

ISSUE BRIEF

RISKY BUSINESS:

SURGING U.S. LIQUEFIED NATURAL GAS EXPORTS JEOPARDIZE GLOBAL DECARBONIZATION GOALS

Meeting the world's climate goal to hold temperature rise to 1.5 °C above preindustrial levels will require a fundamental shift in how the world produces and uses energy. Critical to this effort is a rapid shift away from all fossil fuel production, including fossil gas (often misleadingly called “natural gas” by the oil and gas industry). Fossil gas is commonly presented as a “transition fuel”—cleaner and with lower carbon dioxide (CO₂) emissions than coal or oil—and as a potential tool to help address climate change. However, neither fossil gas nor liquefied natural gas (LNG) is clean, nor are they particularly low in greenhouse gas (GHG) emissions. In a 1.5 °C aligned world, CO₂ emissions from fossil fuels will need to decline by 45 percent from 2010 levels by 2030, meaning that emissions from all fossil fuels—including from fossil gas—need to see sharp declines this decade.¹ In fact, recent studies show that expansion of fossil gas infrastructure—such as the current expansion of U.S. LNG export facilities—is utterly inconsistent with the goal of holding warming to 1.5 °C.²

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The International Energy Agency's (IEA) *Net Zero by 2050* report models how the global energy supply mix needs to shift over the next 30 years to achieve a net-zero energy sector by 2050, which would allow us to stay within the 1.5 °C threshold of global warming. Findings from this report suggest that global use of fossil gas must be 55 percent lower by 2050 compared with 2020 levels.³ Furthermore, the IEA's 2050 road map shows that many of the LNG facilities currently under construction around the world or in the planning stage are incompatible with the net-zero scenario, which would see global LNG trade falling by 60 percent between 2020 and 2050.⁴ This necessary global shift away from fossil gas and LNG has massive implications for America's current and planned LNG export facilities.

The United States is expected to become the world's largest exporter of LNG by the end of 2022.⁵ Not only does the U.S. LNG sector cause additional GHG emissions to occur domestically, but it also impedes renewable energy uptake in the importing countries.⁶ If the expansion of U.S. LNG infrastructure is left unchecked, by 2030 the production, transportation, and liquefaction of fossil gas in the United States could generate annual emissions equal to the output of up to 45 million fossil fuel-powered cars.⁷

The United States' support for LNG flies in the face of its climate commitments. In early 2021, the Biden administration announced its nationally determined contributions (NDC) pledge to cut GHG emissions 50–52 percent below 2005 levels by 2030, and it has taken steps to push for greater climate action both domestically and internationally (see text box below).⁸ However, despite efforts to reduce GHG emissions at home and scale up climate action abroad, the United States continues to permit new fossil gas leasing and drilling, approve further infrastructure development, and grant LNG export licenses.⁹

Successive independent studies have confirmed that fossil gas production is responsible for significant emissions annually. A recent report from the IEA found a massive underreporting of methane emissions from the energy sector globally, with U.S. emissions more than 1.5 times higher, according to the IEA, than what the United States reports to the United Nations climate convention.¹⁰

U.S. POLICIES TO END SUPPORT OF OVERSEAS FOSSIL GAS PROJECTS AND EXPAND RENEWABLE ENERGY

In January 2021 President Biden signed the "Executive Order on Tackling the Climate Crisis at Home and Abroad" (E.O. 14008), which established climate considerations as an essential element of United States foreign policy and national security.¹¹ Guided by this executive order, the Biden administration has taken some important steps to advance the implementation of its international climate mitigation goals, curtail new financial support for overseas fossil gas projects, and ramp up support for renewable energy deployment. The administration:

- Released the U.S. International Climate Finance Plan in April 2021 to mobilize financial resources to help developing countries reduce GHG emissions, build resilience, and adapt to the impacts of climate change. The plan addresses the need to better align public and private financial flows consistent with what is needed to achieve the Paris Agreement's temperature and resilience goals.¹²
- Issued the Fossil Fuel Energy Guidance for Multilateral Development Banks in August 2021 to end financial support for new coal and oil projects and to narrow support for overseas gas projects.¹³
- Issued the Interim International Energy Engagement Guidance in December 2021. The guidance stops U.S. government support for unabated* fossil gas, oil, and coal projects overseas and shifts investments into innovative clean, renewable energy projects around the world, except in rare circumstances.¹⁴
- Alongside the European Union, led efforts to launch the Global Methane Pledge at the 2021 Glasgow climate conference.¹⁵ More than 100 nations pledged to collectively reduce global methane emissions by at least 30 percent from 2020 levels by 2030.
- Committed to mobilizing \$11.4 billion of international climate finance per year by 2024.¹⁶ This would include a significant ramp-up in support for overseas renewable energy efforts.
- Launched the Build Back Better World (B3W) and the Department of Energy's Net Zero World initiatives to help countries tap into the growing market for renewable energy.¹⁷

*Abated fossil gas refers to gas used in conjunction with carbon capture, utilization and storage (CCUS) technology

A detailed, satellite-based assessment by the Carbon Mapper project shows almost 1,100 super emitters of methane in the country's Permian Basin alone.¹⁸ This area of western Texas and southeastern New Mexico accounted for almost 17 percent of U.S. fossil gas production in 2021.¹⁹

Clearly, unrestricted expansion of U.S. fossil gas production not only undermines our domestic and global climate commitments and policies but also erodes U.S. credibility as an international climate champion.

It is important that every decision the Biden administration makes going forward facilitate a carbon-free energy future and does not extend global overreliance on fossil fuels, including fossil gas. Plans to limit GHG emissions are only part of the solution. It is equally important that the administration look at ending all support for expansion of U.S. LNG exports to help keep the pathway to 1.5 °C alive. The United States should support a global renewable energy future through efforts including the G7's Build Back Better World, the Net Zero World Initiative, and the implementation of new sectoral announcements made at the Glasgow climate summit, among other things.²⁰ Sustaining expensive and environmentally damaging fossil gas import dependence will not help our trade partners or allies around the world meet either their energy security or decarbonization goals.²¹

