**2012 – 2015 Triennium Work Report**

**June 2015**

**Programme Committee D3: SMALL SCALE LNG**

**REGIONAL TEMPLATE**

**REGioN: North America**

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# General (and short) overview about LNG industry in the region

*North America has suffer a big metamorphosis in the last five years due mainly to the development of the Shale Gas, spurred the swift of the US from global Importer of Gas to become a net exporter of Gas and LNG while Canada needs to find new destinations for its gas, targeting the premium market in Asia.*

*At the present, only one plant in the US makes LNG for Export (Nikiski in Alaska) but there are more than 60 small plants for peaking & storage services. In the last two years, more than 20 projects asked for LNG export permitting to the Department of Energy, both Non FTA and FTA countries. Until today, only a few numbers of them has been granted. The DOE is conducting studies in order to identify the convenience of those exports and how export volumes of gas might impact in prices within the US. There are also some restrictions related to potential increase in LNG development costs and global demand of LNG linked to HH (willingness of some off takers to absorb volumes with index risk).*

*Canada needs to find a new market for its gas, and some Western projects have been announced. These projects are focus on large but remote shale gas reserves in the province of BC and Alberta. The Canadian projects are all Greenfields with the extra difficulty of being an isolate projects and the construction of a Pipeline thought two mountain ranges.*

# Analysis of regional data based on report structure

*The Small Scale LNG business has initiated its activity in the US long ago and has traditionally been considered a niche business. The main activity for the SS LNG has been concentrated in Peak-Shaving with a storage volumes of around 90bcf, although LNG volumes storage represents a small portion of the Gas storage in the US, which represents around 2,2%.*

*The main drivers for the growth on the Small Scale activities in the US are Economical and Environmental, its relevancies depend on the state and promoter. The existence and feasibility of those businesses are based mainly on the huge pipeline infrastructure and the existence of HUBs markets all around the country that allows trading activities in an economical way.*

*The Economic reasons are justified by the existing differential between oil and Natural gas prices while Environmental reasons are base in the cleanly of the natural gas burns in comparison to other fossil fuels, this aspect is a main driver in the west coast of US.*

*For homogenizing the report, it is considered two main categories; Consumption driven projects (regas) and production driven projects (liquefaction):*

*The classification for the different business model is the following:*

## Consumption driven:

* *Isolate/Remote Trucking LNG*

## Production driven:

* *Liquefaction facility for Peak Shaving*
* *LNG as a Fuel; Heavy duty Trucks & Bunkering*
* *Liquefaction for LNG Exports*

##  Consumption driven: Isolate/Remote Trucking LNG

* ***Main drivers & business model:*** *There has been several activities in the US of this type of business, some examples are:*
	+ *The Fairbanks Natural Gas LLC in Alaska, they have been trucked LNG from the liquefaction plant in Alaska’s Cook Intel to Fairbanks, 300 miles north.*
	+ *Applied LNG Technologies also has been trucking LNG to Mexico from the liquefaction plant of Topock.*

*The* ***main driver*** *in this cases are Economical due to the lack of infrastructure, which only happens in Isolate and remote locations in this area of the world, where the investment is not justified due for the distance and complexity or for the low consumption in the area.*

*There are recently, new proposals as it is the case of Hawaiian utilities that are moving to import LNG instead of using Oil fuels. In this specific case, tourism is relevant in the GDP of the region and Environmental and economic issues are taken into account in making the final decision.*

* *The* ***business model*** *is focused in small volumes and remote locations in all cases, with utilities as main consumers, focusing their activities in power generation and house-heating. The business model competes directly with other alternative fuels, as Coal or propane, with the consideration of Economics, but also depending on the localization (case of Alaska or Hawaii) the Environmental aspects.*
* ***Key Players:*** *It has been identified two examples, with two specific companies, but in general speaking, a major consumer is needed, usually to supply a Power generator facility, in order to compile with a minimum quantity of product needed to make it economic and feasible.*
* ***Main conclusions:***

