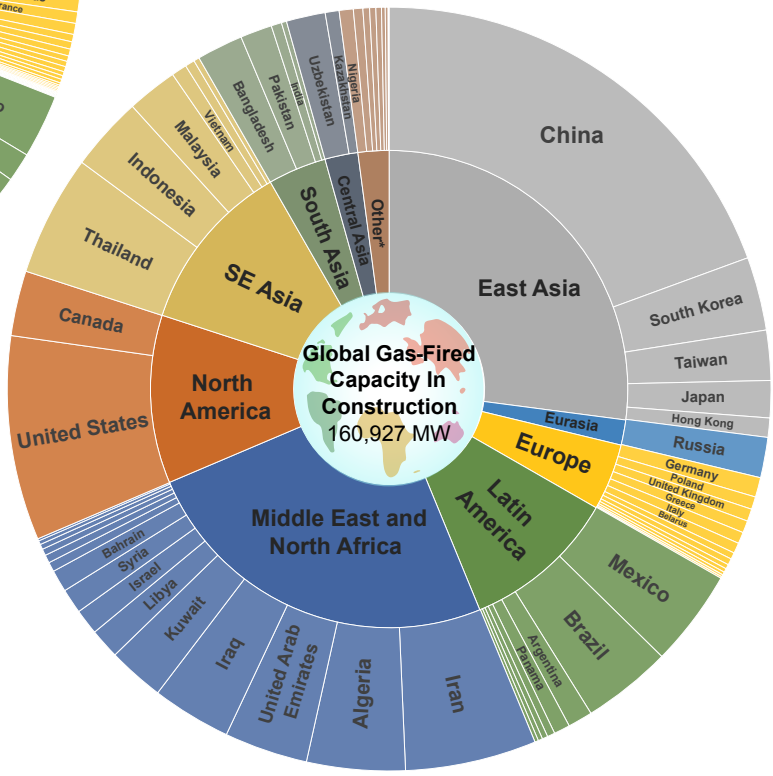
January 2022 (units 50 MW and larger globally; 20 MW and larger in the European Union and the UK)




*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)



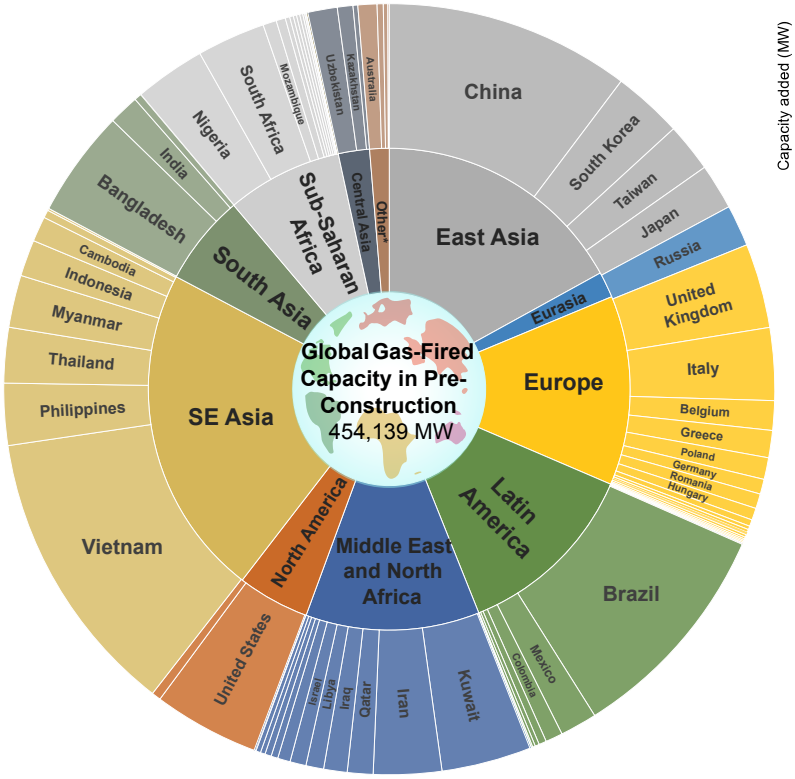

*Other regions includes sub-Saharan Africa, Western Asia, and Australia/New Zealand

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).

