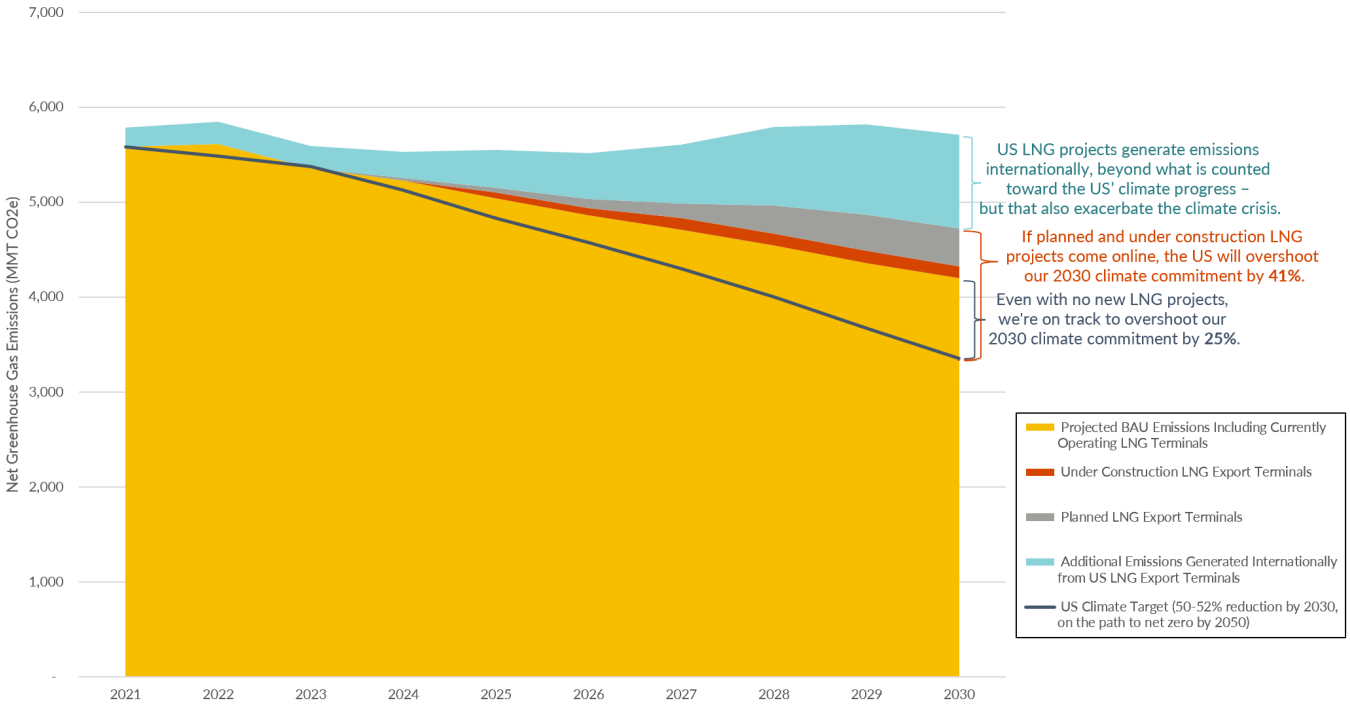
LNG Expansion Thwarts US and Global Climate Goals



The US has ambitious near-term and long-term climate goals: a Nationally Determined Contribution (NDC) of 50-52% emissions reductions by 2030 and a commitment to reach net zero emissions economy-wide by 2050. The Administration and Congress have taken ambitious legislative and regulatory steps towards these goals, but the continued expansion of liquefied methane gas (or "LNG") infrastructure threatens to undo this progress and put global and domestic climate goals out of reach. LNG is a fossil fuel largely composed of methane, a greenhouse gas (GHG) that is over 80 times more potent than carbon dioxide.[1] There is scientific consensus[2] that there is no room for new fossil fuel infrastructure in a climate-safe pathway. Yet, in the US, there are already eight existing LNG export terminals and an additional 30+ proposed terminals or expansions, which would lead to a quadrupling of LNG export capacity.[3]

