

**Testimony of Charlie Riedl, Executive Director of the Center for Liquefied Natural Gas, before
the U. S. Senate Committee on Energy and Natural Resources**
THE IMPORTANT ROLE OF U.S. LNG IN EVOLVING GLOBAL MARKETS

July 11, 2019

Good morning, Chairman Murkowski, Ranking Member Manchin, and members of the committee. Thank you for the opportunity to testify today. My name is Charlie Riedl, I am the Executive Director for the Center for Liquefied Natural Gas or CLNG.

CLNG represents the full LNG value chain, including LNG producers, shippers, terminal operators and developers, providing it with unique insight into the ways this abundant and versatile fuel can realize its vast potential, to the benefit of the U.S. economy and global energy security.

We appreciate the opportunity to address the committee about the evolving global natural gas market and the many environmental and economic benefits of U.S. LNG exports. America's abundance of natural gas has led to our emergence as a world-class exporter of natural gas, creating U.S. jobs, growing our economy, significantly strengthening global energy security -- all while reducing emissions and pollution.

The United States began exporting LNG in 2016 and has steadily solidified its position as a major global energy power. The U.S. is now home to four LNG export terminals in operation, six projects under construction, and seven projects that are permitted and awaiting Final Investment Decisions. There are another fourteen projects in the FERC queue.

Each of these projects individually represents billions of dollars of investment in America's energy future. By seizing and executing on the opportunity made possible by our enormous supply of natural gas, the U.S. LNG industry is poised to provide natural gas that will improve our trading partners' access to clean energy, while providing jobs and a stable supply of natural gas and revenues here in the United States.

The focus of my testimony will be on LNG and the incredible opportunity we have before us. However, I believe it is critically important to first understand the current and projected supply of natural gas here in the United States before speaking further about LNG and LNG exports. CLNG has a deep understanding of the entire U.S. natural gas supply portfolio and rising demand for natural gas both in domestic markets and abroad because of our position as a committee of the Natural Gas Supply Association, a national trade association that has represented top producers and marketers of U.S. natural gas for more than 50 years.

The United States has an abundant supply of natural gas. Underpinning the environmental, economic and security benefits we can achieve with exports is our abundant supply of natural gas. Technological breakthroughs in the oil and natural gas industry have unleashed an energy renaissance, establishing the United States as the world's largest natural gas producer – and domestic production continues to grow.

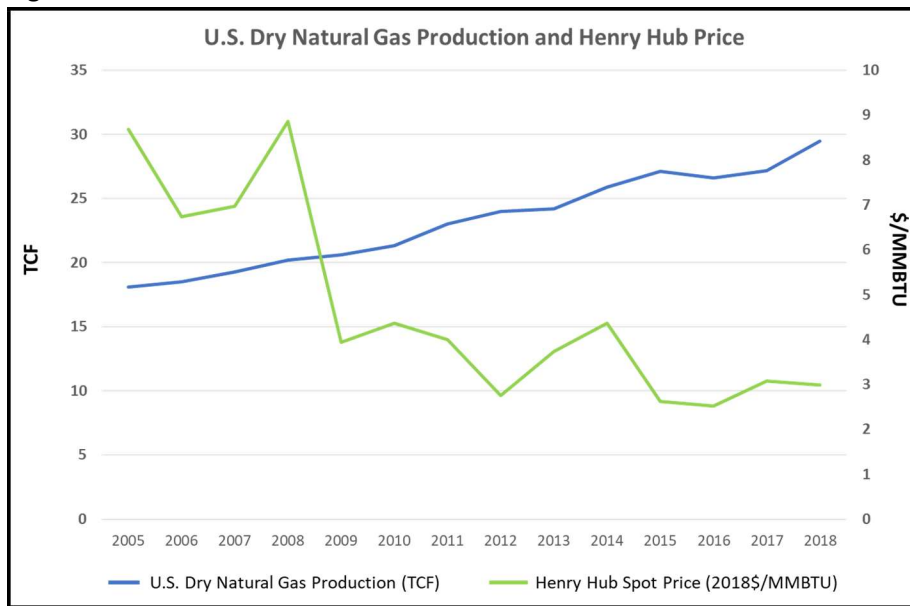
We have enough natural gas to supply affordable energy domestically for at least 100 years with current technology, as well as to significantly increase U.S. participation in the global market for LNG.

