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Marine CNG: Technically Sound, Commercially Viable, and Imminent

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Abstract

One of the newest frontiers in the upstream energy sector is marine compressed natural gas (CNG), and the economic challenge of how to safely transport and market marine CNG on a regional or international basis. Stakeholders are working to meet these challenges head-on and are creating solutions for all aspects of development, transportation and delivery of a reliable CNG product to varied customers.

Traditional concerns surrounding technical feasibility have given way to economic considerations on a project by project basis, with increased focus on the niche capabilities that marine CNG fulfills. Proponents have succeeded in overcoming the technical challenges and have attained regulatory approvals for their designs and are in a race to be the first successful application of this technology.

The Centre For Marine CNG Inc. has been tracking the progress of all the proponents, while advocating for the technology as a whole. While research continues on the technical aspects of CNG, the gas owner/operators have recognized that the first project is imminent and are following the technology appropriately.

This paper serves to provide an industry update, describing the niche that CNG fills in comparison to LNG or other natural gas monetization strategies, identification of the technology proponents and the relevant regulatory approvals, as well as some basic economic models to help validate the viability of marine CNG.

Introduction

From the Oil & Gas industry perspective, one of the obstacles to a stranded gas development is that marine CNG, as a monetization strategy, is not yet in commercial operation anywhere in the world. Many owners worldwide have struggled with how to monetize their gas reserves when the conventional options of a pipeline or LNG development do not fit the characteristics of their reservoirs.

In general terms, marine CNG differs from LNG in that the natural gas is compressed, rather than liquefied for transport. Depending on the proponent, the gas is transported in a range of 1500 to 4000 psi to achieve energy densities of approximately 1/3 of their liquefied counterpart of LNG. The gas is stored in pressure vessels aboard a CNG ship that will then transport the gas to market. Depending on distance to market and the demands for non-interruptible supply, multiple ships would be required to maintain “flow”. One could consider the CNG solution comparable to a floating pipeline, with much less infrastructure required for exploitation of the natural gas reserve. Loading and unloading requirements are comparable to and adaptable from both LNG and oil transfer systems, while the transport vessel can range from a small volume barge to a large capacity LNG-sized vessel.

Given the capability of marine CNG transport as a monetization strategy, one must ask why this method has not yet been implemented. The first and most obvious answer is the hesitation of any owner to be the first to employ a new and unproven technology on a large scale development project. Given the scope and expense, it is not surprising that owners/operators are hesitant to move forward with a new technology when the technical and economic details are not yet well defined.

However, the economic and technical concerns that have burdened marine CNG in recent years have lessened as the proponent technologies have moved closer to project application. The major players in CNG have worked hard to overcome significant hurdles, furthering the reliability of their technologies, achieving regulatory approvals and moving from theoretical models to prototype development and testing.

Perhaps it is most telling that in the last 12 months, the economics surrounding marine CNG projects have received greater attention than the technical issues that once were the major focus. Confidence in the technology has grown and now the economic hurdles common to all gas monetization strategies are the focus for the first project application.

Economics

Marine CNG has been identified as a niche technology that will complement both LNG and pipeline technologies for stranded gas monetization. One of the major benefits for CNG is the minimal fixed capital assets for resource exploitation. In comparison to LNG, there is no requirement for liquefaction and regassification terminals, with the added benefit of a mobile asset (the CNG vessel) that can be redeployed, depending on gas supply agreements, seasonality and/or life of field.