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In Reply Refer to:
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April 17, 2020

VIA E-PORTAL FILING
Adam J. Teitzman, Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

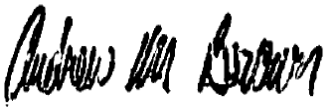
Re: In re: Petition for approval of tariff modifications for liquified natural gas service by Peoples Gas System
Docket No. 20200093

Dear Mr. Teitzman:

Attached for electronic filing in the above docket on behalf of Peoples Gas System, please find its Response to Staff's First Data Request (Nos. 1-11). Please note that we are filing with Response No. 7 redacted because we will be seeking confidential treatment for that response.

Your assistance in this matter is greatly appreciated.

Sincerely,



Andrew M. Brown

AB/plb
Attachment
cc: Paula K. Brown
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Ms. Karen Bramley
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Linda Berndt (lindaberndt@eaglelng.com)

1. Please refer to paragraph 7 of the petition for the following questions:

a. This paragraph mentions the cruise industry in Florida. Have any cruise ship companies expressed interest in this LNG tariff? Please explain.

b. Are there any cruise ships in Florida that already run on LNG?

c. Have any other customers expressed interest in this LNG tariff? Please explain.

d. Please explain the process of converting a cruise ship from its current power source to LNG. Would companies have to buy new ships or could they convert their existing ones?

e. On average, how many therms of LNG would a cruise ship use in a year?

A. a. Major shipping companies along with several of Florida's largest ports have expressed a strong interest in Peoples providing LNG solutions by leading the development of LNG infrastructure to support the transition of the shipping industry from fuel oil to cleaner LNG. Attached as additional support is an "Alternative Fuels Study" co-sponsored by the Florida Ports Council and Florida Natural Gas Association. This report demonstrates the opportunities before Florida's ports to expand the use of domestic natural gas and create economic and environmental benefits for the state of Florida.

https://smhttp-ssl-63157.nexcesscdn.net/wp-content/uploads/FPC-Alternative-Fuels-Study-01092020.pdf

b. According to Carnival's website, the first cruise ship that will be fueled by LNG in North America and in Florida will be the Carnival Mardi Gras that is scheduled to be in-service in Q3 2020. Peoples understands that multiple cruise ships serving the Florida market are scheduled to be in service between 2022 to 2027. According to a report published by Sea\LNG, there are 23 new cruise ships that are on order worldwide that will run on LNG.

c. Yes, multiple customers across different industries have expressed interest in securing natural gas via LNG services from Peoples. Examples of these customers include: a refuse company using natural gas for their own transportation, a railroad interested in using natural gas as fuel in

locomotives, marine shipping companies operating vessels fueled by LNG to ship bulk products domestically and internationally, electric utilities interested in using LNG as a back-up fuel to increase system reliability and meet their peak gas needs, shipping companies interested in exporting LNG by ISO containers and other industrial customers using LNG where their facility is not in close proximity to a natural gas pipeline. In addition to the cruise market, it is important to note that the Port of Jacksonville is home to four container vessels that are currently operating on LNG. Globally, Sea\LNG reports that there are 18 roll-on/roll-off cargo vessels, 40 container vessels, 53 tanker vessels, 7 car carrier and 6 bulk carrier vessels on order that will be capable of operating on LNG.

As support for increasing LNG demand, Peoples references the url below. Royal Dutch Shell ("Shell") periodically publishes an LNG outlook on their website. Highlights from this report include the following: There are 385 vessels across the multiple marine segments that are either in operation or on order to be built. Approximately, 150 new vessels are projected to be built between 2020-2022.

https://www.shell.com/promos/overview-shell-lng-2020/_jcr_content.stream/1584588383363/7dbc91b9f9734be8019c850f005542e00cf8ae1e/shell-lng-outlook-2020-march.pdf

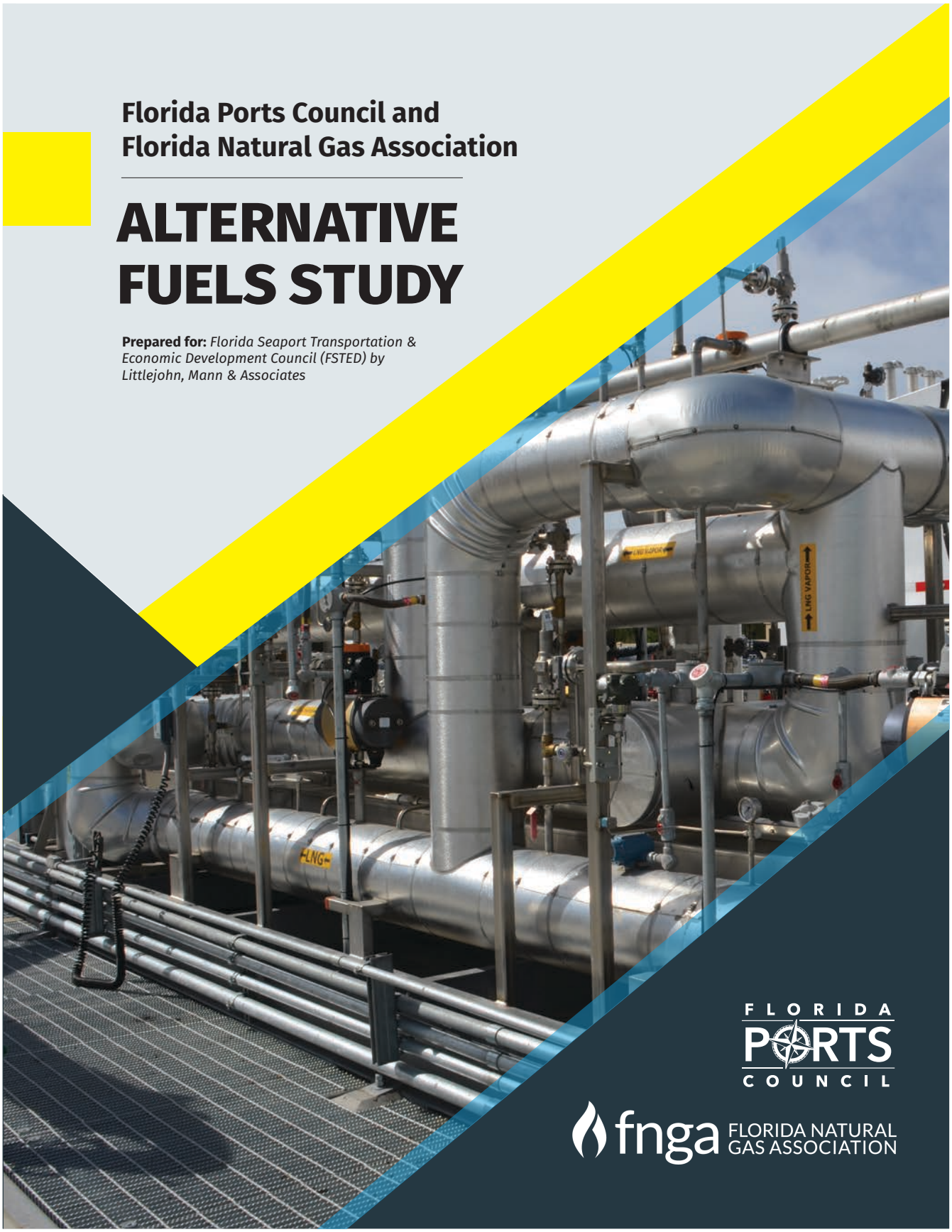
d. It is Peoples' understanding that the majority of LNG powered vessels will be new vessels that are built to operate on LNG rather than retrofitted to use LNG.

e. The equivalent amount of therms of LNG that a cruise ship uses per year varies based on the size of the cruise ship, number and distance of annual voyages, and the frequency of the shipyard maintenance during a particular year. The amount of gas demand for a cruise ship is approximately 35,000 to 50,000 therms each day.

Florida Ports Council and
Florida Natural Gas Association

ALTERNATIVE FUELS STUDY

Prepared for: *Florida Seaport Transportation & Economic Development Council (FSTED) by Littlejohn, Mann & Associates*



FLORIDA PORTS COUNCIL

fnga FLORIDA NATURAL GAS ASSOCIATION

Introduction

The exponential growth of the natural gas industry, along with the increasingly stringent environmental regulations affecting the use of traditional fuels, has created a heightened demand for alternative fuels. Increasing environmental regulations are forcing many industries to look to options other than traditional fuels to meet current and future environmental standards. Each of these factors is contributing to the increased utilization of natural gas to replace traditional fuels in many applications, including power generation, industrial operations, ships, space operations, rail, trucking, vehicles and fuel distribution.

Florida seaports are in a unique position to capitalize on this growth and be a pivotal part in the distribution of alternative fuels, as well as the on-port utilization of such fuels. With the environmental and economic benefits available from these fuels, new markets are opening to Florida seaports, which are well-positioned to initiate or expand their deployment of natural gas on-port, throughout the state, nationally and internationally. The markets for compressed natural gas (CNG) and liquid natural gas (LNG) are emerging beyond import and export operations.

RON DESANTIS
GOVERNOR

STATE OF FLORIDA
Office of the Governor
THE CAPITOL
TALLAHASSEE, FLORIDA 32399-0001
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January 7, 2020

As the state of Florida's first Chief Resilience Officer, I am proud to support the Florida Ports Council and the Florida Natural Gas Association in the release of their Alternative Fuels Study for the state's network of seaports. This report shows Florida seaports continue to be leaders in the implementation of environmentally friendly, less costly, domestically produced natural gas.

Natural gas is a lower-carbon bridge fuel that will help Florida continue to transition to other cleaner energy sources.

As more stringent air quality regulations for port operations and maritime vessels are implemented across the country, there is increased demand for alternative fuels in the national and global transportation industry. This increased demand, coupled with the rapid expansion of the natural gas industry, provides an exciting opportunity for Florida seaports to expand their use of natural gas, creating economic and environmental benefits for the state.

Florida's ports are a key component to our national security. They also provide 900,000 jobs across the state and have a total annual economic impact of more than $117 billion. Our ports are in a unique position to capitalize on their economic strength and are on the leading edge nationally of LNG and CNG fuel for cargo and cruise vessels. We must ensure that Florida has the infrastructure and business climate to promote the economic and environmental benefits from these alternative fuels.

I appreciate the tremendous impact our ports have on the state of Florida's resiliency, and am pleased to see Florida's ports are committed to promoting sound practices that benefit not only our national security, but our communities, economy, and environment.

Sincerely,

Dr. Julia Nesheiwat
Chief Resilience Officer
State of Florida

Contents

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About Florida's Seaports

Florida's 15 public seaports play a critical role in the lives of our citizens and continue to drive Florida's economy. From what we wear to what we eat, from building materials to automobiles, almost everything we use in our daily lives flows through our ports.

