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East Coast Canada R&D and Offshore Development in Northern Frontiers

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Abstract

Atlantic Canada has seen the successful development of four major offshore projects in a technically-challenging frontier environment with high discovery and development costs. The response to the challenges of ice and a harsh operating environment have contributed to the growth of a significant R&D and engineering consulting capacity that is now being applied to projects in arctic, sub-arctic and other ice-covered regions. Although significant investment is being applied globally towards petroleum resource development in these environments, considerable technical challenges remain. A concerted R&D effort will be required to enable economic development of these resources. With the scarcity of arctic engineering and related capacity in the global R&D/engineering community, collaboration can minimize redundant research effort and share technology development risks and costs. This paper will present a review of some of the "arctic" R&D capabilities and activities in Atlantic Canada, including ongoing and recently completed projects.

Introduction

The International Energy Agency's World Energy Outlook 2008 reference scenario projects a 45% increase in global energy demand by 2030, with hydrocarbons accounting for 80% of supply *(International Energy Agency, 2008)*—the world still faces a "fossil energy future". This demand will be largely met in three ways: improved recovery from currently producing reservoirs; the development of known but previously uneconomic or low quality reserves such as shale gas and oil sands; and the discovery and exploitation of new resources in remote regions, including deep water and/or harsh environments such as the arctic.

The recently-released US Geological Survey assessment of circum-arctic resources estimates that the area north of the Arctic Circle contains 1669 trillion cubic feet of natural gas, 90 billion barrels of oil and 44 billion barrels of natural gas liquids *(US Geological Survey, 2008)*, equivalent to twice the reserves of Canada's oil sands. It is further estimated that 84% of these resources lie in offshore basins. The resources of sub-arctic regions with arctic-like engineering challenges like the Caspian Sea, Sakhalin Island, and the Labrador Shelf are not included in this assessment. The cost of exploration, drilling and transportation in these areas will make economic development challenging, and the development of new technologies and engineering solutions is central to reducing costs and enabling the safe and environmentally-sound development of these resources.

Many of the challenges facing northern offshore development are already found on Canada's eastern frontier: sea ice and icebergs, cold temperatures, and severe winds and waves. The threat of iceberg scouring to the integrity of any pipeline built on the Grand Banks of Newfoundland, for example, has made the development of the 4.5 trillion cubic feet (tcf) of proven gas reserves there problematic, and perhaps uneconomic with current technology. Research and technology development that delivers new ideas, improved technology and improved economics in this environment will in some cases be directly applicable to arctic and sub-arctic regions.

The global economic downturn and decline of commodity prices is dampening current investment, but significant commitments have been made by major operators in arctic assets, and cold regions R&D and engineering activity is expected to continue growing in the long run. This work may be limited by the availability of human resources with cold regions expertise and specialized equipment and facilities, a challenge faced by the industry in general. Coordination of this effort by communicating programs and activities will minimize duplicate efforts and encourage cost and risk sharing thorugh joint