

September 2024

Analysis: LNG + Department of Energy's Public Interest Determination

Under the Natural Gas Act, DOE must deny authorizations for non-FTA LNG terminals when their harms outweigh their public benefits. Oil Change International presents the following scientific evidence, showing that DOE must strengthen its analysis of LNG's climate impacts and conclude that no additional LNG terminals may be approved as meeting the Public Interest standard.

The bottom line is that methane gas production and consumption must decline immediately to meet climate goals. Additional supply and export infrastructure will undermine domestic and international efforts to prevent climate catastrophe.

Fossil fuel expansion continues unabated despite evidence showing no alternative to fossil fuel phase-out that does not risk severe climate disruption. LNG is a key driver of this expansion in the U.S. and as a global market commodity, and therefore, it is a key threat to meeting international climate goals. The U.S. acknowledged this need by backing the call for a fossil fuel phase-out at COP27, but it has hypocritically continued permitting more gas and oil production and export facilities and is considering additional LNG terminals.

A country can only claim adequate climate ambition by committing to stop worsening the problem through fossil fuel expansion. New gas fields and LNG facilities will exacerbate the climate crisis or become stranded assets that leave behind clean-up burdens, revenue shortfalls, and job losses. Gas expansion, in particular, is a barrier to the clean energy future we need to avert catastrophe.

Additionally, LNG export terminals release not only planet-heating emissions but also harmful pollutants such as volatile organic compounds, nitrogen oxides, sulfur dioxide, carbon monoxide, and particulate matter.¹ The majority of the planned and existing terminals are in communities with higher cancer risks, higher respiratory hazards, and higher minority populations and/or low-income populations, with residents among the most susceptible to harmful pollutants.²

There is no alternative to reducing gas production if we are to stay within 1.5°C. Even if LNG's upstream and midstream emissions were somehow minimized or negated — which is uncertain — approving new facilities will lock in downstream emissions that move us farther from climate goals. The global carbon budget has no room for gas production or infrastructure expansion.

The oil and gas industry has proposed several false solutions aimed at providing cover for continued gas expansion, including on-site CCS, certified gas, and methane pledges. These red herrings distract from the need to phase out gas *regardless of* how methane-intensive it is. Despite touted technological improvements, methane emissions from oil and gas are rising in lockstep with production growth.³

In its current state, LNG is even more harmful than standard gas because of the energy-intensive process used to liquefy, transport, and regasify it. Methane escapes at every stage. But even if these harms are mitigated, more LNG terminals will mean more production, and more production means more emissions at a time when the world must urgently transition to renewable energy sources to meet climate goals.

It is inaccurate to assume that LNG exports will displace coal in the power sector. Renewable energy and energy storage are displacing coal generation today, a trend that will only increase. Replacing coal with gas in the power sector, even where upstream and midstream emissions are minimized, will not reduce emissions enough to maintain a safe climate.

International Energy Agency: To meet climate goals, we must stop extracting fossil fuels, close gas fields, and halt new infrastructure plans, including LNG facilities

The IEA has mapped out a net-zero emissions (NZE) scenario, showing what fossil fuel consumption must look like if we want to stay under 1.5°C of warming to avoid the most catastrophic effects of climate change. In May 2021, the agency found no new coal mines or oil and gas fields should be developed if the world is to hold warming to 1.5 degrees Celsius.⁴

