International Association for Energy Economics
Luncheon Presentation
April 21, 2004

Recent Changes in the Natural Gas Market and the Need for More LNG in New England

Mike Reimers, Weaver's Cove Energy, LLC
www.weaverscove.com
mreimers@weaverscove.com

Liquefied Natural Gas, commonly known as LNG, has received considerable attention in recent years. Last summer Federal Reserve Chairman Alan Greenspan brought LNG to newspaper front pages when he testified before the U.S. House of Representatives about natural gas supply and demand issues, noting that natural gas prices had increased significantly in response to tight supplies. Greenspan stated, "… our limited capacity to import liquefied natural gas (LNG) effectively restricts our access to the world's abundant supplies of gas." Does the US need imports of LNG? New England already has one of four existing LNG import facilities. Are more needed in this region? Not so many years ago domestic natural gas was plentiful and, other than the LNG facility in Everett, Massachusetts, the other 3 US LNG import terminals were sitting idle. What has changed that can now make LNG imports successful in the US market?

As a starting point it is probably appropriate to provide a short definition of what LNG is. LNG is the same natural gas we use every day to heat our homes and businesses, cook with and fuel our power plants. This liquid form of natural gas has been reduced to a liquid by a process of refrigeration. In liquid form, LNG can be readily transported across the ocean in specially designed ships and delivered from remote gas fields to the United States and other consuming nations.

In 2002, 12 countries exported LNG. LNG trade represents 6% of worldwide gas consumption though only about 1% of US consumption. US gas consumption represents just over 26% of total worldwide gas consumption. Virtually all of Japan's natural gas is supplied by imports of LNG. In Europe, LNG imports supply about 50% of the gas consumption in Spain and about 25% of consumption in France.

Obviously, the importation of LNG did not catch on in the US when compared with these other gas consuming countries. In the 1970's, when the four existing LNG import terminals were built, there was a belief that the US would begin running out of natural gas by the mid-1980's. In response a number of companies proposed LNG import terminals to address market supply requirements. At this same time natural gas prices were regulated at the wellhead and removing regulation was seen as a way to incentivize producers to drill more and bring new supplies of natural gas to the market. By the mid-1980's de-regulation of natural gas was in full flower and prices had been rising. Instead

of higher prices spurring natural gas development, the more significant response was the sharp drop in demand for the fuel, creating a "gas bubble" which ultimately sent prices to all time lows. LNG was viewed as an expensive and exotic fuel. LNG import terminals were idled and, in at least one instance, sent into bankruptcy.

Does this mean the LNG industry failed in the US?

Not at all. The US has the largest number of LNG facilities in the world with 113 LNG storage and peak shaving facilities of the 200 in existence worldwide. The largest concentration of LNG storage facilities is in New England with over 40 facilities. Why then does the US only have 4 of the 40 worldwide LNG import terminals?
To understand where we are, we need to look at the other markets in the Atlantic and the Pacific and what caused them to develop in different ways. In this way we can also see that LNG as a supply source to the US market can be successful in the future.

Let's look at the Pacific Basin first.

Through the 1970s and 1980s, the countries in the Pacific Basin saw a steady growth in energy demand of between 5 to 10% per year. For a country like Japan, which has virtually no indigenous supply of natural gas, security of supply was and remains extremely important and the Japanese market made a conscious decision to pay for supply security.

In the Japanese model, the market (Japanese buyers) recognize that significant upstream investments need to be made at the wellhead, in pipeline facilities, in LNG production trains and in shipping. A typical LNG production facility might have cost between $1 billion and $3 billion. Depending on the size of the project, anywhere from 4 to 8 LNG ships would be required at $250 million per vessel. As a result, long-term contracts (20 years or more) were entered into which assured the producing countries, and the producing companies, a secure revenue stream in return for assured supplies of natural gas. Natural gas prices were indexed to crude oil, since no independent market price for gas could be established.

As with the Japanese market the Korean and Taiwanese markets developed in much the same fashion and a rigid system of purchase and sales contracts were entered into
The next big markets for LNG imports in the Pacific Basin are expected to be India and China. Agreements are being discussed and LNG import terminal sites are being identified.