Natural gas companies understand that with this opportunity comes the responsibility to be dedicated stewards of local land, air and water. We are committed to responsible development to ensure that our natural resources are protected, while maximizing this great opportunity before us.

As I speak today, U.S. natural gas resources have reached an all-time high, according to the U.S. Potential Gas Committee.¹ Even as U.S. natural gas production continues to grow year over year, our total natural gas resource estimates continue growing as well, due to improvements in our ability to detect and extract natural gas.

In fact, if the Potential Gas Committee’s 1966 estimate of 600 trillion cubic feet (Tcf) had remained static, the United States would have run out of natural gas in the 1990s. Instead, estimates doubled by 2002, to more than 1,200 Tcf, and by 2017 had exceeded 2,800 Tcf.²

Figure 1

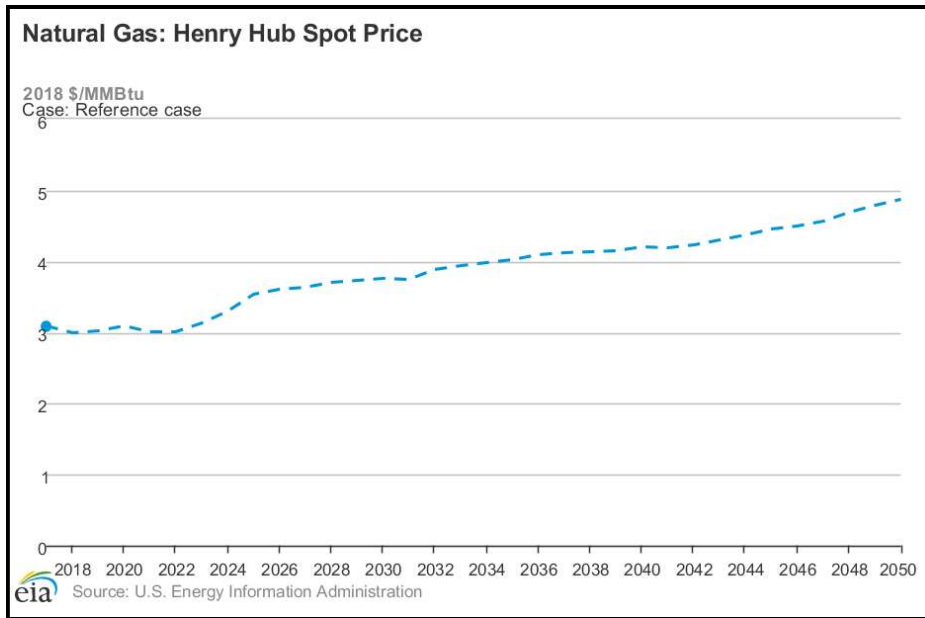


Concurrent with this nearly five-fold increase in the total resource base, U.S. natural gas production has increased by 69 percent since 2005, according to the U.S. Energy Information Administration (EIA) and yet prices have declined by 64 percent over the same time period. And EIA projects production to continue to grow well through 2050, while prices will stay below \$5 out to 2050. This is all due to the stability of our abundant supply. Based on EIA estimates, between 2008 and now, the United States will have effectively added **double** the LNG capability that Qatar has planned – by 2030. Put another way, we have grown our LNG by the equivalent of two Quatars in 2030. Remarkably, we will have done this with no increase in domestic prices.

¹ U.S. Potential Gas Committee, [Biennial Estimate of North American Natural Gas Resource Base](#), July 2017.

² U.S. Potential Gas Committee, [Biennial Estimate of North American Natural Gas Resource Base](#), July 2017.

