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The Asia Pacific region is now recognized as the major growth area for energy demand, due to both demographics and the creation of wealth. Oil, gas and electric power now take center stage for investment in this growing and emerging market. This region has vastly inadequate local crude oil production relative to its expanding needs and will need increased imports from outside the region, particularly from Middle Eastern producers. Coupled with governmental policy changes encouraging deregulation, privatization and foreign investment, the future appears bright; yet risk prevails. Deregulated markets bring with them competitive risks not previously seen. Thus, energy risk management rises in importance in such a changing market environment.

Oil is still the key fuel of the industrial world. It has strategic importance. In the Asia Pacific region, the overriding concern has always been security of supply rather than price risk. In this environment, the use of energy risk management tools, particularly on futures exchanges, has repeatedly failed. Risk avoidance rather than risk management has been the operative word in Asian oil markets. That is about to change due to the twin engines of deregulation and privatization driving competition. The business as usual approach no longer works as a sharp increase in oil dependence adds more price uncertainty and undoubtedly more future price volatility. Oil, which exhibits annualized price volatility of 40 to 50% per year, is almost the highest of any commodity.

Timing is everything. The time for using energy risk management tools is now. Deregulation and globalization of energy markets are bringing with it the need for active management of market risks. The markets are becoming more price sensitive with the rapid dissemination of price and market information.

The need to use these financial tools exists. The effectiveness of the tools is more established and the knowledge base wider. Oil futures trading has moved forward from the exchange-traded instruments of the 1980s and mid 1990s to the over-the-counter markets of today particularly in the Asia Pacific region where no viable futures contracts exist to manage large volumes of oil price risk. However, financial instruments do not exist in a vacuum. They are based on what is occurring in the physical energy markets.

Background

Energy markets are the most volatile commodity markets in the world due to dramatic changes in the physical markets which are in turn influenced by unpredictable weather patterns, political events and dramatic swings in supply-demand balances. These factors lead to tremendous price swings in short time periods. Thus, the energy commodities, i.e. oil, gas and electricity, are quite conducive to the use of price risk management tools. However, the innate conservatism of the energy industry has demonstrated a reluctant and slow acceptance of the risk management tools of the world financial markets. This process of market acceptance is now underscored by the deliberate and yet incremental development of energy derivatives in the Asia Pacific region. The financial revolution that overtook Atlantic basin oil markets during the 1980s is still just getting started in Asian markets, even though Asia Pacific oil prices continue to be inordinately influenced by Atlantic basin-orientated financial instruments for energy i.e. Brent and WTI.

While futures trading in energy began in 1978 with the New York Mercantile Exchange (NYMEX) launch of heating oil futures, it has taken longer than expected for the energy derivatives market to develop in the Asia Pacific region. And the Asia Pacific energy derivatives markets are following a different path from the more mature markets of London and New York. With no viable energy futures contracts, the over-the-counter (OTC) energy derivatives markets are leapfrogging energy futures market developments in the Pacific Rim region with many OTC derivatives agreements created to meet growing market needs. And while the OTC markets can sometimes evolve into futures contracts, such as 15-day Brent did in Europe, the OTC swaps and options markets tend to function like a quasi-futures market in Asia. These markets are unregulated, global, and both short and long term, and are influencing prices beyond their notional value, i.e. they are influencing price formation in the physical markets.

The change in the energy commodity markets is being brought about by underlying developments in the physical markets in the Asia Pacific, including new and planned refinery projects, growing petrochemical capacity, rising electric power needs, development of a natural gas infrastructure (particularly for LNG), and a movement away from a high degree of government regulation of the energy sector in many countries. Capital flows to Asia in the coming decades will be substantial as greenfield energy projects proliferate. But this move towards deregulation will follow an Asian model and will not be a rapid transition to open markets but a gradual process. In effect, a controlled deregulation process is underway. Moreover, Asia's role continues to rise in importance in world energy markets so that risk management imperatives will be more pronounced in the forthcoming years, for it will be increasingly necessary for both oil producers and refiners to use these instruments.

Asia Pacific in the supply scheme of the world

During this decade, continued economic growth for the Asia Pacific countries will bring pressure on regional oil and gas markets, particularly with a reduction or at best, a plateauing of oil production. The Asia Pacific energy markets are heavily dependent on

hydrocarbons, including roughly 50% coal, 30% oil, 10% natural gas, with nuclear and hydro constituting the remaining 10% (on an oil equivalent basis). Gas usage, except for LNG, is relatively new in the region and will require more investment in a pipeline infrastructure and distribution facilities, but it is sure to rise. This region consumes roughly 25% of world oil demand, 45% of coal and 10% of natural gas demand.