Suppliers to the Pacific markets are Australia, Indonesia, Brunei and Malaysia in Asia and Abu Dhabi, Qatar and Oman from the Middle East.

Future prospects for the Pacific basin appear strong with steady growth in future years, although more modest than in the past.

Now let us look at the Atlantic Basin

European markets, such as Spain and France previously noted, have imported greater portions of their total natural gas consumption as LNG because of limited indigenous domestic supply and the desire to diversify supply sources, much as was the case with Japan. The UK market resembles the US experience most closely where ample domestic supplies combined with access to additional supplies from the Norwegian sector of the North Sea served to limit the need for additional gas and, therefore, the willingness to enter into long-term contracts.

France chose the LNG option to diversify its supply from a reliance on Russian imports in addition to Dutch and Norwegian supplies. Likewise Spain, Belgium and Italy have opted for long-term LNG supply arrangements. Gas supply agreements in European markets were defined, not by regulations imposed on the participants, but instead by the limited number of buyers and sellers.

The US market, in contrast, has a large number of buyers and sellers, both major producers and independents, and for many years prices were kept at artificially low levels by regulation. We also had an interesting split between intrastate and interstate markets where gas held for sale within the producing state could be sold for higher prices than the "allowed" price for sales in interstate commerce. While demand for natural gas continued to increase through the 60's and 70's, supply did not seem to be keeping pace.

By the mid-1970's there was real concern that the US was going to run out of natural gas. In response we saw regulations to limit the use of natural gas and imports such as LNG were pursued. LNG import terminals were built in Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia and Lake Charles, Louisiana. Long-term LNG supply contracts were signed.

At the same time de-regulation of natural gas prices was considered to be a necessary step to encourage the drilling for reserves and production of natural gas. By the early 1980's regulatory order de-regulated prices and removed fixed contract terms which required buyers to purchase and pay for contract volumes. The supply response was robust and a gas bubble formed which caused prices to fall from approximately $3 per Mcf at the time of de-regulation to a low of $1.

Low natural gas prices in the US could not support the significant costs incurred by LNG producers and combined with the loss of contract assurances, the LNG import business stopped almost completely for 2 years and then was reduced solely to the operations of the LNG terminal in Everett, Massachusetts which served the New England market with its high reliance on LNG for its peak winter needs.

The technical story continues to develop

The gas supply response in the US was robust due in part to improved technologies such as improved seismic and directional drilling. While these exploration improvements

helped domestic producers they also helped in vast reserve discoveries in Qatar, Yemen, Nigeria, Venezuela, etc. These large resources are far from existing markets.

At the same time new reserves were being discovered, LNG production costs began dropping with the pursuit of technology improvements. Shipping costs were also dropping. Where an LNG ship once cost about $250 million today it would cost about $160 million. Ships are also getting larger with resulting improvements in economies of scale. Liquefaction plant costs have been more than halved over the past 15 years.

Where are we in the US market today?

As a consequence of supply tightness, gas prices have risen dramatically in recent years with increased volatility in daily cash price quotations. In the late 1990's the wholesale price for gas tended to average about $2.50 per Mcf with some volatility associated with weather such as extreme cold in market areas or summer hurricanes disrupting production in the Gulf of Mexico. Since the winter of 2000/2001 we have seen significantly increased gas prices sustained at levels above $5/Mcf and reaching much higher prices during peak winter periods. A wholesale price quote above $19/Mcf is no longer an unknown event.

Natural gas demand in the US continues to increase. The Energy Information Administration, The National Petroleum Council and others have forecast that gas demand will outpace domestic and Canadian production and increased LNG imports are needed. Increased demand is primarily driven by increased use of gas for electric generation. Gas-fired power plants are easier to permit and relatively quick to build and, for environmental reasons, natural gas is the fuel of choice. Over the past 3 years the US has added 100,000 MW to the electric grid and 90% of this is gas-fired. The EIA projects that demand for natural gas will increase at an average annual rate of 1.4% from 2002 through 2025.

With growing demand the EIA and others see a supply gap developing as domestic production fails to keep pace with demand growth. For many years the US has been able to meet demand growth with increased imports from Canada. In addition, during the last 3 years all of the existing LNG terminals have been brought back into service. The Everett terminal has been expanded and the other 3 terminals are currently being expanded. Nonetheless a supply/demand gap is growing.