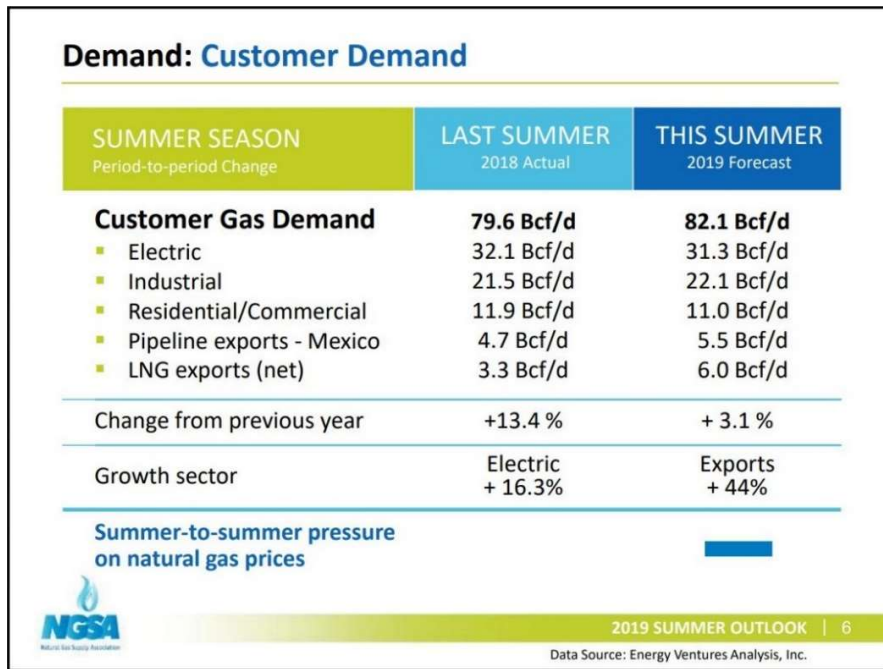
Figure 2



Because our supply of natural gas is so abundant, operating and planned export capacity are helping provide stability to the domestic energy market. LNG exports offer an important new market for surplus natural gas production, which often occurs due to associated gas that is tied to oil production. Exports provide another demand outlet and thus help to keep natural gas production steady and predictable.

In fact, growth in exports sends market signals to incentivize domestic production, which benefits consumers here at home and benefits industries involved in the natural gas supply chain such as construction and manufacturing, spurring even more economic growth.

Figure 3



The United States is poised to realize its potential as a major international gas supplier, but the window of opportunity to solidify our position is narrowing. Globally traded LNG volumes were 37 billion cubic feet per day (Bcf/d) in 2018, setting a new annual record. Worldwide demand for LNG is expected to increase to 67.7 Bcf/d by 2035.³ It is projected that 13.5 Bcf/d of liquefaction capacity will be added between now and 2023, to help meet world demand for LNG.⁴ Globally there is approximately 15 Bcf/d of new regasification capacity under construction and numerous countries are vying to serve this growing LNG market.⁵ The demand for LNG is clear, and that is why it is critical the United States be positioned to compete on a level playing field for access to these new and expanding markets.

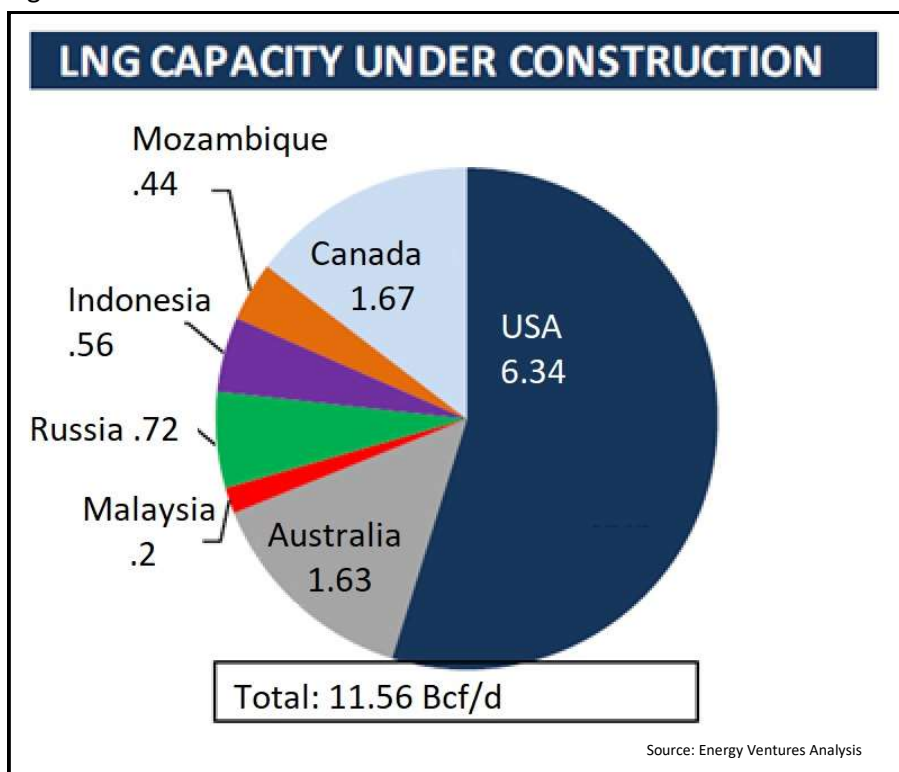
³ Energy Insight, McKinsey, [Global Gas & LNG Outlook to 2035](#), September 2018.