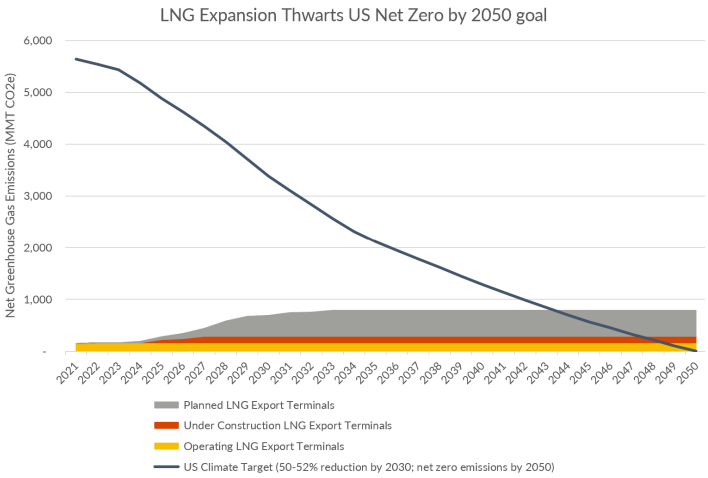
Lifecycle emissions from expansion of gas exports

All together, lifecycle emissions from full operation of the existing LNG export facilities are estimated to be 557 MMT CO_2e annually,[4] equivalent to over 120 million gasoline-powered cars or 149 coal plants. The annual lifecycle emissions for the 30+ planned and under construction projects would be equivalent to that of 532 coal plants or over 428 million gasoline-powered cars (1,986 MMT CO_2e). This means that **the full proposed LNG buildout could contribute to the climate crisis as much as 681 coal plants or 548 million gasoline-powered cars (2,543 MMT CO_2e) each year**.[5]

Increase in LNG exports puts US climate goals out of reach

We looked at the extent to which LNG expansion would cause the US to overshoot our climate goals. This analysis, which uses the 100-year global warming potential (GWP) of methane to align with economy-wide models of efforts to meet US climate goals, paints a conservative picture of the negative impacts of LNG, given methane's short-lived potency. Even with this conservative approach, LNG expansion is clearly at odds with our climate goals.

The US target under the Paris Agreement is to cut emissions by 50-52% below 2005 levels by 2030. Under a business-as-usual (BAU) scenario, which includes the benefits of the IRA, the US will make progress in cutting emissions by the end of the decade, with reductions of 25% below 2021 levels by 2030. However, if planned and under construction LNG terminals come online, a portion of that progress is wiped out, with emissions reductions of only 15% from 2021 to 2030. That is, these new LNG terminals would erase a portion of US climate progress, in 2030 emitting more than one-third of what will be reduced by other measures.[6] US LNG terminals also



generate emissions internationally – beyond what counts toward the US' targets – but these international emissions also worsen the climate crisis. In fact, only about half of the emissions from the LNG lifecycle are generated domestically, meaning the problem is much larger than it might appear on our domestic climate ledgers (depicted above).

LNG buildout is also not compatible with the US' commitment to reach net zero emissions by 2050. If the LNG industry's plans come to fruition, annual domestic LNG emissions will be 789 MMT CO_2e in 2050, when the US needs to have zeroed out its greenhouse gas impact. That does not even include the emissions from combusting LNG abroad, which threatens other countries' 2050 net zero goals as well.

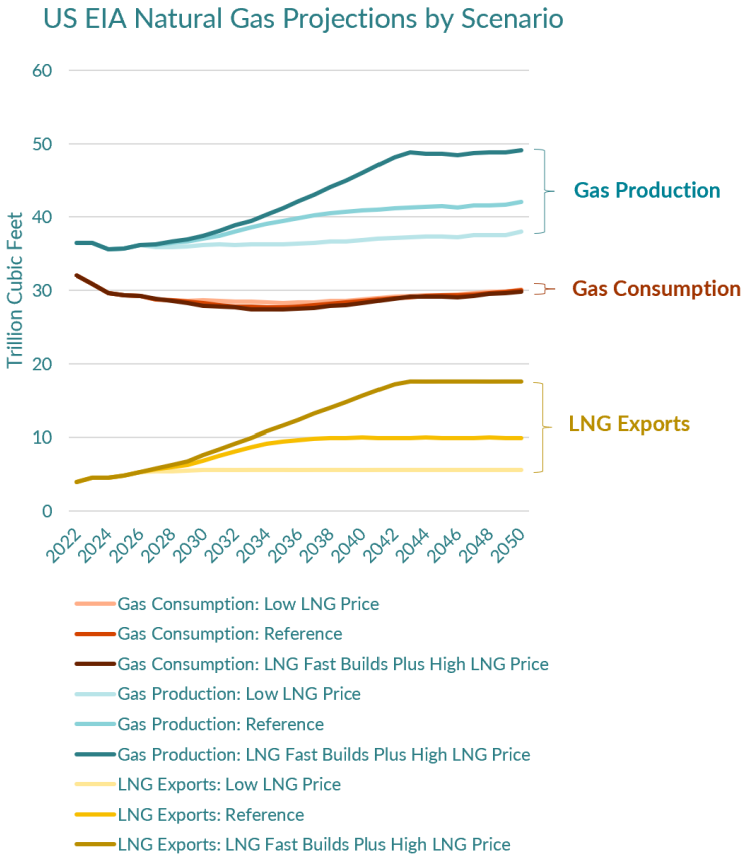
Why is LNG so GHG-intensive?

