

## Atlantic and Pacific Rim LNG Markets

By Douglas B. Reynolds\*

Most gas supplies currently are transported to market via pipelines, which physically link each supplier with each customer. That is why the world's natural gas market consists of a number of regional markets with regional suppliers. However, soon the world will see a fundamental transformation where an ever larger percent of natural gas will be transported as liquefied natural gas (LNG) over the oceans. This will interlace regional markets so that they are more connected creating an emergent world LNG market.

However even though the cost of transportation for LNG is declining, those costs are still high enough that there may continue to be some regionalization of gas markets. In particular two main regional LNG markets look to emerge in the future: the Pacific Rim LNG market and the Atlantic Rim LNG market. In my new book, *Alaska and North Slope Natural Gas: Development Issues and U.S. and Canadian Concerns* (2003), I explain how the two markets will develop and be quite different from each other.

These two LNG markets are actually quite distinct with unique characteristics. Because of the distances involved, the Pacific Rim and the Atlantic Rim can be considered separate

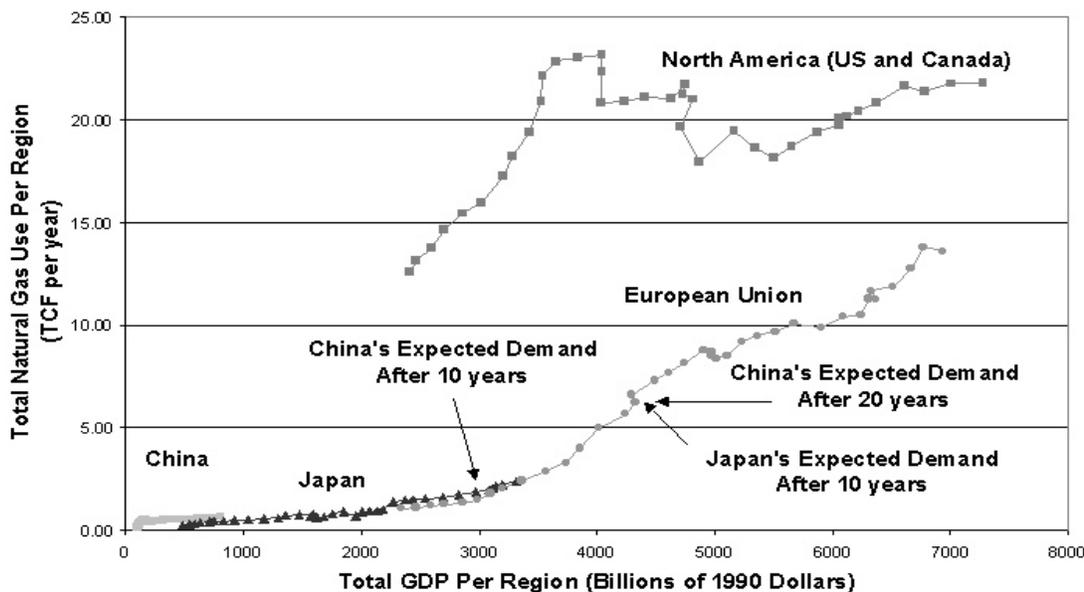
two neighborhood markets.

First let's look at the Pacific Rim. On the demand side, the Pacific Rim has four main customers: China, Japan, California and the rest of East Asia. Japan's economy with ten years of sluggish growth is slow moving with structural problems. China's economy is moving slower than expected also due to a lack of internal market deregulation. Therefore, energy demand in both countries and indeed for all of East Asia is increasing at a much slower pace than expected.

Figure 1 shows the demand for natural gas as a function of GDP for China, Japan, North America (not including Mexico), and the European Union (E.U.). Notice how China and Japan are following an E.U. type of pattern of slower growth in demand. This is probably due to high cost supplies but also due to differently regulated markets. On top of this slow growth in gas demand compared to GDP, East Asia has also begun to experience slower GDP growth itself, particularly in Japan. This will make the yearly overall growth in LNG demand even slower.