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.

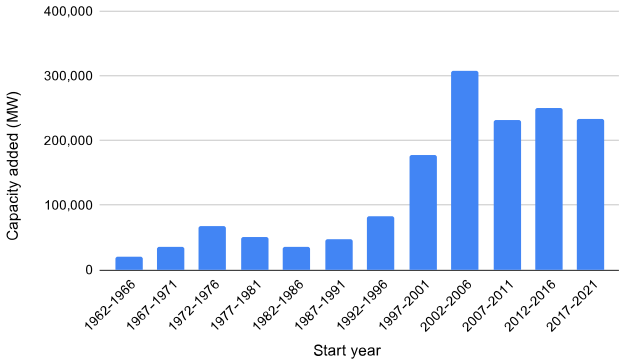
**Figure 4. Where Are Gas Plants in Pre-construction?**

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

**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

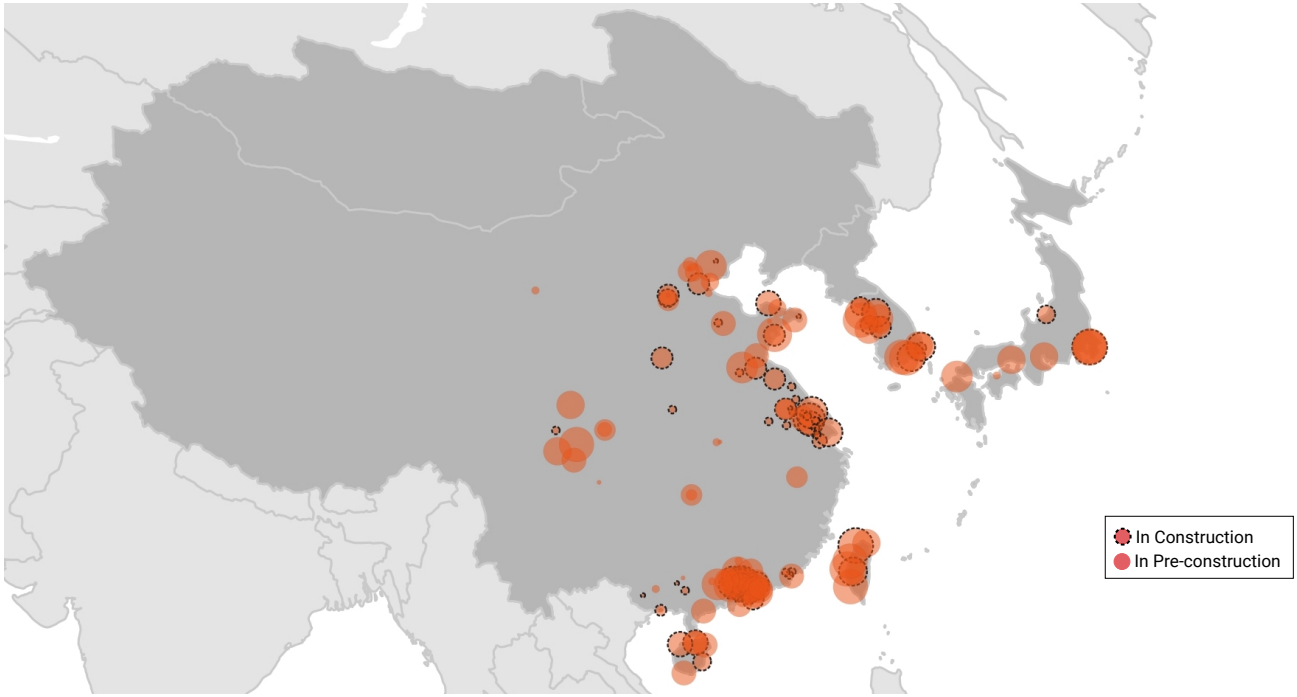
East Asian countries include: China, Hong Kong, Japan, South Korea, and Taiwan.

