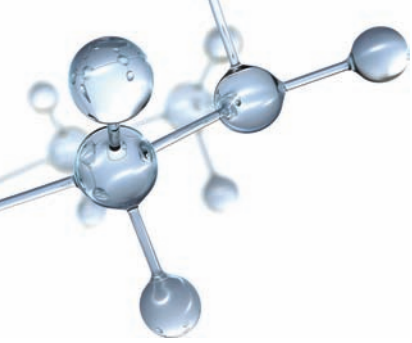


Controlled Freeze Zone™

increasing the supply of clean burning natural gas



ExxonMobil
Taking on the world's toughest energy challenges.™



the need for CFZ™ technology

ExxonMobil scientists invented and patented the Controlled Freeze Zone™ technology, a breakthrough process that more efficiently removes impurities from natural gas. The CFZ™ technology could also make carbon capture and storage more affordable and efficient in reducing greenhouse gas emissions. This technology continues to be developed for commercial demonstration and subsequent application.

This proprietary CFZ™ technology is significant because as much as one third of today's world gas resources contain large amounts of carbon dioxide (CO₂). While conventional technologies are unable to efficiently process natural gas with large concentrations of CO₂, the CFZ™ technology has the ability to process natural gas with any amount of impurities. The application of the CFZ™ technology at a global scale could therefore expand the pool of affordable clean-burning natural gas resources for development and delivery to consumers.

The CFZ™ technology efficiently removes impurities from natural gas and is less expensive than existing technologies, requiring fewer processing steps and equipment. This increases its attractiveness, especially for offshore and remote applications.

The CFZ™ technology works by removing CO₂ and hydrogen sulfide (H₂S) from natural gas in a specially-designed section of a distillation tower, where CO₂ is allowed to freeze in a controlled manner.

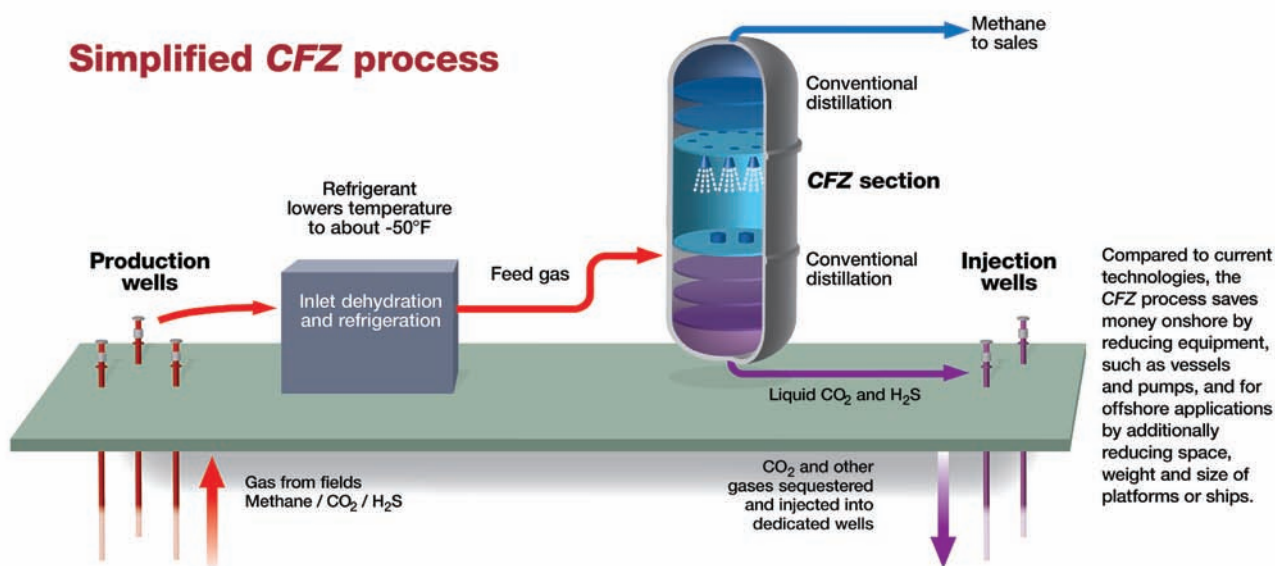
Next, CO₂ is remelted and further distilled to recover valuable methane. It can then be pumped safely for injection into dedicated wells – either for sequestering or for use in enhanced oil recovery. The remaining natural gas now contains the desired level of purity.

In conventional methods, CO₂ is separated at very low pressure and must be compressed – at significant costs – for injection into underground storage. In contrast, the CFZ™ technology discharges the CO₂ as a high pressure liquid, offering a strong commercial advantage. As a result, the CFZ™ technology could make carbon capture and storage more economical.

the benefits of CFZ™ technology

The CFZ™ technology offers the following advantages relative to conventional gas treating processes for the removal of CO₂ and H₂S in natural gas:

- **Single step processing**
 - Meets natural gas pipeline quality requirements without additional polishing
 - Requires no solvent regeneration, additive recovery or downstream dehydration facilities
- **No limit on CO₂ or H₂S content**
 - Handles highly sour gases with ease
 - Incrementally reduces costs for higher acid gas content streams
- **High pressure operation**
 - Discharges acid gas as a high pressure liquid
 - Reduces compression horsepower and equipment requirements for acid gas injection or enhanced oil recovery

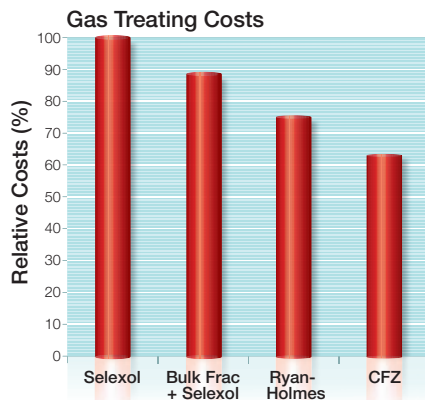


- **Alternative to sulfur recovery plants**

- Discharges H₂S and other sulfur compounds with the CO₂ for disposal
- Provides an attractive alternative to building expensive, high operating cost sulfur plants

- **Overall cost savings**

- Simplifies process and lowers equipment count, making the CFZ™ technology a low cost alternative
- Reduces fuel gas consumption, allowing greater gas sales revenue
- Allows efficient integration of gas treatment, acid gas injection, and/or power generation operations



12 -37% cost savings for treating

The bar chart above compares the relative capital costs of different gas treating processes for a feed gas with 68% carbon dioxide, 4% hydrogen sulfide and 19% methane (balance N₂). The treated gas in this case study is used in a 1.2 GW natural gas, combined cycle power plant.

the global commercialization of CFZ™ technology

The Clear Lake Pilot Plant, near Houston, Texas, first demonstrated the CFZ™ technology concept in 1986. The pilot plant processed natural gas with high levels of CO₂ (as high as 65%), and at rates up to 600,000 standard cubic feet per day. The successful separation yielded an overhead gas product stream with as low as 300 ppm of CO₂, and a liquid CO₂ stream with as low as 0.5% methane.

ExxonMobil is currently preparing for world-class commercialization with a CFZ™ commercial demonstration plant at its Shute Creek Treatment Facility in LaBarge, Wyoming. The plant has the ability to process up to 14 million standard cubic feet per day.

The goal of the plant is to demonstrate that the CFZ™ technology can meet or exceed the specifications for sales gas over a wide range of field compositions, while capturing design data that will allow the scale-up of CFZ™ technology facilities to world-class size applications.



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