

# TRANSACTION COSTS AND FLEXIBILITY IN THE LNG MARKET: A CASE STUDY ON UNITED STATES

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## Overview

The international LNG market is facing a major structural change due to the increase in LNG commercialization and the impacts of the shale gas revolution in the United States. Since the turn of the century, LNG markets have grown rapidly: by 2000, only 11 countries had LNG importing facilities and 12 countries had liquefaction terminals, with few restrictive and inflexible contractual arrangements. By 2017, there were 40 LNG importing countries and 19 exporting ones, with total commercialization volume of 290 million tons per annum (MTPA). During these years, in addition to the increase in the market participants and, consequently, in the regasification and liquefaction capacities, the LNG market also witnessed a major increase in the spot and short-term volumes: by 1992 these markets represented only 1% of total commercialized volume, in 2017 their participation increased to 27% of the total (GIIGNL, 2018).

The second reason for the structural change taking place in the LNG market is related to the shale gas revolution in the United States. Due to the advent of technologies to explore the unconventional resources, the production of the abundant shale and tight gas reserves was made economically viable, which interrupted the country's declining path in the natural gas production by 1986. The unconventional production stabilized the national production until 2005, but from that year onwards it grew systematically (an average of 3.6% per year), due to the shale gas' high recovery rates. In 2000, the shale gas production was only 1.6% of total US production, growing to 4.1% in 2005 and reaching 60% in 2017, according to US Energy Information Administration. One of the immediate consequences for the international market was the rapid reduction of the country LNG importing needs (which was drastically reduced from 60 mcm/d in 2007 to 5.9 mcm/d in 2017) and the previously unimagined perspective to become a LNG exporter (Corbeau & Flower, 2016).

The entry of the US in the international LNG market as an exporter brings a new perspective to the contractual arrangements that can be offered. The first innovation is the fact that the contracts are linked to Henry hub, breaking the traditional trend of indexation to the oil market (by Brent or fuel oil prices). The exports business structure is also an innovation: while in many exporting countries the liquefaction project is specifically integrated to the transportation and, in some cases, also to the natural exploration and production (i.e., involving all chain investments), in the US the liquefaction terminal is connected to the country's extensive transport network and gas can be purchased from any producer, depending on the chosen business model. For this reason, the contracts offered by US LNG companies are more flexible than the traditionally used in the international market. Another differential from the US LNG contracts is the destination flexibility, which can be a great upside in its competitiveness in comparison with the mainstream rigid long-term contracts.

The objective of this paper is to evaluate the changing landscape in the LNG international market, especially as a consequence of the new business models being developed and how and why it brings more flexibility to the LNG market. Even before the advent of US LNG, about 20% of LNG supply was already non-Long-Term contract, but the appearance of US LNG on the market has enhanced short term/spot LNG cargo trading, a trend that will continue in the future.

## Methods

The gas market structure is a particularity of US and has a direct influence on the "asset specificity" in its natural gas chain, which impacts LNG contract definitions. Transaction Cost Theory (TCT), developed by Coase (1937), Williamson (1979, 1981, 1985), Klein, Crawford & Alchian (1978), defines that the costs of entering into a contract (transaction) are greater as the assets involved are more specific to that particular transaction. The natural gas market chain has several examples of the application of TCT, mainly due to the existence of "asset specificity" particularly in the transportation of natural gas through pipelines.

## Expected Results

The main expected result of this article is to have an insight into the particularities of the US gas market and how these affect the asset specificity conditions for the LNG production and the consequent impact on the contractual models. Due to specific US conditions, the country's LNG contracts have provided a new perspective for the international market (which still relies heavily on rigid long-term contracts) by providing destination flexibility clauses, LNG pricing based on Henry hub and wide availability for the spot market.

## Conclusions

The objective of this paper was to analyse the particularities of the US LNG export projects under construction and already on-stream and its impacts on LNG market flexibility. We used the Transaction Cost Theory perspective, to achieve a good understanding of what aspects are unique in the US case, regarding the asset specificity of the project and related contracts.

The USA tolling projects are unique in comparison with the established ones. The contractual flow is inverted, because the LNG buyer is the agent that contracts the liquefaction and pipelines capacities, also doing the gas procurement in the US gas market, whereas the typical tolling project has the upstream company as the capacity owner in the transactions. Cheniere special case is also an innovation in terms of business structure because it also provides gas procurement and transportation.

The focus point of this improved flexibility is related to the non-dedication of upstream assets and the reduced cost of transaction, which allows to a less verticalized structure on LNG supply side and different contractual arrangements. The contracts offered by the US companies provide flexibility to buyer's when faced with downward demand situations, by allowing diversion of cargoes. It also provides flexibility in upward demand, by boosting the spot market in direct sales or by the off-takers trading strategies, mainly portfolio players and traders.

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