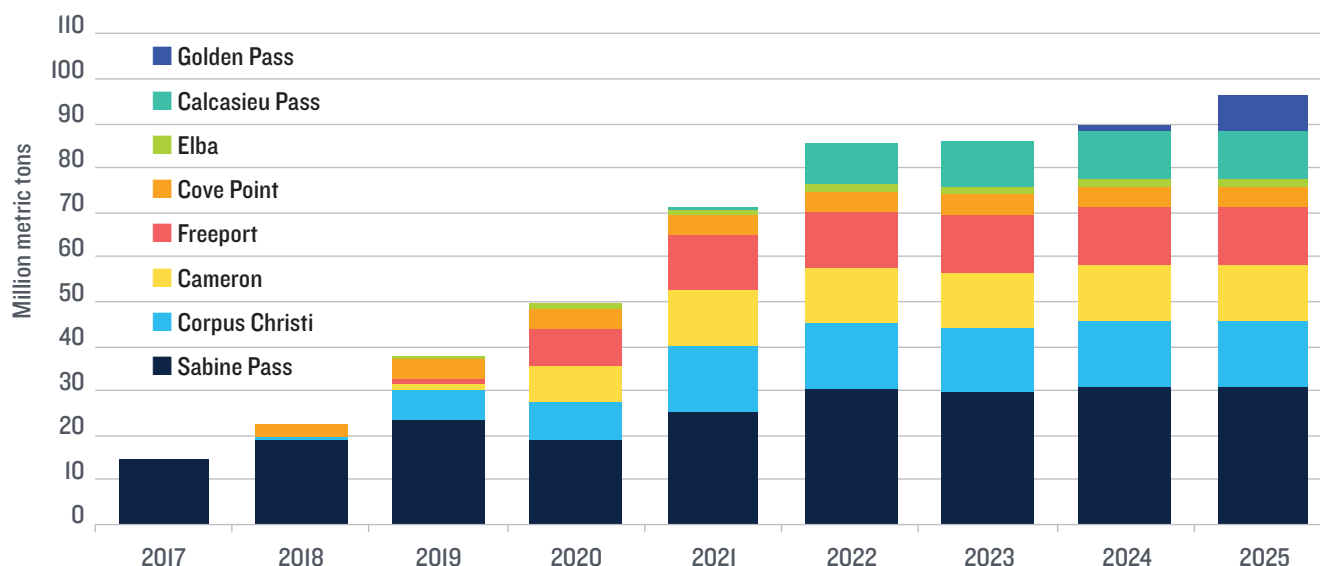
GROWTH OF U.S. LNG EXPORTS

Extensive overseas shipping of U.S. LNG via tankers began in 2016. Total monthly shipments in December 2021 showed that U.S. LNG export volumes had surged to the top of the global rankings, beating Australia and Qatar for the first time in history.²²

After new planned units start operations at the end of 2022, the United States is expected to have the world's largest LNG export capacity.²³ According to the U.S. Energy Information Administration (EIA), peak U.S. LNG liquefaction capacity was 11.6 billion cubic feet (bcf) per day at the end of 2021.²⁴ By the end of 2022, this will have increased to 13.9 bcf per day, exceeding the daily peak capacities of both Australia (11.4 bcf) and Qatar (10.4 bcf).²⁵

This surge in U.S. LNG exports is the result of the shale gas boom, backed by significant investments in liquefaction facilities and a regulatory environment that has effectively approved all LNG permits and infrastructure expansion requests (see text box on page 4). The shale gas boom transformed the United States from a net LNG importer to the top exporter in less than a decade (Figure 1).²⁶

FIGURE 1: U.S. LNG SUPPLY: OPERATIONAL FACILITIES AND PROJECTS UNDER CONSTRUCTION



Note: A sixth liquefaction unit, Train 6, at Sabine Pass began production in 2021. Train 3 at Corpus Christi was commissioned in 2021, Calcasieu Pass LNG will begin production before the end of 2022, and Golden Pass Train I is scheduled to come online in 2024.

Source: BloombergNEF, Global LNG Market Outlook 2021–25.

WHICH AGENCIES REGULATE AND AUTHORIZE NEW U.S. LNG EXPORT INFRASTRUCTURE?

The U.S. Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) split the review of LNG exports.²⁷ FERC reviews applications to build infrastructure, such as LNG terminals or interstate gas pipelines, while DOE reviews applications to export the commodity. Under the Natural Gas Act (NGA), FERC may approve a pipeline if it is required by the public convenience and necessity; it must approve an LNG export terminal unless its approval would be inconsistent with the public interest. The NGA gives DOE no authority to deny exports to countries that have entered into a free trade agreement with the United States, it must approve the export unless the export would be inconsistent with the public interest. Once an LNG export terminal is approved, the Pipeline and Hazardous Materials Safety Administration—part of the Department of Transportation—helps to ensure that LNG facilities are operating safely.

U.S. LNG exports are becoming a significant share of fossil gas imports in many overseas markets. According to U.S. Department of Energy data, between January 2016 and February 2022, 42 countries imported more than 10,406 bcf of U.S. LNG.²⁸ The top 10 importing countries during that time together accounted for over 70 percent of the total volume (see Figure 2).²⁹

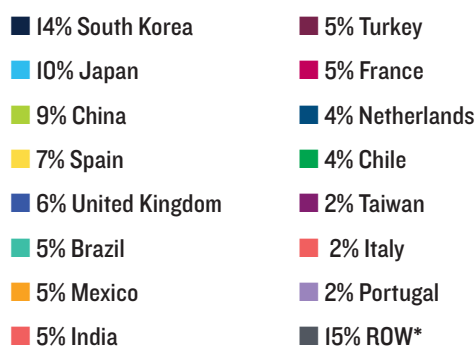
The leading importers of U.S. LNG shipments (by volume) are South Korea, Japan, China, Spain, the United Kingdom, Brazil, Mexico, India, Turkey, and France.³⁰ Among this group, Mexico also has the unique distinction of being the top destination for piped fossil gas from the U.S., with a portion of it intended for re-exports to overseas markets. (See Appendix for a detailed discussion on regional markets for U.S. LNG exports)

The planned expansion of U.S. LNG exports allows the domestic fossil gas sector to continue growing its profits without shouldering any responsibility for the associated

climate and environmental impacts in importing nations. Importing nations must also account for the GHG emissions of the fossil gas they burn on their soil, making it more difficult for them to reach their national climate goals. Further, the Russian invasion of Ukraine has tightened global gas supplies and added even higher price risk for many non-European U.S. LNG importing countries due to increased allocation of U.S. LNG supply to Europe as EU nations attempt to move away from Russian gas imports.³¹

