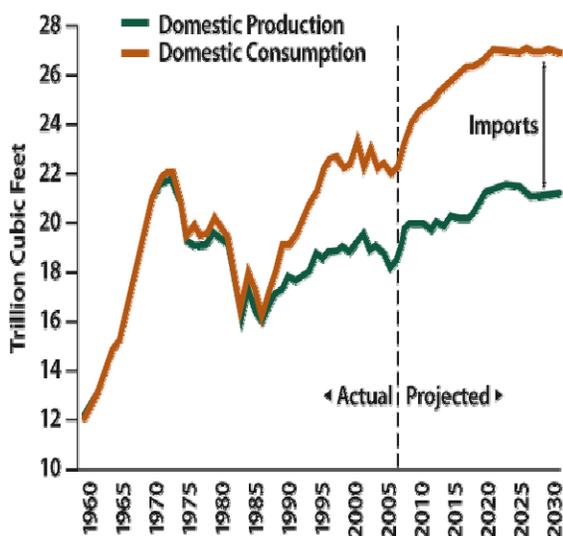


Turning Coal into Pipeline Quality Natural Gas

U.S. Natural Gas Production is in Decline

The growing demand for natural gas in the U.S. is forecast to continue to exceed the nation's production capacity, with the vast majority of new growth expected to be met by imports, including Liquefied Natural Gas (LNG).

FIGURE 1. U.S. NATURAL GAS PRODUCTION IS FALLING SHORT OF DEMAND



Source: DOE/EIA-Report#0383 (2007) and EIA Annual Energy Review, 2007.

About 60 percent of the world's natural gas reserves are held by Russia, Iran, Venezuela and Qatar, which have discussed forming a new energy cartel to control supply and price. Relying on imported LNG creates the same energy security and economic risks as imported oil.

Coal costs were just one-fourth of the delivered price of natural gas in 2007. The states that use the most coal-based electricity enjoy power costs that average

more than 40 percent lower than the states that rely on other fuels.

Creating substitute natural gas (SNG) from abundant, domestically-produced coal provides a clean, competitive and secure alternative that enhances U.S. energy security and promotes economic growth. Coal can be gasified to create SNG, and when using carbon capture and storage, it has lower greenhouse gas emissions than those from LNG production.

Using coal to produce SNG would ease supply pressures and provide an alternative source for at least 15 percent of America's annual natural gas consumption. Using an additional 340 million tons of coal per year could produce 4 trillion cubic feet (TCF) of SNG annually by 2025.

Production of SNG

Conversion of coal into SNG begins with a gasification process to break down the solid coal feedstock into gaseous components. Gasification thermally converts the coal into a synthetic gas, or syngas, which is made up of predominantly hydrogen (H₂) and carbon monoxide (CO). Gasification systems can convert any carbon-based feedstock including coal, petroleum coke, heavy oils, wastes or biomass into syngas, which can then be converted into SNG through a methanation process that includes removing impurities such as sulfur compounds through chemical and physical absorption.

As part of this process, carbon dioxide (CO₂) is produced in a concentrated stream. This can be captured for use or for long-term geological storage.

Quality Considerations

SNG produced by the gasification of coal is added to natural gas pipelines and must meet the same standards for quality as natural gas. These include meeting minimum methane content and heating value levels. SNG from coal gasification plants is designed to meet those same quality requirements as the natural gas to which it is added.

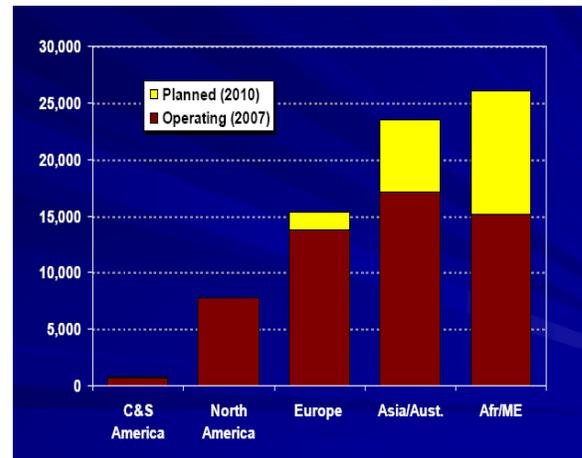
Coal gasification has been in commercial use for more than 80 years as a process technology for the refining, chemical and power industries. The latest World Gasification Survey, prepared by the Gasification Technologies Council, identified and gathered information on 420 gasifiers in operation 142 gasification plants. Even more are in construction, or in planning or design stages, especially in China. Many of these are for the production of SNG.