If drilling bans are not lifted in areas such as the federal lands in the Rockies and the offshore Atlantic and Pacific coasts then our supply response must come from Alaska, unconventional domestic production and LNG. Even with the opening of coastal areas and Alaskan developments, many believe increased LNG imports will be required because of the lengthy development timelines of these alternative sources. The EIA projects that the expanded capacity of the existing LNG import terminals will be fully utilized by 2008 and that at least 5 new terminals will be needed.

What about New England?

Over the past decade consumption of natural gas in the New England market has grown at one of the fastest rates in the US. As is true for the US as a whole, the EIA forecasts that New England will continue to have an annual average growth rate of about 1% per year. And much of this growth will be driven by increased use of gas in electric generation.

New England is at the end of the pipeline system whether one looks at US gulf coast production areas, western Canadian production or Eastern Canada offshore. To a much greater degree than the rest of the US, New England relies on imports from Canada comprising 40% of its supply versus 15% for the US as a whole. LNG imports make up 15% of gas supply for New England and, because the region lacks any gas storage, regasified LNG makes up 25% or more of the gas delivered on a peak winter day. The New England market experiences much higher wholesale and residential prices than the rest of the US.

New England has pipeline infrastructure in place to deliver about 4 Bcf per day. Much of the year this level of capacity is more than adequate to meet demands of a market that, on average, requires 2 Bcf/day. However, the ability of the region's infrastructure to meet market demands is coming under increasing scrutiny as ISO New England, the entity responsible for managing the region's transmission system, has raised concerns about the ability of the natural gas infrastructure to supply coincident demands of electric generators and natural gas users on peak days. In addition, the FERC completed a study of the New England pipeline infrastructure in December 2003 in which they found the system adequate through 2005 and that proposed new infrastructure including an LNG terminal between Boston and New York would be required to meet future demand.

While the increase in the use of gas for electric generation is an important driver for demand growth, in a weather sensitive market such as New England, increased use of gas for heating needs in all market sectors raises peak demands at the very time that the existing pipeline infrastructure is at or near capacity. Home conversions to gas have increased and new construction, particularly in Southeastern Mass and the Cape, are increasing residential heating loads. For this reason LNG has been and will continue to be an important component in meeting the region's peak day needs.

The EIA forecasts that New England, as was true for the US as a whole, will face a supply demand gap. Canadian production being delivered into the region has fallen each of the last 2 years. At one time we believed that increased imports from newly discovered gas reserves off the Eastern coast of Canada would meet the region's growing demand. However, production from this region has failed to meet expectations with the result that a planned expansion of the Maritimes & Northeast pipeline has been cancelled.

Pipeline expansions face a myriad of challenges resulting a lengthy permitting process and expensive construction. The recently completed Hubline project is evidence of the environmental and cost challenges faced by a pipeline expansion in the congested areas around Boston. Pipeline expansions from the Gulf coast producing areas would also

confront significant challenges. Recent pipeline expansion proposals into the Carolina market suggest that an expansion all the way to New England could incur a transportation cost of up to $2/Mcf. The market could bear this cost at most during the 3 coldest months of the year leaving 9 months with the new pipeline losing money.

So – is LNG the answer for New England?

An LNG import terminal offers a lower cost solution to meet the region's market demand. Just last month Rhode Island Governor Carcieri spoke before the US Congress about the need for natural gas supplies and some price relief for the consumers, residential and industrial, in Rhode Island. In his comments the governor included his support for LNG.

Why should the US LNG import industry succeed now when it struggled earlier?

1. Need – the "old" market with a heavy overlay of regulation masked the true supply and demand drivers; now the demand is more readily apparent
2. Price – US market prices and certainly those in New England have risen to levels well above the level needed to satisfy the significant producer investment and these prices are expected to be maintained for the foreseeable future
3. Cost – improved technologies have reduced the cost of exploration, production, liquefaction and shipping of LNG

The US market demand and the growing use of clean burning natural gas have brought us to the point that we need imported sources of gas to supply our needs. The US market now has features more like the Japanese model than we did in the late 1970's.