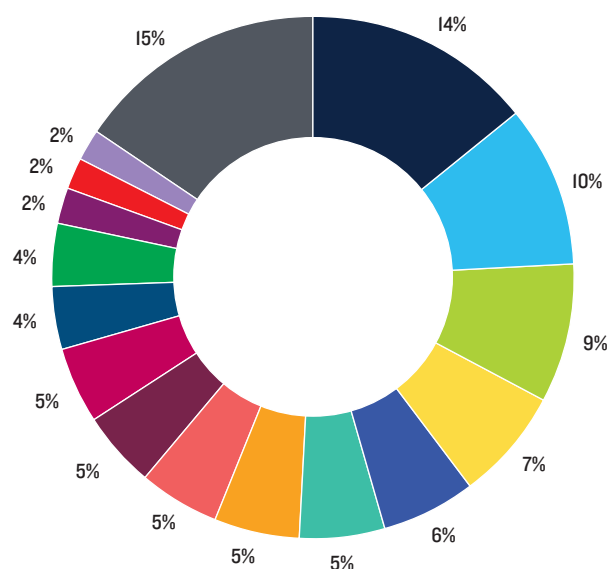
Finally, United States' expansion of LNG supplies is a bad long-term infrastructure bet in the face of declining costs of renewables, energy storage, and electrification projects. As recent analysis shows, it is likely that plans to develop new fossil gas import infrastructure in Europe will result in stranded assets as climate action accelerates the uptake of cleaner and more efficient alternatives.³² Importing countries—especially less wealthy ones—risk wasting money that could instead be spent adopting cleaner energy.

FIGURE 2: U.S. LNG EXPORTS' TOP DESTINATION COUNTRIES, JANUARY 2016–FEBRUARY 2022 (% SHARES)



* Rest of the World includes Argentina, Poland, Pakistan, Jordan, Greece, Dominican Republic, Kuwait, Singapore, Belgium, Lithuania, Thailand, Bangladesh, Jamaica, Croatia, United Arab Emirates, Panama, Israel, Colombia, Egypt, Malta, Indonesia, Malaysia.

Note: Rounding may impact totals.



Source: U.S. DOE, LNG Monthly, April 2022.

“Some countries are turning to new unabated natural gas as a transition fuel. Burning natural gas produces fewer emissions than coal, but it is mainly composed of methane. Unless fully abated, new natural gas capacity will lock in decades of new emissions when we should all be focusing on deploying abundant and cheap clean energy.”*

— U.S. Climate Envoy John Kerry, February 21, 2022³³

**Abated fossil gas refers to gas used in conjunction with carbon capture, utilization and storage (CCUS) technology.*

SURGING U.S. LNG EXPORTS ARE INCOMPATIBLE WITH CLIMATE MITIGATION AND ENERGY SECURITY GOALS

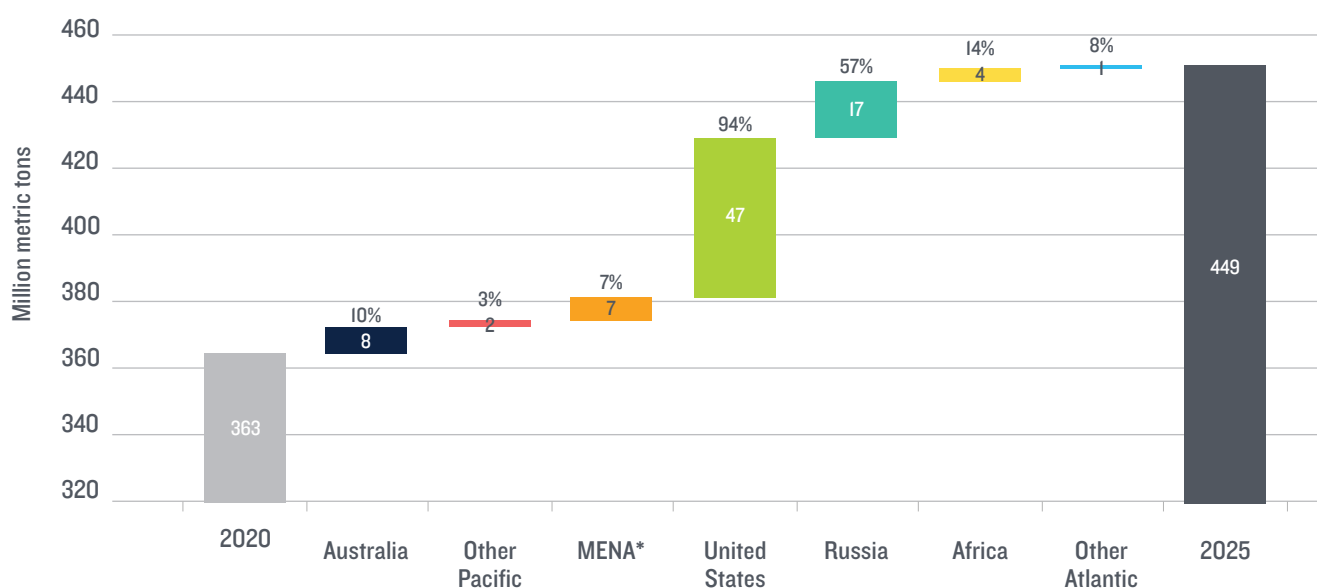
In its *Climate Change 2022: Mitigation of Climate Change* report, the Intergovernmental Panel on Climate Change (IPCC) highlights the need for immediate and deep emissions reductions across all energy sectors.³⁴ The report further states that projected CO₂ emissions—over the lifetime of existing and currently planned fossil fuel infrastructure—will, without additional abatement actions, exceed the total cumulative net CO₂ emissions allowable under scenarios that limit warming to 1.5 °C.³⁵ In this context, it is difficult to make a case for sustaining or expanding the extraction of fossil gas, even as a transition fuel. It’s essential that fossil gas production decline well before the end of this decade.