Growing oil import dependency will lead to more price volatility and supply instability. While coal is the region's most abundant energy resource and dominant primary fuel, it is oil and gas demand growth that will rise substantially, entailing new financial risks. There is the possibility of coal commoditization in the Asia Pacific region as global coal trading emerges.

Oil markets

The importance of the Asia Pacific region in terms of world oil demand and refining cannot be understated. Since 1985, Asia has accounted for over 70% of total world oil demand growth. This area has already surpassed Europe and will soon eclipse North America as the primary region of world oil demand. The Asia Pacific continues to be the most dynamic oil market in the world with demand projected to increase to 25.4 million b/d in 2005, reaching 29.4 million b/d in 2010. Most of this increased consumption will be sourced from the Middle East from where presently over 70% of the supply comes. It is estimated that 80% of Persian Gulf oil production will be exported to China, India, Japan, South Korea, Taiwan and the Association of Southeast Asian Nations (ASEAN) countries by the year 2010. Growing commercial ties between the Gulf producers and Asian consumers seem inevitable, especially as the giant US market shifts to a greater regional dependence on Latin American producers away from the Middle East.

By 2005, Japan, South Korea, China, India, Taiwan, Thailand and Singapore will all be importing oil at over 1 million b/d each. While some Atlantic Basin crudes from West Africa and the North Sea may supply some of the older, less flexible Asian refineries that have an appetite for those sweet crudes, the key issue is the growing Asia Pacific dependency on Middle Eastern sources of crude.

This increased dependency on oil presages an era of continued price volatility and the growing need for more risk management instruments to be developed and utilized in the Asian markets. China already turned into a net oil importer during 1993 and its needs to continue to grow. And Indonesia, an OPEC member and current oil exporter, seems to be slipping to oil importer of oil recently.

With about half of world oil growth projected to continue to be in the Asia Pacific region, rising product demand and tightening fuel quality standards driven by rising environmental awareness, the need for managing energy price risk seems poised for explosive growth over the next several years. However, it has taken an inordinately long time to get started in the region compared to the North American and European experiences, particularly because of the more protectionist Asian economies.

Asia will need more imported crudes in the coming years as output declines in Indonesia and only some oil production increases in China, and even though increased output is likely in Australia, Malaysia, Papua New Guinea and Vietnam for the short term. Sour barrels will come from Mexico and the US. Moreover, product import dependency is also rising at an astounding rate. Changing markets and oil trade patterns presage rising price volatility.

Deregulation as a Market Driver

Besides the increased consumption of oil and the growing electric power needs in the Asian markets, several other factors are creating change in the Asian energy markets. These include changing petroleum product specification standards because of more stringent environmental laws, a movement to just-in-time oil inventories now popular in US oil markets, and the entry of new competitors into the energy markets. These changes will add to more price volatility in the coming years as government protection is removed in the energy markets.

The most significant political driver of the market in Asia is the deregulation effort under way in the energy sector in most countries. This movement to freer competitive markets will mean that risk will be increasingly shifted to energy companies and away from government protection. While each country has its own unique timetable towards deregulation, the movement towards freer markets with more competitors and international price impact should bring more risk management activity to the petroleum, natural gas and electric power markets.

While many derivatives players continue to eye China as their next market for growth, commodity exchanges will take time to develop there. Occasionally, opportunities for using risk management tools are quite evident. China remains a wild card in the Asian energy markets since its demographics can change supply and demand needs very significantly on its road to economic development and industrialization. Moreover, the longer term derivatives markets should develop with the use of commodity indexed loans to oil, used to finance large projects in oil and gas exploration and production, refining and electric power generation.

Other Fundamental Changes Underway in Asian Oil Markets

Petroleum storage requirements for refiners and traders are another area impacted by deregulation, but they are also a growing area for risk management. Many storage expansions have been announced throughout the region. Singapore, as an active regional transshipment center, has already undergone more storage capacity increases. Subic Bay in the Philippines is another strategic location in the storage story. China, India, South Korea and Thailand have all announced that large scale storage projects are under way. These and other projects are an attempt to reduce the transshipment costs of Singapore facilities. Another reason is the need for strategic stockpiling of oil and products for energy security reasons, still a dominant part of the Asian energy puzzle. In fact regional storage seems to be taking hold as evidenced by Chinese oil stockpiling this year.