⁴ International Gas Union, [World LNG Report](#), 2019.

International Energy Agency, [Market Report Series Gas 2018](#), Executive Summary.

⁵ International Gas Union, [World LNG Report](#), 2019.

Figure 4



As study after study has shown, exports drive economic growth here at home, particularly in natural gas-producing regions. Most recently, in-depth research by NERA Economic Consulting for the U.S. Department of Energy (DOE) in 2018 found that exports are a net benefit to the U.S. economy. The DOE study determined that increased natural gas demand from exports will spur increased investment in domestic natural gas production, driving job growth in areas where production grows.

The 2018 DOE study concluded that export demand will not be met by existing production but rather be met almost entirely by additional production. This is an important point. Just as previous economic studies conducted for DOE found, the 2018 study also determined that increased production will drive investment in natural gas-producing regions and support thousands of additional jobs.⁶

Another study, conducted by ICF for the American Petroleum Institute, showed that exports could generate more than 450,000 jobs and more than \$73 billion for the economy by 2035.⁷

Finally, DOE's study showed that exports will result in an increase in U.S. households' real income and welfare that exceeds any potential impact that could come from marginally higher natural gas prices.⁸

Exports represent a tremendous geopolitical opportunity for the United States. LNG exports are already supporting our national security interests by strengthening the energy security of our allies and

⁶ Department of Energy, [The Macroeconomic Outcomes of Market Determined Levels of U.S. LNG Exports](#), June 2018

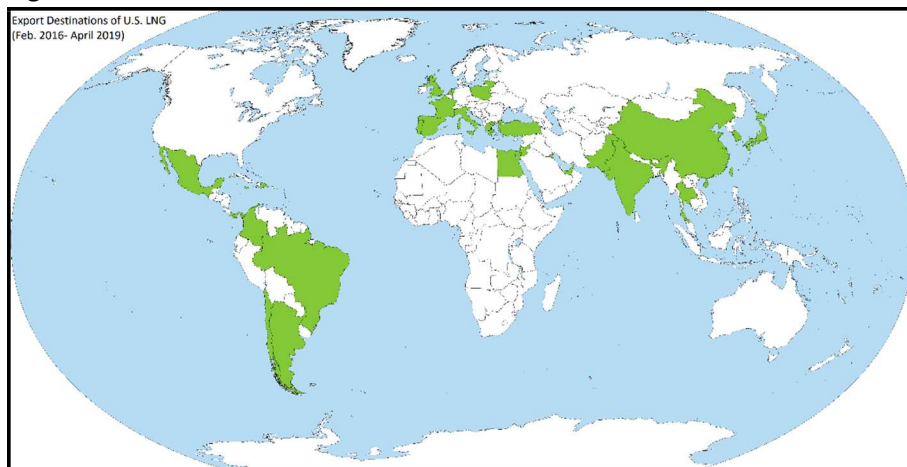
⁷ ICF, [Impact of LNG Exports on the U.S. Economy: A Brief Update](#), September 2017.

⁸ Department of Energy, [The Macroeconomic Outcomes of Market Determined Levels of U.S. LNG Exports](#), June 2018

weakening those nations who use natural gas exports as geopolitical leverage. For example, Europe remains highly dependent on Russia for natural gas, which supplies 35 percent of its total natural gas imports. For countries in Central and Eastern Europe (like Czech Republic, Hungary, Bulgaria, Greece), that share is much higher. Russia has demonstrated its willingness to use energy as a political tool, cutting off natural gas supplies to European consumers several times over the last decade, with Eastern European countries most harmed by Russian manipulations.