However, the opposite is occurring, both globally and within the United States. According to a recent study by Climate Analytics, fossil gas was the largest source of fossil

fuel-based CO₂ emissions increases between 2010 and 2019 globally, accounting for 42 percent of the rise.³⁶ Fossil gas operations were responsible for about 60 percent of methane emissions from overall global energy production during that same period.³⁷

Within the United States specifically, the EIA expects that domestic fossil fuel production will continue to rise in 2022 and reach a new record in 2023.³⁸ According to Bloomberg New Energy Finance, in 2022 U.S. LNG production is set to rise to 85 million metric tons per annum (Mtpa) from 74 Mtpa in 2021. In fact, Bloomberg’s *Global LNG Market Outlook 2021–25* forecasts that U.S. LNG supply will grow 94 percent by 2025 relative to 2020 levels (see Figure 3).³⁹ Much of this growth is driven by the continued build-out of new export capacity.⁴⁰ U.S. LNG exports grew 50 percent between 2020 and 2021 alone, reaching record levels as fossil gas prices and global demand for LNG rebounded from pandemic-related lows.⁴¹

FIGURE 3: GLOBAL ENERGY SUPPLY GROWTH BY REGION, 2021–2025



* MENA (Middle East and North Africa)

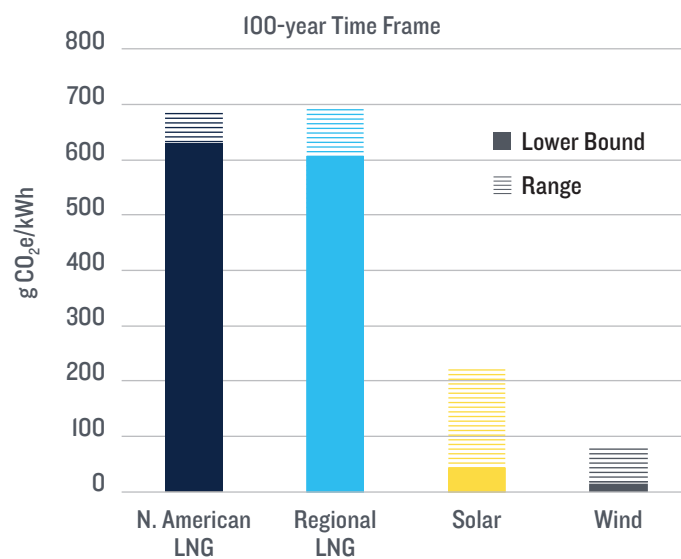
Source: BloombergNEF, *Global LNG Market Outlook 2021–25*.



Contrary to narratives about fossil gas as a climate-friendly fuel, the expected rise in emissions from growth in LNG supply is alarming. It is true that in direct comparison with coal, prior literature has found that U.S. LNG produces 27 to 33 percent less life-cycle GHG emissions.⁴² However, this literature may have assumed relatively low methane leakage rates, below third-party estimates for the country or those reported in certain producing basins.⁴³ This could mean that U.S. LNG's emissions are considerably higher than prior literature has estimated, and that the advantages of U.S. LNG, relative to fossil alternatives like coal, are actually more limited than previously believed. Methane, which is the principal component of fossil gas, does not persist in the atmosphere as long as CO₂ does, but its climate impact is more than 80 times stronger in the short term (20 years) and 28 times stronger over the long term (100 years); it is the second-biggest driver of climate change.⁴⁴

When compared with the clean energy alternatives like solar and wind that fossil gas is competing with in the marketplace, its climate impact is much higher (see Figure 4). In a rebuttal to those who would call LNG a “transition fuel” or claim that it is clean energy, the emissions gap between LNG and renewable energy sources is clear.⁴⁵ Life-cycle GHG emissions for solar power are less than 7 percent of LNG emissions; emissions for wind power are even lower, less than 2 percent of life-cycle LNG emissions.⁴⁶ The climate benefit of switching to renewables based power generation compared to fossil gas based generation is clear.

FIGURE 4: LIFE-CYCLE GHG EMISSIONS FROM LNG EXPORTS TO EUROPE AND ASIA COMPARED WITH SOLAR AND WIND



Note: Regional LNG represents LNG exported from Australia to Asia and from Algeria to Europe.

Note: Solar and Wind Life-Cycle Assessment values updated to reflect 2021 NREL data.

Source: NRDC, *Sailing to Nowhere*, 2020.

Further, although the emissions associated with the shipping and end uses of U.S. LNG will occur beyond U.S. borders and not be counted as part of our national total, the production of LNG, particularly the methane released during the drilling and transport of fossil gas for export, adds to domestic GHG emissions and makes it more difficult for the United States to meet its nationally determined contribution (NDC) in line with the Paris Agreement.⁴⁷ The U.S. is currently not on track to meet its stated NDC target of 50 to 52 percent GHG emissions reductions below 2005 levels by 2030—and, according to the Climate Action Tracker, even meeting that target would be insufficient to stay on track to hold warming to 1.5 °C.⁴⁸

I. Investing in overseas LNG assets means financing infrastructure with a limited life span

The United States must end any support for expansion of fossil gas infrastructure overseas, to avoid inadvertently creating future stranded assets.⁴⁹ In both the developed and developing parts of the world, building new fossil gas or LNG infrastructure is a risky investment. In Southeast Asia,

65 percent of existing and planned fossil gas plants would be incompatible with the 1.5 °C temperature target, according to researchers at the University of Oxford.⁵⁰ In Poland, new renewable capacity is already cheaper than planned new large-scale fossil gas, meaning that any new large-scale fossil gas projects there could be forced to close well before their useful life is over.⁵¹

U.S.-supported multilateral development banks continue to play a significant role in funding fossil gas expansion in Asia.⁵² Such public finance support is key to the success of expensive fossil energy projects. Since these projects and facilities have only limited potential to be repurposed cost effectively, they will no longer be able to generate an economic return in the wake of changes associated with decarbonizing the global economy. The build-out of fossil gas supply chains, including import terminals, regasification facilities, and associated pipelines, is capital intensive.⁵³ LNG import dependence in the current volatile market is already sparking concerns that these large planned investments will be at risk of becoming stranded assets due to limited project life spans.⁵⁴



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“If we really want to stop long-term making Putin very rich, we have to invest in renewables and we need to do it quickly. If you really want to make sure that you can provide stable, affordable energy to your citizens, renewables is the answer.”

— Frans Timmermans, European Commission executive vice president,
in remarks to European environment ministers, January 22, 2022⁵⁵

II. LNG imports do not guarantee energy security for allies

The U.S. fossil gas industry and its supporters claim that increasing LNG exports in the long term is crucial to the national security interests of importing nations because it ensures their access to a diversified fossil gas supply.⁵⁶ However, these claims are at best a half-truth, especially around the ongoing European gas crisis.⁵⁷ Further dependence on imported LNG only prolongs our allies’ exposure to global market volatility and price shocks and embeds long-term import dependence. A smart strategy would see U.S. LNG-importing countries ramp up plans to achieve their energy security and climate targets with local, national, and regional clean energy resources as early as possible.