But the role of storage is changing as well. The use of strategic product storage for both oil security issues and to arbitrage physical market movements for petroleum products with paper instruments will become more pronounced. Changing fuel quality specifications requiring more blending for clean products as well as growing oil demand are influencing the need for more storage. Oil traders already see this opportunity and have acquired product storage. Paper structures are offered by these storage providers as well. Product storage arbitrage should grow in the coming years.

Changes in Oil Suppliers

Another source of growing energy supply to the Asia Pacific is the emerging Russian Far East as a new source of hydrocarbons. The resource base of the Russian Far East is primarily the area of Sakhalin Island, including the offshore areas of the Sea of Okhotsk and the Yakutia producing area of the Russian Siberia. Discoveries of oil and gas are also expected on the shelf of the Bering Sea. These areas will supply some oil but mostly natural gas. This new supply of the Russian Far East oil and gas program is beginning to ramp up today.

The Asian markets are also net importers of middle distillates. China and India are major importers from Europe as well as the Middle East. There can be active arbitrage of middle distillates from the European and US west coast markets when opportunities arise.

Tanker market developments

Tanker trade will also be significantly impacted by rising demand for crude oil and petroleum products imports from outside the Asia Pacific region. This factor will shift the use of vessels for the Arab Gulf to the West, and to the Far East to meet rising needs for very large crude carriers (VLCCs).

Because incremental demand for refined products in the Asia Pacific will not be satisfied by the planned expansion of both Asian and Middle Eastern refineries, product carriers from more distant refineries such as the Mediterranean and US West Coast will be needed. The average tanker voyage will become longer. Smaller tankers will benefit to a lesser degree and VLCCs may bring shipments from Northwest Europe to Asia if product demand becomes too tight in the Asian markets. Obviously, this change will bring a rise in world scale time charter rates, and perhaps a rise in hedging activity for tanker rates another nascent paper market for trading.

Asian Market Characteristics

The Asian markets are evolving quite differently on the paper side from the US or Europe. For the Asian paper markets, it seems that many smaller markets for both crude oil and petroleum products will develop rather than one crude oil marker, such as Brent or WTI, or singular benchmark petroleum products. At the present time, Malaysian Tapis Oman and Dubai are OTC price markers for crude oil but other paper markets for crude oils should emerge for various Indonesian, Australian, Chinese, Vietnamese and Alaskan crudes. And proposals have been made to develop a basket of crude oils as a viable forward or futures market contract. This will probably be the best solution to the long-standing

problem of how to hedge the Asian barrel, and was proposed at an APPEC meeting in 1989. The petroleum products markets are already following the path of regional paper market development with active markets for open spec naphtha in northeast Asia, and markets for motor gasoline, jet fuel, gasoil, high sulfur and low sulfur fuel oils. In fact, the development of a paper market for LSWR, the low sulfur Indonesian fuel oil that is mostly used in the Japanese electric power market, is indicative of this change and trades one to three months forward. The wide variety of petroleum product swaps in Asia is similar to the European market experience as there are many different petroleum product swaps markets in Europe but only one successful energy product futures contract, which is the gasoil on the IPE.

One continually active paper market is for jet fuel. Far Eastern airlines such as Cathay Pacific, Singapore Airlines, and Malaysia Airlines already use derivatives to hedge their jet fuel exposure. These deals vary from one quarter to 18 months forward. The jet fuel derivatives market is influencing forward prices for jet fuel in the physical markets and has been active and well established for several years.

Part of the reason for this evolutionary process in Asia is that OTC contracts are more flexible than futures contracts and can be developed more quickly. They are also not subject to regulatory approvals that are required for exchange-traded futures contracts. At present, the Asian markets also are more interested in the 'plain vanilla' swaps rather than more exotic instruments and structures.

Another significant difference in the evolution of Asian paper markets is that unlike longer-dated instruments in Europe and North America, much of the business is shorter term, i.e. less than one year although some three-year deals are written, mostly for gasoil.