Currently, Florida seaports generate nearly 900,000 direct and indirect jobs and contribute $117.6 billion in economic value to the state through cargo and cruise activities. Florida maritime activities account for approximately 13 percent of Florida's Gross Domestic Product while contributing $4.2 billion in state and local taxes.

A re-alignment of global trade routes is clearly underway, and Florida ports are strategically positioned to take maximum advantage of this opportunity. Our goal is to invest in infrastructure, improve the business climate, and above all, seize the opportunity to become a global hub, capturing an even larger share of international trade and related commercial activities.

This will be accomplished by providing investments and incentives for projects that capture a larger share of the containerized imports serving Florida businesses and consumers; expanding export markets for Florida businesses; and creating more efficient logistics patterns that attract advanced manufacturing and other export-related industries to Florida.

FPC's role is to provide leadership to Florida's seaports through a collective voice in the areas of data & research, state & federal advocacy, and marketing and communications.

Florida Ports Council Staff

Doug Wheeler, *President and CEO*
Mike Rubin, *Vice President of Governmental Affairs*
Casey Grigsby, *Vice President of Programs and Planning*
Jessie Werner, *Vice President of Public Affairs*
Christy Gandy, *Director of Administration*

Florida Natural Gas Association Staff

Dale Calhoun, *Executive Director*
Leslie Thimmes, *Communications Director & Meeting Planner*
Shari Sumner, *Accounting & Membership Manager*
Kerry Dodson, *Executive Assistant*

Consultant

Littlejohn, Mann & Associates

Executive Summary

Across the United States, the unprecedented expansion of shale gas development has produced large reserves of natural gas, allowing the United States to emerge as a net exporter of the product.

1. Opportunity for Florida

The economic and environmental advantages of natural gas, when coupled with historically abundant domestic supply, are opening new markets for natural gas within Florida. With sufficient domestic supply to meet America's diverse energy needs for more than a century, natural gas is more relevant than ever to our energy future.

2. Power and Commodities

Primary applications for alternative fuels are as a fuel source for the motive power in maritime vessels and as a commodity cargo for import and export in Florida.

3. Leading the Progress

Florida seaports are on the leading edge of alternative fuel utilization nationally and have continued the development and deployment of alternative fuels for cargo and cruise vessels.

4. JAXPORT Bunkering

Jacksonville currently has the largest LNG bunkering operation at a U.S. port.

5. Carnival Mardi Gras

In 2020, Port Canaveral will be homeport for the first fully LNG-powered cruise ship in North America, Carnival Cruise Line's *Mardi Gras*.

Across the United States, the unprecedented expansion of shale gas development has produced large reserves of natural gas, allowing the United States to emerge as a net exporter of the product. The domestic natural gas industry now includes more than 6,300 producers, 1,200 distributors and 300,000 miles of natural gas pipeline spanning the nation. Natural gas production in the U.S. grew by 10 billion cubic feet per day in 2018, an 11% increase over 2017, and the increased supply continues to put downward pressure on the cost of natural gas. The combination of low cost and the heightened focus at the state, national and international levels on the environmental benefits of conversions to cleaner-burning fuels is causing the expansion of natural gas utilization across many industry sectors. The expanding supply of natural gas and the increasing demand for the product worldwide presents an incredible opportunity for Florida seaports, through participation in the growing import and export business and through new and increased uses on and near ports.

The economic and environmental advantages of natural gas, when coupled with historically abundant domestic supply, are opening new markets for natural gas within Florida. LNG as ship fuel is fast approaching the status of a fully developed technology with low, stable prices and sufficient domestic supply to meet America's diverse energy needs for more than a century. Natural gas is more relevant than ever to our energy future and the economic incentive and value of converting to cleaner burning, lower emission LNG/CNG is compelling.

Florida seaports are on the leading edge of alternative fuel utilization nationally and have continued the development and deployment of alternative fuels for cargo and cruise vessels. In the maritime shipping industry, there are two primary applications for LNG. The primary application is as a fuel source for the motive power in maritime vessels. The second is as a commodity cargo for import and export. With increasing natural gas reserves and environmental regulations limiting air emissions from maritime vessels, both markets are experiencing significant growth. Florida seaports have installed LNG processing centers, expanded natural gas exports to the Caribbean, increased the number of LNG-powered cruise ships calling on Florida seaports, and added state-of-the-art bunkering barges.

Jacksonville has the largest LNG bunkering operation at a U.S. port and can currently store approximately 16 million gallons of LNG and has over 1.9 million gallons of daily LNG production. The facilities located at JAXPORT (JAX LNG and Eagle LNG) have established a significant LNG-bunkering location with the capability to serve not only the domestic fleet but larger international vessels as well.

In 2020, Port Canaveral will become the hailing port for the first LNG bunkering barge developed by Q-LNG Transport to provide waterside fueling of LNG for North America's first fully liquefied natural gas-powered cruise ship, Carnival Cruise Line's *Mardi Gras.* Disney Cruise Lines is also building three LNG powered ships and has traditionally based its new ships at Port Canaveral.

This report concludes with an examination of the financial considerations and economic incentives associated with the increased deployment of alternative fuels and associated infrastructure in Florida's seaports, space industry, and the multimodal network.

State of the Industry

Natural gas development throughout the nation and globally has significantly expanded over the last decade, and growth is expected for many years to come.

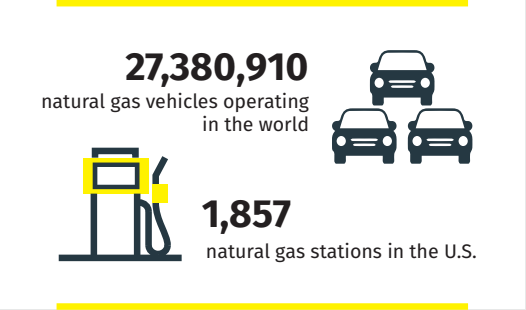
The United States now leads the world in natural gas exports, with proven reserves for the next century. Global natural gas reserves are believed to be available for the next 250 years. This rapid expansion has impacted both Florida and the maritime industries in significant ways, leading to the development of new markets to meet the increased demand for natural gas. This section will provide an overview of the state of the industry in Florida, as well as the maritime industry nationally and internationally.

The first interstate natural gas pipeline to reach Florida was put into service in 1959 by Florida Gas Transmission. The industry has continued to grow to meet the increased natural gas demands of Florida. Today, the state of Florida has several interstate, intrastate, and local distribution pipeline companies serving utility, transportation, industrial, commercial, and residential markets. These systems serve 63 of the 67 counties and are expanding quickly.

The economic and environmental advantages of natural gas, when coupled with historically abundant domestic supply, are opening new markets for natural gas within Florida. With low, stable prices and sufficient domestic supply to meet America's diverse energy needs for more than a century, natural gas is more relevant than ever to our energy future. New market opportunities for natural gas are reshaping transportation, manufacturing and other industries. Power generators have already made a significant shift from oil and coal-fired plants to more efficient natural gas plants. Businesses across the state and country are converting to natural gas for economic and environmental reasons.

In 2012 the Florida Legislature passed House Bill 599, creating the Freight Mobility and Trade Plan, which required the Florida Department of Transportation, in coordination with its partners and stakeholders, to assist in making freight mobility investments that contribute to the economic growth of the state. The Plan specifies that natural gas and propane motor fuels can reduce transportation costs for businesses and residents within the state.[1] Natural gas can play a significant role in Florida's efforts to increase trade and transportation mobility, as a readily available, less costly, domestic, and environmentally friendly alternative fuel source. Furthermore, producing cleaner-burning fuel from domestic reserves will allow the United States to reduce its dependence on foreign oil and its emissions of regulated air pollutants. Eventually, the transportation sector may see more radical changes in motive power such as advanced batteries and hydrogen fuel cells, but cost and technological limitations could delay widespread use of such options for decades. Natural gas technology is widely regarded as the most appropriate near-term solution to reduce fuel costs and environmental impacts, and this is increasing the demand for alternative fuels for trade and transportation.

Today there are 27,380,910 natural gas vehicles operating in the world, which accounts for approximately 3 percent of all vehicles.[2] Fleet vehicles are leading the growth, as they experience substantial benefits from the use of alternative fuels, such as, current and long-term lower fuel costs compared to traditional fuels as well as lower maintenance costs. Currently, there are at least 90 compressed natural gas (CNG) stations in Florida. Within the United States, there are 1,857 natural gas stations for transportation use.[3]



Financial Considerations and Economic Incentives

With natural gas priced 50 to 75 percent less than diesel on an energy-equivalent basis, the economic incentive and value of converting to cleaner burning, lower emission LNG/CNG is compelling. LNG as ship fuel is fast approaching the status of a fully developed technology. As new applications are developed and competition between suppliers increases, capital expenditure costs will likely decrease while operational costs remain consistent with traditional fuel systems.

Beyond the fleets in Florida that have invested in fueling infrastructure and engine conversions or transportation acquisitions, the question remains: What more needs to be done to stimulate the markets in order to promote statewide and nationwide implementation of natural gas-powered fleets? Several states around the nation are investing in fueling infrastructure and conversions for these alternative fuel vehicles as they are trying to take advantage of the emerging sources of natural gas in the United States. Similar trends are occurring internationally, as many countries are assisting in the development of natural gas infrastructure and subsidizing capital expenditures for new vessels powered by natural gas through grants and tax credits.

Currently, there are only two active funding mechanisms within Florida to assist in the implementation of natural gas fleets and related infrastructure. FDEP recently renewed its participation in the state Diesel Emissions Reduction Act (DERA) grant program, which is coordinated with

“The natural gas industry is a proud partner of Florida’s port system. Our ports are implementing the use of alternative fuels, including natural gas, which benefits both our environment and our local economies.”

Dale Calhoun
Executive Director, Florida Natural Gas Assocation

The Florida Natural Gas Association (FNGA) was organized in order to promote, protect and encourage the growth of the natural gas industry in the State of Florida. The association works to protect the interests of the natural gas industry, its members and consumers.

the EPA. The state's DERA program offers funding for various projects to upgrade or replace existing diesel equipment with alternative fuels and other cleaner technologies. The grant offers various match percentages depending upon specific projects.[4] Florida also recently finalized the Volkswagen (VW) Beneficiary Mitigation Plan, which is closely modeled after DERA and offers additional grant funds for similar project types.[5] The VW Plan is scheduled to be available for project funding by 2020.[6] An additional potential funding mechanism to assist Florida seaports in increased utilization of alternative fuels is through the Florida Seaport Transportation and Economic Development (FSTED) project funding program.

