



Small Scale and Containerized LNG

April 2022

Natural gas is commonly transported and delivered in bulk to end-users by pipeline or large scale liquefied natural gas (LNG) tankers, but these methods may not be feasible for smaller markets. Natural gas producers are reaching smaller markets with “virtual pipelines” that transport LNG by rail, on trucks, barges, or small ships.

Overview

Liquefied natural gas (LNG) is natural gas that has been cooled to a liquid state, at about -260° F (-162° C), for shipping and storage. The volume of natural gas in its liquid state is about 600 times smaller than its volume in its gaseous state, making it possible to transport natural gas to places pipelines do not reach. Global LNG trade, mostly by large LNG tankers traveling long distances over oceans, reached 379 million tonnes, or approximately 49 billion cubic feet per day (Bcf/d) in 2021. LNG can also be transported in smaller quantities, by truck, rail, or ship, to locations that do not have



natural gas pipeline infrastructure, are not near a port that can receive large LNG tankers, or to small markets on islands or other remote locations.

LNG International Standards Organization (ISO) containers: These are specialized intermodal tanks that can be loaded onto trucks, ships, and rail cars.

Integrated tank trucks: These are trucks with insulated tanks that can carry LNG.

Small LNG ships: With capacity under 30,000 cubic meters, these ships can move LNG to smaller ports. Smaller size LNG ships can serve as bunker vessels and can refuel LNG-powered ships at ports.

Integrated tank truck courtesy of Chart Industries

Users for Small Scale LNG Shipments

- Small power plants
- Combined heat and power plants
- Manufacturing facilities
- Vehicle fleet operators
- Refueling stations for LNG and CNG vehicles
- LNG-powered marine vessels
- Oil and gas field operations

Emerging Practice: Liquefying Stranded Gas

Oil producers in some locations face a challenge in handling the “associated gas” that is produced along with crude oil and must be flared, vented or combusted on site if there is no natural gas infrastructure to transport it to pipelines or processing facilities. Some oil and gas producers have begun utilizing equipment to liquefy this gas at the wellsite using small mobile liquefaction units. The LNG can be stored in specially made containers and transported by truck, rail, or port shipments to another location for use. Liquefying natural gas at the wellsite can be economically challenging and is not yet widely done. However, onsite gas liquefaction could allow operators to create valuable and transportable product streams while also enhancing their environmental performance.

Liquefied Natural Gas vs. Compressed Natural Gas

Compressed natural gas (CNG) is natural gas compressed to a pressure at or above 2900-3600 pounds per square inch at atmospheric temperature and stored in high-pressure containers. It is used as fuel for natural gas-powered vehicles. CNG is delivered to fueling stations by natural gas pipeline networks and by truck. CNG vehicles are in wide use globally, with the majority in Asia, Latin America, and Europe. CNG vehicle types include cars, vans, urban and transit buses, short-haul trucks, and forklifts. CNG can be a practical choice for retail sales because fueling a vehicle with CNG is like filling a diesel or gasoline tank, while fueling with LNG requires protective eyewear and clothing. LNG as a vehicular fuel is primarily used by fleets of regional and long-haul trucks, locomotives, and marine vessels. LNG’s main advantage over CNG is that it can supply the same amount of energy in just 30 percent of the volume.

Small Scale LNG Exports from the United States

Small scale exports of LNG from the U.S. in ISO containers transported on cargo ships to island nations in the Caribbean began in 2016. End-users include manufacturers, commercial entities such as hotels, residential users for cooking, and power generation.



Photo of cryogenic ISO containers courtesy of Chart Industries

Small Scale LNG Exports from the U.S. to the Caribbean(Thousand cubic feet)

Country	2016	2017	2018	2019	2020	2021	
Antigua and Barbuda	--	--	--	--	--	--	7,649
Bahamas		1,696	137,354	156,032	256,944	482,512	
Barbados	99,577	199,627	173,632	211,152	240,832	296,830	
Haiti				41,552	117,872	137,376	
Jamaica					848	220,365	848
Nicaragua		--	--	--	--	--	

Export Authorizations

Companies in the United States that want to export natural gas must get authorization from the Department of Energy (DOE). The Natural Gas Act requires DOE to make public interest determinations on applications to export LNG to countries without free trade agreements (FTAs) with the U.S. Obtaining an authorization to export LNG to countries that do not have FTAs with the U.S. allows companies maximum flexibility in choosing shipping destinations.

U.S. Small Scale LNG Companies with Non-FTA Export Authorizations

Authorization Holder	Authorized Capacity (Billion cubic feet/day)	DOE Docket Number
American LNG Marketing, LLC	0.008	14-209-LNG
Carib Energy (USA)	0.004	16-98-LNG
Eagle LNG Jacksonville	0.14	16-15-LNG
Eagle Maxville	0.008	17-79-LNG
Nopetro LNG, LLC	0.14	20-167-LNG

Expedited Permitting for Small Scale LNG Exports

To meet the demands of the small scale LNG market, in July 2018, DOE issued a rule that expedites the permitting of small scale exports of U.S. natural gas (less than 0.14 billion cubic feet per day or 51.75 billion cubic feet or 1 tonne per year.)

The rule provides that complete natural gas export applications to non-free trade agreement countries that meet two criteria will receive automatic approval from DOE, much in the same way as free trade agreement export applications are currently treated with automatic approval. The two criteria are: 1) that the proposed export is for less than 0.14 billion cubic feet per day and 2) that the proposed export is from a facility (or facilities) that do not require the preparation of an Environmental Assessment or Environmental Impact Statement.

DOE tracks and publishes all U.S. natural gas import and export data, including large and small scale LNG, at energy.gov/fecm/listings/lng-reports

For more information, please visit energy.gov/fecm/regulation