The entrance of swaps brokers into the Singapore market has also added liquidity to the paper markets in Asia. Unlike the swaps brokers in other oil trading centers, most Singaporean swaps brokers still trade both the physical and paper barrels because of the immaturity of the paper markets. The paper trade is less developed for swaps brokers but is evolving as more paper is being incorporated into physical deals, particularly for high sulfur fuel oil. The Asian markets still tend to be more orientated to physical trading rather than financial hedging.

Challenges to Change

One of the biggest issues facing the development of the energy derivatives markets involves credit worthiness, which can hamper the development of longer term deals. The financial collapse of one major player can affect the market significantly. Therefore counter-party risk must be closely monitored and the financial strength of companies assessed routinely. This is not an insurmountable obstacle but will take time to overcome.

Also, the proliferation of state owned oil companies and state owned utilities inhibits competition at the present time. But the status quo is changing. The privatization and deregulation of these energy markets that will be coming in the next few years should hasten the development of more paper trading in Asia. At present, many of the paper market makers are said to be chasing the same business, but this is true of many immature markets, such as the electricity trading business in the US.

While the Asia Pacific oil trade is still centered on security of supply rather than price risk management, the Asia Pacific derivatives markets are just beginning to emerge as the next opportunity for growth for the derivatives markets in energy. Fed by growing oil demand in the region and the growing interest in making Singapore the energy derivatives center for Asia, it seems likely that at the present time it is only the beginning of the change to a more financial rather than physical orientation in energy trading. And political changes in the Asian countries as they move to deregulation should bring more active trade in both futures and derivatives.

But currently, the OTC oil derivatives markets are providing the paper markets with liquidity and price discovery without viable Asian oil futures contracts. It is a similar development to the electricity derivatives markets in the US which now goes two, three and five years out or longer without an active cash market, viable futures contracts or a price discovery mechanism.

The highly publicized financial debacles in recent years, such as Enron, Worldcom, and others have focused attention on risk management. The 'D' word for derivatives is now quite well known to senior executives throughout the energy industry. Consequently, there is now more interest in hedging and the use of energy risk management tools. What these financial disasters have done is to raise hard questions about the derivatives and futures markets, and the need for companies to hedge. Senior management is now asking the right questions, such as what is the natural hedge position of the company or is the company long or short in the market? Should we hedge? These essential questions go to the heart of why energy companies must use price protection programs, for risk is much more complex than only management of price risk, and risk monitoring is now becoming a corporate fiduciary responsibility of senior energy executives.

Energy hedging is still just getting started with small amounts of oil hedged. Typically commodities can trade daily volumes on futures exchanges at a factor of six to 20 times the physical market. It should not be forgotten that energy futures trading only began on NYMEX in 1978 and in the OTC derivatives market in 1986 when Chase Manhattan Bank invented the oil swap. The Pacific Rim, with its tremendous need of oil, gas and power, is just beginning to develop the financial trading structure needed to manage energy price risk. It will be a growing part of the Asian energy complex.

New financial risks need to be intelligently managed. Consequently, risk management, once considered a peripheral concept, has now become a key management tool. In fact, effective risk management can be an essential tool in achieving industry leadership. Having this capability allows growth opportunities by enhancing company competitiveness and supporting financial objectives. Risk management, when employed effectively, reduces market risks, increases wholesale and retail competitiveness, protects and enhances margins, and stabilizes earnings. The relative sophistication of an energy company's risk management framework depends upon the nature and extent of the risk as well as the complexity of its transactions.

In the Asia Pacific markets, there is actually now less uncertainty than previously on the regulatory side as countries are making their deregulation plans known quite visibly. But market, credit and operational risks are still pervasive in the Asian markets.

Components of market risk include price, basis, spread, liquidity and volatility risks. And components of credit risk include counter-party credit worthiness, transaction attributes and market conditions. Most importantly, a company's risk tolerance must be identified, particularly since oil, gas and power are the most volatile commodities traded.

The objective of using risk management tools is simply to achieve corporate goals, and these are unique to each company. There is no cookie cutter approach of one size fits all. These goals can include lower fuel costs, securing market share, reducing earnings volatility or increasing margins. The key is reduction of risk, not risk elimination (since that is impossible). While Asian energy companies have been slow to adopt these financial tools, the tools are more finely developed and the knowledge base wider than when they were accepted in the US and Europe over a decade ago. Thus, the Asian markets may have some advantages in using more sophisticated risk management software and having a more developed control structure so that trading does not go awry.

