NATURAL GAS: THE WAY OF THE FUTURE

While petroleum development during the past 50 years has primarily been focused on extracting crude oil from onshore and offshore locations, a concerted effort is now being made by many of the world's top international players to develop the associated gas fields that lie adjacent or underneath the oil deposits.

The world's first LNG tanker was built in 1959

The recent rise in oil prices has made the search for hydrocarbons a very attractive business. However, the demand on a global scale for natural gas as a cleaner and more environmentally sound source of energy is driving the need to develop natural gas fields.

Although Atlantic Canada has primarily been an oil-producing region for the past ten years, natural gas studies have indicated that the region is rich in this alternate source of fuel. In Newfoundland and Labrador, the emphasis is being placed on development of natural gas in its compressed form (CNG), while Nova Scotia is mainly developing liquified natural gas (LNG) facilities to process the hydrocarbons.

The Canada-Newfoundland and Labrador Offshore Petroleum Board has revised the natural gas resource potential of the Jeanne d'Arc basin and the adjoining Ridge Complex as part of the petroleum resource assessment of the entire Newfoundland and Labrador offshore area. All the hydrocarbon discoveries to date on the Grand Banks lie within this area. The resource assessment was carried out in co-operation with the Geological Survey of Canada.

The total amount of potential recoverable gas, both discovered and undiscovered, is 18.8 trillion cubic feet, comprised of 12.6 trillion cubic feet in the Jeanne d'Arc basin and 6.2 trillion cubic feet in the Ridge Complex.

Liquefied natural gas is poised to become a large part of the energy mix in Atlantic Canada. There are currently three proposals for terminals in the region at Bear Head and Goldboro, Nova Scotia, and Saint John, New Brunswick.

Relatively long distances between the gas sources and markets or difficulties associated with accessing remote, deepwater offshore fields may make pipelines prohibitively expensive for otherwise promising gas projects.

Since many gas-producing fields lack suitable infrastructure for liquefying natural gas, and because terminal regasification facilities may be limited, transportation of this stranded gas in compressed rather than liquid form offers cost and operational benefits.

Gas can be loaded directly onto gas carriers from offshore production facilities, increasing safety and decreasing security concerns. It can be compressed and contained onboard, eliminating the need for costly liquification and regasification processing. CNG carriers also can discharge gas directly into terminal facilities located offshore, further minimizing potential impact to population centers and areas of high environmental sensitivity.

Natural gas is one of the most widely used forms of energy today. It is commonly used to heat and cool homes and businesses nationwide. In addition, more than 85,000 compressed natural gas vehicles, including one out of every five transit buses, are operating successfully today in the United States. CNG's popularity stems, in part, from its clean-burning properties. In many cases, CNG vehicles generate fewer exhaust and greenhouse gas emissions than their gasoline- or diesel-powered counterparts.

CNG is odourless, colourless, and tasteless. It consists mostly of methane and is drawn from gas wells or in conjunction with crude oil production. CNG vehicles store natural gas in high-pressure fuel cylinders at 3,000 to 3,600 pounds per square inch. An odorant is normally added to CNG for safety reasons.

Compressed natural gas is used in light-duty passenger vehicles and pickup trucks, medium-duty delivery trucks, and in transit and school buses. LNG, on the other hand, is favoured for heavy-duty applications, such as transit buses, train locomotives, and long-haul semi-trucks.

CNG ranks relatively high in convenience and availability. California's extensive network of natural gas pipelines can deliver the fuel directly to many sites where compressors are installed by the local utility. These can even include individual homes.

"Compressed natural gas transportation by ship provides the answer to gaining access to the world's stranded natural gas, economically. Since half of the world's discovered gas is considered stranded and more than half of that gas is located offshore, a wealth of energy will soon be accessible to many countries around the world. A new dynamic to the global natural gas market is about to unfold," comments Steve Campbell, president of Trans Ocean Gas of St. John's, Newfoundland and Labrador.

"CNG transportation will not only provide energy for existing markets, but will also create many new markets. Island nations and remote populations will now have economical access to natural gas for power generation and economic development. Asia is poised to benefit most from the safe and economical transportation of CNG by ship," he states.

The world consumes about 90 trillion cubic feet of natural gas per year. Global

energy analysts predict the world's consumption rate to reach 160 trillion cubic feet by 2020. The majority of demand growth will be in developing regions of the world such as Southeast Asia. Within ten years, China is predicted to consume the same amount of natural gas as the United States, which currently consumes 25 per cent of the world's production but only holds five per cent of discovered reserves.

Declining natural gas production in North America has caused the price to double in less than two years. The price is still climbing. Other areas of the world are experiencing similar price increases as supply concerns are raised.

The United States and other developed countries are desperately hoping that LNG imports can close the impending gap between supply and demand, but that is highly unlikely due to public safety perceptions.

Fortunately, CNG can be delivered through an offshore mooring buoy. This overcomes the public safety perceptions and provides for a more efficient production system. CNG is therefore seen as the solution to a significant number of the world's gas supply problems.

Natural gas liquefaction dates back to the 19th century when British chemist and physicist Michael Faraday experimented with liquifying different types of gases, including natural gas. German engineer Karl Von Linde built the first practical compressor refrigeration machine in Munich in 1873. The first LNG plant was built in West Virginia in 1912. It began operation in 1917. The first commercial liquification plant was built in Cleveland, Ohio, in 1941.

The liquified natural gas was stored in tanks at atmospheric pressure. The liquification of natural gas raised the possibility of its transportation to distant destinations. In January 1959, the world's first LNG tanker, The Methane Pioneer, a converted World War II liberty freighter containing five, 7,000 barrel aluminum prismatic tanks with balsa wood supports and insulation of plywood and urethane, was constructed.

The vessel carried an LNG cargo from Lake Charles, Louisiana to Canvey Island in the United Kingdom. This event demonstrated that large quantities of liquified natural gas could be transported safely across the ocean.

During the next 14 months, seven additional cargoes were delivered with only minor problems. Following the successful performance of The Methane Pioneer, the British Gas Council proceeded with plans to implement a commercial project to import LNG from Venezuela to Canvey Island.

After the concept was shown to work in the United Kingdom, additional liquification plants and import terminals were constructed in both the Atlantic and Pacific regions. Four marine terminals were built in the United States between 1971 and 1980.

The first exports of liquified natural gas from the United States to Asia occurred in 1969 when Alaskan LNG was sent to Japan. Alaskan LNG is derived from natural gas that is produced by ConocoPhillips and Marathon Oil from fields in the southern portions of the state of Alaska, liquified at the Kenai Peninsula LNG plant and shipped to Japan. The LNG market in both Europe and Asia continued to grow rapidly from that point on.

In 1999, the first Atlantic Basin LNG liquification plant in the western hemisphere came on production in Trinidad. This event, coupled with an increase in demand for natural gas in the United States, particularly for power generation; and an increase in American natural gas prices, resulted in a renewed interest in the American market for LNG.

The Hibernia field contains 1.2 trillion cubic feet of natural gas