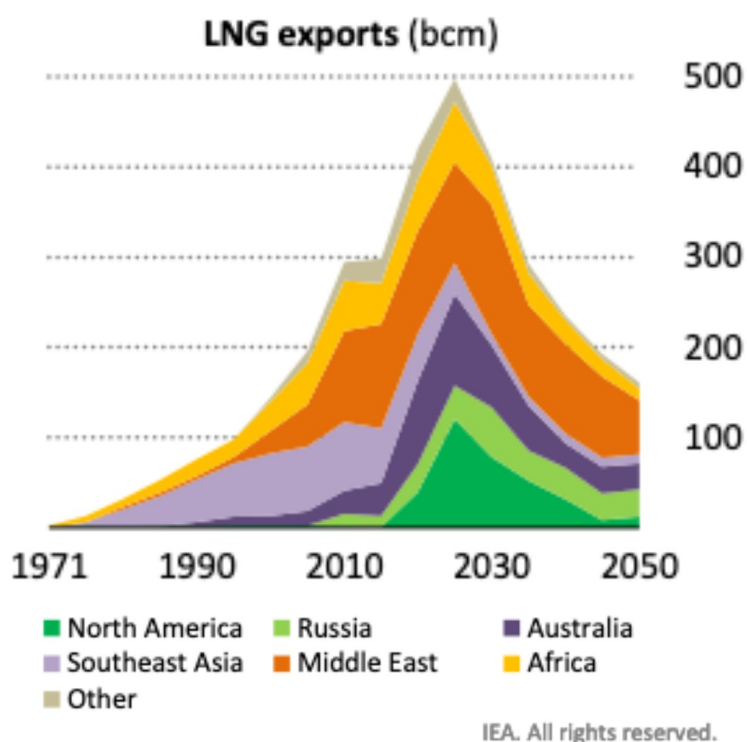
¹ Alexandra Shaykevich, "Troubled Waters for LNG: The COVID-19 Recession and Overproduction Derail Dramatic Expansion of Liquefied Natural Gas Terminals," Environmental Integrity Project, October 2020, <https://environmentalintegrity.org/reports/troubled-waters-for-lng>

² EJScreen: Environmental Justice Screening and Mapping Tool, United States Environmental Protection Agency, <https://www.epa.gov/ejscreen>

³ Oil Change International, "U.S. Gas Industry Claims Are False: Analysis of IEA Methane Tracker Finds U.S. Oil & Gas Sector Lags Behind Eighteen Other Countries on Emissions Intensity," May 2024, <https://priceofoil.org/2024/05/16/u-s-gas-industry-claims-are-false-analysis-of-iea-methane-tracker-finds-u-s-oil-gas-sector-lags-behind-eighteen-other-countries-on-emissions-intensity/>

⁴ International Energy Agency, "Net Zero by 2050: A Roadmap for the Global Energy Sector," May 2021 <https://www.iea.org/reports/net-zero-by-2050>

Global LNG exports by region in the NZE



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The report also outlined the declining role of gas and LNG trade: “No new natural gas fields are needed in the NZE beyond those already under development. *Also not needed are many of the liquefied natural gas (LNG) liquefaction facilities currently under construction or at the planning stage.*”⁶

That was in 2021. 16.5 million tons per annum (Mtpa) of new capacity has been brought online in the US since 2021. A shocking 74 Mtpa is currently under construction.⁷ Therefore, US capacity additions already overshoot the IEA’s NZE scenario for LNG. The DOE’s pause affects planned terminals well beyond any interpretation of the IEA’s analysis. There is no plausible scenario in which the LNG capacity currently affected by the pause could go ahead that does not lead to an overshoot of the 1.5°C goal. Looking deeper into IEA’s NZE scenario, we can see the pace by which LNG must be phased out: “Between 2020 and 2050, natural gas traded as LNG falls by 60%,”⁸ while inter-regional LNG trade peaks in 2025.⁹ (These new facilities would add capacity beginning after that date.)

⁵ “Net Zero by 2050: A Roadmap for the Global Energy Sector,” page 175

⁶ “Net Zero by 2050: A Roadmap for the Global Energy Sector,” page 102

⁷ BNEF Global LNG Import, Export Project Database, 2Q-2024 Update

⁸ “Net Zero by 2050: A Roadmap for the Global Energy Sector,” page 102-103

⁹ “Net Zero by 2050: A Roadmap for the Global Energy Sector,” page 175

To meet climate goals, gas demand must decline by more than 5% annually, on average, in the 2030s. This will lead to the closure of some gas fields.¹⁰ Gas will be largely displaced by renewables and storage in the power sector, while energy efficiency and hydrogen made with renewable energy could reduce gas use in other sectors, including industry and buildings.

In addition, NZE requires that the remaining gas emissions be fully mitigated by carbon capture and storage (CCS). However, CCS remains unproven, expensive, and unreliable. The 2023 update to the 2021 NZE reduced reliance on CCS by 40%. If CCS and other carbon removal technologies currently being developed fail to deliver at the levels outlined in the NZE, which current trajectories suggest, steeper reductions in gas production and consumption will be required to meet climate targets.

Fossil fuels in existing extraction projects exceed what we can burn to meet climate goals.