LNG generates emissions along every phase of its long lifecycle, as the gas typically must be extracted, transported, liquefied, shipped overseas, regasified, transported, and then finally combusted in power plants. Methane leaks along the way allow this potent greenhouse gas to escape into the atmosphere.

LNG Emissions Share by Lifecycle Phase[7]	
Upstream	**52%**
Liquefaction	**5%**
Shipping	**2%**
Regasification	**1%**
Combustion for End Use	**40%**

LNG exports are driving the increase in domestic gas production

Thanks to climate policies and market forces, US domestic gas consumption is set to decline as renewables and other technologies grow. However, the exponential growth of LNG exports is driving an increase in gas production today and will play a large role in determining gas production through 2050, according to the US Energy Information Administration (EIA).[8] In the EIA's reference scenario, LNG exports increase 152% by 2050, increasing fracked gas production 15% by 2050 – all while domestic gas consumption declines by 6%.[9] In other words, despite any US progress to reduce domestic gas use and move toward net zero emissions by 2050, EIA projects there will be 15% more extraction than the record amounts of gas extracted today – because of increased LNG exports. In a scenario with higher LNG prices and faster development of export projects, LNG exports would increase by 344% by 2050, driving a 35% increase in gas extraction and essentially no difference in projected gas consumption from the Reference scenario.[10] In this "high LNG" scenario, US gas *consumption* will remain flat, foreign gas demand will lead to increased US LNG production and its associated pollution, and US methane gas prices will rise.



ENDNOTES

1 Using the 20-year global warming potential (GWP) of methane. Intergovernmental Panel on Climate Change (IPCC): www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

2 International Environment Agency (IEA): https://www.iea.org/reports/net-zero-by-205, https://www.iea.org/reports/world-energy-outlook-2022

3 Sierra Club's tracking of LNG projects and their statuses is based on FERC's list of US LNG Export Terminals, DOE's Summary of LNG Export Applications of the Lower 48 States, deepwater port licensing applications received by MARAD, and projects tracked on the ground by local partners, as of August 2023: www.sierraclub.org/dirty-fuels/us-lng-export-tracker

4 Million metric tons of carbon dioxide equivalent

5 Sierra Club's methodology for calculating LNG lifecycle emissions is based on emissions estimates from the Carnegie Mellon study cited below, using the 20-year global warming potential (GWP) of methane, applied to the nameplate capacity of LNG terminals.
Carnegie Mellon: www.pubs.acs.org/doi/suppl/10.1021/es505617p/suppl_file/es505617p_si_001.pdf
Equivalent emissions from coal plants or gasoline-powered cars are calculated using the EPA's GHG Equivalency Calculator: www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

6 Emissions pathway to meet the US climate target is from Energy Innovation's Energy Policy Simulator: https://energypolicy.solutions/simulator/us/en
Projected BAU emissions are from Rhodium's Taking Stock 2023 Baseline, with the central scenario modified to hold LNG export emissions constant after 2030, in order to model a scenario where no new export projects come online: https://rhg.com/research/taking-stock-2023/
Emissions from US LNG export terminals are calculated by the Sierra Club using the methodology described in note 7, assuming each project comes wholly online in the month that the developer currently projects. Sierra Club LNG emissions estimates typically use the 20-year global warming potential (GWP) of methane, but in this chart use the 100-year GWP for a consistent comparison with the other sources graphed.

7 Carnegie Mellon (using the 20-year GWP figures): www.pubs.acs.org/doi/suppl/10.1021/es505617p/suppl_file/es505617p_si_001.pdf

8 U.S. Energy Information Administration (EIA)https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Release_Presentation.pdf, page 23

9 EIA: https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Release_Presentation.pdf, page 23

10 EIA: https://www.eia.gov/outlooks/aeo/data/browser/

Sierra Club National
2101 Webster Street, Suite 1300
Oakland, CA 94612
(415) 977-5500

Sierra Club Legislative
50 F Street, NW, Eighth Floor
Washington, DC 20001
(202) 547-1141

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