California may start to buy LNG supplies on the Pacific Rim, but probably at a slow pace since California already has access to gas from New Mexico and is a mature market with a slower demand growth rate. Therefore, for the Pacific Rim the demand side looks to be sluggish and slow moving.

Figure 1  
Natural Gas Use as a Function of GDP



market neighborhoods each with their own major supply and demand players. Therefore, it is interesting to look at how the two market neighborhoods are shaping up and to analyze what the advantages and disadvantages are for Alaska and LNG suppliers such as Russia and the Middle East in these

\*Douglas B. Reynolds is Associate Professor of Oil and Energy Economics, School of Management, University of Alaska Fairbanks. This is the second of a series of articles based on his new book

On the supply side in the Pacific Rim, there are a number of nearby suppliers with substantial supply capacity, particularly Indonesia, Australia, and the Sakhalin Islands off of Russia's East Coast. All three of these suppliers have natural gas wells right on the shore line with gas that is ready to be converted to LNG and shipped. Unfortunately for Alaska a long and expensive 800 mile pipeline is required before its

gas can even get to a shoreline let alone get to market in the Pacific Rim. That makes Alaskan gas very uncompetitive on the Pacific Rim. Other supply players on the Pacific Rim will be Middle East countries like Qatar and possibly Bangladesh. Therefore, on the Pacific Rim there are more than adequate supplies and a slow moving demand side that should make small new projects easy to plan and get on line. The way the market is shaping up there will be slow growth, very competitive supplies and therefore a stable, relatively low price.

The Atlantic Rim however looks quite different. While

at first glance there appears to be plenty of Atlantic natural gas suppliers (including Algeria, Nigeria, Norway, Venezuela, Trinidad and Tobago, Russia's western regions, and even the Middle East) the demand side may still outpace supply growth. Thus the difference between the Atlantic Rim and the Pacific Rim is not really the size and potential capacity of the supply side, but rather it is the difference in the speed with which the demand side will increase. This is where the U.S. East Coast comes into play. But before we can understand how the eastern United States and eastern Canada will change the Atlantic Rim LNG market so profoundly, we need to look at how U.S. natural gas supplies will soon peak and decline (or indeed may have already peaked and started to decline) creating a huge supply gap within North America.

Right now North America is almost a de-facto closed market for natural gas. But the supply within the region is subject to M. King Hubbert's supply curve. To see the implication of this let us step back in time and see what happened in the United States oil market back in the 1970s and 1980s. A lot of energy professionals may recall the U.S. oil situation in the 1970s. At that time M. King Hubbert was one of the few energy professionals touting an imminent peak and decline in U.S. oil production. One criticism of Hubbert was that even if he were right about U.S. supplies, there would be plenty of oil supplies to satiate U.S. oil demand from the Middle East, and at reasonable or even cheaper prices. What actually did happen was quite unexpected. OPEC emerged as a powerful oil broker willing to reduce output in order to maximize its own value of the oil. And incidentally OPEC also managed to conserve the world's most important non-renewable natural resource for future generations, which very few people give them credit for doing. See Reynolds (2000). We should all be saying, "Thank you" to OPEC.

However, there is one other important lesson from the 1970s and 1980s. The actions at that time of individual OPEC members, and even non-OPEC oil producers who control their own oil production such as Mexico, show that supply does not quickly increase in the face of high energy prices. One reason for this is something that energy professionals have not considered much. Oil and gas producing countries that own and control all their own energy output