In May 2022, researchers published a peer-reviewed analysis finding that “staying within a 1.5°C carbon budget (50% probability) implies leaving almost 40% of 'developed reserves' of fossil fuels unextracted.”¹¹

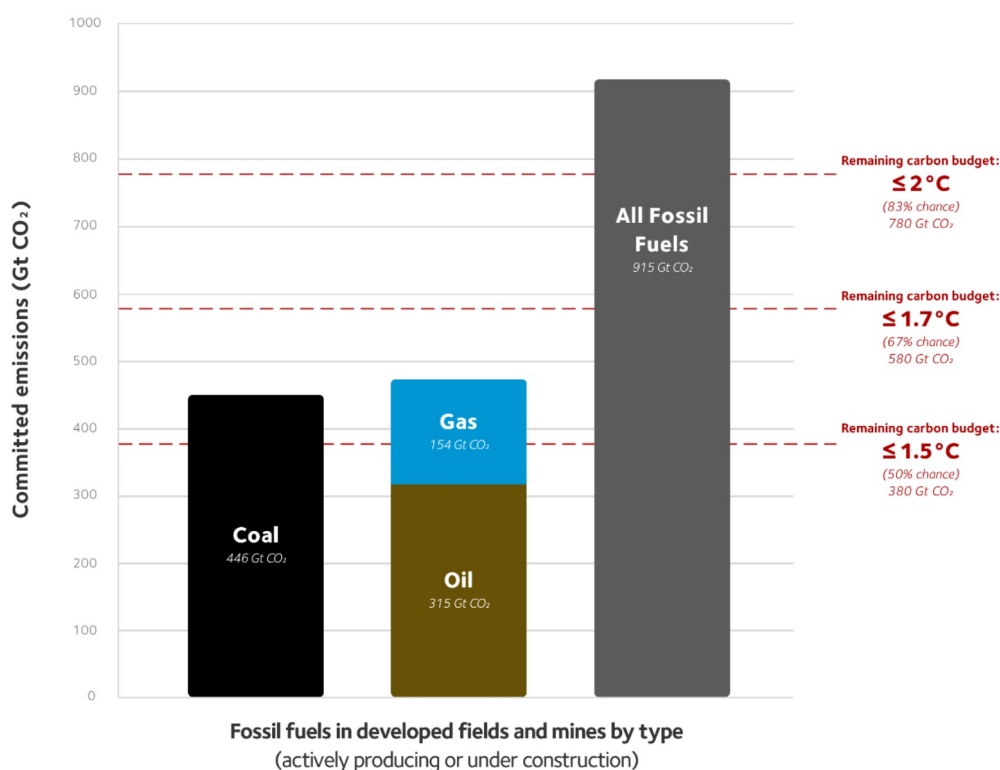
In August 2023, our research team updated this analysis, which was based on the remaining carbon budget in 2018. They found that the majority of fossil fuels deemed economically extractable in active fossil fuel production projects must stay in the ground to meet climate goals.¹² If developed reserves were fully extracted, the resulting cumulative carbon emissions would exceed by 25% the maximum allowed for maintaining 1.5°C. It would be enough to push us past 2°C, making parts of the planet newly uninhabitable.

¹⁰ “Net Zero by 2050: A Roadmap for the Global Energy Sector,” page 103

¹¹ Kelly Trout et al, “Existing fossil fuel extraction would warm the world beyond 1.5 °C,” Environmental Research Letters, May 2021, <https://iopscience.iop.org/article/10.1088/1748-9326/ac6228>

¹² Oil Change International, “Sky’s Limit Data Update,” August 2023, <https://priceofoil.org/content/uploads/2023/08/skys-limit-data-update-2023-v3.pdf>

CO₂ emissions committed by developed oil and gas fields and coal mines, compared to remaining carbon budgets from the start of 2023



Specifically, **60% of developed reserves must stay in the ground** as of 2023 versus 40% as of 2018 — reflecting the increasingly deep emissions hole we must dig out of. Even if no new gas fields are developed and coal extraction stops tomorrow, roughly 20% of oil and gas fields must be shuttered to achieve 1.5°C. If carbon pollution continues at 2022 levels, we only have **five to eight years left** until emissions exceed the level that has a 50% chance of causing warming to exceed 1.5°C.¹³

The conclusion is clear: Besides ceasing new fossil development, as the IEA called for, governments must ensure existing extraction sites are shuttered ahead of schedule. Demand created by new LNG terminals would stimulate additional gas production at precisely the time when we need to put gas production into decline.

