

## Indications of the Roles that Gas Hydrates Could Play in Future Natural Gas Developments

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### Abstract

Gas hydrates (GHs), or clathrates, are an "ice-like" crystalline mixture of water, "host", and gas, "guest", molecules. Methane and carbon dioxide are common guests because of their availability and thermodynamic stability in modern environments. Natural GHs are a potential petroleum resource, a means of natural gas transportation, a possible geotechnical and seafloor hazard, a postulated agent of global change, and, a medium for industrial processes. The efficient storage of natural gas, up to 164 volumes per volume of GH, results in a gas reservoir comparable to a conventional reservoir at 16 MPa. This gives GHs an energy density like heavy oil and bitumen that much higher than other unconventional gas reservoirs.

Canada has an immense inferred GH resource that is located in its offshore and Arctic basins. Driven largely by Asian energy security concerns GHs are an active target of research, including recent drilling and production experiments in the Canadian Arctic, the Gulf of Mexico, the Pacific Margin of North America, and Japan. Several preliminary engineering and economic models of in-situ GH production exist. There is a general consensus that indicates, that the gas could be commercially recoverable through the judicious application of current technologies, that reservoir performance varies as a function of reservoir geology, and that this resource could be commercially viable, especially where developed in association with conventional natural gas accumulations. However, long-term production tests will be required before the preliminary production models are perfected and accepted and the potential resource is considered an augmentation of gas supply.