There is an emerging consensus among energy experts that the days of low gas prices may be over for the foreseeable future in Europe and worldwide.⁵⁸ Fossil gas contracts for future deliveries, especially in Europe, are increasingly factoring in high prices for 2023, 2024, and likely even beyond.⁵⁹ Any energy security benefits Europe may obtain from relying on U.S. LNG supply will be shaded by the risk of rising gas prices that have the potential to cause devastating near-term shocks to the economy and consumers in these countries.⁶⁰

Further, the U.S. government cannot guarantee the destination of private LNG cargoes currently or in the future.⁶¹ Price arbitrage opportunities to take advantage of record prices across the world continue to attract global energy traders and LNG exporters.⁶² In this volatile market, U.S. LNG spot cargoes occasionally have been diverted mid-route to whichever market was paying the highest price.⁶³ This could be Europe one day, Asian countries the next, or markets in the Americas the following day.

Europe and Asia need to rethink their dependence on fossil gas and plan to limit their exposure to volatile energy prices. Importing more U.S. LNG to supplement energy diversification is just a short-term measure that does not take away the risk of future supply disruptions. To ensure that they are not reliant on imported LNG cargoes or piped fossil gas, Europe and Asia should expand their investment in renewable energy sources and accelerate the development and implementation of respective national clean energy transition plans.



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This shift is already occurring in Europe. The 2022 Russian invasion of Ukraine has seen a previously unthinkable political U-turn by the European Union to end its reliance on all fossil fuels imported from Russia. As a response to the crisis the European Commission crafted the REPowerEU plan, which calls for more affordable, secure, and clean energy.⁶⁴ Recent studies looking at the proposed plan to wean Europe from Russian gas have found that renewable energy, heat pumps, and energy efficiency could play dominant roles in the transition, and that Europe could curtail by 66 percent its demand for Russian gas by 2025 via clean energy solutions alone.⁶⁵ Another study, by the German think tank Agora Energiewende, came up with a 15-point plan consisting of priority actions that the buildings, industry, and power sectors in Europe could take to move away from importing fossil fuels from Russia. These priority actions could eliminate 1,200 terawatt-hours of fossil gas consumption by 2027, which is 80 percent of the fossil gas currently imported to Europe from Russia.⁶⁶

Several European countries have already expanded their renewables capacity and promoted energy efficiency.⁶⁷ In 2021 five European countries introduced legislation to ban licenses for new oil and gas exploration.⁶⁸ Countries including key U.S. allies in Europe will increasingly make energy choices that limit their exposure to global fossil fuel market volatility and reduce their energy import dependence—fostering true clean energy security.

It is clear that long-term demand for fossil gas in Europe, including LNG, will fall sharply by the end of this decade. Europe’s efforts to regain its energy independence will likely prioritize the reduction of fossil gas consumption from all sources across all end-use sectors.

*“Putin has broken the narrative of natural gas as a bridging technology;
the bridge has collapsed.”*

— Dr. Patrick Graichen, state secretary at the German Federal Ministry for Economic Affairs and Climate Action⁶⁹

III. LNG price volatility puts consumers and economies at risk

The global LNG markets are currently experiencing extraordinary volatility. In September 2021, Platts' Japan-Korea Marker (JKM) Asian LNG spot price (immediate market price, as opposed to price under long-term contract) was assessed at \$27.27/MMBtu, up from just \$4.78/MMBtu a year ago.⁷⁰ Similarly, the Dutch Title Transfer Facility (TTF) day-ahead contract was assessed at \$23.59/MMBtu, more than six times higher than the price a year ago.⁷¹ This price volatility is expected to continue for the foreseeable future, thanks to the ongoing geopolitical and energy supply crisis.⁷²

Given the volatility of LNG markets at present, reliance on U.S. LNG imports will expose importing countries (particularly those in the global south) to greater energy-supply insecurity and associated economic risks from LNG supply shocks and disruptions.⁷³ For example, a recent report explored some of the negative consequences that could accompany continued growth of U.S. LNG exports to countries in Asia, including increased fuel costs.⁷⁴ The report highlights the potential impact of LNG pricing volatility on gas-based power generation throughout the region as a major concern associated with high dependence on LNG imports. LNG price spikes could potentially lead

to increased electricity tariffs and operating costs for industries. These consequences could in turn reduce the economic competitiveness of domestic industries and businesses as well as raise prices for consumers. For example, in 2021, South Korea saw electricity prices rise nationwide for the first time in eight years, the increase corresponding with spikes in the contracted spot prices of LNG cargoes due to the ongoing global gas crisis.⁷⁵

These impacts were also seen throughout the latter half of 2021 in other countries, notably including Bangladesh, Pakistan, and Thailand, with dire economic and social consequences (see text box below).⁷⁶ And the problems aren't going away: In early 2022, Asian importers seeking spot LNG cargoes needed to pay sky-high rates to attract shipments away from Europe, which is experiencing high demand for U.S. LNG in the wake of the Russian invasion of Ukraine.⁷⁷

The debilitating effects of LNG price volatility are likely to be an issue for the future of most fossil gas importing countries. Import dependence on fossil fuels is an avoidable risk with clear cost-effective alternatives like greater renewable energy, energy efficiency measures, and energy storage in the energy mix.

BANGLADESH'S GAS PRICES COULD DOUBLE IN THE FACE OF VOLATILE LNG MARKETS

In early 2022, geopolitics and LNG market volatility led state-owned gas distributors to propose a doubling of retail gas prices in Bangladesh.⁷⁸

Bangladesh is heavily dependent on fossil gas for its energy needs and began importing LNG to meet the shortfall from its domestic gas fields in 2018.⁷⁹ Bangladesh now is one of the fastest-growing LNG import markets in Asia.⁸⁰ The country imported almost 58 bcf of LNG between February 2016 and February 2022 from the United States.⁸¹

The U.S. International Trade Administration, in its 2021 update on Bangladesh, stated that U.S. companies have had an outsize role in its energy industry.⁸² For example, in 2021, the American manufacturer GE supplied the gas turbine for the 583 MW combined cycle power plant at Meghnaghat.⁸³ Before then, GE had approximately 3 GW of installed gas turbine capacity in the country.⁸⁴

The current gas crisis in Bangladesh emphasizes the folly in rushing to gas as a transition fuel. Bangladesh is deepening its energy import dependence and exposing its economy to volatile commodity prices. The rising cost of LNG imports has had significant financial and economic impacts for Bangladesh, including higher electricity prices for millions of consumers.⁸⁵ To add to this, the anticipated spike in energy costs will create a disproportionate burden on poor Bangladeshi households and could further jeopardize the country's industrial recovery in the post-pandemic period.⁸⁶ In addition to the energy crisis, the World Bank noted that in 2020 the pace of poverty reduction in Bangladesh slowed, exports declined while inequality increased, and the poverty rate increased to 18 percent from 14 percent. Sustained high prices of energy imports add a disproportionate burden on poorer developing countries. There is an urgent need to support developing countries like Bangladesh away from their unsustainable dependency on fossil fuels and towards a low-carbon energy future.