##  Production driven: Liquefaction Facilities for Peak Savings

* ***Main drivers & business model:*** *The main aspect for this kind of business within the US Energy Information Administration is a risk-management consideration by Pipeline Company or the Utility. It is considered Peak Shaving as a production driver, in order to categorize the business model in one unique category, even though some facilities and activities are Storage and Regasification units without a Liquefaction site.*
* *The* ***business model*** *is base in maintain an equilibrium between the cost of service interruption and developing a liquefaction and storage facility, and in many cases LNG is the best solution playing a relevant part in the security of gas business.*
* *The* ***main players*** *historically are a local utility that owns and operates LNG plants as part of their distribution network, reducing in this way, expensive interstate pipeline capacity requirements and providing with enough flexibility to meet the peak winter demand. Whether or not storage facilities have liquefaction, virtually all of these facilities are connected to the pipeline grid or local utility distribution systems. Most of the LNG storage capacity (around 85%) is located in the East coast of US.*

*According to Black&Veach, a typical US LNG peak Shaving plant can process 5 to 20 million cubic feet of gas per day.*

*As an exhibit, are including some peak shaving facilities in US.*

* ***Main conclusions:***

## Production driven: LNG as a fuel; Heavy-Duty Trucks

* ***Main drivers & business model:*** *The LNG as a fuel for Heavy Trucks has been historically the chicken and the egg Dilemma, but due to the existing gap between Oil & Gas prices, a few companies are beginning to develop a chain of LNG fueling Stations across the country, solving the Dilemma. The main develop for this kind of business within the US has been in the West coast, driven mainly by environmental criteria’s. Ports of Los Angeles and Long Beach (California) have prohibited drayage trucks from burning dirty fuels, in order to cut air pollution in the area.*

*Natural Gas Vehicle in America has laid out its own road map in the recent time, boosted by final customers that are adopting the new technology in their fleet supported by the steady gap in prices between oil & Gas, the Engine trucks developments and the quick amortization of the vehicles gap in prices.*

*A similar effort is under way in Canada, called the Canadian Blue Corridor, which would space LNG fueling stations every few hundred miles along major trucking corridors.*

*Some locations are supporter with their own LNG liquefaction facility, but most of them get the LNG by trucking it form other facilities, acting as a satellite plant.*

* *The* ***main players*** *are independent companies, as Clean Energy, who being aggressive in the develop of this business model, but also some major companies are involved, as it is the case of Shell, already with two new projects in the transport corridors in the great lakes and gulf coast region, and other one in Alberta.*
* ***Main conclusions***

## Production driven: LNG as a fuel; Bunkering

* ***Main drivers & business model:*** *As it is happening with the fuel for Heavy duty trucks, the chicken and the egg riddle restrains widespread use of LNG fuel for ships as well, because only a few locations exist were ships can top off their LNG tanks and few ships are allow to use LNG as a fuel. The main develop for Bunkering has come from those vessels that have a fixed route, as it happens with Ferry’s.*

*The Annex VI of MARPOL entered into force in May 2005 and named 4 ECA (Emission Control Areas) for sulfur reductions. One of the eca’s is North America (US & Canada) since August 2011 and other one is US Caribbean since 2013. For those eca’s the larger effect of Annex VI will come on 2020 when the requirement to reduce sulfur content of marine fuels to 0.5% on a global basis. This regulatory and environmental issue has been traditionally the main factor for the adoption of bunkering. But lately, and pushed by the price differential between oil & Gas in North America, a blooming for this business model has appeared in many region of the GoM and Canadian lakes, with few projects announced recently for Bunkering and export purpose in the last two years, as for instance;*

* + *New Orleans-based Harvey Gulf International has secured plans to construct and operate the United States’ first LNG marine fueling facility out of Port Fourchon, LA.* *The facility will consist of two sites each having 270,000 gallons of LNG storage capacity and the ability to transfer 500 gallons of LNG per minute.*

*But still it is an incipient industry, as Lloyd's, one of the big international organizations that establish technical standards for ship construction and operations, predict in its report that just 4 percent of new ships delivered by 2025 — 653 ships total — would use LNG as a fuel. These ships most likely will be container ships, cruise ships or oil tankers.*

* *As it happens with the LNG fuel for trucks, the* ***main******players*** *are independent companies, who have detected this market niche, and are aggressive in developing this business model, but also, as in the case above some major companies are beginning to be involved.*
* ***Main conclusions***