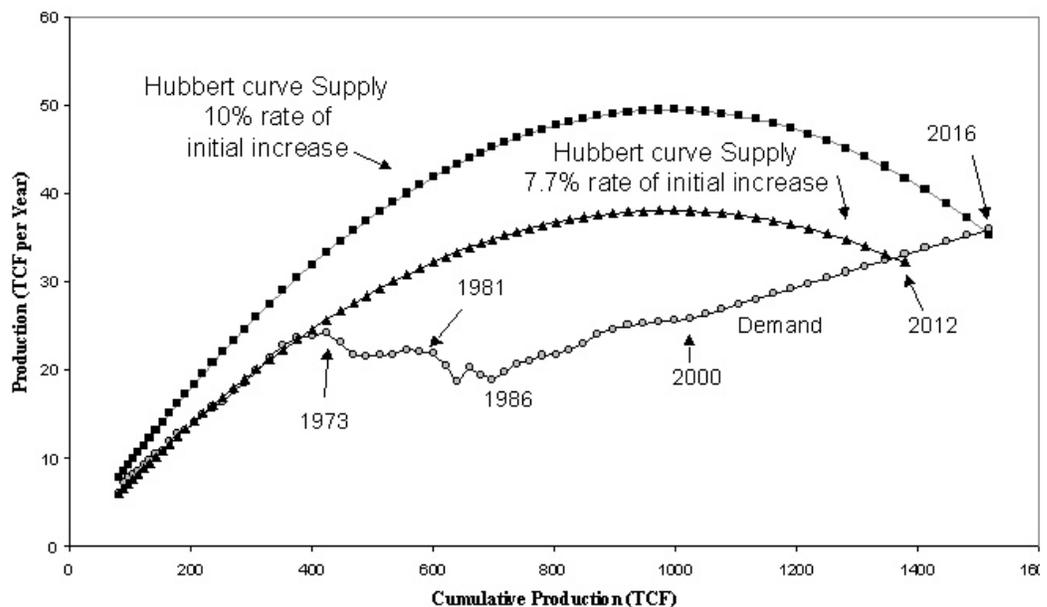
tend to have very high reserve to production ratios. This is in part due to the risk averse nature of these countries. See Reynolds (2002). Oil producing countries are so concerned about making mistakes in investment and making mistakes in production agreements with major oil companies that they tend to expand oil and gas development very slowly.

Thus even though oil prices were very high in the 1970s and 1980s, and even though there were no OPEC agreements on output reductions until 1982, many OPEC countries could not expand their output and lower their reserve production ratios by much. This same problem is likely to inhibit growth in Atlantic Rim LNG supplies.

Now move from the 1970s back to the early 21<sup>st</sup> century. What happened with oil supplies in the United States is also about to happen with natural gas supplies. Soon if not already, North America's natural gas supplies will reach

**Figure 2**

**U.S. Lower 48 and Southern Canadian Natural Gas Production and Forecast  
Maximum Production and Demand as a Function of Cumulative Production Base on  
Multi-cycle Hubbert Model Forecast**



a peak, the same way that oil production peaked and declined for the United States in 1970. See Figure 2 for one (possibly optimistic) scenario based on one analysis of natural gas discoveries within the currently accessible U.S. and southern Canada natural gas supply region. Once the natural gas production peak occurs, the United States and even Canada, will need substantial quantities of natural gas much of it coming from international LNG producers.

This shortage scenario will happen quickly. First a severe gap in U.S. supply and demand will emerge that Canada and Mexico will not be able to fill. Even with Alaskan and Northern Canadian gas on line there will still be a gap, so LNG imports will start up. But the demand gap for gas is likely to open up fast just like the U.S. oil supply gap enlarged very rapidly after U.S. oil production peaked. Most of this U.S. gap in natural gas supply will be on the east coast

such that mostly Atlantic Rim supplies will be needed.

Unfortunately because of the speed with which the gap in supplies will hit and the large volumes of supply that will be needed, the Atlantic Rim suppliers will not be ready in time with new supplies. Atlantic Rim suppliers will have a hard time reacting quickly enough and the price may spin out of control. Indeed this is already happening. Certainly demand will also be forced down with the higher prices, but still a price shock will ensue. And prices can easily stay high for ten or more years while the major LNG suppliers only slowly increase their facilities. One reason that supplies will not rapidly increase as might be expected is because all of the major LNG suppliers will be risk averse to investing in new LNG capacity. This is exactly what happened with OPEC members in the 1970s. Oil production capacity just could not increase very quickly and it was actually demand reductions rather than supply increases that finally brought oil prices down. Plus bottlenecks and cartel behavior may only add to the long lead time needed.