In order to further increase implementation of natural gas fuels at Florida seaports and maximize the benefits of these fuels, the implementation of incentives through the use of additional grants, tax credits, and/or new regulations may be necessary. Some market readiness and incentive options designed to encourage investments in gas delivery infrastructure and natural gas-powered transportation solutions are included below.

	INCENTIVE OPTIONS
✓	Utility capital cost recovery mechanisms for infrastructure expansion
✓	Purchase incentives, such as government grants, to use as rebates
✓	Business income tax credits for fleet purchases of vehicles, marine vessel conversions, and installation of fueling infrastructure at or near Florida's seaports
✓	Fuel excise and sales tax exemptions
✓	Promotion of public-private partnerships for infrastructure development
✓	Reduced tolls on toll roads
✓	Reduced vehicle registration fees
✓	State and local government fleet purchases

The level of any such state-provided incentives should be fully supported to ensure they are available when businesses and residents make their purchasing decisions. With government initiatives generally designed to change or promote certain market behavior, some of these benefits are likely to sunset as the intended market reaction occurs. As a result of higher future fuel costs for traditional motor fuels and the increased availability of alternative fuels in the marketplace, the upfront costs for fleet conversions should continue to be offset by the long-term fuel cost savings.

Alternative Fuels Usage and Infrastructure

Not only are the vehicular transportation sectors implementing natural gas fuels, but the maritime and rail transportation is also making a shift to operate on this fuel. Recent news releases in Florida have highlighted that many Florida companies, municipalities, and counties are transitioning to the consumption of natural gas motor fuels. The key highlights for the use of these fuels has been the fuel cost savings and environmental benefits.

In addition to Florida's increased utilization of natural gas as an alternative fuel source across multiple industry sectors, the natural gas market in the maritime and related transportation industries has been growing exponentially in Florida, the nation and internationally. This expansion goes beyond increased import/export demands and includes utilization by the vessels and vehicles involved in all aspects of maritime transportation. Fuel preferences are emerging in the various transportation modes, depending on fuel cost, infrastructure cost and complexity and other factors.

In shipping and rail industries, LNG has proven the most cost effective and beneficial alternative fuel source. In fleet and cargo handling operations, CNG and LNG are both reliable alternatives, subject to the particular application and task. Because maritime

operations involve multiple modes of transportation, this section provides an overview of the current use of alternative fuels as to shipping, rail, trucking and on-port cargo handling equipment. In addition, the space industry is considering use of LNG as fuel for rocket engines for launchings from the Kennedy Space Center at Cape Canaveral.

Alternative Fuels in the Maritime Industry

In the maritime shipping industry, there are two primary applications for LNG. The primary application is as a fuel source for the motive power in maritime vessels. The second is as a commodity cargo for import and export. With increasing natural gas reserves and international standards requiring limited air emissions from maritime vessels, both markets are experiencing significant growth. A limiting factor worldwide in the increased utilization of LNG for maritime vessels is the availability of infrastructure to supply LNG powered vessels.

LNG as a fuel is both a proven and available commercial solution. However, LNG bunkering requires specialized infrastructure for supply, storage, and delivery to vessels. Additionally, to power ships with LNG requires either retrofitting existing vessels or purchasing new LNG powered vessels. While different technologies, such as scrubbers or ultra-low sulphur conventional marine fuel, can be used to meet the stricter air emissions standards, many companies are looking to LNG as a long term, cost-effective means to ensure continued compliance with strict environmental regulations.

Notably, recent studies have found that LNG offers a lower energy cost per ton than traditional maritime heavy fuel oil.[7] Additionally, initial LNG capital expenditure costs are falling, narrowing the gap between the expense of switching to LNG powered vessels compared to utilizing scrubbers with ultra-low sulphur fuels or traditional heavy fuel oils, which also have their own capital expenditure involved in purchase, installation, and maintenance of scrubbers.[8] LNG has also historically remained much more stable in its pricing index. However, the delivered price of LNG fuel to ships must also account for the liquefaction or break-bulk cost, distribution cost and applicable profit margins. While the price level is competitive with maritime gas oil, direct competition with heavy fuel oil is difficult given the additional costs associated with LNG production and transportation.[9]

The Congressional Research Service found that LNG prices, after taking all production/transportation costs into account, are near $7-$8/MMBtu (million British thermal units), and roughly $9/MMBtu for LNG shipped to Asian ports.[10] A comparison against spot markets demonstrated that LNG was significantly less expensive than ultra-low sulphur fuel and by 2018 was extremely competitive with standard high sulphur fuel.

Eric Green
JAXPORT CEO

The Jacksonville Port Authority (JAXPORT) is an independent agency responsible for the development of public seaport facilities in Jacksonville, Florida. JAXPORT's mission is to create jobs and opportunity by offering the most competitive environment for the movement of cargo and people.

“With more than a billion dollars in LNG investments in Jacksonville alone, there is no doubt that Florida is the state for LNG, as both a fuel and a cargo type. The opportunity is just beginning and it’s an exciting time for our industry and our community.”

This is an important consideration with the new International Maritime Organization standards, as traditional and ultra-low sulphur fuel markets will likely be volatile while LNG prices are tied to natural gas costs, which historically have limited fluctuation. In evaluating whether LNG powered vessels result in fuel savings is a complex determination given the many variables, including capital expenditures, operational expenditures, market cost fluctuations of various fuels, energy efficiency of various fuel types and cargo type and capacity requirements. The most relevant factor for most shipping companies is the desired return on investment over the lifetime of the ship. LNG has been found to typically result in a greater return on investment to shipowners and operators, with payback periods ranging between one to three years.[11]

Jacksonville currently has the largest LNG bunkering operation at any U.S. port. And JAX LNG is the first small-scale LNG facility in the United States with both marine and truck-loading capabilities.

The number of ports worldwide that have developed the necessary infrastructure for LNG is limited, though growth is accelerating quickly. LNG bunkering is expanding in Europe, where the European Union is requiring a core network of ports to provide LNG bunkering by 2030.[12] More than 40 European coastal ports have LNG bunkering capability currently in operation, primarily at locations on the North Sea and the Baltic Sea, as well as in Spain, France, and Turkey. These locations include major port cities such as Rotterdam, Barcelona, Marseilles, and London. Fifty additional LNG bunkering facilities are in development at European ports.[13]

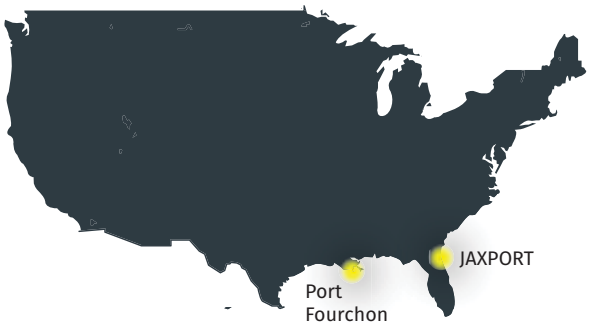
LNG bunkering is also advancing in Asia, led by Singapore, the world's largest bunkering port. Asian countries, together with Australia and the United Arab Emirates, have about 10 coastal ports offering LNG bunkering, with another 15 projects in development.[14] Singapore also has signed a memorandum of understanding with 10 other partners to create a group aimed at promoting the adoption of LNG bunkering at ports around the world.[15] LNG bunkering is not as developed in South America, although there are currently nine operating LNG marine terminals and another six in development.[16] If expansion continues, South America could support significant LNG bunkering operations in the near future.

JAXPORT currently has the largest LNG bunkering operation at a U.S. port. One bunkering facility at the port, developed by JAX LNG, initially began truck-to-ship refueling operations in 2016 for 2 LNG-powered container ships.[19] In August 2018, upon delivery of the "Clean Jacksonville" bunker barge, the facility began to replace truck-to-ship bunkering with ship-to-ship bunkering.[20] LNG will also be supplied from a new, small-scale liquefaction plant that JAX LNG opened in May of 2019.[21]

JAX LNG is the first small-scale LNG facility in the United States with both marine and truck-loading capabilities. The state-of-the-art facility was constructed through a joint venture between Pivotal LNG and NorthStar Midstream. Currently, the JAX LNG facility has the capacity to produce 120,000 gallons of LNG per day and store more than 2 million gallons on-site. There is room to expand the facility, adding two liquefaction trains and a second storage tank, which would increase LNG production capacity to 600,000 gallons per day and add more than 4 million gallons of on-site storage. JAX LNG can use its location on the water to serve its maritime customers using LNG bunkering vessels. JAX LNG is also the long-term supplier of LNG to the world's first LNG dual-fuel container ships, the *Isla Bella* and *Perla del Caribe*, which are operated by TOTE Maritime Puerto Rico.

LNG bunkering in the United States has significant potential for expansion. Currently, LNG bunkering only takes place in Jacksonville, Florida and Port Fourchon, Louisiana.[17] A third bunkering facility is in development in Tacoma, Washington, but has encountered various permitting delays. Port Canaveral will soon take delivery of a LNG bunkering barge developed by Q-LNG Transport to provide fuel to the first fully liquefied natural gas-powered cruise ship in North America, Carnival Cruise Line's *Mardi Gras*.[18] Disney Cruise Line is also building three LNG ships and will be basing two of those at Port Canaveral.

LNG BUNKERING IN THE U.S.



The first LNG bunker barge built in North America, Jacksonville's 2,200-m3 *Clean Jacksonville.*

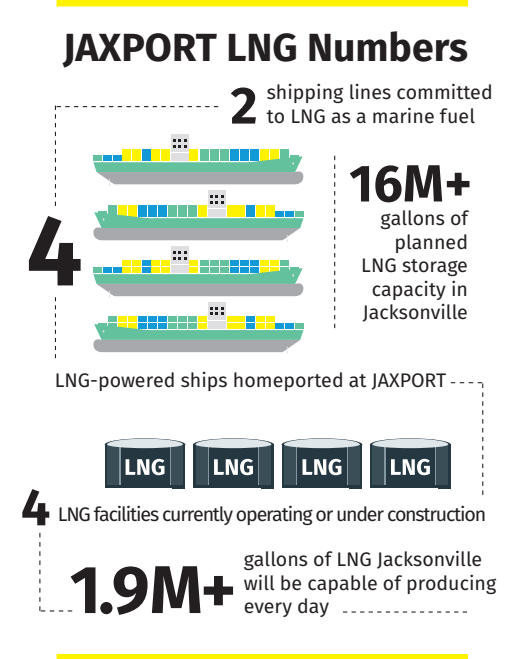
JAX LNG joins a number of other LNG bunkering infrastructure projects in the southeastern United States. Both Q-LNG and NorthStar Midstream have ordered or are building LNG bunker articulated tug barges (ATBs) that will operate on the U.S. east coast, supporting U.S. and internationally flagged dual-fuel vessels, as well as transporting LNG cargoes to the Caribbean.