Fortunately, U.S. LNG exports provide an opportunity to diversify our allies' supply choices and expand the global natural gas market. Lithuania and Poland, for example, have already signed deals to import U.S. LNG. As Lithuanian President Dalia Grybauskaitė wrote, "U.S. gas imports to Lithuania and other European countries is a game changer in the European gas market. This is an opportunity for Europe to end its addiction to Russian gas and ensure a secure, competitive and diversified supply."⁹

Figure 5



Furthermore, exports reinforce our commitment to open trade. By allowing the open trade of U.S. LNG, we are sending an important signal to other commodity exporters. A commitment to unencumbered exports promotes U.S. leverage in trade negotiations, particularly with other commodities.¹⁰

LNG exports offer clear environmental benefits to overseas consumers. A 2014 study conducted by DOE found that LNG exports could reduce global greenhouse gas emissions by displacing more carbon intensive fuels in importing nations.¹¹

This was the conclusion of the Department of Energy in 2014, and its findings have been subsequently echoed in studies [that](#) compare greenhouse gas emissions of LNG and other fossil fuels over their full lifecycles¹². Furthermore, these studies show how natural gas and renewables are ideal partners for

⁹ Agnia Grigas, *Foreign Affairs Magazine*, "U.S. Natural Gas Arrives in Lithuania," September 12, 2017.

¹⁰ Michael Levi, Brookings, [A Strategy for U.S. Natural Gas Exports](#), June 2012.

¹¹ Department of Energy, National Energy Technology Laboratory, [Lifecycle Greenhouse Gas Perspective Report on Exporting LNG from the United States](#), 2014.

¹² Pace Global, [LNG and Coal Lifecycle Assessment of Greenhouse Gas Emissions](#), October 2015.

improving air quality and emissions,¹³ and document case studies detailing enormous improvements in pollution and smog with increased use of natural gas.¹⁴ Current events further support that finding. For example, the Chinese have rapidly expanded their use of natural gas in order to reduce their reliance on other fossil fuels.

Today China has overtaken South Korea as the world's second largest LNG importer and U.S. LNG cargoes have already made their way to Chinese import terminals. In fact, before trade tensions between China and the United States began, China was the 3rd largest U.S. LNG customer, however now China has fallen to the 15th position.

Just last fall, LNG took center stage in trade negotiations during President Trump's visit to China, culminating in a deal between China Petrochemical Corp, China Investment Corporation, Bank of China, the State of Alaska and the Alaska Gasoline Development Corporation for the development of LNG export capacity in Alaska. The three state-owned Chinese companies would invest \$43 billion into the project. This type of partnership is important both from an environmental standpoint and to provide the financing for a project that will have huge job and economic benefits for the local Alaskan communities.

Countries like India, where it is believed up to 400 million people¹⁵ lack access to reliable electricity, desperately wish to ramp up their use of natural gas. 36 U.S. export cargoes have already made their way to India and the second operational U.S. LNG export terminal, Dominion Energy's Cove Point facility in Maryland, has a 20-year contract with GAIL India Ltd, the country's largest natural gas utility.

Greater use of natural gas in importing nations will help reduce carbon emissions but it will also help reduce traditional pollutants – burning natural gas creates little to no emissions of sulfur dioxide, nitrogen oxides or particulate matter that can lead to smog.¹⁶ Providing our trade partners with access to a cleaner-burning energy alternative reinforces our commitment to environmental progress.

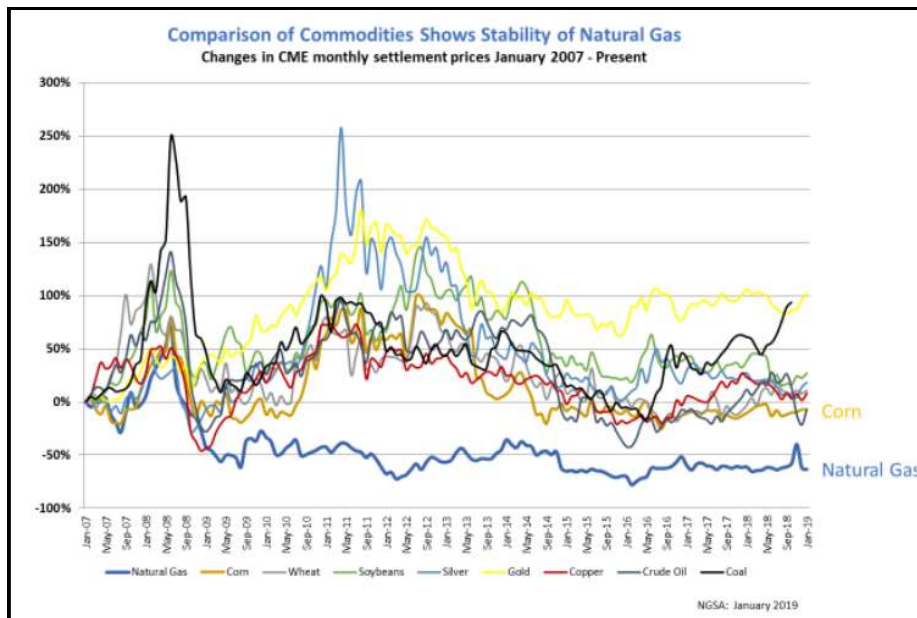
¹³ National Bureau of Economic Research, [Bridging the Gap: Do Fast-reacting Fossil Technologies Facilitate Renewable Energy Diffusion](#), July 2016.

