

ISO containers offer third market for LNG

International LNG traders earn about \$160 billion annually from the export of ocean cargos. Increasingly, LNG-fueled transportation also represents a viable and growing market. This article examines a third market, intermodal container trade, and some of the proponents behind it.

Last summer, Bermudan's paid about 45 cents per kilowatt hour for their electricity, one of the highest prices for electric power in the world, according to a [report](#) from the [Bermuda Electric Company \(BELCO\)](#). The average electric bill has risen from \$265/month in 2008 to \$313/month in 2012. BELCO believes energy prices are largely to blame for the island's high cost of living.

In June, the company paid an average \$157/bbl (\$26.70/MMBtu) to import diesel and \$108/bbl (\$18.37/MMBtu) to import heavy oil to fuel its 165-megawatt power plant. The facility, which supplies Bermuda's tourism industry and about 65,000 local residents, is too small for a world-scale LNG import terminal.

Yet, some 600 miles to the west, U.S. power plants paid just \$2.70/MMBtu for natural gas – one tenth BELCO's fuel price. Does this offer an opportunity for U.S. LNG exporters to go after small, but high value markets? Already, moves by some companies indicate this market is just as viable as world trade and alternative fuels.

On Jan. 28, Shell US Gas & Power LLC (Shell) and Southern Liquefaction Company, a subsidiary of Kinder Morgan, announced intentions to develop a liquefaction plant in two phases at their Elba Island LNG import terminal, near Savannah, Ga. Phase I will establish a 1.5-million-tonne-per-year plant, which Shell reports will require no additional U.S.DOE approvals.

Lure of intermodal containers

While Shell has not announced an International Organization of Standardization (ISO) intermodal container program, an increasing number of entrepreneurs

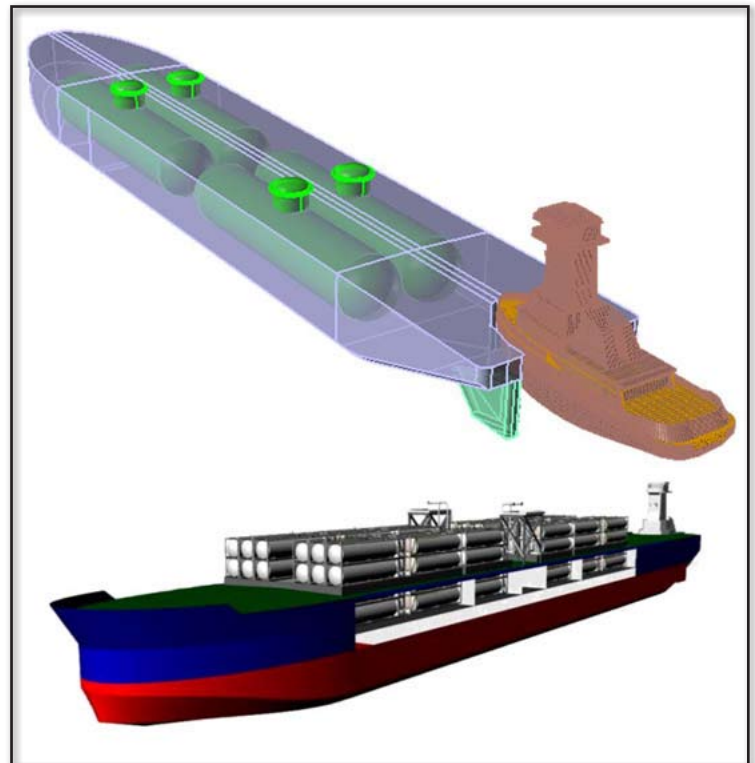


Figure 1: Argent Marine and Maersk Line, Limited, have proposed using LNG barges and iso containers as a means to serve markets too small for world-scale import terminals. Images courtesy of Argent Marine.



Figure 2: Liquline has experience with transporting LNG via ISO containers on trucks (top), trains (middle) and ships (bottom). Photo courtesy of Liquline.

highways and railroads.

Argent Marine has teamed with Danish shipping giant, Maersk Line, Limited, to offer technology to accommodate firms like Carib Energy. The graphics in Figure 1 illustrate concepts Argent and Maersk have proposed. The first represents a 10,000-liquid-cubic-meter (220-million-cubic-feet) barge concept, called “[swap and drop](#),” where a full barge is delivered to a dock and an empty barge is retrieved for refill.

The second graphic illustrates a ship design where more than a hundred ISO containers can be transported and offloaded via a container port to be distributed intermodally by truck, rail and barge to small regas facilities.

