Investigation into the Process and Economic Feasibility of LNG Production From Bolivian Natural Gas

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Executive Summary

The purpose of this project is to examine the economic feasibility of liquefying Bolivian natural gas and selling it to California; one of the largest natural gas markets in the neighboring countries to Bolivia. Bolivia ceases the second largest natural gas reserve in South America (53 tcf) but it has a weak production rate of one bcfd. 40% of that production is consumed and the other 600mcfd is exported, which is equivalent to 4.5 mtpa. After examining the political situation between Chile and Bolivia and after figuring the high cost of transporting LNG via pipelines to the closest beach (Peru) it was decided that the liquefying plant is going to be constructed in Lima (Peru) and from there the LNG will be shipped to California. This is done because Bolivia is a land lock and access to the Pacific Ocean should be found.

Piping from Bolivia to Lima was investigated. A direct route from Santa Cruz to Lima over the Andes Mountains was avoided due to the costs associated with compression over the 4000 m average mountain range. The pipeline instead is directed through Cuzco where the average height of the Andes is only 1000 m. An optimization of the pipeline was undertaken to determine the diameter that minimizes the costs for the purchase of equipment. This cost was found to be $714 million for equipment, which equates to a TCI of $1.25 billion.

The liquefying plant chosen for this process is the Conoco Phillips Optimized 2 in 1 cascade with a capacity of 4.5 mtpa. Each of the existing 3 MRP (Mixed Refrigerant Processes) is examined (APCI, Linde, DMR) with comparison to the Phillips Cascade. The Phillips Cascade reliability and lower capital cost is why it is chosen for this project. The over all compressor power needed for this process to liquefy the natural gas approximately equals to 282,000 hp.

An economic evaluation of the project was conducted to determine the feasibility of the project. The TCI for the liquefaction process was determined to be $1.54 billion, with a first year operating cost of $1.8 billion. Additionally, risk analysis was conducted and the venture was found to have 90% chance of returning a negative NPW. This leads to believe that the project is not presently feasible due to high TCI and operating costs associated with the implementation of a transcontinental pipeline through the Andes.