¹⁴ International Gas Union, [Case Studies in Improving Urban Air Quality](#), 2016.

¹⁵ Asian Venture Philanthropy Network, [Addressing Energy Poverty in India](#), August 2018.

¹⁶ Leidos, Inc., [A Comparison of Emissions from Major Fuels Used to Generate Electricity in the U.S.](#), 2016.

Figure 6



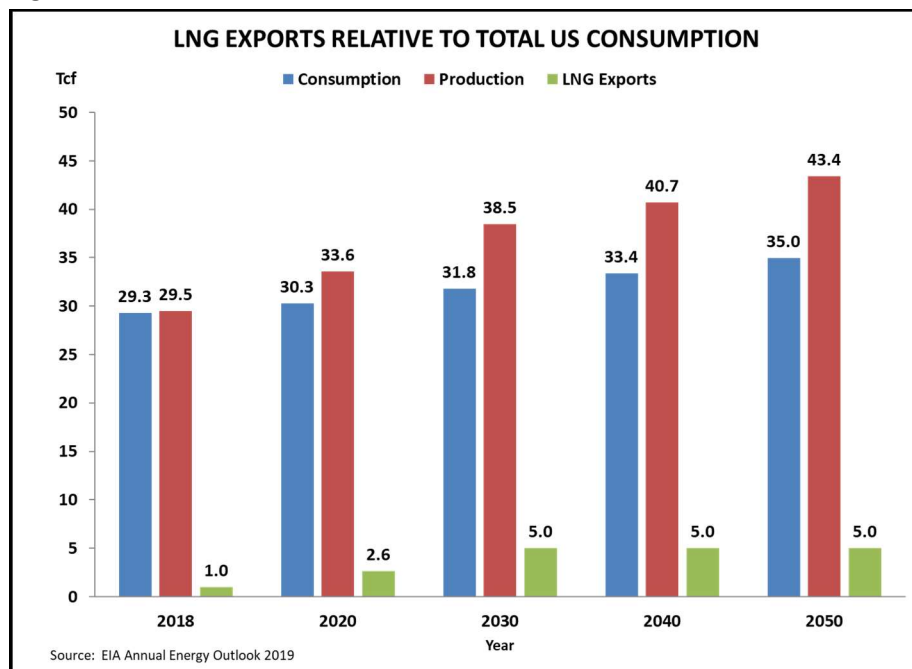
LNG exports and U.S. natural gas production provide support for the industrial renaissance and provide stability here at home. The past decade’s dramatic increase in natural gas supply has occurred even as natural gas has enabled an industrial renaissance in the manufacturing sector, with demand for natural gas from that sector projected to reach an all-time high this summer.¹⁷ New domestic supplies of more affordable natural gas and natural gas liquids (NGLs) have created a competitive advantage for U.S. chemical manufacturers, leading to greater investment, industry growth, and new jobs. Companies from around the world are investing in new projects to build or expand their shale-advantaged capacity in the United States. Forty new industrial projects in the petrochemical, fertilizer, steel and gas-to-liquids sectors were completed between 2015 and 2018, and another 40 are expected to be completed by 2023, representing an investment of more than \$135 billion.¹⁸

Domestic gas supply can support increases across all sectors, with LNG exports and manufacturing living harmoniously. Because of our enormous domestic natural gas resource base, the United States is uniquely positioned to compete on a global level for LNG markets, while still providing an affordable and environmentally advantageous fuel source for American manufacturers. The United States needs new markets to encourage continued production of natural gas and NGLs to support our domestic manufacturing and encourage manufacturers to stay in the U.S. The resurgence in domestic industrial growth not only strengthens the U.S. economy, it also provides an opportunity to reduce CO₂ globally. This global CO₂ reduction is possible because the energy consumed in U.S. manufacturing is less carbon intensive than other manufacturing areas throughout the world.