RENEWABLES LED ENERGY TRANSITION WILL HELP LIMIT THE ROLE OF LNG

Fossil gas coupled with carbon capture, utilization, and storage (CCUS) technology is at best a temporary complement to renewables (see text box on page 11), especially in the power sector. As renewables-based power generation increases and the cost of energy storage comes down, it is expected that fossil gas plants will increasingly be relegated to providing energy only when the grid is overtaxed; facilities that do this are known as seasonal/peaking capacity plants. And even that arrangement is likely to be tenuous moving forward. BloombergNEF found in its modeling scenarios that solar photovoltaic (PV) technology paired with storage is already cost competitive with fossil gas peaking plants.⁸⁷ Traditional fossil fuel-based energy sources, including LNG, are simply running out the clock.

By the end of 2021, the world was meeting almost 10 percent of its electricity generation needs from wind and solar energy.⁸⁸ According to the most recent IPCC report, between 2015 and 2020 the costs of electricity from solar PV and wind dropped 56 percent and 45 percent, respectively, and battery prices dropped by 64 percent.⁸⁹ According to Bloomberg, in nearly half the world it is now cheaper to build and operate a new large-scale wind or solar power plant than to run an existing coal or gas-fired plant.⁹⁰ The pace of renewable energy installations, implementation of energy efficiency measures, and development of energy storage solutions is only increasing.⁹¹ This energy transition is set to continue and could help meet the energy needs of importing countries without investing in new, expensive, polluting fossil gas infrastructure that will make it impossible to stay on track toward the 1.5 °C global warming goal.

“Renewable energy is potentially the greatest peace plan in history.”

— Jennifer Granholm, U.S. Secretary of Energy,

in remarks to U.S.-EU Energy Council Ministerial on February 7, 2022⁹²



RENEWABLES STEP UP AS NEW-BUILD FOSSIL-FUEL CAPACITY ADDITION SLOWS GLOBALLY

Globally, plans for expanding coal-based power plants have fallen in number in recent years.⁹³ The financial prospects for the remaining proposed plants dramatically declined in 2021 as the United States, China, the European Union, Japan, and South Korea—the largest public funders of overseas fossil fuel projects—formally committed to ending support for coal projects in the run-up to the Glasgow climate conference.⁹⁴ This commitment, from all the G-20 nations, made any new coal power plant outside China and India difficult to fund, as expansions in key countries are heavily dependent on overseas public finance.⁹⁵

In Europe, because of soaring gas prices in the second half of 2021, new renewables overwhelmingly replaced fossil gas.⁹⁶ Since 2019 almost 52 percent of new renewable generation has directly replaced fossil gas-based power generation in Europe.⁹⁷

The EIA, in its 2022 *Annual Energy Outlook*, says that in the United States, renewable electricity generation will increase more rapidly than overall electricity demand through 2050, meaning that renewables will become the dominant source of electricity generation.⁹⁸ The EIA also predicts, in its March 2022 *Short Term Energy Outlook*, that most of the growth in U.S. electricity generation in 2022 and 2023 will come from new renewable energy sources.⁹⁹ It forecasts that the share of generation for non-hydropower renewable sources in this country, including solar and wind, will grow from 13 percent in 2021 to 17 percent in 2023 and that fossil gas-based generation will fall from 37 percent in 2021 to 34 percent in 2023.¹⁰⁰

A recent study of least-cost energy pathways for India, conducted by Lawrence Berkeley National Laboratory, concluded that almost 467 GW of renewables-based new generation capacity (solar, wind, storage) will come online by 2030 in that country to meet demand, compared with only about 25 GW of new fossil gas-based power plants.¹⁰¹

As renewables become increasingly cost competitive with fossil fuel-based power generation, the economics of new gas-fired power generation has become tenuous. Recent findings by the Carbon Tracker Initiative indicate that almost one-third of U.S. gas-based power plants and one-fifth of those in Europe are not making a profit.¹⁰²

The shift away from fossil fuels is imminent. However, that global transition is still hindered by a glut of carbon-intensive U.S. LNG supply.

CONCLUSION

In April 2021, the Biden administration announced a goal to reach 100 percent carbon-free electricity by 2035, coupled with a global drive to help “keep 1.5 °C alive” this decade.¹⁰³ However, unrestrained growth of LNG exports makes it harder for the United States to reach its emissions goals, wastes resources on infrastructure with potentially shortened life spans, locks our allies abroad into higher-emission energy pathways, and undermines our role as a leader rallying the world to do what is necessary to avoid climate catastrophe. Championing global climate action requires that the Biden administration facilitate a clean energy future and not perpetuate our overreliance on volatile fossil fuels. Instead of continuing to support LNG exports, the administration should fully deliver on commitments made under the U.N. Paris Agreement and the Glasgow Pact as well as Biden’s own executive orders.

The writing is on the wall for the U.S. fossil gas sector in the next few decades: Decarbonization is coming. Non-fossil energy sources are getting cheaper every day. The United States’ planned transition to 100 percent carbon-free

electricity within 13 years and net zero GHG emissions by mid-century will accelerate development and deployment of modern clean energy technologies at scale at home and abroad.

Looking ahead, the United States should invest in research, development, and deployment of climate and clean energy technology with a plan to be a global leader in this space. In addition, we must set up clear guidelines for its financial institutions and its banking industry to align their lending practices to meet long-term climate-safe lending benchmarks. Finally, the administration must robustly implement recent energy engagement guidance to stop funding fossil fuel infrastructure overseas.