Starting in 2021, NorthStar Midstream's 5,400-m3 ATB will source LNG from JAX LNG, owned by NorthStar and Pivotal LNG, in Jacksonville, while Q-LNG's 4,000-m3 Q-LNG 4000 will load cargoes at the Elba LNG facility in Savannah, Georgia.

Jacksonville's only currently operating bunker barge is the 2,200-m3 *Clean Jacksonville*, which is used to refuel Tote's 3,100-TEU, dual-fuel container ships, *Taíno* and *El Coquí*.

A storage facility at JAXPORT, operated by Eagle LNG, provides LNG bunkering sourced from a liquefaction plant in west Jacksonville.[22] Eagle LNG is also constructing an on-site liquefaction and vessel bunkering facility at the port. Together, the JAX LNG and Eagle LNG facilities have established JAXPORT as a significant LNG-bunkering location with the capability to serve not only the domestic fleet but larger international vessels as well. With these facilities combined, Jacksonville can currently store approximately 16 million gallons of LNG and has more than 1.9 million gallons of daily LNG production.[23] Additionally, Eagle LNG has already received approval to export up to 10 million cubic feet of LNG per day and Carib-Energy, a subsidiary of Crowley, is conducting small scale LNG exports to Puerto Rico with plans to expand exports to Latin American and the Caribbean.

In Louisiana, Harvey Gulf International Marine constructed a $25 million facility at its existing



terminal in Port Fourchon to store and bunker LNG sourced from liquefaction plants in Alabama and Texas.[24] The facility can provide truck-to-ship bunkering services for LNG-fueled offshore supply vessels, tank barges, and other vessels.[25] Port Fourchon recently applied for a large expansion of its LNG plant to include a liquefaction facility with a peak capacity of 5 million metric tons per annum (MMtpa) and a dedicated berth.[26] Phase I is estimated to be operational by the fourth quarter of 2021.

Puget Sound Energy has proposed an LNG liquefaction and bunkering facility at the Port of Tacoma in Washington state. The proposed Tacoma LNG facility would be capable of producing up to 500,000 gallons of LNG per day and would include an 8 million-gallon storage tank.[27] Puget Sound Energy originally planned to put the LNG facility into service in late 2019. However, permitting issues have delayed its opening until 2020 at the earliest.[28]

In addition to the permanent bunkering depots either constructed or undergoing construction, there have been significant increases in LNG bunkering capacity through the use of bunkering vessels. Since 2017, LNG bunker vessels have been delivered for operation in key locations such as the Amsterdam, Rotterdam, Antwerp (ARA) region, the North Sea, the Baltic Sea and the East coast of Florida. Bunker vessels for other key locations - such as the Western Mediterranean, the Gulf of Mexico, the Middle East, Singapore, China, South Korea and Japan - are under development and will likely come online in conjunction with delivery of new LNG-fueled, deep-draft ships within the upcoming years.[29] The significant number of U.S. ports and operating LNG terminals that could supply bunkering barges suggest that LNG bunkering could soon be within reach of every port along the Eastern Seaboard and in the Gulf of Mexico. On the West Coast, the ports of Los Angeles and Long Beach, California, are near the Costa Azul LNG terminal in Ensenada, Mexico. Seattle and Tacoma are adjacent to the proposed Tacoma LNG project. With the anticipated continued growth of LNG bunkering, through either permanent facilities or bunkering barges, the growing availability of LNG as a replacement to conventional maritime fuel is rapidly occurring.

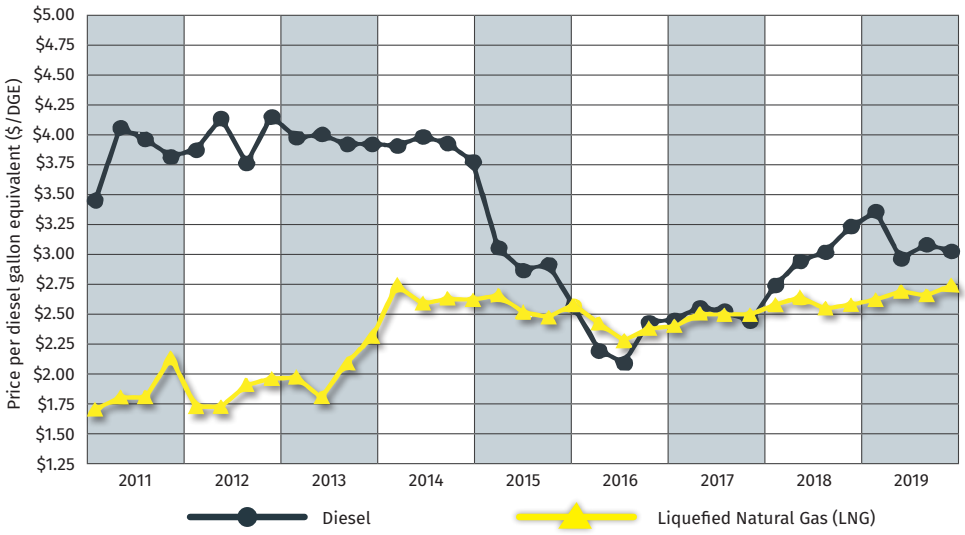
This is further demonstrated by the increased number of LNG powered ships being ordered around the world. As of December 2018, 137 LNG-fueled ships were in operation and 136 newbuilding orders were confirmed.[30] According to Cleaves Securities, as of February 2019, the LNG order book is at an all-time high.[31] LNG powered ships now represent 13 percent of the total order book, up from 2 percent a decade ago.

Cruise, Increasingly Powered by LNG

According to the Cruise Ship Order Book, 26 new LNG powered cruise ships are to be built and delivered between 2020-2026, with at least one of these scheduled to arrive in Florida in 2020.[32] The

The first fully liquefied natural gas-powered cruise ship in North America, the *Mardi Gras*.

LIQUEFIED NATURAL GAS (LNG) PRICES VERSUS DIESEL (2011-2019)



Source: Clean Cities Alternative Fuel Price Report, July 2019, U.S. Department of Energy

Congressional Research Service estimates that LNG-powered vessel construction may increase from the current rate of approximately 120 ships per year to more than 400 ships per year.[33]

Disney Cruise Line has plans to add three new LNG-powered cruise ships to their current fleet. At approximately 144,000 gross tons and 1,250 guest staterooms, the new LNG-powered ships will be slightly larger than the *Disney Dream* and *Disney Fantasy*. The three ships already under construction are scheduled for completion in 2021, 2022 and 2023. The first of these, *Disney Wish*, is scheduled for delivery in late 2021 and is expected to set sail from Port Canaveral beginning in January 2022.

Alternative Fuels in the Rail Industry

Rail is typically associated as another method of shipping LNG in the import/export market. However, as with the maritime industry, environmental requirements to reduce air emissions are also causing the industry to evaluate LNG as a potential alternative fuel source. Florida East Coast Railway has been operating on LNG since late 2015 and completed the conversion of its entire mainline thru-haul fleet to run on LNG. However, unlike in the shipping industry, the bunkering market is not experiencing the growth necessary to support Class I railroad operators for cross-country rail lines.[34] Because of this, regional rail companies are the sole users of LNG powered locomotives.

In 2014, the U.S. Energy Information Administration evaluated LNG as an alternative fuel source for rail and found, not surprisingly, that LNG will play an increasing role in powering freight locomotives. It found that the potential of LNG-fueled trains may be similar to the switch from steam propulsion to diesel in the 1940s and 1950s, a revolution in freight rail known as dieselization.[35] Railroads are evaluating the use of LNG in locomotives because of the potential for significant fuel cost savings and reductions in regulated emissions. Given the expected price difference between LNG and diesel

fuel, future fuel savings are expected to more than offset the approximately $1 million incremental costs associated with manufacturing an LNG locomotive and its tender.

Several technologies utilizing LNG are in development, including dual-fuel trains that use both LNG and diesel fuel. Dual-fuel trains can significantly cut fuel costs per train over the course of a year. The benefits to the rail industry could be significant, as the Class 1 railroads accounted for 7% of all diesel consumed in the U.S., with major railroads consuming more than 2 billion gallons per year alone, and all locomotives combining to consume 3.1 billion gallons per year, according to the Energy Information Administration (EIA).[36] Though the market is not as developed as the shipping industry, the Florida East Coast Railway recently hosted stakeholders from across the globe to tour their LNG operations and LNG powered locomotives, demonstrating a continued interest in the potential of LNG as an alternative fuel source in the rail industry.

Alternative Fuels in the Trucking Industry

The freight trucking industry differs from the other modes involved in transportation activities as the market has expanded significantly in recent years to include both CNG and LNG powered trucks.[37] Heavy-duty CNG/LNG powered trucks have been manufactured for decades and now include many of the mainstream manufacturers.[38] Both forms of natural gas have met performance expectations, but fuel preference differs slightly depending on the type of cargo and length of delivery route.

With the increased availability of natural gas, the continued installation of natural gas fueling stations around the country and the world, and the significant lower fuel costs, the trucking industry appears to be shifting quickly toward natural gas.[39] Many companies project the increased purchase price of natural gas trucks will be offset by the long term lower costs of natural gas compared to diesel.

Alternative Fuels in the Space Industry

Florida has been the epicenter of America's space program and will continue to see tremendous growth in all phases of commercial space for the foreseeable future. As companies evaluate the use of new technologies in all phases of their programs, some of the new propulsion technologies will use LNG as a primary source of fuel. Blue Origin will begin using the BE-4 engine for the New Glenn rocket, and the BE-4 uses methane as the primary fuel. The BE-4 is the most powerful LNG fueled rocket engine ever developed and uses an oxygen-rich staged combustion cycle. The BE-4 is capable of producing 2,400 kN (550,000 lbf) thrust with deep throttle capability. Seven BE-4 engines will power New Glenn's reusable booster, and two BE-4 engines will drive the first stage of United Launch Alliance's Vulcan launch vehicle.[40]

Space X announced that it will also use methane as a fuel for its Raptor engine, the critical propulsion for the Falcon 9 and future Starship launches. Raptor is a full-flow, staged combustion rocket engine powered by cryogenic methane and liquid oxygen (LOX), rather than the RP-1 kerosene and LOX used in SpaceX's prior Merlin engine family. The Super Heavy booster is powered by 37 Raptors, while Starship is powered by six.[41]

While many of the operational plans to utilize LNG are currently under development, it's clear that the commercial space industry will use LNG in the future, however the volume and frequency of use has yet to be determined. The proximity of Port Canaveral to the Cape Canaveral Air Force Station and Kennedy Space Center will provide a great nexus for the development of a regional LNG infrastructure to meet the needs of the growing marine and space industries.