Liquline is another relatively new company that has demonstrated experience in marine, rail and trucking transportation in Europe. See Figure 2. The company has just opened an office in Vancouver with the intent to serve North America. Speaking to the *World LNG Fuels* conference in January, Calum McClure, VP North America, reported Liquline’s containers can store LNG for up to 80 days without releasing boiloff. The firm uses

are working to supply small markets, like Bermuda, LNG via ISO containers. One such firm, Florida-based Carib Energy, has announced plans for the Caribbean and Latin America.

In 2011, the U.S. DOE authorized Carib Energy to export LNG to [Free Trade Agreement countries](#). Under the order, Carib is permitted to export domestically produced and previously imported LNG in approved ISO containers transported by ocean-going vessels from the southeast United States, including Florida, and the Gulf Coast, including Texas, up to the equivalent of 11.53 bcf (0.23 million tonnes) annually for 25 years.

Chile, Colombia, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama and Peru are among the FTA countries in the Caribbean and Latin America. Carib states that in the majority of cases, no facility modifications or additions will be required for it to export LNG from the United States.

Carib intends to take delivery of LNG at the site of existing liquefaction plants, purchasing relatively small quantities, in most cases, making use of excess capacity. Carib also will transport the LNG from liquefaction facilities within the United States over

Track&Trace to monitor, pressure, level and position of the containers in transit.

The ISO Equipment

Cryogenic equipment manufacturer, Chart Industries, manufactures 20-foot (6.1 meter) and 40-foot (12.2 meter) ISO pressure-transfer containers. Both models are contained within standard 96-inch (2.44-meter) square frames. The 20-foot models can store a little over 20,000 liters of LNG (0.44 million cubic feet of natural gas) for between 52 and 75 days, depending on the model's pressure ratings.

The 40-foot models can store about 43,500 liters of LNG (0.95 million cubic feet of natural gas) for between 53 and 65 days, depending on the model's pressure ratings.

Storage costs are estimated by this publication to range between \$4.00 and \$5.00 per liter, depending on quantity and model purchased. In comparison, field-erected storage tanks, such as the ones commonly built for world-scale LNG import terminals, commonly cost between \$0.50 and \$1.00 per liter. Thus, the goal for proponents of this new marketing concept is to target the markets suffering from the highest cost energy, like Bermuda, where natural gas can offer a 90% margin in which to liquefy, transport, store and vaporize the LNG.

EXPEDITING LNG-FUEL SUPPLY WORKSHOPS & TOUR

JUNE 25-26, 2013 | WYNDHAM HOTEL | **HOUSTON, TX**



Join us June 25-26 as we learn about new technologies to enable fleets and industries to expedite LNG fuel use.

On June 25, manufacturers of LNG mobile fuelers and ISO containers, including Linde, INOXCV A and WesMor, will display mobile LNG fuel delivery systems for participants to examine. Representatives will answer questions onsite.

On June 26, WesMor Cryogenic Companies will host a tour for qualified participants of its La Porte manufacturing facility where LNG ISO containers and trailers are built.

FEATURED SPEAKERS

Using Mobile Fuelers to Expand LNG Usage in Exploration & Production

Brian Murphy, engineering manager, Ensign Energy Services

Inventorizing, Deploying Mobile Fuelers to Expedite LNG Availability

David Hill, vice president, Encana

Safety and Siting Issues for LNG Mobile Fuelers

Kirk Richardson, Texas A&M

Stepping Up Manufacturing Volumes of Mobile Fuelers

Tim Miller, vice president, INOXCV A

Mobile Fuelers from an Integrated Supplier, Manufacturer Perspective

Roy Twymon, energy solutions business development manager, Linde

Jamaica: The Ideal Market for LNG Containers

Stephen Wedderburn, advisor to Jamaican Prime Minister Portia Simpson-Miller

Intermodal LNG Service: An LNG Suppliers Perspective

Shaunt Hartounian, vice president, Applied Natural Gas Fuels

Integrated ISO Container Distribution: Lessons Learned from Abroad

Calum McClure, president, Liquiline

Inland and Intercoastal Intermodal Distribution

Gary Van Tassel, manager, LNG technical, Argent Marine

Enabling LNG Bunkering via Intermodal Containers

Alex Harsema-Mensonides, manager, business development, Marine Services GmbH

Managing Boiloff at Intermodal LNG Delivery Points

Keith Hall, director of engineering and product development, WesMor

WWW.ZEUSINTEL.COM/ISO2013