New LNG facilities support a business-as-usual trajectory that fails climate goals.

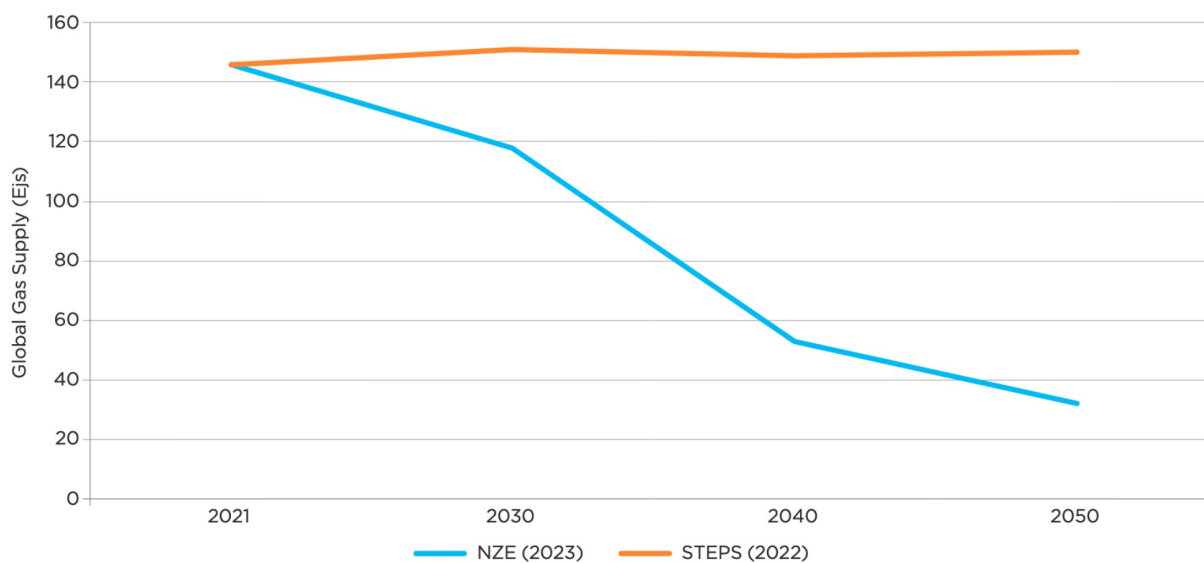
The IEA NZE projects a nearly 80% decline in fossil gas use by 2050 compared with 2022 levels.¹⁴ In the figure below, the blue line shows the decline in fossil gas use needed to achieve NZE, while the orange line represents a continuation of business as usual.

¹³ Sky's Limit Data Update. p. 4

¹⁴ Oil Change International, "The Climate Case Against Gas Expansion," October 2023, <https://priceofoil.org/content/uploads/2023/10/Africa-Gas-Factsheet-1.pdf>

As mentioned above, the NZE already includes ambitious targets for carbon capture, primarily capturing emissions from gas in sectors that are difficult to electrify. There is no alternative to reducing gas production and consumption. There is no room for additional LNG capacity. The capacity operating today will need to be phased out.

Global Gas Supply in IEA Scenarios - Business-as-Usual (STEPS) Vs Net Zero Emissions (NZE)

