

# Comparison of Natural Gas Supply Responses to Seasonality

Sam Van Vactor, Economic Insight, Inc., 1.503.222.2425,  
Don Winslow, Chevron, 1.925.842.1938, don.winslow@chevron.com

## Overview

The market for internationally traded natural gas is currently divided into three distinct submarkets: (1) North America, (2) Europe, and (3) Asia. In addition to the significant differences in the supply and demand fundamentals that lead to very different natural gas prices, the supply response to seasonal demand for natural gas is drastically different in these three regions as well.

Historically, the natural gas industry in North America has relied on underground storage to manage the seasonal swings in demand. Europe also has natural gas storage facilities. However, despite the fact that Europe has more weather sensitive demand than North America, it has less storage than North America. Instead the European gas market has historically relied on the ability and willingness of the major gas producers to vary their volumes delivered into the market. This paper will examine the historical development of such practices.

Asia has even less storage in proportion to its seasonal demand. In contrast, the gas market in Asia cannot rely on underground storage because there are few appropriate reservoirs in the major Asian markets (Japan, Korea & Taiwan). Furthermore, because of their reliance on LNG rather than pipeline imports, this market cannot benefit from the volumetric flexibility offered by gas producers (as in Europe). However, the load profiles of the various Asian gas markets differ in their seasonality: thus while Korea is a winter peaking load, Taiwan's load is summer peaking. Although China has not historically relied on natural gas for residential and commercial space heating, its plans call for dramatic increases in these weather-sensitive loads. It has begun to invest in large underground gas storage facilities in order to accommodate this growth.

In general, as North American LNG exports to Asia and Europe increase in the next decade, there is a prospect that the regional responses to seasonal demand could become more closely linked as well. Thus, for example, either Asia or Europe could come to rely on spot shipments of LNG to supplement storage as a way to manage unusually unexpected weather or other supply disruptions. One question that arises in that context is the correlation between severe cold weather on the three continents.

## Methods

This paper will examine the engineering and economic considerations associated with the various responses to seasonality: (1) gas storage: (2) production curtailment: and (3) using flexible deliveries of LNG. Historical patterns of gas production, storage and demand data will be compared across the three continents.

## Results

A comparison of the three gas markets reveals similarities and also substantial differences. In effect, the diversity creates classic "gains from trade" potential; in this case the gains will be reflected in better system balancing, fewer curtailments of customer demand and less volatile prices.

## **Conclusions**

The three major natural gas markets (North America, Europe and Asia) have differed considerably in their response to variations in seasonal demand. However, as the linkage of three markets grows with increases in the traded volumes of LNG, the markets' response to seasonality will become more interconnected.

## **References**