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

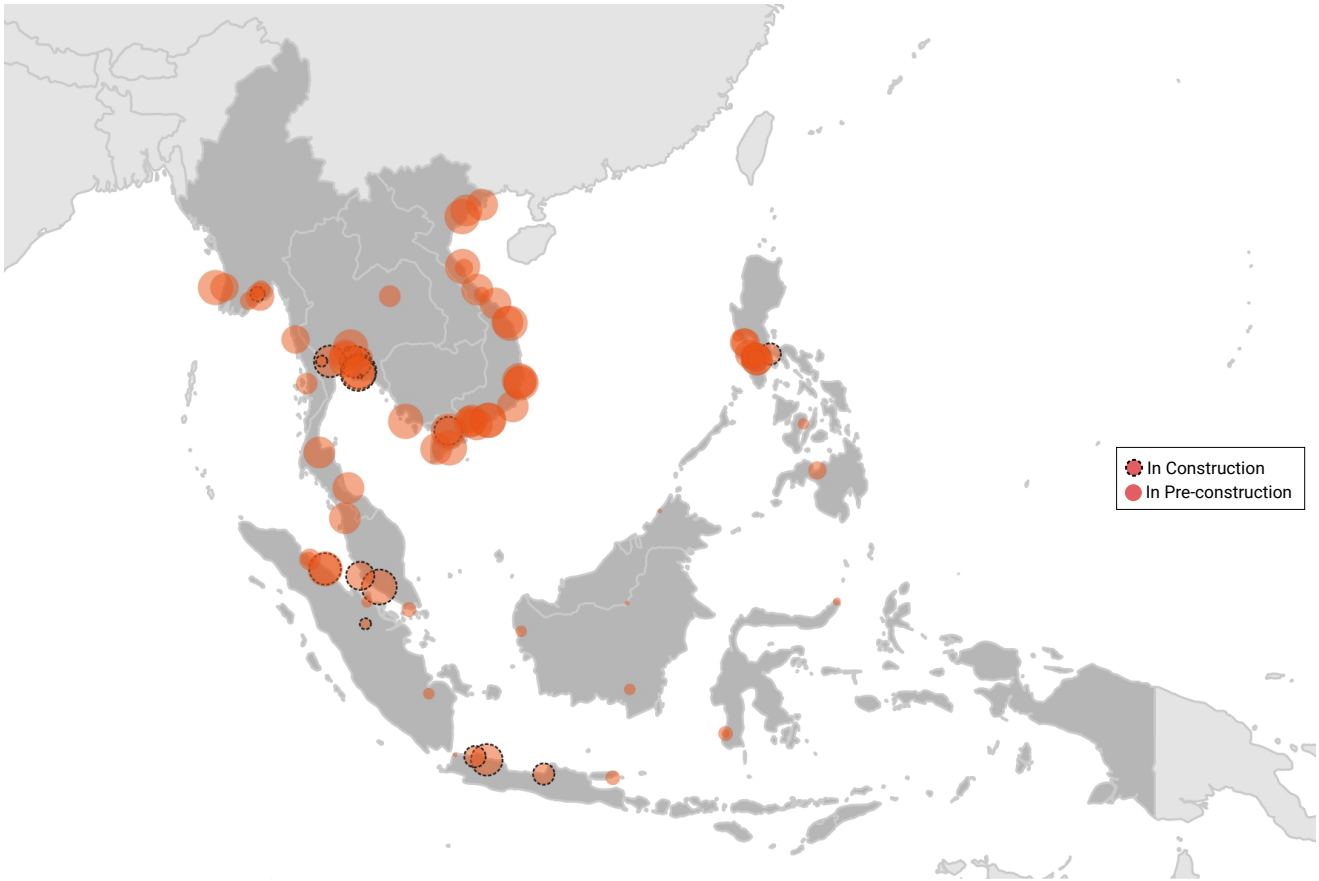
The Southeast Asia region ranks second in planned gas expansion with 120 GW of capacity under construction or in pre-construction. If built, this will more than double the 89.5 GW of existing gas-fired capacity in Southeast Asia and cost US$102 billion.