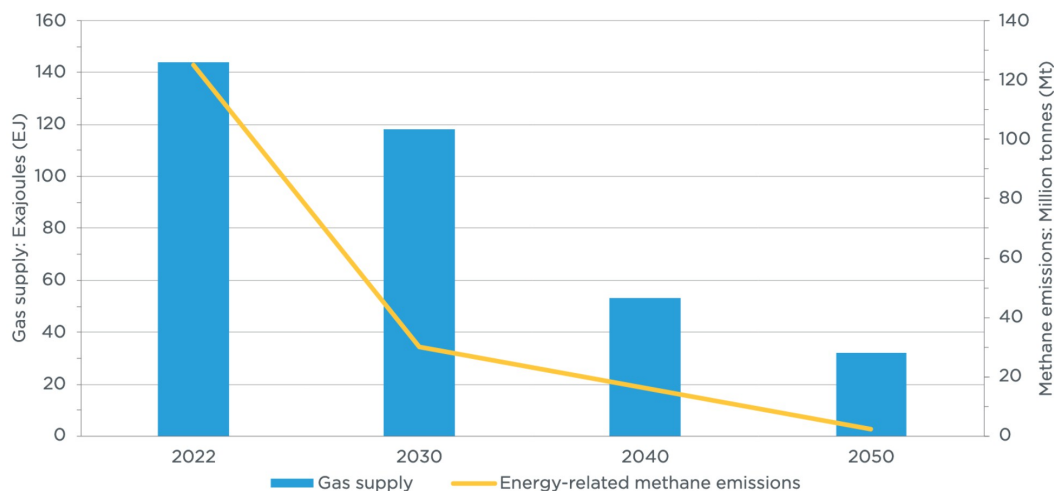


Source: Oil Change International based on IEA's [Net Zero Report \(2023\)](#) and [World Energy Outlook 2022](#)

Reducing methane emissions in the oil and gas sector is not a substitute for phase-out.

Even if the LNG industry could drastically curtail its methane emissions — which is uncertain — the proposed terminals will still expand gas use at a time when we need to be phasing it out.

The Decline of Gas Supply and Methane Emissions in the IEA's Net Zero Emissions Energy Scenario (2023)



Source: Oil Change International based on IEA's [Net Zero Report \(2023\)](#)

The yellow line in the chart above shows what should happen to energy-related methane emissions to achieve the IEA's NZE and keep warming within 1.5°C: energy-related methane emissions plunge 75% by 2030 and decline to near zero by 2050 (right-hand axis). This is the maximum reduction deemed technically feasible by the IEA. However, this does not afford any increase in gas production and consumption. As indicated by the shrinking blue bars in the chart, gas supply should also decline by almost 20% by 2030 and close to 80% by 2050 (left-hand axis). As mentioned above, the IEA's NZE already assumes ambitious levels of CCS to mitigate remaining gas combustion.

Therefore, there is no alternative to reducing gas supply and consumption starting today. No matter how leak-proof and efficient the LNG industry claims it can become, proposed new terminals exporting additional gas will move us farther from the 1.5°C goal. It could not be clearer that we need to clean up the oil and gas sector while also phasing it out. Doing one without the other simply will not be enough to prevent massive climate impacts.

Progress on either goal is currently floundering. While emissions from burning fossil fuels continue to rise, methane emissions from the oil and gas sector are also increasing, and the US is the largest source. The IEA estimated 2023 methane emissions from global oil & gas operations at 77 million metric tonnes (Mt), with an additional 2.5 Mt coming from end-use equipment, including power plants, gas stoves, and boilers.¹⁵ This totals 79.5 Mt, a 2 Mt rise

¹⁵International Energy Agency, "Global Methane Tracker 2024," March 2024, <https://www.iea.org/reports/global-methane-tracker-2024>

from 2022.¹⁶ Based on a 20-year Global Warming Potential (GWP) factor of 85, 79.5 Mt of methane equals almost 6.8 billion tons of CO₂ equivalent (CO₂e). This means that global oil and gas methane emissions in 2023 were equivalent to the emissions of around 1,737 coal plants.¹⁷

The US oil and gas sector emits more methane than any other, and the total volume of its methane emissions from oil and gas systems grew from 2022 to 2023, according to the IEA's tracker.¹⁸ US methane emissions are estimated at 13.3 Mt from oil and gas operations, a 4% increase from 2022. An additional 577 thousand tons is estimated for end-use equipment. The total, 13.8 Mt of methane, equates to nearly 1.2 billion tons of CO₂e. This is equivalent to 301 coal plants, significantly more than are currently operating in the United States.

The IEA data reveals that U.S. oil and gas sector methane emissions are rising in lockstep with increasing gas production, contradicting the industry's claims that methane intensity is decreasing. The IEA states that companies may under-report methane by as much as 95%.¹⁹

Based on the IEA methane tracker data and national-level oil and gas production data, the US oil and gas sector ranks nineteenth when it comes to methane intensity.²⁰ It is not a global leader.

