Newfoundland Poised To Capture Natural Gas Benefits

Fabrication and research expertise could enable Newfoundland & Labrador to tap the economic and industrial benefits of natural gas.

By: By Jennifer Hatt

Two recent studies examining the province's ability to commercialize compressed natural gas (CNG) technology concluded that the array of fabrication facilities and experience and the presence of major research facilities provide an opportunity for Newfoundland & Labrador to "position itself at the forefront of a new offshore development."

CNG technology is able to rise above the physical and economic restrictions facing pipeline construction to connect stranded or remote natural gas fields with lucrative markets. CNG-equipped vessels are able to harvest and transport the gas to various landing points, with an efficiency equal to or better than pipelines, at a cost that can make production on small or isolated reserves profitable.

At the heart of the studies, prepared for the Industrial Benefits Division of the provincial Department of Mines and Energy by Davis Engineering and Associates Ltd., is CNG technology methods used to transport natural gas and the potential for Newfoundland & Labrador to benefit from such activity. The first study, released in December 2002, examined the province's fabrication, research and development capabilities for two proprietary CNG transport methods: EnerSea Transport's Volume Optimized Transport and Storage (VOTRANS) system and Williams Energy's Coselle CNG System. A follow-up study released in June 2003 examined the same criteria for two composite pressure vessel CNG systems: one by Trans Ocean Gas and the other by TransCanada. Here is a snapshot of the players and their technologies:

VOTRANS is designed to provide a complete gas delivery system, including compression and chilling, loading lines, shuttle loading system, receipt facilities, flowlines, gas handling systems, and storage. The system itself is a series of API carbon steel pipes stacked horizontally or vertically, depending on the vessel size that maximize gas to payload ratios. Vertical stacking is used in vessels carrying less than 1.2 BCF, which is likely the size for projects in Eastern Canada.

The rights to the VOTRANS technology is owned by EnerSea Transport. Earlier this year, the Houston, Texas company announced a partnership with shipbuilding giant Hyundai Heavy Industries to commercialize CNG marine transport technology. It has also partnered with Kawasaki Kisen Kaisha Ltd, or K Line, for the ownership and operation of VOTRANS vessels.

The Coselle CNG system gets its name from its primary unit: lengths of standard 150 mm pipeline coiled around a large carousel. A total of 144 coselles are installed per vessel, providing 2100 km of pipeline. Energy loss is about six to nine percent, compared to five to 10 percent for the average pipeline.

The Coselle system was invented by Canadian consultant Cran & Stenning, but the patent is solely owned by Williams Energy of Tulsa, Oklahoma, the second largest owner and operator of pipelines in North America.

Trans Ocean Gas CPV has at its heart a cell made of fibre reinforced plastic (FRP), made by winging carbon or glass filaments over a high-density polyethylene liner. FRP was pioneered in the aerospace industry and is also used in natural gas vehicles because of its strength, non-rupture characteristics, light weight and resistance to corrosion. Each cell-42 inches in diameter and 40 feet long-is grouped in modules and vertically nested in the hull of the carrier.

Trans Ocean Gas, based in St. John's, recently received approval in principle from the American

Bureau of Shipping, which means it can approach companies to start using its CNG storage cylinders.

The TransCanada CPV system uses a steel and glass fibre hybrid pressure vessel, called a Gas Transport Module (GTM). Each GTM is a steel liner overwrapped with a glass fibre laminate, for a total diameter of about 42-60 inches. The modules, constructed in 40 or 80-foot lengths, can be transported by ship, barge, truck or rail car.

TransCanada, of Calgary, Alberta, owns three Canadian pipelines and is part owner of seven others in North America. In addition to introducing this new technology, the reports point to areas in which Newfoundland and Labrador could make significant contributions in research and development, and in fabrication.

In research and development, Memorial University of Newfoundland and the National Research Council's Institute for Marine Dynamics provide necessary skills and facilities. Specific areas for research and development expertise include: the designing of vessels able to withstand ice loading, mooring in shallow water, and other extreme environmental conditions; the testing of CNG storage vessel components using high strength, low temperature pipeline materials; the design of control systems for automated loading and off-loading; and the process engineering to control hydrate formation, waxing, and corrosion within the CNG systems.

In terms of fabrication, a single-field CNG pipe and support structure can contain 200,000 tonnes of steel. Components include gas storage vessels as well as the turret mooring systems, deck-mounted process packages and inshore offloading mooring system. In addition to fabrication, there is the need for installation, hook-up and commissioning of the gas storage components within the ship hull, services available now from the offshore fabrication facilities at Bull Arm and Marystown. Several smaller fabricators in the province could provide the components.

As well as direct construction, assembly and commissioning of the systems for the Grand Banks, the province's fabricators could also build systems for export. Specifically, fabrication facilities could establish a small diameter pipe mill and winding plant for CNG storage units and fabricate the steelwork associated with these units, build manifolds and pipework for the CNG system, manufacture and install shipboard automated gas storage control systems, build utility packages for gas processing and compression, install and commission the CNG storage units within the ship, and build and assemble components for offshore and inshore loading mooring systems.

Additional opportunities exist for construction of CPV vessels, which would require a manufacturing plant able to fabricate vessels from winding glass and carbon fibre.

CNG technology is a reality. Each of the proponents surveyed is in the testing phase and in the process of securing its first East Coast contract. Both studies recommend using existing facilities to support this technology development and to launch more detailed studies into the potential costs and benefits for the province. Key questions remaining include the cost of commissioning a CNG system for the Grand Banks and the opportunities for job creation.