Florida has been the epicenter of America's space program, with LNG use in its future.

LNG or CNG?

In deciding whether to operate on liquefied natural gas (LNG) or compressed natural gas (CNG), industry representatives indicate that freight mixing models and length of route are the determining factors. For freight that meets gross weight before volume capacity (such as liquid cargo), LNG may be the preferred choice because it can go further with smaller or fewer fuel tanks compared to CNG. This reduces vehicle weight and increases cargo capacity. Additionally, for terminal-to-terminal routes, LNG is often preferred due to its longer range. However, CNG is the preferred fuel for local routes or cargo that utilizes volume capacity as the fuel is cheaper and more widely available due to less-costly infrastructure to supply CNG.

Port cargo handling equipment, such as cranes, drayage trucks and forklifts also employ both CNG and LNG as an alternative to diesel fuel. An industry-led feasibility study recently conducted found that cargo handling equipment accounted for up to 85 percent of the emissions from seaport operations.[42] While some equipment, such as gantry cranes, appear to be moving toward electrification, the same feasibility analysis found that natural gas was currently the best alternative fuel source for other cargo handling operations.

The study was intended to evaluate the current state of zero-emission and near-zero-emission fuel-technology platforms suitable for drayage trucks and the infrastructure needed to fuel and service them.[43] The study found that currently, natural gas trucks for drayage and freight operations are the most-advanced alternative fuel platform, both technologically and considering their commercial maturity. This is true for both LNG and CNG platforms.[44] Natural gas cargo handling trucks were found to be the closest direct replacement for diesel in terms of operational feasibility.[45] Forklifts have been operating on CNG and LNG for an extended period of time and have proven reliable for warehouse uses. They also have the added benefit of no down time for charging, as with electric powered forklifts, while still achieving significant reductions in air emissions.[46]

Environmental, Regulatory and Legislative Overview

Many factors are impacting the trend toward increased utilization of alternative fuels, including the perceived and actual environmental impacts from conventional fuels. These concerns have led to implementation of state and federal statutes and rules promulgating stricter air emissions standards. These stricter standards, which apply to operations on port property as well as maritime vessels in U.S. and international waters, are driving the industry toward increased deployment of alternative fuels

Dr. Julia Nesheiwat
Chief Resiliency Officer, State of Florida

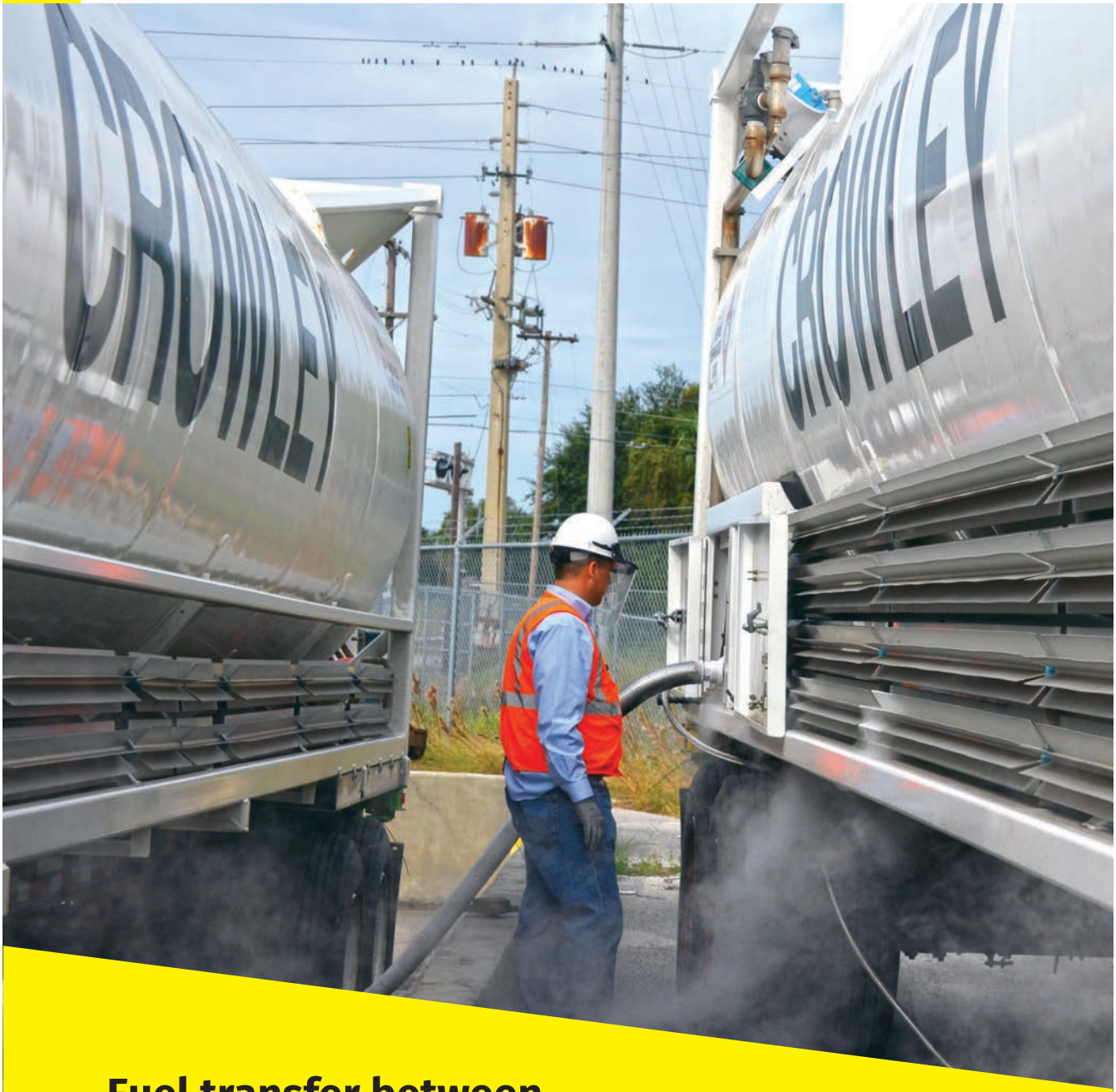
Governor Ron DeSantis appointed Dr. Julia Nesheiwat as Florida's first Chief Resilience Officer (CRO) in August of 2019. The CRO is tasked with developing and achieving resilience goals for the state of Florida.

"Florida ports are leading the way in moving to cleaner, alternative energy sources, bringing tremendous environmental benefits to our transportation systems and our communities."

Crowley Maritime's *El Coquí* is one of the world's first combination container/roll on-roll off (ConRo) ships powered by liquefied natural gas.

as a cost-effective and reliable means to attain compliance. With the expanding market for natural gas, there are also many regulations regarding the construction and operation of CNG/LNG facilities and bunkering operations.

In 1973, the International Maritime Organization (IMO) adopted the International Convention for the Prevention of Pollution from Ships (MARPOL). Annex VI of the convention, which came into force in 2005, addresses air pollution from ships. The annex established limits on nitrogen oxide (NOx) emissions and set a 4.5% limit on the allowable sulfur content in vessel fuels.[47] In 2008, the IMO announced a timeline to reduce the maximum sulfur content in vessel fuels from 4.5% to 0.5% by January 1, 2020. Annex VI requires vessel operators to either use fuels containing less than 0.5% sulfur or install exhaust gas-cleaning systems ("scrubbers") to limit a vessel's sulfur oxide (SOx) emissions to a level equivalent to the required sulfur limit.[48]



Fuel transfer between ISO tanks for potential exports.

MARPOL is implemented in the United States through the Act to Prevent Pollution from Ships. (33 U.S.C. §§1901-19012.) The U.S. effectively ratified MARPOL Annex VI in 2008 when the Maritime Pollution Prevention Act was signed into law. (P.L. 110-280.) The act requires that the U.S. Coast Guard and the Environmental Protection Agency (EPA) jointly enforce the Annex VI emissions standards.[49] These requirements apply to both U.S. flagged ships and foreign ships operating in U.S. waters.[50] Annex VI provides for the establishment of Emissions Control Areas (ECAs), which are waters close to coastlines where more stringent emissions controls may be imposed. The North American ECA limits the sulfur content of bunker fuel to 0.1% of total fuel weight, an even lower bar than that set by the IMO 2020 standards. This standard is enforced by Coast Guard and EPA in waters up to 200 miles from shore.[51]

The IMO adopted safety standards for ships using natural gas as a bunker fuel in 2015, which took effect in 2017, and these standards apply to all new ships and conversions of ships (except LNG tankers, which have separate standards). The IMO standards address engine design, LNG storage tanks, fuel distribution systems, and electrical systems. They also establish new training requirements for crews handling LNG and other low flashpoint fuels. As is the case for the sulfur standards, the IMO LNG safety standards apply to all IMO member nations, including the United States.[52]

The Coast Guard has the most prominent role in regulating LNG bunkering, given its general authority over port operations and waterborne shipping. In 2015, the Coast Guard issued two guidelines for the handling of LNG fuel and for waterfront facilities conducting bunkering operations.[53] [54] In 2017, the Coast Guard issued additional guidelines for conducting safe LNG bunkering simultaneously with other port operations. The guidelines advise on risk assessment of facilities bunkering LNG and risks posed to crews and facilities.

The Federal Energy Regulatory Commission (FERC) also plays a role in the regulation of LNG bunkering due to its jurisdiction over the siting of LNG import and export terminals under the Natural Gas Act of 1938.[55] Specifically, FERC asserts approval authority over the place of entry and exit, siting, construction, and operation of new LNG terminals as well as modifications or extensions of existing LNG terminals.[56] FERC will also monitor all construction and restoration activities to ensure compliance with all federal, state, and local permits, plans, and regulations.[57]

In response to the current administration's promotion of increased LNG exports, the Department of Energy (DOE) recently finalized a rule intended to speed up the approval process for small-scale LNG exports from U.S. facilities. (See, 10 C.F.R. 590.)[58] Upon receipt of any complete application to export natural gas to non-free trade agreement countries, the DOE will grant the application provided two criteria are met: the application proposes to export no more than 51.75 billion cubic feet per year of natural gas, and the proposed export qualifies for a categorical exclusion under DOE's National Environmental Policy Act (NEPA) regulations.[59] The small-scale market in the U.S. primarily involves exports of LNG to the Caribbean and Central and South America.

In addition to the Coast Guard, FERC, and DOE, other federal agencies have jurisdiction over specific aspects of LNG bunkering operations in U.S. ports under a range of statutory authorities.[60] Other federal agencies, including the Environmental Protection Agency, the U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service and the Transportation Security Administration, may regulate other aspects of LNG bunkering projects.[61]

Benefits for Florida Seaports

The increased utilization of natural gas in many industry sectors, opens up the potential market for seaports to participate even beyond the foreign export or bunkering of liquefied natural gas.