State of the Industry

The largest concentrated source of gasification capacity in the world is at the Sasol facility in South Africa, the location of about 1/4th of all of the gasifiers worldwide. The Sasol plant's synthetic fuels account for about 3/4ths of all of the nation's liquid fuel production.

Significant increases in gasification are occurring worldwide through the construction of new plants that are providing greater regional, feedstock and product diversification.

FIGURE 2. GEOGRAPHICAL DISTRIBUTION OF GASIFICATION CAPACITY (MW THERMAL EQUIVALENT)

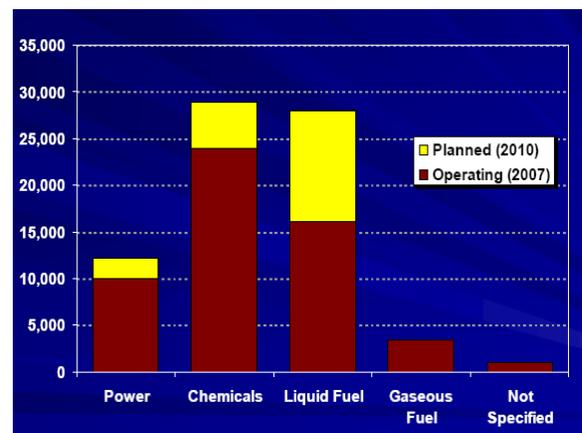


(Gasification Technologies Council, 2008)

Products of Gasification

Historically, syngas has been used primarily as a feedstock for the production of chemicals. In 1989, chemical production accounted for almost one-half of syngas use worldwide. This situation is changing as more power generation projects are being constructed and planned. The overwhelming majority of the post-1990 new capacity in the gasification industry has been devoted to the production of chemicals and power: 66 in the 1990s and 94 for planned post-2000 plants.

FIGURE 3. WORLD GASIFICATION CAPACITY BY PRIMARY PRODUCT (MW THERMAL EQUIVALENT)



(Gasification Technologies Council, 2008)

Current Projects for Production of SNG

Coal and petroleum-based materials provide the vast majority of feedstock for world gasification capacity. There are currently fifteen SNG projects in various stages of planning in the U.S. There are also projects in China and the Czech Republic.

The most notable project in current operation is the Great Plains Synfuels plant, owned and operated by the Dakota Gasification Company, a part of Basin Electric Power Cooperative. This plant began operation in 1984, and produces more than 54 billion standard cubic feet of SNG annually. The SNG is delivered via the Northern Border Pipeline, to homes and businesses in the eastern U.S. SNG produced at this plant meets pipeline quality requirements.

There are a number of SNG projects in development in the U.S. using domestic coal. These include projects in Illinois, Indiana, Kentucky and Louisiana.

Recommendations to Promote Production of SNG

The production of SNG from coal can help to reduce the amount of natural gas imported in the form of LNG from foreign sources. While SNG technology is proven in operation and commercially available, high capital costs and issues such as CO₂ capture and sequestration have stalled its development. In prior reports, the Council has made the following recommendations to the Secretary of Energy:

- The U.S. should take steps now to remove the key barriers to implementation of SNG plants, namely environmental permit approval, financing risk and CO₂ sequestration solutions.
- Some incentives should be made available to the first group of projects to overcome the increasing capital costs. These incentives should include investment tax credits and Federal loan guarantees.
- Additional funding should be utilized to accelerate demonstration of large-scale CO₂ capture and geologic sequestration.

As a public advisory committee to the Secretary of Energy initially chartered in 1984, The National Coal Council has compiled over 30 reports at the Secretary's request on numerous issues affecting coal and U.S. energy policy. The factual information in this paper, and the conclusions based thereon, are drawn from these studies and the documents used to compile them, all of which have been submitted to the Secretary of Energy.