



The Climate Implications of U.S. Liquefied Natural Gas, or LNG, Exports

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Introduction and summary

As the expansion of shale gas production has positioned the United States to become a potential net exporter of natural gas, the overall effect that increased exports would have on the climate has been in dispute.

Many aspects of an increased natural gas exports scenario would affect emissions. On the one hand, natural gas could partially displace the use of coal overseas in the generation of electricity. This would put downward pressure on emissions, as natural gas plants on average emit approximately 50 percent less carbon dioxide, or CO₂, than coal plants.¹

On the other hand, methane, which is a potent, short-lived greenhouse gas with many times the warming potential of CO₂, escapes into the atmosphere from leaks and intentional venting throughout the natural gas supply chain. Although cost-effective technologies exist that minimize the escape of methane, there is evidence that current levels of methane emissions can be high. Recent studies of air samples collected over natural gas production sites in the western United States reveal leakage rates of 4 percent at the Denver-Julesburg Basin and 6.2 percent to 11.7 percent at the Uinta Basin.²

Other aspects of the natural gas trade further complicate the climate effect of exports. For example, the physical process of transporting natural gas carries a sizable emissions penalty. Natural gas destined for overseas ports is liquefied, shipped, and later re-gasified. Each stage of the exports process results in greenhouse gas emissions.³ A recent analysis from the National Energy Technology Laboratory estimates that liquefaction, shipping, and re-gasification account for approximately 17 percent of total emissions associated with liquefied natural gas, or LNG, exports when the destination is Europe, and 21 percent of total emissions when the destination is Asia.⁴

It is possible for an increased LNG exports scenario to result in an overall benefit for the climate, but the necessary conditions are formidable. In the near term, fuel switching could drive a net decrease in global emissions, but only if methane emissions are strictly controlled. Taking a longer view, it is important to consider whether exports to a particular region would slow a transition to a low-carbon economy. Heavy investments in natural gas infrastructure could lock in the use of fossil fuels. LNG exports to a particular region could therefore be defensible from a climate perspective only if the following conditions are met:

- Methane emissions are strictly controlled domestically and overseas
- The exported LNG displaces coal or prevents new use of coal
- The exported LNG does not displace low-carbon power sources or impede growth in the use of low-carbon power sources

These conditions set a high bar, although not an impossible one. Not only must the potential near-term benefit of LNG exports be realized—by displacing coal and controlling methane emissions—but it must be ensured that the exports do not serve to prolong the world’s dependence on fossil fuel.

This report explains the aspects of an increased exports scenario that affect emissions and the conditions that are necessary for LNG exports to be defensible from an emissions standpoint. In addition, given that many applications to export LNG have already been approved by the Department of Energy and it is likely that further approvals are forthcoming—see the next section for background information—this report makes several recommendations for mitigating emissions in the context of the impending LNG trade and for moving some distance toward meeting the conditions necessary to see a net emissions benefit. In particular, it recommends that the Environmental Protection Agency, or EPA, set enforceable, stringent limits on methane emissions and that the Bureau of Land Management, or BLM, address methane leakage in the context of its proposed rules on venting and flaring. It also recommends using any LNG exports to create dedicated revenues to support clean energy and energy efficiency.

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