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.**



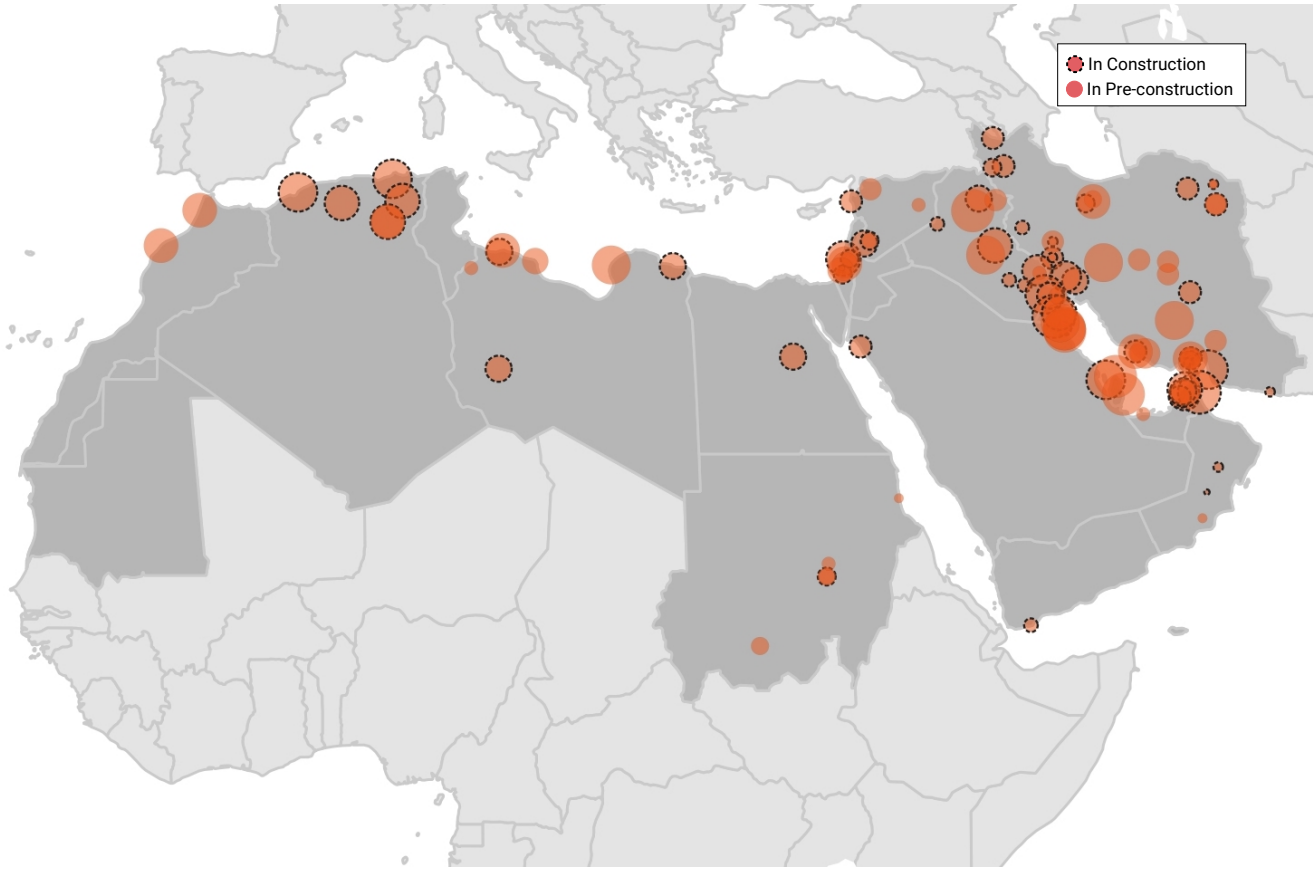
## Middle East and North Africa

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 Petrobas. 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.

