

UTC Spotlight

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Transportation in a Liquefied Natural Gas Rich World

The University of New Orleans (UNOTI) is conducting several phases of Liquefied Natural Gas (LNG) research concerning the US shale revolution and its effect on the energy sector and various transportation systems. UNOTI initially assisted the Port of New Orleans with LNG bunkering research. Phase II continued with LNG energy policy and export analysis. Phase III is currently analyzing: (1) challenges to US LNG exportation, (2) value added alternative LNG uses such as marine fuel, and (3) potential effects of the shale oil and gas industry on US transportation systems.

LNG Bunkering

In 2015, UNOTI and the Port of New Orleans agreed that there existed little interest among users of the Port of New Orleans (PONO) for LNG bunkering. It was concluded as well that there was no market demand in the region for LNG as a marine fuel. However, much has changed in energy and maritime policy since 2015 which has caused UNOTI and PONO to reconsider the role of LNG in the Gulf Coast megaregion.

Energy Policy And Exports

The US, Australia, Qatar, Russia, Iran, Azerbaijan, and Turkmenistan all have plans underway to expand both piped natural gas infrastructure and LNG facility production to serve markets in Asia, India and Europe between now and 2025. Therefore, US LNG export growth will not be without competition.

A global oil and gas glut resulted in a price collapse in 2014. These commodities remain at deflated prices despite some recent slight upward price movement. A key long-term challenge for US LNG exporters will be their ability to secure traditional long-term LNG import contracts at profitable rates. Unfortunately, with increased competition the LNG trade is now based on short-term contracts de-linked from oil prices.

Additionally, since 2013, worldwide renewable energy investments added 142 gigawatts of renewable capacity compared to 141 gigawatts in new fossil fuel generating capacity. These factors combine to create a hard-to-predict future for the global LNG export industry, and specifically, the amount of new LNG facilities that the US export market can sustain.

Value Added Alternatives

Although the Gulf Coast's petrochemical build-out is prone to the same boom-bust dynamic and macroeconomic forces that negatively affect LNG, energy-intensive petrochemical production can likely provide a broader industrial revival in the region versus the capital-intensive process required for LNG exportation.

Like energy policy of other major global hydrocarbon-producing regions, a top priority for US policy makers should be to capture the long-term industrial feedstock value-chain that inexpensive and lower-carbon-emitting US shale gas represents versus a policy that focuses on shipping vast quantities of LNG abroad at increasingly competitive global pricing indexes.

LNG As A Marine Fuel

The US is showing signs of developing LNG powered marine vessel refueling technology with waterside LNG barge refueling as an alternative to shore side bunkering, spearheaded in large part by the US marine vessel builder Conrad LNG. This suggests future growth in LNG as a marine fuel, especially as we reach the 2020 International Maritime Organization's MARPOL Annex VI convention deadline mandating maritime emissions reductions.



Figure 1. Construction of the first LNG bunker barge built in North America at Conrad Shipyard, Orange, TX, 2017

Conrad LNG.

As foreign flagged vessels begin utilizing new LNG powered engines, US ports need to seriously consider the costs and benefits associated with LNG fuel bunkering (both shore-side and barge bunkering) to accommodate the refueling needs of foreign flagged (and domestic) vessels that frequent US ports.

Transportation Implications

Expansion Of The Panama Canal

The June 2016 expansion of the Panama Canal opened a money saving route to Asia. The new locks of the expanded Panama Canal can now accommodate oversized LNG tankers that previously could not pass through the canal. The more direct route to Asia now takes only 20 days (11 days fewer than the 31-day Atlantic Ocean-Asia Suez Canal route, or 34-day southern-tip-of-Africa route). Through the expanded Panama Canal, Louisiana to Tokyo is approximately 35% less expensive than other routes, reducing shipping costs by roughly one-third.

As of late March 2018, Latin American imports have accounted for 70% of LNG traversing the expanded Panama Canal, with Chile, Mexico, and Argentina continuing to import large quantities of LNG since the widening of the canal.

The U.S. Department of Energy predicts that by 2021, as many as 550 LNG tankers could be crossing the canal annually, accommodating roughly 90 percent of the existing world LNG tanker fleet.

Short Sea Shipping (SSS), along with container on barge technology utilizing the Mississippi River tributary system, could provide alternative modes to road, rail, and pipeline transport



Figure 2. Galea LNG carrier transiting the Panama Canal.

of shale oil and gas in the expanding trade with Latin America. With 44% of the nation's refinery capacity along the Gulf Coast, regional trade through SSS should be considered as a viable option.

Table 1. US LNG exports to Latin America and the Caribbean in 2016 (million cubic feet)	
Country	million cubic feet
Chile	29,405
Mexico	27,470
Argentina	16,661
Brazil	9,196
Dominican Republic	2,945
Barbados	100
Total	85,777

Source: US Energy Information Administration

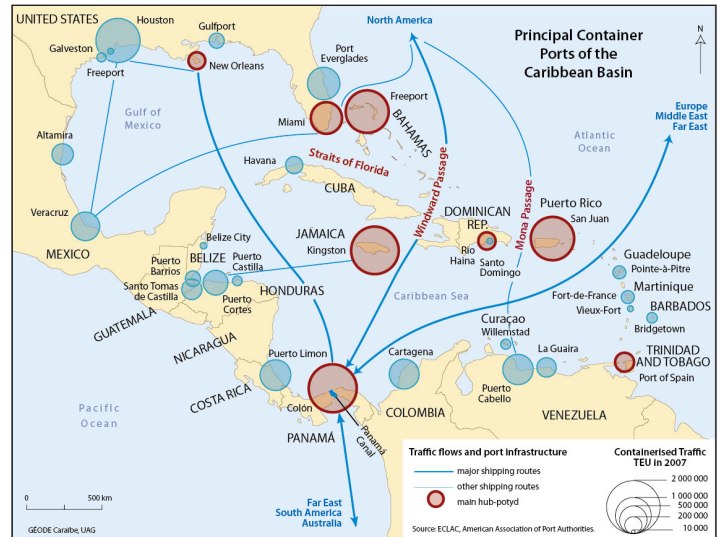


Figure 3. Short Sea Shipping. Principal container ports of Caribbean Basin.

The US Road Network

Recent increases in shale fracking, expanding pipeline construction, and LNG export facility permitting and construction activity, inevitably places additional stress on local, state and federal road systems. UNOTI is examining the implications of increased shale fracking on US road infrastructure, the trucking industry, and implications for maintenance schedules, costs, safety, and potential shifts in national freight movements.

Conclusion

Although forecasts by analysts predict the US as a dominant exporter of LNG by the mid 2020's, uncertainty remains. What is certain is the anticipated growth in production of LNG implies important new considerations for academic study and development opportunities for industry, for both the maritime and surface transportation fields.



About This Project



Since 2014, Director Dr. Bethany Stich, Senior Researcher Mr. James Amdal, and Ian Butler-Severson, a Graduate Research Assistant at the University of New Orleans Transportation Institute (UNOTI), have conducted US Liquefied Natural Gas (LNG) policy research pertaining to LNG exportation, uses in the petrochemical industry, and use as a marine fuel. Currently in Phase III, this research is ongoing. Inquiries may be directed to bstich@uno.edu. More information on this and other UNOTI projects can be found at: transportation.uno.edu.

This newsletter highlights some recent accomplishments and products from one University Transportation Center. The views presented are those of the authors and not necessarily the views of the Office of the Assistant Secretary for Research and Technology or the U.S. Department of Transportation.



Panama Canal Authority

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