With the increased demand for alternative fuels in multiple markets, Florida seaports are in a unique position to capitalize on this growth as part of the supply chain as well as on-port utilization of alternative fuels. This section will evaluate some of the emerging alternative fuel markets and the related infrastructure considerations necessary to engage in these markets.

The marketplace for alternative fuels has continued to expand and now includes uses in industrial operations, oil and gas exploration, power generation, rail and ship motive power, and fueling distribution for ships, locomotives and vehicles. The developments in the industry now make it possible to have operations run entirely on natural gas even if there is no pipeline near the point of use. This, plus the increased utilization of natural gas in many industry sectors, opens up the potential market for seaports to participate even beyond the foreign export or bunkering of LNG. As seaports deal primarily in the movement of cargo and goods, import and export of alternative fuels will likely play a large role in any seaport's increased utilization of natural gas, and each of the emerging markets discussed in this report require the import and/or export of natural gas.

Emerging Markets for Alternative Fuels

There are more than 6,300 producers of natural gas in the United States, and the largest integrated production companies, with worldwide operations and interests in all segments of the oil and gas industry, are termed "Majors." There are 21 active Majors in the United States. There are also about 1,200 natural gas distribution companies in the U.S., with ownership of more than 1.2 million miles of distribution pipe. Additionally, there are more than 110 LNG processing facilities operating in the U.S., performing various services, including exporting natural gas from the U.S., supplying the interstate pipeline system and local distribution companies, storing natural gas for periods of peak demand, and producing LNG for vehicle fuel or industrial use.

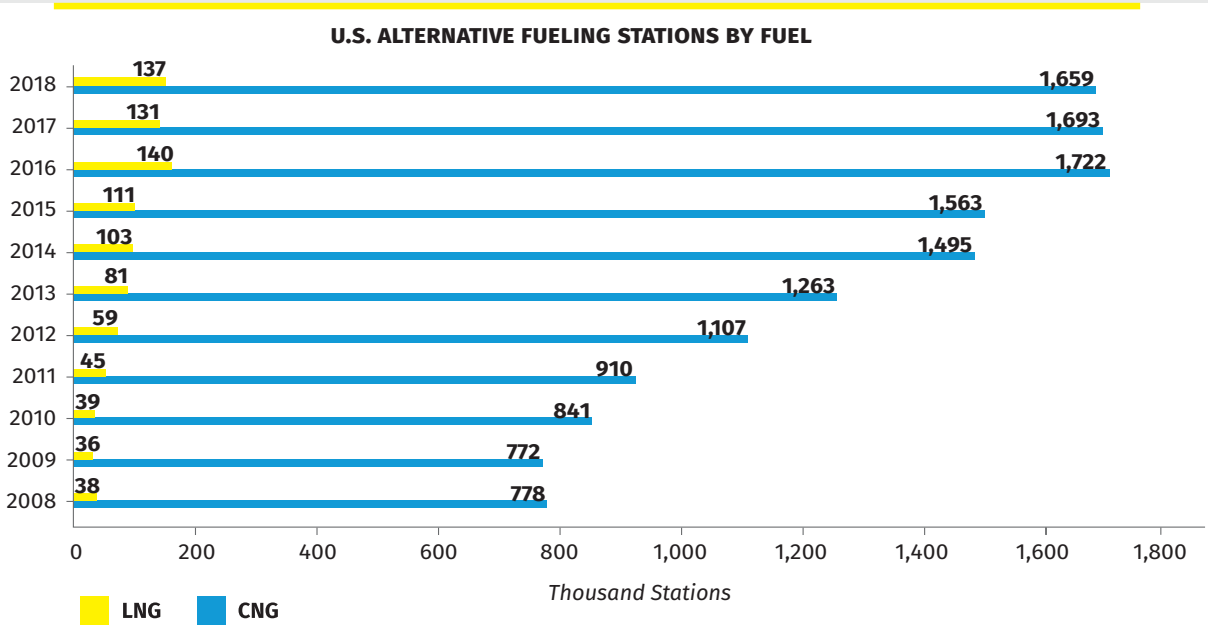
With natural gas operations and facilities continuing to expand to meet the export demands of natural gas, Florida seaports stand in a unique position to participate in the increased utilization of natural gas in the state and around the world.

New innovations in the storage and transport of natural gas through railcar and transport trailers are expanding the opportunities for industrial consumers to operate using natural gas even when removed from the gas pipeline grid. This creates a virtual pipeline in which Florida seaports could play a significant role by facilitating the necessary import and export of LNG to these distribution networks. These virtual pipelines have started to increase

in demand and are able to supply enough natural gas to operate smaller-scale power generation plants. Such operations are proving extremely valuable in island countries and nations where no pipeline infrastructure exists. Florida seaports' close proximity to multiple island chains places them in a unique position to participate in this market.

The expansion of LNG powered shipping and cruise vessels provides another opportunity for Florida seaports to further engage in the alternative fuels market. As detailed above, there are limited bunkering operations around the world and in the U.S. Even though bunkering barges are rapidly entering the marketplace, there is also a strong demand for fixed LNG bunkering facilities. While there are large capital investment costs associated with the specialized infrastructure required for fixed LNG bunkering, these costs could potentially be offset through industry partnerships, state or federal grants, and economy of scale.

Recent environmental trends are turning the focus toward increased utilization of alternative fuels on the landside operations of seaports as well. With the increased domestic supply and lower fuel costs of natural gas, the market for deployment of port cargo handling equipment - including rail and freight trucks - that runs on cleaner burning natural gas is on the rise. As Florida seaports evaluate necessary vehicle and equipment replacements, they can take advantage of these trends to move to equipment powered by natural gas. There are necessary infrastructure improvements required but there is also the potential to offset some of these costs through economic incentives and grant programs.



Data Source: *Alternative Fuels Data Center (AFDC), either directly (afdc.energy.gov/stations/states) or from historical Transportation Energy Data Books (www.osti.gov). Data accessed on 09/27/2018.* **Notes:** *Data snapshots for each year are based on the federal fiscal year and taken as close to September 30th of the indicated year as possible. All attempts were made to space data samples out one year.*

Infrastructure for Deployment of Alternative Fuels

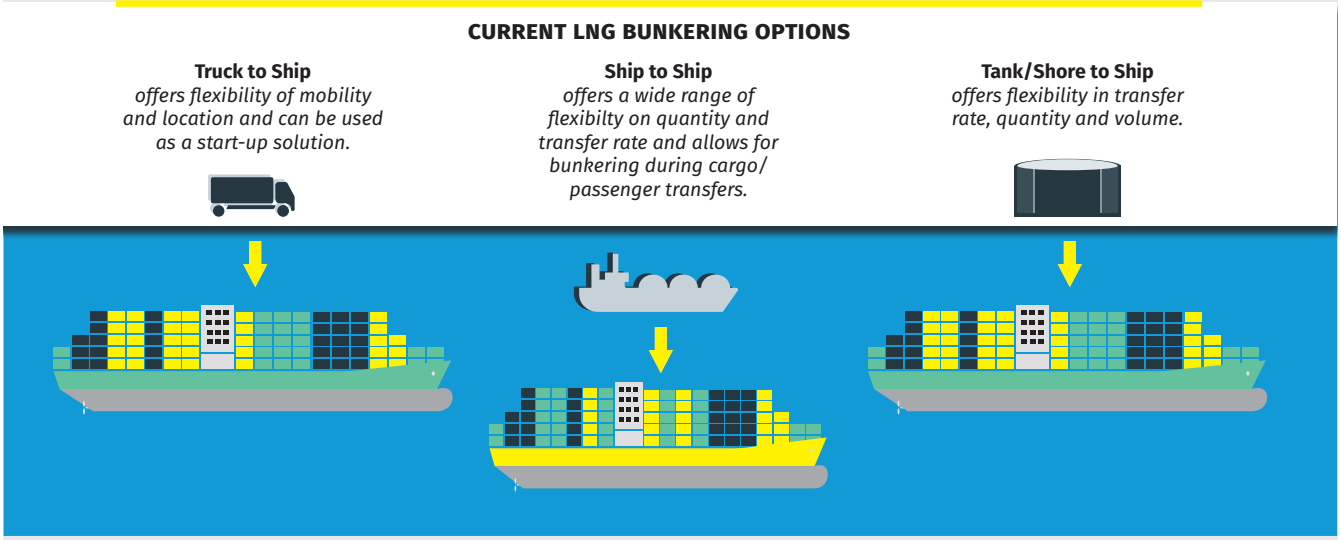
Many of the emerging markets for natural gas require construction of new infrastructure at seaports. The infrastructure required for natural gas deployment understandably varies between the use of LNG and CNG. Because LNG requires significant cooling (-260 °F), more specialized and costly infrastructure is necessary. CNG infrastructure does not require liquefaction or regasification like LNG, and therefore is less expensive.

LNG was developed primarily as a means for transporting natural gas by ocean carriers to overseas markets. Today, LNG is expanding quickly as fuel for shipping, truck and rail modes. For on-port fueling uses, infrastructure is needed to provide LNG bunkering. Because the development of infrastructure is dependent on the needs of specific ports and stakeholders, there is no "standard" bunkering option. Each port will need to address its specific uses and needs and tailor their infrastructure accordingly, while allowing for necessary future growth.

Employing small-scale LNG plants with liquefaction capability that are connected to the local pipeline grid is a cost-effective way to address this. By using smaller LNG plants (called trains), and then adding more trains as demand increases, Florida seaports can slowly integrate LNG into their operations and export activities. Another option is developing on-port storage facilities as Eagle LNG has done at JAXPORT to receive LNG from offsite liquefaction plants or have LNG delivered from offsite facilities directly to vessels in port via truck, rail or other means.

Bunkering ships that are powered by LNG or for LNG transport can be achieved through various methods. Each method has benefits and drawbacks and should be analyzed depending upon the size of the ship and the required flow rate necessary for bunkering particular ships. The current methods of bunkering ships include: 1) Truck to ship; 2) Ship to ship; 3) Shore to ship; and 4) Portable tank transfer (ISO containers).

Truck to ship bunkering offers flexibility to vessel owners, operators, and to bunkering location, as typically any berth or pier may be used. For vessels with small volume LNG fuel tanks, it can be used as a



> **At Port Canaveral, we are ready for the future of LNG. We realized some time ago that with the new stricter emissions standards approaching, everybody would need to adapt to the new dynamics, so we worked hard to ensure our Port would be ready for LNG ships. This year, we'll welcome Carnival Cruise Line's Mardi Gras, the first LNG-powered cruise ship to be homeported in North America, and we expect other cruise lines to expand into LNG, as well."**

Captain John Murray
Port Director and CEO, Port Canaveral

The Canaveral Port Authority serves the region by facilitating domestic and international maritime commerce, creating positive regional economic impact while maintaining transparency, effective planning and sound fiscal management practices.

start-up solution for Florida seaports to participate in the bunkering market before making a large capital investment in LNG bunkering infrastructure.