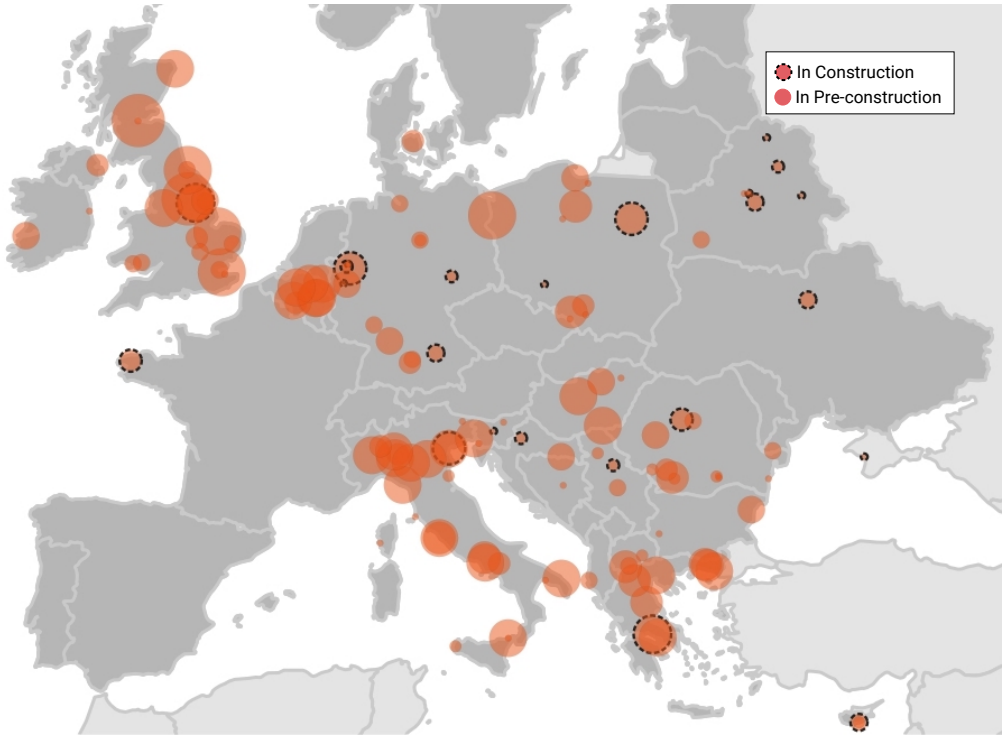
Europe has over 65 GW of gas-fired capacity in development, at an estimated cost of US$61 billion. If built, this will increase Europe's existing gas-fired capacity of 208.1 GW by 31%.

While most European Union (EU) countries have either completely phased out or announced plans[3] 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, 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.