Some might recall that when the U.S. deregulated natural gas that the market started reacting relatively fast to price signals such as the 2000/2001 natural gas price shock. Others might recall that the oil price shocks of the 1970s pushed oil prices above normal for over ten years. So both quick and slow responses are possible in energy markets. Plenty of anecdotal evidence can be had for both situations. Short run elasticities of supply and demand are not easily attained until an actual situation arises where they can be measured. As yet there has never been a natural gas crisis under a deregulated market other than possibly California's 2000/2001 experience to determine short run elasticities. But even in California, there was no LNG involved, no new gas pipelines created, and hydro power was restored.

One thing is clear no matter how fast or how slow LNG suppliers can ramp up and start producing significant new supplies of gas, the gas will be in much greater demand on the Atlantic than on the Pacific Rim side. This is the one reason that Alaska will obtain better value for its natural gas by selling it to the Atlantic Rim side via a long natural gas pipeline to Chicago than by selling it on the Pacific Rim side as LNG.

On the other hand, all energy players whether producers or consumers of energy should understand that there will be a significant difference in the Atlantic Rim LNG market compared to the Pacific Rim LNG market and should start planning for that difference. Maybe there will not be prolonged high LNG price on the Atlantic Rim side, but don't count on it.

#### **References**

- Canadian Gas Association (various years). *Gas Facts*, Canadian Gas Association (CGA).
- Hubbert, M.K. (1962). *Energy Resources, A Report to the Committee on Natural Resources: National Academy of Sciences, National Research Council*, Publication 1000-D, Washington, D.C..
- Reynolds, Douglas B. (2003). *Alaska and North Slope Natural Gas: Development Issues and U.S. and Canadian Implications*, AlaskaChena Associates, Fairbanks.
- \_\_\_\_\_. (2002). *Scarcity and Growth Considering Oil and Energy: An Alternative Neo-Classical View*, The Edwin Mellen Press, Lewiston, pp. 69-110.
- \_\_\_\_\_. (2000) "The Case for Conserving Oil Resources: The Fundamentals of Supply and Demand," *OPEC Review*, June, Volume 24, Number 2, pp. 71 – 86.
- U.S. Energy Information Agency, (various years). *US Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, DOE EIA 0216, found on web page: [http://www.eia.doe.gov/pub/oil\\_gas/natural\\_gas/data\\_publications/crude\\_oil\\_natural\\_gas\\_reserves/current/pdf/appd.pdf](http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/current/pdf/appd.pdf).

#### **Hong Kong Energy Studies Centre Holds International Conference** (continued from page 23)

publication. Fourteen papers were selected, with 11 of them dealing with energy market reform; consequently, the special issue will have the theme "Energy Market Reform." The Hong Kong Energy Studies Centre has invited Prof. Dienes from the University of Kansas to serve as a visiting research fellow during August to October, 2003 to help edit the special issue. The selected papers have been refereed by members of the editorial committee; the authors will carry out the necessary revisions, and the final polishing work by Dr. Chow and Prof. Dienes will be completed by mid-November for final submission to *Energy Policy*.

The Asian Energy Conference is a bi-annual international event presented by the Hong Kong Energy Studies Centre focusing on energy issues of particular relevance to Hong Kong and the region. Given the small number of energy specialists in Hong Kong, but its strategic location within Asia, the Centre believes that it can play a useful coordinating role in linking local specialists and energy firms with international experts to tackle current energy problems.

Results of such activities culminated in some high quality publications, e.g., the First Asian Energy Conference yielded the Special Issue "Themes in Current Asian Energy" *Energy Policy*, No.11, Vol. 31. The past two conferences have been financially supported by the Hong Kong Baptist University, and local energy firms like Hong Kong & China Gas Co. Ltd., CLP Power HK Ltd., ExxonMobil and Caltex Oil HK Ltd. It is anticipated that some future conferences might be jointly organized with Asian universities located in other countries. The network of energy specialists built up in the past two conferences will be very useful in developing future events with an international dimension.

Larry Chow

**IA**  

---

**EE**