Ship to ship bunkering is the transfer from one vessel or barge with LNG as cargo to another vessel for use as fuel (such as the Q-LNG bunkering barge discussed previously). This method offers a wide range of flexibility on quantity and transfer rate. Bunker vessels and barges also have the greatest flexibility in location of bunkering. Ship to ship bunkering offers additional flexibility as cargo/passenger transfer can occur during bunkering, while such operations must cease or only occur on portions of the ship not bunkering.

Shore to ship LNG is transferred from a fixed storage tank on land through a cryogenic pipeline with a flexible end piece or hose to a vessel moored to a nearby dock or jetty. LNG may be transported to the storage tanks by truck, rail, or bunker barge from a remote liquefaction facility or an onsite LNG liquefaction facility. While this method has great flexibility in the design for transfer rate and volume, it is the least flexible with respect to location and mobility. It must be sited at a fixed location, relatively close to the dock due to potential heat loss from long sections of pipeline. The proximity from the dock is further restricted by the high costs of cryogenic-service pipelines to ensure proper temperature of the LNG is maintained.

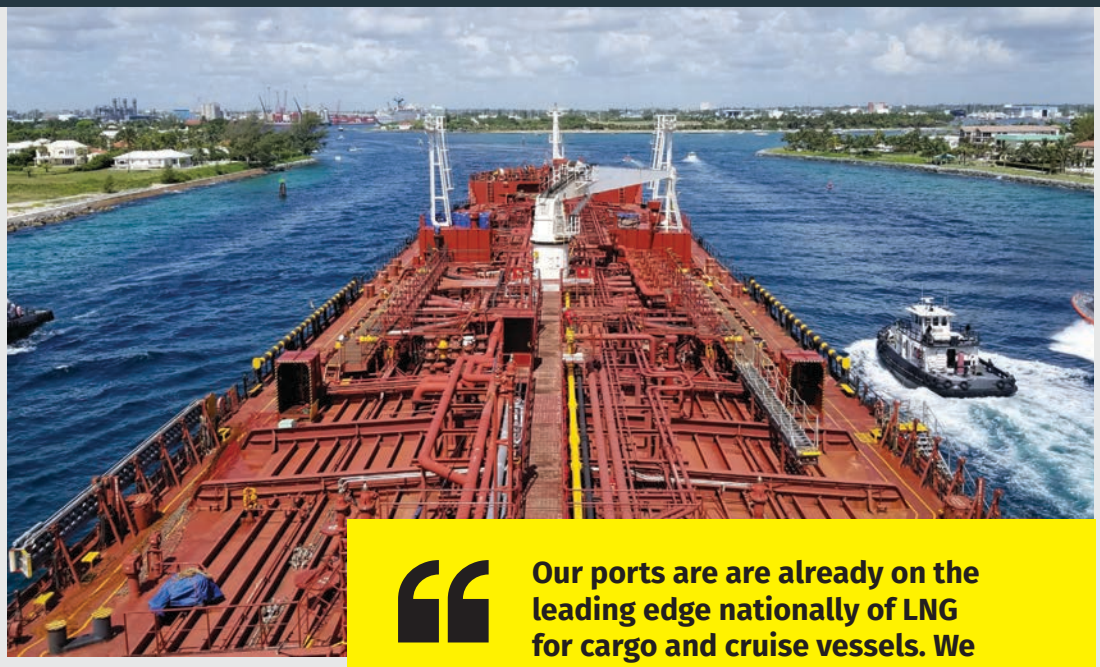
Portable tank transfer may be used as portable fuel storage. They can be driven or lifted on and off a vessel for refueling. The quantity transferred is flexible and dependent upon the number of portable tanks transferred. A 40-foot ISO intermodal portable tank can hold approximately 13,000 gallons of LNG. Like other portable fuels, they can be transported by many different modes, including truck, rail, and cargo vessel.[62]

CNG typically targets small-to-medium sized gas delivery for on-port operations or regional transportation. Because CNG projects do not require the same specialized equipment as LNG, the overall infrastructure is much less expensive and a occupies a smaller footprint. CNG stations are built to conform to codes specifically developed for high pressure gas and include unique components such as gas dryers and high-pressure storage systems. Similar to LNG facilities, CNG fueling infrastructure can be tailored to a seaport's specific needs.

CNG fueling infrastructure can be configured for time-fill or fast-fill fueling rates depending on the fleet and site requirements.[63] Fast-fill fueling infrastructure can achieve fueling rates similar to current diesel fueling stations. In a time-fill configuration, multiple vehicles are connected to a single fuel compressor and filled slowly over the course of several hours, similar to the overnight charging of electric vehicles. Time-fill solutions are generally a less expensive fueling strategy for fleets compared to fast-fill stations because the slower fill rate over a longer period of time allows for the use of smaller compressors and reduced energy consumption. Time-fill stations may also be equipped with a priority hose that allows the full output of the compressors to be directed to a single hose.[64]

Conclusion

The rapid expansion of the natural gas industry and the emerging alternative fuels market across multiple industry sectors provides an exciting opportunity for Florida seaports to expand their utilization and deployment of alternative fuels. While Florida has been on the leading edge of natural gas development in the maritime industry, multiple emerging markets offer great opportunities for Florida seaports to be leaders in the natural gas industry through increased import/export operations as well as on- and near-port uses. With environmental pressures leading to continued stricter air emission regulations, combined with the low fuel costs of natural gas, this industry is likely to continue its exponential growth across all sectors. The availability of grant funding and other inherent economic advantages should encourage Florida seaports to actively engage in the alternative fuels industry and increase their share of this growing sector.



Doug Wheeler
President & CEO,
Florida Ports Council

"Our ports are are already on the leading edge nationally of LNG for cargo and cruise vessels. We must ensure that Florida has the infrastructure and business climate to promote the economic and environmental benefits from these alternative fuels."

Notes

Photo Credits and Appreciation

The Florida Ports Council would like to thank the following for their contributions to this project: Eagle LNG, Crowley, JAX LNG, JAXPORT, Port Canaveral, Port Everglades, Port of Fernandina, Port of Fort Pierce, Port of Key West, Port Manatee, PortMiami, Port of Palm Beach, Port Panama City, Port of Pensacola, Port of Port St. Joe, Port St. Pete, Port Tampa Bay, and Tote Maritime.

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27 Ecology and Environment, Inc., Proposed Tacoma Liquefied Natural Gas Project: Draft Supplemental Environmental Impact Statement, prepared for Puget Sound Clean Air Agency, October 8, 2018, p. 1.

28 CRS, "LNG as a Maritime Fuel: Prospects and Policy"

29 DNV GL, "Assessment of Selected Alternative Fuels and Technologies," June 2019.

30 Id.

31 Splash 247, "LNG Order Book at All-Time High," accessed online August 2019, at https://splash247.com/lng-orderbook-at-an-all-time-high/

32 Cruise Industry News, "Cruise Ship Order Book," accessed online August 2019, at https://www.cruiseindustrynews.com/cruise-news/cruise-ship-orderbook.html

33 CRS, "LNG as a Maritime Fuel: Prospects and Policy"

34 FEC receives LNG from its small-scale production plant in Hialeah, Florida, to operate on its 351 mile track on the east coast of Florida.

35 EIA, "Liquefied Natural Gas Shows Potential as a Freight Locomotive Fuel," April 2014, available online at, https://www.eia.gov/todayinenergy/detail.php?id=15831

36 LNG America, accessed August 2019, at http://www.lngamerica.com/rail-industry.html

37 While freight trucking also includes the movement of LNG through vacuum sealed containers, this section is an overview of natural gas as an alternative fuel for freight trucking.

38 Such companies as Volvo, Peterbilt, Mack, Kenworth, International and Freightliner Truck offer natural gas heavy-duty trucks. See, https://www.ngvamerica.org/vehicles/availability/?vehicle_type=heavy-duty-truck-oems

39 https://www.truckinsurancenitic.com/recent-news/82-trucking-industry-making-slight-shift-to-natural-gas

40 https://www.blueorigin.com/engines/be-4

41 https://www.spacex.com/starship

42 https://www.pacmar.com/story/2019/07/01/features/cargo-handling-operation-and-equipment/713.html

43 2018 Feasibility Assessment for Drayage Trucks, April 2019, available online at http://www.cleanairactionplan.org/documents/draft-drayage-truck-feasibility-assesment.pdf/

44 Id. at pg. 27-28.

45 Id. at pg. 105-106.

46 The market for natural gas powered heavy-duty, high capacity forklifts does not appear as developed as other cargo handling vehicles.

47 International Maritime Organization, "Prevention of Air Pollution from Ships: MARPOL Annex VI—Proposal to Initiate a Revision Process," MEPC 53/4/4, April 15, 2005, p. 2, https://www.epa.gov/sites/production/files/2016-09/documents/marpol-propose-revision-4-05.pdf.

48 CRS, "LNG as a Maritime Fuel: Prospects and Policy"

49 Bunkerspot, "United States: MARPOL Annex VI Ratified," 2008, https://www.bunkerspot.com/latest-news/27972-old-bs-9159.

50 MARPOL's Annex VI requirements are codified at 40 C.F.R. §1043. They apply to U.S.-flagged ships wherever located and to foreign-flagged ships operating in U.S. waters.

51 CRS, "LNG as a Maritime Fuel: Prospects and Policy"

52 Id.

53 The USCG issued Policy Letter CG-521 No. 01-12 "Equivalency Determination – Design Criteria for Natural Gas Fuel Systems," which provides a basis for designing gas-fueled ships and is based on IMO Resolution MSC.285

54 The USCG has also drafted a Policy Letter related to bunkering facilities and vessel bunker operations: Draft Policy Letter No. 02-14 "Guidance Related to Vessels and Waterfront facilities Conducting Liquefied Natural Gas (LNG) Marine Fuel Transfer (Bunkering) Operations (Ref. /74/).

55 (FERC exercises LNG siting regulation under its Section 3 authority, which authorizes FERC to approve the import and export of natural gas (15 U.S.C. §717b).)