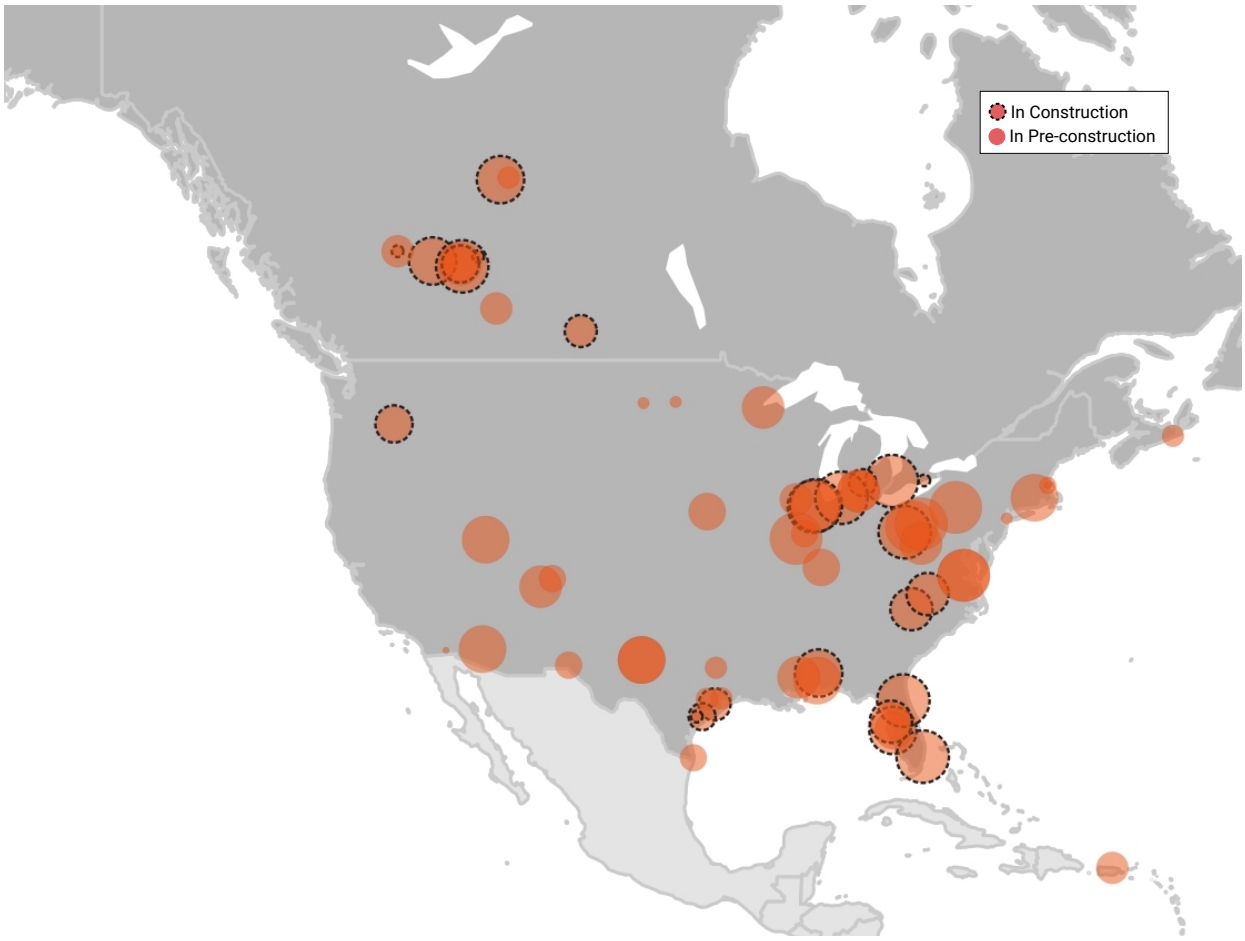
## North America

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 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.**



