

# **U.S. Department of Energy report confirms: U.S. LNG exports to Asia would likely be *WORSE* *than coal* for the atmosphere for decades to come**

Separately, records show as much as 75% of U.S. LNG exports are likely *destined* for Asian buyers

## **A summary from the Chesapeake Climate Action Network**

On May 29, 2014, the U.S. Department of Energy (DOE) released a preliminary environmental report for public comment analyzing the lifecycle greenhouse gas emissions resulting from liquefied natural gas (LNG) exports.<sup>1</sup> DOE's results show that US LNG would likely be nearly as bad as coal when exported to Europe and *worse* than coal when exported to Asia when the climate impacts of methane leakage are measured over a 20-year timeframe.

Moreover, separate records show that as much as 75 percent of the contracts for LNG exports from DOE-approved US facilities are likely headed to Asian buyers.<sup>2</sup> Thus a large majority of anticipated US gas exports, according to the DOE, will apparently be worse than coal for global warming over the next two decades even as President Obama announced on June 2nd a new carbon rule intended to *reduce* coal's impacts here in America.

The DOE greenhouse gas study last week found that U.S. LNG exports offer a climate advantage over coal only when the climate-warming impacts of methane are measured over a 100-year timeframe.<sup>3</sup> But given the fact that the Intergovernmental Panel on Climate Change warned in their latest report that global greenhouse gas emissions will have to fall between 40 to 70 percent within the first half of this century to avoid irreversible climate "tipping points," there is a compelling scientific rationale for using the 20-year instead of 100-year timeframe when measuring methane emissions.<sup>4</sup> When the 20-year timeframe is used, the DOE found that the lifecycle leakage rate would need to stay below 1.9% and 1.4% when exporting U.S. LNG to Europe and Asia respectively.<sup>5</sup> The assumed LNG lifecycle leakage rate modeled in the report when comparing U.S. LNG and foreign natural gas to coal was 1.6%.<sup>6</sup> So according to DOE, LNG exported to Europe could be about 84% as bad as coal over 20 years, while LNG exported to Asia could be about 114% as bad as coal.

What's more, there were major limitations in this analysis that make its conclusions very conservative. The most obvious shortfall is their conclusion that U.S. LNG exports would be a net benefit to the climate when compared to coal. That conclusion is based solely on the 100-year timeframe for methane's climate impacts.<sup>3</sup> As stated above, however, their results also show that LNG could easily be worse for the climate than coal over 20 years when exported to Asia. Given what we know about climate "tipping points", the default timeframe for LNG climate impacts should be 20 years, and their conclusion should certainly address net climate impacts over the 20-year timeframe.

The report also severely underestimates methane leakage for two reasons.

First, their "lifecycle" does not include transmission and distribution (T&D) leakage from pipelines abroad. When describing their methodology, they say "For this analysis, it was assumed that the natural gas power plant in each of the import destinations is existing and located close to the LNG port, so no additional pipeline transport of natural gas is modeled in the destination country."<sup>7</sup> That assumption could lead to vast underestimates of potential leakage. In the U.S., EPA estimates that natural gas T&D accounts for just over half of natural gas-sector methane leakage.<sup>8</sup> This is particularly worrying for exports to a country like India where natural gas is needed all across the country, not just next to ports, and the IPCC warns that pipeline leakage in "developing countries and countries with economies in transition" could be higher than in the U.S. by "an order of magnitude or more."<sup>9</sup>

Second, their 1.6% leakage estimate for U.S. gas production, processing, and liquefaction is almost certainly too low. The body of science to-date shows that methane leakage rates can vary greatly depending on the specifics of each domestic gas operation. But absent the use of proven, cost-effective technologies and practices to reduce methane emissions, those leakage rates can be very high. Several studies have measured methane concentrations near U.S. well sites that estimate leakage rates well in excess of the threshold that makes domestic natural gas safer for the climate than coal.<sup>10</sup>

In summary, DOE's report shows that LNG would likely be worse for the climate than coal when exported to Asia over a 20-year time frame, even when they underestimate methane leakage. If their analysis is overlaid with more realistic foreign and domestic leakage estimates, it becomes clear that the immediate climate impacts of LNG would be *much* worse for the climate than coal if exports began today.

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<sup>1</sup> U.S. Department of Energy: National Energy Technology Laboratory. *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States*. Rep. no. DOE/NETL-2014/1649. Office of Fossil Energy, 29 May 2014. <<http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf>>

<sup>2</sup> CCAN's analysis of DOE-approved LNG contracts: <http://chesapeakeclimate.org/wp/wp-content/uploads/2014/03/Known-LNG-export-contracts.pdf>

<sup>3</sup> Page 2 of DOE report: "The default Global Warming Potential (GWP) used is the 100-year time frame but, in some cases, results for the 20-year time frame are presented as well." This is described in their approach to running a lifecycle analysis. This methodological approach limits the lens through which they make their conclusions to the 100-year timeframe.

<sup>4</sup> "Fifth Assessment Report, Working Group III: Mitigation of Climate Change." Intergovernmental Panel on Climate Change. 13 Apr. 2014. Page 13. <[http://report.mitigation2014.org/spm/ipcc\\_wg3\\_ar5\\_summary-for-policy-makers\\_approved.pdf](http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policy-makers_approved.pdf)>

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<sup>5</sup> Table 6-1 on page 14 of the DOE report, the column titled “20-yr GWP” under “Breakeven Leakage” shows that lifecycle methane leakage would have to stay below 1.9% when exporting to Rotterdam, Netherlands and below 1.4% when exporting to Shanghai, China to breakeven with regional coal in terms of climate impacts over a 20-year timeframe.

<sup>6</sup> Table 6-1 on page 14 of the DOE report, the column titled “Modeled Leakage” shows that DOE assumed a 1.6% lifecycle leakage rate for U.S. LNG when comparing coal and natural gas breakeven thresholds for U.S. LNG and Russian natural gas scenarios.

<sup>7</sup> Page 3 of DOE report.

<sup>8</sup> U.S. Environmental Protection Agency. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012*. Rep. no. EPA 430-R-14-003. N.p., 15 Apr. 2014. Web. <<http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Main-Text.pdf>>. Table 3-43 on page 3-63 shows the EPA's estimates for greenhouse gas emissions from the U.S. natural gas system in 2012. EPA estimates that the transmission & storage and distribution (T&D) stages emitted 69.4 Teragrams of CO<sub>2</sub>-equivalent (Tg CO<sub>2</sub>e) out of the total 129.9 Tg CO<sub>2</sub>e emitted system-wide in 2012. This means that the EPA estimates that T&D account for 53% of total U.S. natural gas system emissions.

<sup>9</sup> Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Chapter 4 – Fugitive Emissions. <[http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2\\_Volume2/V2\\_4\\_Ch4\\_Fugitive\\_Emissions.pdf](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf)> Page 4.46 explains that pipelines in developing countries and countries with economies in transition may leak more due to “less stringent design standards, use of lower quality components, restricted access to natural gas markets, and, in some cases, artificially low energy pricing resulting in reduced energy conservation.”

<sup>10</sup> CCAN’s methane white paper that includes a review of recent scientific literature measuring domestic methane leakage: <http://chesapeakeclimate.org/wp/wp-content/uploads/2014/05/Dominion-Lifecycle-Methane-Leakage.pdf>