56 CRS, "LNG as a Maritime Fuel: Prospects and Policy" and 18 C.F.R. §153.

57 The existing U.S. Federal regulations for LNG facilities, regardless of the size, are generally covered in the following codes and regulations: 33 CFR Part 127 - Waterfront facilities handling LNG and Liquefied Hazardous Gas; 49 CFR Part 193 - LNG facilities: Federal Safety Standard; 18 CFR Part 153- Applications for authorization to construct, operate, or modify facilities used for the export or import of natural gas

58 https://www.federalregister.gov/documents/2018/07/25/2018-15903/small-scale-natural-gas-exports

59 https://www.energy.gov/articles/us-department-energy-finalizes-rule-expedite-approval-small-scale-natural-gas-exports

60 For example, the Pipeline and Hazardous Materials Safety Administration within the Department of Transportation regulates the safety of natural gas pipelines and certain associated LNG storage facilities (e.g., peak-shaving plants). (PHMSA regulations for LNG facilities are found at 49 C.F.R. Part 193) LNG facilities also may need to comply with the Occupational Safety and Health Administration's regulations for Process Safety Management of Highly Hazardous Chemicals. (29 C.F.R. Part 1910.119.)

61 (For a complete list of federal agencies that regulate at least one aspect of the LNG bunkering process, see Danielle Holden, Liquefied Natural Gas (LNG) Bunkering Study, DNV GL, No. PP087423-4, Rev. 3, prepared for the U.S. Maritime Administration, September 3, 2014, p. 87.)

62 DNV GL, "Assessment of Selected Alternative Fuels and Technologies," June 2019.

63 2018 Feasibility Assessment for Drayage Trucks, April 2019, available online at http://www.cleanairactionplan.org/documents/draft-drayage-truck-feasibility-assesment.pdf/

64 Id., pg. 73-74.


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2. What are Peoples current plans and timeline for constructing LNG facilities? Please explain.

A. As described in Staff's First Data Request Response No. 1c, Peoples is in active discussions with multiple customers in different market segments to provide LNG solutions to meet their growing demand for LNG. An approved tariff supports advancing discussions with these parties and their increased demand for natural gas solutions in addition to natural gas pipelines. Peoples does not have an active timeline for constructing facilities.

3. Does Peoples have an estimate on the cost, or range of cost, of constructing these LNG facilities? Please explain.

A. The range of construction costs for an LNG facility can vary depending on the location, service(s) (liquefaction, storage and re-gasification) and capacity of the facility. Some facilities may include all of these services whereas others may only have storage facilities. The capacity requirements i.e., daily volume of liquefaction, volumetric need of storage capacity, etc., the facility is serving has a significant impact on the cost to construct a facility. Peoples expects a typical facility will cost between $25 million and $75 million. However, a large capacity storage and high volumetric (e.g., liquefaction & re-gasification) facility may cost beyond $100M. These larger projects typically serve the needs of energy production or high-volume maritime shipping needs. It is anticipated that long-term contracts with creditworthy counterparties will support the LNG projects and cover the costs of building, operating and maintaining these facilities.

4. Please explain how the company will ensure that the costs of these LNG facilities will be fully covered by subscribers. Will the Company guarantee that non-subscribers would not absorb any unrecovered costs of these facilities if subscribership does not support the facilities? Please explain.

A. Peoples intends to build LNG facilities that will be supported by those customers requesting LNG service. The cost for the LNG service will be determined based on the overall cost, type of service, anticipated demand, term of the agreement, and operation and maintenance activities for each facility. Peoples will design and build the facilities to meet the expected contracted LNG demand and solution for their customers and will structure agreements with customers such that each customer is responsible for its share of costs in the LNG facility. Commercial agreements for these facilities will contain appropriate terms and conditions along with provisions for typical financial guarantees such as surety bonds, letter of credit, etc., as the Company deems appropriate.

5. Tariff Sheet No. 7.406, requires that the parties enter into an agreement for LNG service. Please provide a copy of a sample agreement.

A. Peoples Gas has not developed a sample agreement to date.

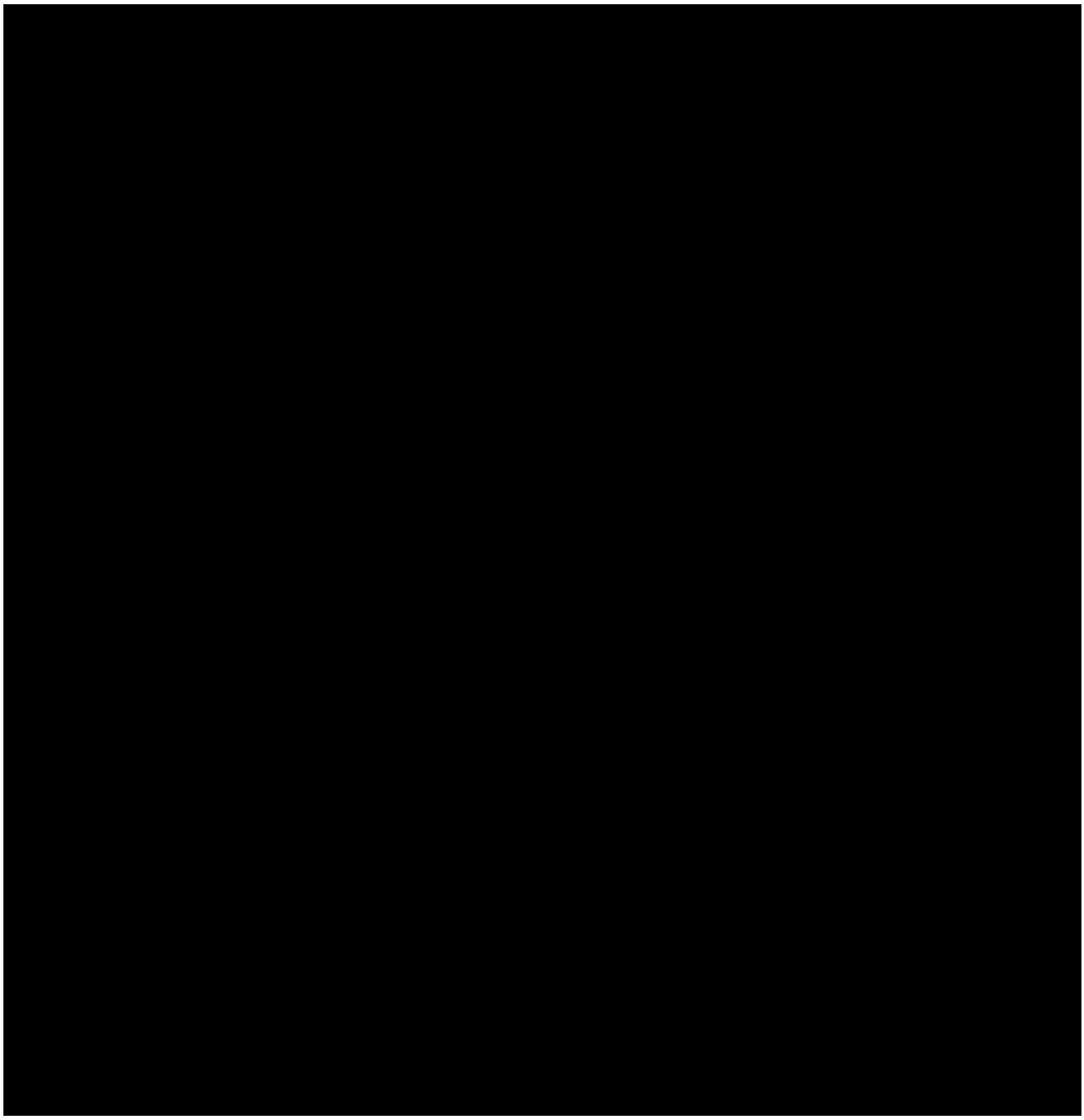
6. On average, how much does it cost to produce 1,000 therms of Liquefied Natural Gas?

A. The cost to produce LNG depends upon a variety of factors, including project location, cost of natural gas, costs to transport natural gas to the facility, size of the facility, technology utilized and overall costs in the area. The capacity requirements i.e., daily volume of liquefaction, volumetric need of storage capacity, etc., the facility is serving will have a significant impact on the cost to produce LNG.

REDACTED

7. Please provide a calculation of the monthly service charge for a hypothetical LNG facility, showing each step of the calculation including all assumptions (depreciation, return, property taxes, other taxes, etc.)

A. [redacted]



8. Please describe the typical maintenance activities Peoples would perform for an LNG plant.

A. The range of typical maintenance activities for an LNG facility can vary depending on the type of facility constructed e.g., storage versus liquefaction. LNG facilities are highly reliable and are not normally down for long periods of time for maintenance. Maintenance activities will be performed in accordance with Peoples' stringent safety and operating standards to ensure that the facility is operating safety and in full compliance with all environmental, regulatory and legal requirements applicable to LNG facilities. Peoples will perform routine maintenance, inspection and testing on piping, valves, filters, compressors, pre-coolers, turbo expanders, vaporizers, pre-treatment, pumps, absorbers, instrumentation, instrument air, dryer, impoundment, odorization system and vaporization. Typical activities include inspection, oil changes, seal replacement, refrigerant make-up, bearing replacement, amine make-up, compressor maintenance, media replacement and filter replacement in addition to all maintenance and certifications required under 49 CFR 193, NFPA 59A and all requirements incorporated by reference.

9. Please explain whether Peoples intends to install LNG facilities pursuant to this tariff only in its current service area, or whether a customer outside Peoples' current service area can request LNG service from Peoples.

A. Peoples intends to install LNG facilities in its current service area and other areas of Florida not served by other LDC's. If a customer(s) located in another LDC's identified service area, requests LNG service, then Peoples will work with the existing LDC in that area to determine if an agreement can be reached to provide LNG services.

10. Paragraph 9 of the petition states that on-site LNG could be a solution to customers in remote locations that do not have existing pipeline infrastructure nearby. Paragraph 14 of the petition states that LNG customers would receive distribution service from Peoples and pay all applicable distribution charges and clauses or riders. Will all those charges apply to an LNG customer that is not connected to Peoples' distribution system? Please explain and state how the natural gas would get to the LNG facility of a customer that is not connected to a distribution pipeline.

A. Distribution charges, and riders or clauses would not apply to a customer that was not connected to Peoples' distribution system. A customer that is not connected to Peoples' distribution system could be provided LNG service by being directly connected to an interstate pipeline or alternatively, a customer that is remote or has intermittent natural gas needs could receive LNG via trucking.

11. Tariff Sheet No.7.406-1, includes special provisions for LNG not consumed in Florida (Special Condition 2(b)). Please describe the circumstances in which a customer's usage could result in this condition.

A. Special condition 2(b) is intended to prevent customers from circumventing FERC regulations by prohibiting customers from injecting natural gas into a FERC regulated interstate pipeline or distribution system. Customers would be allowed to inject natural gas into PGS' distribution system and other intrastate pipelines.