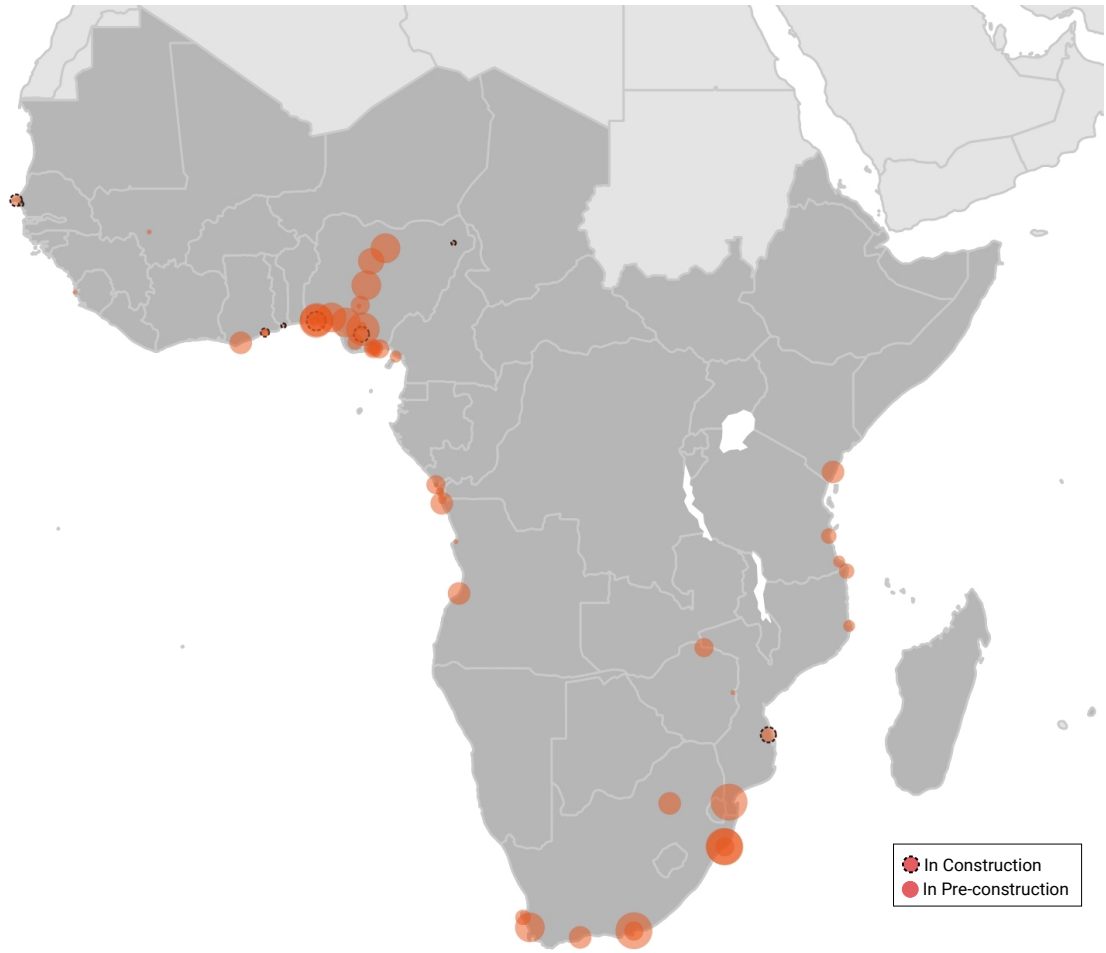
## Sub-Saharan Africa

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.

