

Cost-Efficient Process Increases Natural Gas Production

Engelhard Taps into America's Natural Gas Resources



Engelhard's nitrogen removal unit is 8 by 25 feet, with vessels, vacuum pump, instrument air system, valves, and instrumentation. The skid, about 25,000 pounds, is shipped on a double-drop truck and installed by crane.

The Challenge—Natural gas provides nearly a quarter of the energy used in the United States and is the second-largest energy source for industrial, residential, and commercial use. But as much as 16 percent of untapped natural gas fields have excessive levels of nitrogen, making them too costly to purify. In addition, methane, the main constituent in natural gas, is contaminated by various gases. State-of-the-art purification processes involved multiple steps and were expensive until the late 1990s.

In 1999, Engelhard Corporation proposed using its Molecular Gate technology, which separates nitrogen from methane, to make other sources of natural gas available through a single-step process to remove contaminants. Needing both financial and research assistance, Engelhard turned to the ATP and received a three-year award. With this funding, Engelhard formed three industry-academia research collaborations to advance natural gas purification and to develop high risk molecular separation processes.

The Outcome—Engelhard and its partners significantly advanced molecule separation technology. At the conclusion of the project, new

Molecular Gate adsorbents could separate several undesirable gas molecules from methane molecules in a single-step, multiple-contaminant purification of natural gas. This innovation garnered nine patents and led to numerous journal and news articles. In 2005, the Molecular Gate technology earned a Kirkpatrick Chemical Engineering Achievement award. After granting Guild Associates of Ohio permission to supply the technology in 2006, the technology was positioned to better help energy companies process natural gas. Guild Associates makes two Molecular Gate Adsorbent Systems available for single-step purification: Carbon Dioxide Removal, and Nitrogen Rejection units.

In 2006, BASF Aktiengesellschaft acquired Engelhard for an estimated \$5.6 billion and renamed the company BASF Catalysts LLC. As of late 2006, the technology was used in 19 natural gas facilities across the U.S. Molecular Gate adsorbents are expected to be introduced to 6 to 12 facilities each year. A single-step, low-cost natural gas purification process allows small and medium-sized energy companies to bring otherwise untapped natural gas to the surface and into American homes and businesses.

Partnering Organization:	BASF Catalysts LLC (formerly Engelhard Corporation), Iselin, NJ
Project Duration:	12/1/1999 – 11/30/2002
Project Cost:	\$1.8M ATP cost-share; \$2.7M industry cost-share
Project Brief:	http://jazz.nist.gov/atpcf/prjbriefs/prjbrief.cfm?ProjectNumber=99-01-6041
Project Status Report:	http://statusreports.atp.nist.gov/reports/99-01-6041.htm Research conducted April 2006