## Production driven: LNG as a fuel; Import/Export Terminal

* ***Main drivers & business model:*** *Shale gas has swing the market from an importer market to become an exporter market, with many projects of different configurations pursuing to come on stream. The first projects to swing, and ask for Export permits to DOE has been Brownfields projects, but many Greenfields are following them, some of them looking for differentiation and a niche market, as it is the case of Small Scale. The main target for this small scale projects is the quickest route to market and scalable to fit a wide range of applications mainly in the Caribbean and some of them has leveraged in this activity to develop other activities as Bunkering, Fuel for trucks, etc…. Some of the projects are:*
	+ ***Carib Energy (Crowley):*** *The company plans to transport LNG from liquefaction facilities all along the Gulf coast using approved 40-foot LNG ISO containers transported on ocean-going carriers*
	+ ***Waller Point LNG****: Using small-scale liquefaction technology, Waller Marine plans to install nominal 500,000 gallon per day LNG trains in phases as the market (Caribbean) and demand for marine LNG fuels expands. The Waller Marine’s focus is to supply LNG to the marine fuels market. The WMI Articulated Tug and Barge system (ATB-LNG) is a solution for the transportation, storage and regasification of relatively small quantities of LNG over short distant routes.*
	+ ***BC LNG (Douglas Channel LNG):*** *The project consist in:*
		- *A barge-based liquefaction plant to convert natural gas to LNG.*
		- *A small LNG buffer tank, electrical substation, and other support facilities on land adjacent to the LNG barge.*
		- *A new LNG jetty and berth with loading facilities. Infrastructure to connect existing gas pipeline, electrical power, and roads to the project site.*

* *The* ***main players*** *involved in this small scale business, as a different of the previous cases, are independent without experience in the LNG business, that has realize of the existence of a niche market, many of them relying in the project to technology owned by companies as Chart, Black&Veach, Exmar, etc…..*
* ***Main conclusions***

# Conclusions

* *The development of shale gas in North America has led the market reverse from net importer of Gas to a potential exporter, as well as the development of different activities related to the Gas. This expansion in the use of gas, supported by surplus gas and low prices of HH, are developing numerous projects related to LNG, most of them small and medium scale, with the exception of large export projects.*
* *It can be expected a blooming of the Small Scale LNG business in the US, form the Niche position that it has in the pass, to growth in wide number of applications, reliability and probably technological and in cost efficiency.*
* *The drivers for this blooming are mainly economical, but some of them are also sponsored by environmental aspects, as is the case of Bunkering, some Gas stations, and peak liquefaction plants, that gives flexibility and reliance to a cleanly of the natural gas burns in comparison to other fossil fuels.*
* *A numerous new players are getting involved in this emergency market within North America, some of them without previous experience in such sector but with the technical support of companies well-established and with knowledge and experience in the LNG industry.*
1. Data Collection from the Regions

Please include the excel data collection template

1. Small Scale LNG : Drivers and Business Models

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type of Project**  | **Definition**  | **Challenges** | **Drivers, Purpose\***  | **Business Model\*\***  | **Examples** |
| Liquefaction  | Production of LNG with capacity lower than 1mtpa  |   |   |   |   |
| Break Bulk Infrastructure | Receives LNG (e.g. shipping) and breaks down the LNG into smaller quantities for further distribution to marine bunkering and truck fuelling stations. Also ship to ship transfer viable.  |   |   |   |   |
| Marine Distribution/Milk Run | Effective gas supply solution for thescattered islands or coastal areas, where the other transportation modes are not economically viable or the infrastucture is not present.Milk Run is characterised by partial unloading to multiple locations |   | \* Relatively low gas demand does not justify the high capital investment costs for pipelines |   | \* Eastern Indonesia\* Caribbean islands\* Coasts of Japan and Norway |
| Infrastructure for Inland Distribution  | Trucking/Shipping/Rail of LNG to inland satellite stations |   |   |   | \* China\* Spain  |
| Peak Shaving  | LNG peak shaving facility can be chosen to supply the incremental natural gas required to meet the demands peak demands for example, where the pipeline netweork is already fully utilised for normal demand, in remote areas far from NG resources, or where geology which prevents the development of underground gas storage.  |   |   |   | \* Mount Hayes LNG Peak shaving Facility - British Columbia (Vancouver Island) |
| Small Scale FloatingLNG | Offshore LNG production lower than 1 mtpa– Offshore stranded gas field– Associated gas available from offshore oil field– Near shore location to liquefy country excess gas or shale gas |   |   |   | Total & Technip presentation at LNG17\* Canadian Douglas channel project\* Rubiales LNG in Columbia  |
| Small Scale Regas | Facility regassing LNG with less than 1mpta capacity. Various locations and sources of LNG can be considered.  |   |   |   | \* Sweden - Linde Project \*  |
| …  |   |   |   |   |   |