

# **Commercialization of Nitrogen-Rich Natural Gas**

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## **EXECUTIVE SUMMARY**

Currently, the natural gas supply in the United States does not support the nations demand. In subsequent years the United States will be faced with the decision to find alternative sources for natural gas or increase natural gas imports from foreign countries. A potential solution to ameliorate this issue is to utilize the nation's nitrogen rich natural gas reservoirs. The objective of this study is to identify and analyze potential uses for this low quality natural gas (LQNG). An economic analysis on the feasibility of production and commercialization of nitrogen rich natural gas was performed based on a mathematical model built to determine the best process combination based on maximizing net present value. The separation options include the purification of natural gas by cryogenic distillation, pressure swing adsorption, membranes, and molecular gate technology. The commercialization options include upgrading the natural gas to pipeline quality, conversion of methane to synthesis gas and its derivatives, and combustion of natural gas for power generation.

The evaluation of low quality natural gas leads to two major conclusions. The first is that the most economical way of separating the nitrogen from natural gas is using pressure swing adsorption with molecular gate technology. The second is that the most economical product produced from nitrogen rich natural gas varies by reserve capacity and nitrogen content. If reserve capacity is low the natural gas is most profitable by removing the nitrogen using the PSA process and selling the natural gas via pipeline. If reserve capacity is high the most profitable product produced is urea and is most economically produced by separating the nitrogen out of the natural gas before processing at high nitrogen contents and keeping the nitrogen in when processing at low nitrogen contents.