Instead of leading the world in LNG exports, the United States must curb the deeply harmful expansion of this sector and phase out all support for overseas fossil gas investments impeding decarbonization goals worldwide. We cannot continue to permit new fossil gas expansion, approve further LNG infrastructure development, and grant export licenses—period.

© Courtesy Deepwater Wind



APPENDIX: U.S. LNG—REGIONAL IMPORT MARKETS

Asia's growing appetite for U.S. LNG risks stranded assets and endangers climate targets

In 2021 China overtook Japan for the first time to become the world's largest importer of LNG. China imported 81.4 million tons per annum (Mtpa) of LNG in 2021, up 18 percent from a year earlier.¹⁰⁴ Japan was in second place with 75 Mtpa, South Korea ranked third with 46.4 Mtpa in imports, and India ranked fourth with 24.8 Mtpa.¹⁰⁵ Incidentally, in 2021 four of the largest Asian markets for U.S. LNG—namely China, Japan, South Korea, and India—announced net-zero goals and signed on to various pledges to accelerate their decarbonization efforts. Fulfilling these pledges will require these countries to significantly change their fossil fuel-based energy systems, including their reliance on fossil gas.

China has set the goal of peaking carbon emissions before 2030 and reaching carbon neutrality by 2060.¹⁰⁶ U.S. LNG exports to China saw the biggest ever year-on-year jump, rising 187 percent to 9.21 Mtpa in 2021. U.S. LNG accounted for almost 12 percent of China's total LNG imports in the year, up from 4.8 percent in 2020.¹⁰⁷

In 2021 Chinese firms signed long-term contracts for more than 10 Mtpa of U.S. LNG supplies with exporters Cheniere Energy and Venture Global.¹⁰⁸ The contracts extend to the mid 2040s and have provisions for flexibility in market destinations for the bulk of the purchases. U.S. LNG exporters are depending on China to support their long-term growth.¹⁰⁹ For their part, China's oil and gas companies are looking to transition from being large end users to powerful integrated portfolio players in the coming years.¹¹⁰ This lateral trade move, along with rising consumption of U.S. LNG imports in China, is inconsistent with the long-term decarbonization goals of both countries. China and the United States need to step away from deepening their fossil fuel engagements and raise their climate ambitions.

Japan, in late 2021, put out a new clean energy road map that could see a decline in the use of LNG. Under the latest outline of its *6th Strategic Energy Plan*, the country has decided to bring down LNG's share in the energy mix to around 20 percent by 2030, from 37 percent in 2019.¹¹¹ However, despite its Glasgow commitments, Japan's energy transition is expected to be highly dependent on fossil fuels for the next decade, as plans for expanding solar and onshore wind are limited.¹¹² Like China, Japan has signed long-term contracts with U.S. LNG exporters and plans to expand its funding of overseas LNG infrastructure, including facilities in the United States.¹¹³ The continued support for and investments in fossil gas will extend Japan's dependence on imports in the long term and make its climate goals more difficult to reach, while hampering other countries' low-carbon plans.

India met 6 percent of its total primary energy demand with gas in 2020.¹¹⁴ As part of its planned move away from coal, the share of gas is expected to rise to 15 percent by 2030.¹¹⁵ However, recent spot price volatility of LNG imports could actually help kick-start a shift to cleaner fuels, like biogas or biomethane, which may be more favorable for both the climate and India's long-term economic development.¹¹⁶ India is dependent on the spot market to meet almost 25 percent of its gas demand. Recent modeling conducted by Lawrence Berkley National Laboratory to assess India's least-cost pathway to reach 450 GW of capacity from renewables by 2030 suggests that fossil gas will likely be limited to providing flexible seasonal capacity.¹¹⁷ The use of fossil gas in the industrial sector and the expansion of piped gas infrastructure for domestic cooking need to be reassessed, considering previous years' price volatility, with a view toward reducing India's long-term dependence on LNG imports and meeting its net-zero goal.

South Korea has been the largest importer of U.S. LNG since 2016, accounting for almost 15 percent the total exported volume. In Glasgow, South Korea pledged to reduce emissions by 40 percent (from 2018 levels) and signed the Global Methane Pledge to reduce methane emissions 30 percent by 2030. Overall, the country is expected to use 15 percent more LNG by 2034.¹¹⁸ Its fossil gas use is expected to peak in the same year.¹¹⁹ Recently South Korea moved to include LNG in its taxonomy of green fuels, making this change in line with the EU's Sustainable Finance Taxonomy update in 2021 to consider fossil gas and nuclear energy as "green" under certain circumstances.¹²⁰ Availability of abundant U.S. LNG supplies in South Korea, one of the most fossil fuel-dependent nations in Asia, will only help to delay its plans to deliver on its 2050 carbon-neutral pledge.

Vietnam isn't currently a major importer of U.S. LNG. However, it is commonly cited as a growth market for LNG, with at least 22 projects with a combined 65 GW capacity in its development pipeline as of December 2020. This represents most of the gas projects in development within Southeast Asia at present.¹²¹ The Vietnamese government plans to more than triple the nation's gas capacity by 2045 and is increasingly promoting LNG imports as a significant part of Vietnam's future energy mix.¹²² Further, these new Vietnamese gas-fired power plants would be subject to higher fuel price risk of contracting expensive LNG supplies. It is likely that over time usage rates of that infrastructure will decline in favor of cheaper power sources like renewables, resulting in these newly built gas-fired plants becoming distressed or stranded assets.

European LNG imports from the United States climb due to energy crisis

Between 2016 and February 2022, European markets received just under 35 percent of all U.S. LNG exports.¹²³ Spain, the United Kingdom, France, Turkey, and Italy were the largest importers in the region.¹²⁴ The U.S. government has been actively pushing LNG exports to European countries, largely based on helping to “diversify and render its energy supply more secure.”¹²⁵ By the first quarter of 2021, the U.S. had become the leading LNG exporter to Europe.¹²⁶

U.S. plans to bolster LNG exports to Europe could complicate climate efforts across the region. The proposed gas infrastructure expansion in the EU is inconsistent with the bloc’s legally binding goal of cutting emissions 55 percent by 2030.¹²⁷ To achieve the 2030 target, fossil gas use will need to decline 36 percent between 2020 and 2030 across the EU.¹²⁸

A legacy multilateral collaboration involving the EU’s 12 central and eastern member states—the Three Seas Initiative (3SI)—strongly favors fossil gas over renewable energy and risks locking in new gas infrastructure beyond 2050.¹²⁹ The participating countries are Austria, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The U.S. government pledged \$1 billion toward this initiative in 2020.¹³⁰

Poland, one of the 3SI countries, has embarked on a very expensive journey to build new fossil gas capacity. Recent analysis of five planned gas plant projects indicates that none will be financially viable without subsidies through capacity market mechanisms.¹³¹ The five units alone could cost Polish taxpayers more than \$4.4 billion if they proceed to development. And this does not consider future price volatility for any fossil gas used during the projects’ lifetimes. This money can easily be redirected toward renewables, energy efficiency, or even R&D on innovative technology to get to the 2050 EU carbon neutrality target.

