Floating LNG (FLNG) Technical Challenges and Future Trends

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1 Introduction

Natural gas (NG) and liquefied NG (LNG), which is one trade type of NG, have attracted great attention because their use may alleviate rising concerns about environmental pollution produced by other fossil fuels as coal and oil.

In the figure below, the typical components of NG are reported giving also the idea of their relative amount:

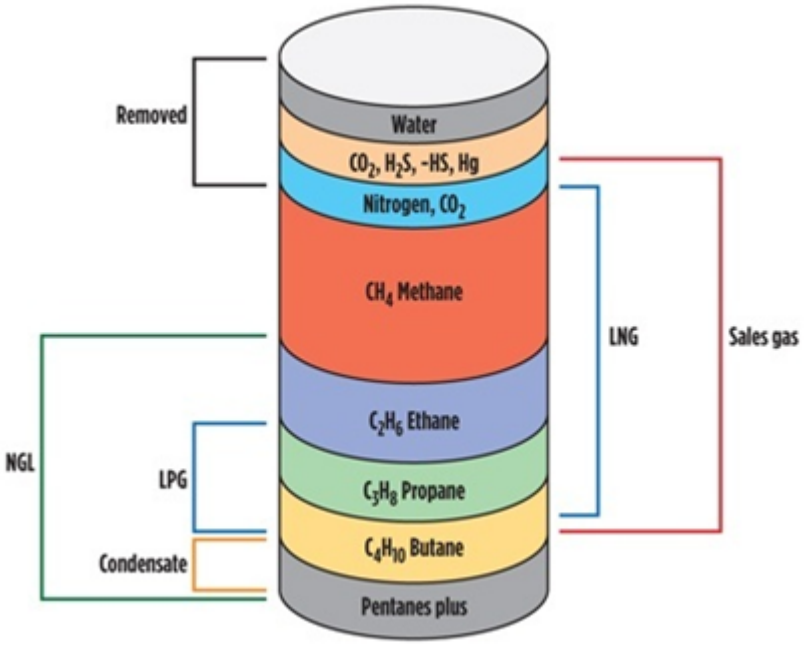

Figure 1: Natural gas composition[1]

There are two main distinctions in between the final products

obtained from gas processing: *Pure natural gas liquids*, meaning that at least 90% of the liquid contains ONE type of primary molecule, as:

- Ethane
- Propane
- Normal Butane
- Isobutane

Mixed natural gas liquids, meaning that the liquid contains at least two different types of primary molecules, are:

- Ethane/Propane (EP) Mix
- Natural Gasoline

NG reserves may locate in embedded underground areas and a significant portion of the reserve is often located off-shore. The off-shore extraction of NG and its conversion in liquified NG has reached a turning point in terms of economic feasibility; in fact, just few years ago, that extraction type was thought to be:

- Environmentally unsafe, due to the lack in LNG off-shore previous practice
- Particularly expensive, due to the installation of long subsea NG pipelines

As a result, there are many efforts to excavate and monetize these stranded and offshore reserves with floating facilities where offshore liquefaction of NG is possible. Therefore, the development of floating LNG (FLNG) technology is becoming important.

Natural gas off-shore facilities as FLNG represent a very complex condensate of chemical plant technologies, designed to be installed in limited space conditions on dynamic moving vessels.

Space limitation of floating vessels is indeed a challengeable problem to overcome. Due to this reason, the amount of feed

gas that can be reserved for floating liquefaction is restricted. Units for gas pretreatment operation are supposed to occupy about 50% of the available deck space of a floating production facility, although this relies on the impurity level in the feed gas stream. This indicates that FLNG is more suited to feed gas streams including low levels of inert gases and impurities. CO_2, hydrogen sulfide, nitrogen, mercury, and acid gases are the main impurities determining the amount of feed gas.

[1] *https://www.saubhaya.com/chemical-makeup-of-natural-gas/*