Meanwhile, some lobbyists claim certifications by a handful of startup companies prove U.S. suppliers are reducing emissions.²¹ They are referring to "certified gas" schemes that now purportedly cover up to 30% of U.S. gas and which have come under scrutiny for their lofty claims and lack of accountability.²² However, as emissions are still growing in line with

¹⁶ Note that due to methodology revisions in the 2024 methane tracker this emissions growth estimate is based on the 2024 tracker's reporting of year-on-year growth rather than a comparison of the reported emissions in the 2023 report.

¹⁷ Coal plant calculation based on [EPA GHG Equivalencies Calculator](#)

¹⁸ From direct communication with IEA staff. The IEA updated its methodology leading to slightly lower estimates of oil and gas methane emissions for previous years compared with last year's data. When comparing U.S. data from last year's tracker with this year's, the apparent emissions reduction is misleading. As IEA has not yet published previous years' country level data using this year's methodology, we requested a figure for U.S. oil and gas methane in 2022 using this year's methodology to understand how much of the apparent reduction was due to methodology revisions over improved performance. The IEA stated that estimated U.S. emissions from oil and gas operations (excluding end-use sectors) was 12.8Mt using this year's methodology. For 2023, this figure is 13.3 Mt, a 4% increase.

¹⁹ International Energy Agency, "After slight rise in 2023, methane emissions from fossil fuels are set to go into decline soon," March 2024, <https://www.iea.org/news/after-slight-rise-in-2023-methane-emissions-from-fossil-fuels-are-set-to-go-into-decline-soon>

²⁰ Oil Change International, "U.S. Gas Industry Claims Are False: Analysis of IEA Methane Tracker Finds U.S. Oil & Gas Sector Lags Behind Eighteen Other Countries on Emissions Intensity," May 2024, <https://priceofoil.org/2024/05/16/u-s-gas-industry-claims-are-false-analysis-of-iea-methane-tracker-finds-u-s-oil-gas-sector-lags-behind-eighteen-other-countries-on-emissions-intensity/>

²¹ PPI, "PPI Proposes Path Forward on White House LNG Export Pause," February 2024, <https://www.progressivepolicy.org/pressrelease/ppi-proposes-path-forward-on-white-house-lng-export-pause/>

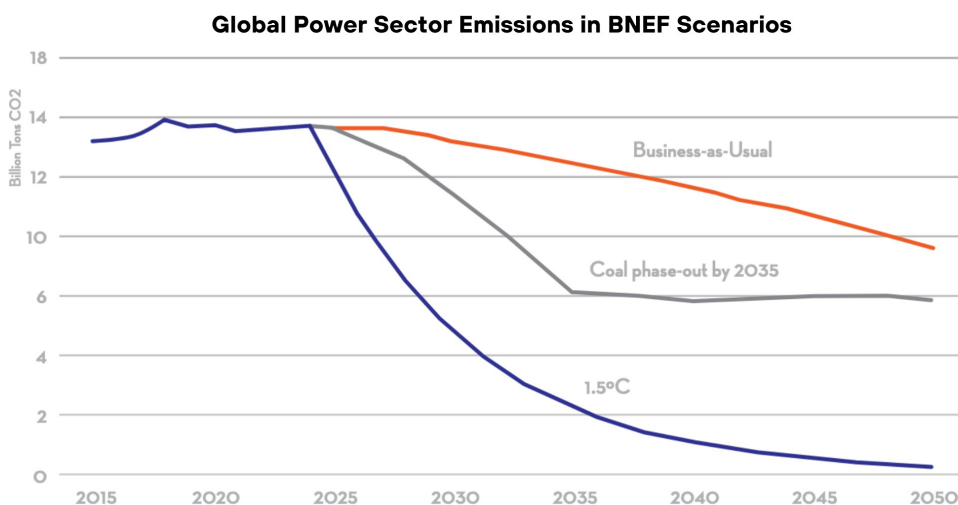
²² Oil Change International, "Certified Disaster," April 2023, <https://priceofoil.org/2023/04/17/certified-disaster-report/>

production, gas certification is clearly failing. It is fundamentally a marketing tool rather than an effective strategy for cleaning up oil and gas. Reducing fossil fuel consumption and phase-out is the only way to reduce climate pollution.²³

LNG expansion would drive methane emissions growth when we need to reduce them drastically. New LNG terminals would not only increase overall emissions via increased gas combustion but also stimulate more gas production, processing, and transportation, making it more difficult to implement the most effective strategy for reducing methane emissions in the supply chain, reducing supply.