Analysis shows that across the EU, LNG terminals under construction will add 20 billion cubic meters (bcm) per year of capacity at a cost of €2.6 billion, and those in the preconstruction stage would add 81 bcm per year at a cost of €13 billion.¹³² As shown by this analysis, the EU does not need this major expansion of gas infrastructure and can end Russian gas imports by 2025.¹³³ Construction of additional terminals would interfere with the EU’s climate goals by locking in expensive infrastructure that is paid for with limited public resources. To achieve the reductions in gas consumption that are called for in the European Commission’s outlook for 2030, fossil gas consumption will need to immediately start declining at a rate of more than 4 percent per year.¹³⁴

The largest European recipients of U.S. LNG are countries that have either effectively phased out coal-fired power plants or have a near-term timeline for doing so. The high life-cycle emissions of U.S. LNG have raised concerns about the climate benefits of such imports, leading some European customers to reject the fuel.¹³⁵ U.S. LNG isn’t necessarily replacing coal-fired generation in Europe—it is more likely just substituting in place of fossil gas from other sources.

U.S. LNG helps sustain fossil fuel dependence in Latin America

Latin American countries accounted for almost 20 percent of U.S. LNG exports between 2016 and February 2022. Brazil (5.4 percent), Mexico (5.2 percent), Chile (3.8 percent) and Argentina (1.9 percent) were the leading destinations in this region for U.S. LNG exports during this period.¹³⁶

Latin American countries that are highly dependent on hydropower tend to have an element of seasonality associated with LNG demand. Also, most Latin American countries post a lower emissions profile in the energy sector than do other nations, due to their large hydropower generation capacity.

Mexico is the largest Latin American market for total U.S. gas exports.¹³⁷ The country imported approximately 2,260 bcf by pipeline from the U.S. during 2020, and in June 2021 pipeline imports from the U.S. accounted for almost 76 percent of Mexico’s total natural gas supply.¹³⁸

Mexico’s long-term role in the LNG market looks more likely to be as a hub for re-exporting U.S. gas. In 2021 CF Energía, a subsidiary of the public utility CFE (Comisión Federal de Electricidad), sought formal expressions of interest from private sector firms to build and operate a gas pipeline and floating LNG export terminal at Salina Cruz.¹³⁹ The plans to build out CFE’s pipeline system will allow a higher volume of gas imports, which would supply projects that are in development along Mexico’s Pacific Coast as U.S. gas exporters rush in to meet the rising Asian demand for LNG. For example, the U.S.-based energy infrastructure company Semptra is proceeding with plans to expand the Energía Costa Azul export project on Mexico’s Pacific coast to supply Asian markets. Semptra opened the Costa Azul LNG Terminal in Mexico in 2008. In November 2020 Semptra Energy announced that it had reached a final investment decision for the development, construction, and operation of the ECA LNG Phase 1 natural gas liquefaction–export project on the Baja Peninsula in Mexico. In 2021 Semptra announced plans to expand its export capacity and develop another export terminal named Vista Pacifico. Both of the proposed LNG export projects in Mexico would rely on fossil gas exported from the United States.

As more U.S. gas is shipped globally out of Mexico, this is likely to not only complicate Mexico’s renewable energy transition but add to its national carbon footprint.

Brazil, whose energy mix relies heavily on its hydroelectric-based power generation, was the largest market for U.S. LNG exports in Latin America between 2016 and February 2022.¹⁴⁰ A severe drought impacted water levels across its dams in 2021, and the ensuing hydroelectric power shortfall added to Brazil's demand for LNG imports.¹⁴¹

The country imported a record 23 million cubic meters per day of LNG in 2021, a volume around 200 percent higher than in the previous year.¹⁴² In April 2021, Brazil passed the New Gas Law, setting the basis for a deep reform of its gas market.¹⁴³ A key driver of this reform was the Brazilian government's desire to attract more investments and market players to build out the necessary infrastructure for a higher share of gas use.¹⁴⁴ Between now and 2030, the share of hydropower in Brazil's energy mix is expected to drop to 49 percent from almost 70 percent.¹⁴⁵ During the same period, the share of fossil gas is expected to reach almost 15 percent, up from a 6 percent share.¹⁴⁶

In July 2021, the heart of South American winter, U.S. LNG purchases by Brazil and Argentina together surpassed those by China, with the two countries buying more than 62 bcf of gas, compared with China's 42 bcf.¹⁴⁷ Buying expensive LNG imports to meet domestic demand is requiring Argentina to tap into its already strained foreign reserves.¹⁴⁸ Argentina is trying to develop its shale gas fields in Vaca Muerta to increase production and reduce its dependence on LNG imports.¹⁴⁹

Chile was among the earliest nations to import U.S. LNG after the launch of Cheniere Energy's Sabine Pass liquefaction facility in 2016.¹⁵⁰ Under the 2003 free trade agreement between the two countries, LNG cargoes from the United States are not subject to Chile's 6 percent import tariff. Chile, like Brazil, suffered a serious drought in 2021, but unlike Brazil and Argentina, it moved away from buying more LNG in the face of price volatility in the global markets.¹⁵¹ Instead, it largely moved toward diesel as a substitute fuel during 2021.¹⁵²

Latin American consumers have been negatively impacted by LNG price volatility over the past year.¹⁵³ Due to recurring drought, the supply of hydropower in the region is being threatened, forcing many countries to compete for gas as a backup fuel.¹⁵⁴ Cheap U.S. LNG imports could sustain dependence on overseas fossil gas in the long term. Latin American countries have excellent renewable energy resource profiles: Approximately 59 percent of the electricity generation mix in Latin America and the Caribbean is sourced from renewable energy.¹⁵⁵ Energy transition plans for Latin America should continue to put renewables first.



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