¹⁷ Energy Ventures Analysis, Inc., [2019 Summer Outlook for Natural Gas](#), May 2019.

¹⁸ Energy Ventures Analysis, Inc., [2019 Summer Outlook for Natural Gas](#), May, 2019.

Figure 7



LNG is Cutting Emissions in the Transportation Sector. The expanded use of natural gas as a transportation fuel, whether in the form of LNG (or CNG), can help reduce air pollution and carbon emissions from the transportation sector, whether in the marine industry or in cars and fleet vehicles.

In the maritime sector, for example, new international emissions standards for ships¹⁹, in addition to the low cost of natural gas compared to more conventional fuels, has encouraged the use of LNG as a fuel by the shipping industry in recent years. This growth is expected to continue since LNG emits significantly lower levels of nitrogen oxide, sulfur oxides, particulate matter and carbon dioxide compared to oil-based alternatives currently used for marine fuel.²⁰

As a result of LNG’s comparatively low emissions, the United States is projected to almost double its current fleet of LNG-fueled tankers from 2016 to 2019²¹, led by shipping investments made by Harvey Gulf and Tote, according to the U.S. Energy Information Administration. Even the cruise industry has embraced LNG in shipping, with cruise lines such as Carnival and Disney building new ships powered by LNG. Worldwide, the global fleet of LNG-powered ships is expected to grow more than 40-fold to almost 1,800 vessels by 2020.²²

On a well-to-wake lifecycle basis, marine vehicles powered by natural gas emitted up to 21 percent fewer greenhouse gas emissions compared to gasoline and diesel-powered vehicles²³. According to the DNV-GL’s [Alternative Fuels Insight Map](#), there are more than 280 LNG stations for marine vehicles in operation or under construction and another 91 planned.

¹⁹ International Maritime Organization (IMO) has set new limits for sulphur in fuel oil used on board ships to take effect in 2020.

²⁰ U.S. Dept. of Transportation Maritime Administration, [Liquefied Natural Gas Bunkering Study](#), 2014.

²¹ LNG World News, “[EIA: LNG Fueled Vessels on the Rise in the U.S.](#)” 2016.

²² DNV GL, “[In Focus – LNG As A Ship Fuel](#)” 2015

²³ SEALNG, [Life Cycle GHG Emission Study on the Use of LNG as Marine Fuel](#), 2019.

On a well-to-wheel lifecycle basis, land vehicles powered by natural gas emit also between 13 and 21 percent fewer greenhouse gas emissions compared to gasoline and diesel-powered vehicles²⁴. These natural gas-powered vehicles can further improve local air quality because they emit approximately 50 percent less NOx gas and other pollutants. According to the Alternative Fuels Data Center²⁵, there are more than 130 LNG stations for heavy duty trucks in operation or under construction and another 50 planned.

Continued growth in the use of natural gas as a vehicle fuel – the number of natural gas vehicles around the world increased by an estimated 300 percent between 2006 and 2014²⁶ – will help improve air quality and reduce carbon emissions. And more rapid growth is expected.

Conclusion

The promise of more LNG facilities in the United States brings the promise of a new era benefiting the economies of the United States and our global trading partners, as well as contributing to vast improvements in energy poverty abroad and the improved health and cleaner environment that accompanies that change.

The United States is fortunate that our enormous natural gas resource base ideally positions us to compete on a global level for LNG market share while still providing an affordable and environmentally advantageous fuel source for American households and manufacturers and benefiting the U.S. economy.

Streamlining the approval process for LNG export applications from the United States can create tens of thousands of American jobs and reduce global greenhouse gas emissions, while preserving a competitive advantage.

Thank you for the opportunity to testify on behalf of CLNG and NGSA and our members. We are committed to helping to find solutions to address the world's energy needs and look forward to working with the Committee to that end.

²⁴ NGV America, [Environmental Benefits of Natural Gas Vehicles](#), 2018.

²⁵ U.S. Department of Energy, [Alternative Fuels Data Center](#).

²⁶ U.S. Department of Energy, [Clean Cities Webinar Presentation](#), October 2014.