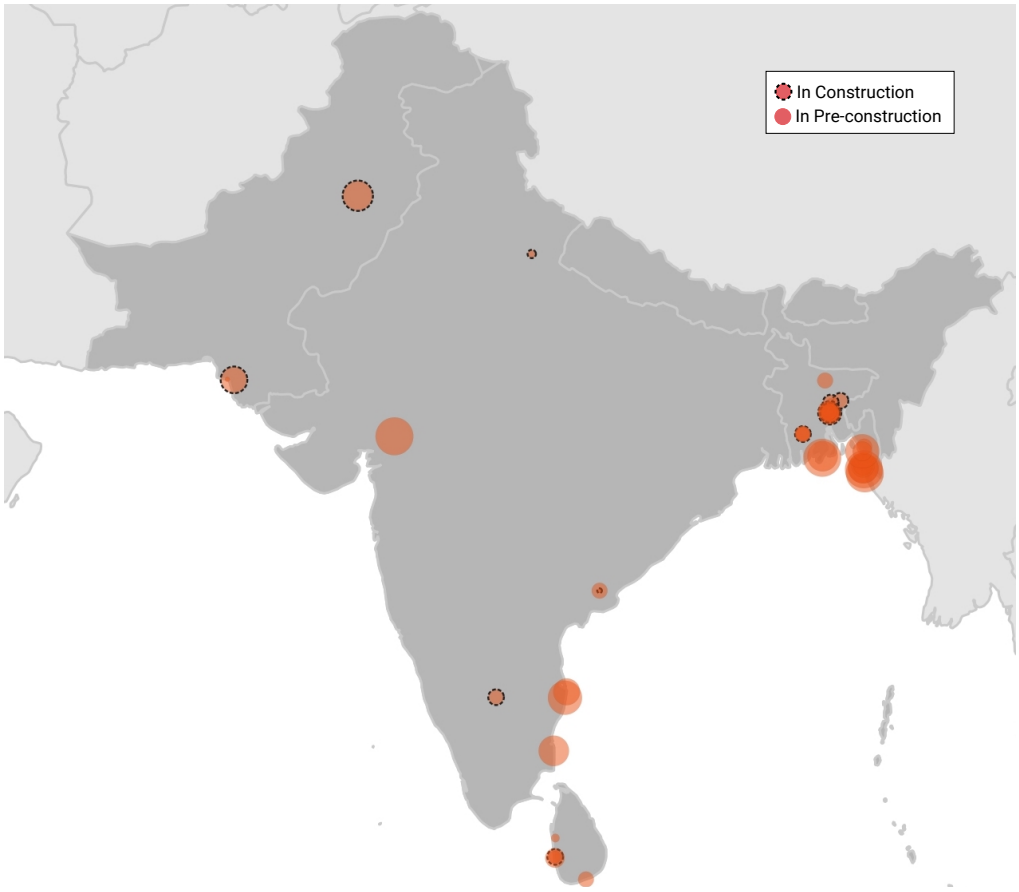
South Asia has over 34 GW of gas-fired capacity in development, at an estimated cost of US$29 billion. If built, this will increase the 52.3 GW of existing gas-fired capacity in South Asia by 65%. Bangladesh leads the region with over 23.6 GW of gas-fired capacity in development, more than double the 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 countries[4], 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

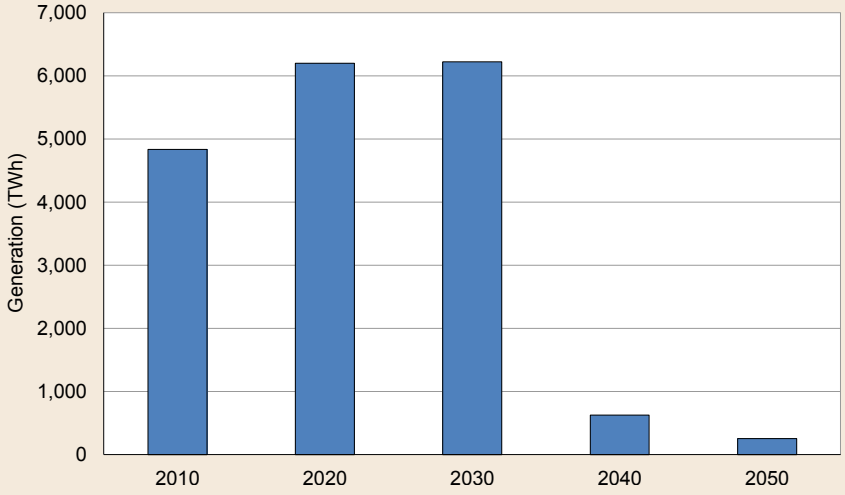
## CLIMATE IMPACT OF GAS-FIRED POWER GENERATION

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 $CO_2$ emissions, and the largest projected source of $CO_2$ 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** |