Replacing coal with gas in the power sector does not adequately reduce emissions.

Replacing coal plants with new gas plants will not cut emissions by nearly enough to keep within 1.5°C, according to a 2019 analysis by Bloomberg New Energy Finance (BNEF). In the figure below, the blue line shows the decline in emissions needed to align with 1.5°C; the gray line shows emissions in a hypothetical scenario where coal is phased out by 2035 and replaced with a combination of gas and renewables.²⁴ The graph shows that although phasing out coal could help, emissions will remain well above the 1.5°C target if gas is locked in as coal’s primary replacement.²⁵ The analysis is based only on combustion emissions, so unless the oil and gas sector makes progress on reducing methane emissions in the supply chain, which the analysis above shows is yet to happen, this scenario overestimates the already inadequate reductions potentially achieved by coal-to-gas switching.



Source: Oil Change International based on BNEF New Energy Outlook 2019

²³Oil Change International, “The Way to Eliminate Fossil Methane is to Phase Out Production,” July 2023, <https://priceofoil.org/2023/07/06/the-way-to-eliminate-fossil-methane-is-to-phase-out-production/>

²⁴ Bloomberg New Energy Finance, New Energy Outlook, 2019.

²⁵Oil Change International, “The Climate Case Against Gas Expansion,” September 2021, https://priceofoil.org/content/uploads/2021/11/LNG_factsheet1fin_v3.pdf

LNG will not displace coal in the market. Renewable energy is already doing it.

The assumption that LNG exports will displace coal in the power sector does not warrant scrutiny. In China, coal remains a significant economic sector, accounting for 1.5 million jobs.²⁶ The country is undergoing an unprecedented realignment, with clean energy jobs growing by 2 million between 2019 and 2022 while fossil fuel jobs dropped by 600,000.²⁷ Of the 19 million people working in China's energy sector, 60% (about 11.4 million people) are employed in clean technologies, compared with 50% in 2019.²⁸ But China will not sacrifice those jobs to imported LNG. It will implement its transition on its terms, creating a clean energy economy to replace coal jobs on its schedule. To assume that growth in US LNG will somehow impact China's coal policy is to misinterpret China's management of its economy.

Meanwhile, renewables and battery storage have proven themselves worldwide to be cheaper relative to both coal and gas, eliminating the economic incentive to use gas as a "transition fuel."²⁹ Solar, wind, and long-duration battery storage are replacing coal-fired power in the US³⁰, despite the US having some of the cheapest gas in the world. There is no justification to assume that China will replace coal-fired power with LNG when it stands to benefit economically from building out a robust renewable energy economy, a sector in which it already dominates and exports to the world.³¹

A June 2024 report from the Institute for Energy Economics and Financial Analysis (IEEFA) found: "Over the past decade, the share of gas-fired electricity in China's power mix has remained at just 3%, while the share of wind and solar has quadrupled to 16%. The growth of renewables has contributed more than gas to a reduction in coal's market share from 70% to 61%."³² The report found LNG is far more expensive than coal and onshore wind and solar, making it an unrealistic replacement for coal. Official Chinese government policy limits LNG imports and discourages coal-to-gas switching.

²⁶ Global Energy Monitor, "100 miners a day face job cuts as industry winds down coal," October 2023, <https://globalenergymonitor.org/press-release/100-miners-a-day-face-job-cuts-as-industry-winds-down-coal/#:~:text=China%20has%20more%20than%201.5, mining%20workforce%20%E2%80%94%20approximately%20870%2C400%20people>.

²⁷ International Energy Agency, "World Energy Employment," https://iea.blob.core.windows.net/assets/ba1eab3e-8e4c-490c-9983-80601fa9d736/World_Energy_Employment_2023.pdf p. 5

²⁸ "World Energy Employment," page 6

²⁹ Rupert Way et al, "Empirically grounded technology forecasts and the energy transition," September 2021, [https://www.cell.com/joule/fulltext/S2542-4351\(22\)00410-X](https://www.cell.com/joule/fulltext/S2542-4351(22)00410-X)

³⁰ Ivan Penn, "Coal Power Defined This Minnesota Town. Can Solar Win It Over?," New York Times, August 2024

<https://www.nytimes.com/2024/08/19/business/energy-environment/coal-solar-power-minnesota.html>

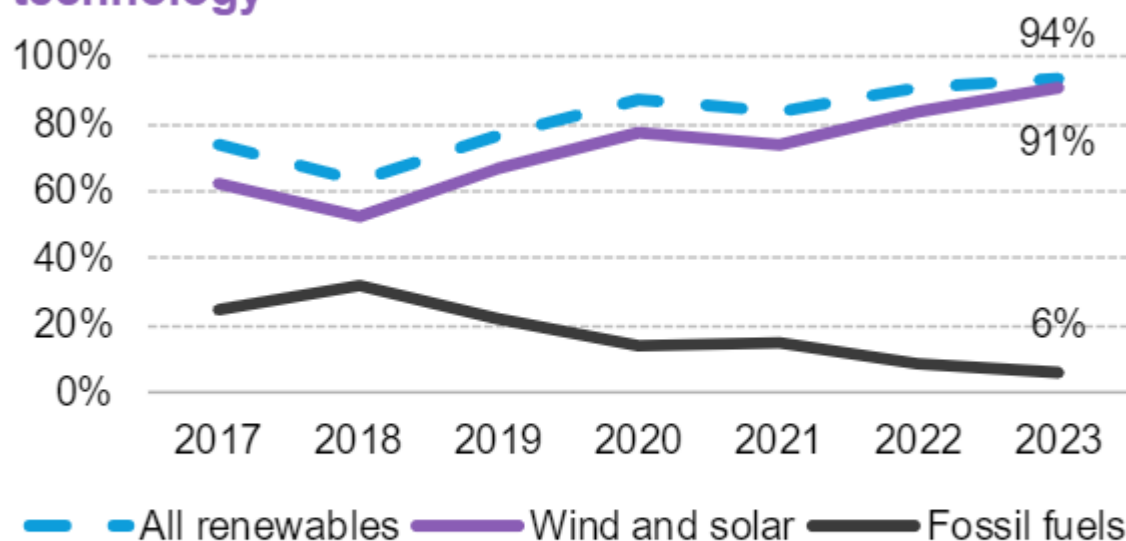
³¹ Institute for Energy Economics and Financial Analysis, "LNG is not displacing coal in China's power mix," June 2024, <https://ieefa.org/sites/default/files/2024-06/IEEFA%20Report%20-%20LNG%20is%20not%20displacing%20coal%20in%20China%27s%20power%20mix.pdf>

³² "LNG is not displacing coal in China's power mix," page 3

The dramatic shift underway in China is further illustrated by an 80% reduction in new coal permits in the first half of 2024 and data showing that new solar and wind generation exceeded new coal generation in China for the first time.³³

The trend is unmistakable. BNEF just released data showing that renewable energy installations now account for the vast majority of power generation capacity additions worldwide. In 2023, 91% of global power capacity additions were wind and solar, while fossil fuel capacity additions were a mere 6%.³⁴

Share of global power capacity additions, by technology



Source: BloombergNEF. Note: Net capacity additions based on the year-on-year change in the installed base by technology, including retirements and gross additions, and excluding nuclear.

Conclusion

The assertion that gas is cheaper and more reliable than renewable energy is outdated. The DOE must recognize that recent data shows gas use is declining in the power sector. At the same time, renewable energy, long-duration storage, improved energy efficiency, and a more efficient circular economy are the future. Additionally, the urgent need to phase out fossil fuels means there is no justification for more LNG capacity.

³³ Coleen Howe, "China has cut new coal power plant permits by nearly 80%, Greenpeace says," Reuters, <https://www.reuters.com/business/energy/china-has-cut-new-coal-power-plant-permits-by-nearly-80-greenpeace-says-2024-08-21/>

³⁴ BNEF, Power Transition Trends 2023. August 2024

The Biden Administration's action to review DOE's process is a promising first step, but it must give way to a reimagined Public Interest Determination evaluation that accounts for the clear climate harms of gas expansion. Given the need to reduce existing gas extraction and infrastructure, it's clear that any newly-permitted LNG infrastructure would move us even farther from climate goals. DOE must develop a review process that would prevent approval of proposed new LNG terminals because their climate impacts harm the Public Interest.