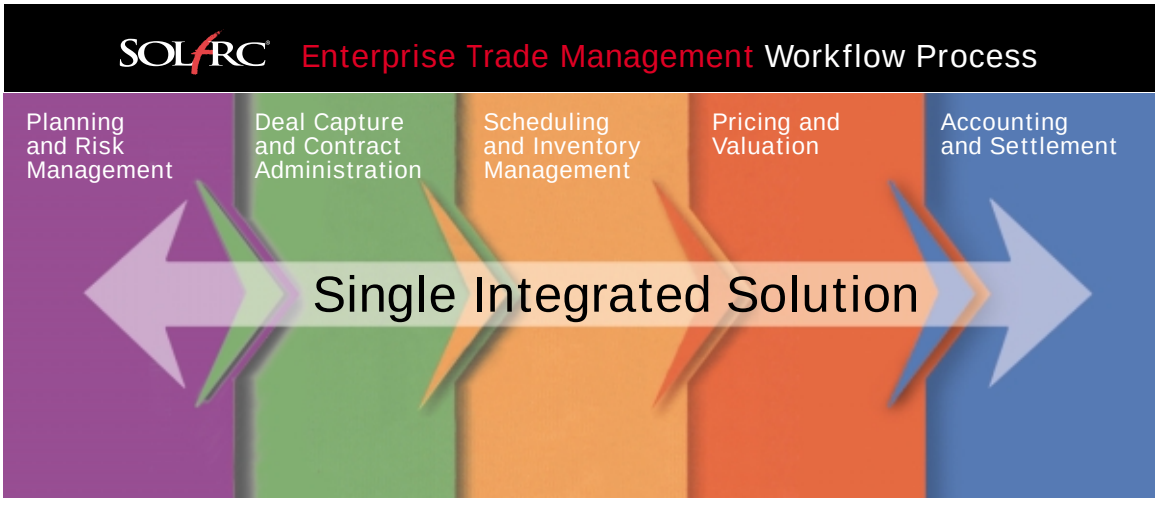
Conclusion:

What is most important in the Asia Pacific region is the security of oil and gas supplies. This continues to dominate Asian risk management strategies which still focus on short-term trading and hedging. This is in effect a supply balancing system. However, rising oil demand in the region coupled with increased price volatility and followed by the rise of a global LNG market will begin to change that type of thinking as more sophisticated hedging and a longer-term orientation will begin to change management thinking. Also the integration of both physical and financial trading which is more advanced in Western Europe and North America will begin to influence supply logistics systems implementation and energy risk management.

The Asia Pacific derivatives markets are markets are evolving in a different manner to London and New York, with a proliferation of many different OTC financial instruments for many different products and crude oils. Asia Pacific's derivatives will become more established over time as oil demand continues to increase and more competition enters the oil markets in this region. New uses for energy derivatives will be to drive project finance through forward oil and gas sales, commodity-indexed loans and synthetic oil fields thus supply the vast capital needs of the industry through securitization.

Peter Fusaro is Chairman and Founder of Global Change Associates, an energy and environmental consulting firm based in New York City with representative offices in Houston, Tokyo, Seoul and Singapore. The focus of GCA is on teaching companies and government how to make markets for trading energy and environmental financial products. Peter is an expert on Asia Pacific region in terms of energy trading, restructuring and market liberalization. Peter has worked for 28 years in the international energy business, and is a frequent speaker at energy and environmental conferences throughout the world. He is speaking at his fourth APPEC conference this year. He is adviser to many global energy companies as well as the US DOE, the White House, State Department, World Bank, Mitsubishi Research Institute, the Institute of Energy Economics, Japan, and Japan's METI. He is a member of the Institute of Petroleum, the Energy Risk Management Association and the Global Association of Risk Professionals (GARP). He is New York Chapter President of the International Association of Energy Economics and on the Advisory Board of the NYU Energy Forum. Peter has a BA from Carnegie-Mellon University and an MA in International Relations from Tufts University.

Peter and Tom James are currently writing a new book entitled Energy Hedging in Asia *to be published by MacMillan next year. He and Tom are also in discussions with a Japanese publisher to write another book called* Energy Risk Management in Japan*. He is coauthor of* Green Trading: Commercial Opportunities for the Environment *to be published this fall. Peter is author to several other books on energy trading and risk management including the New York Times best seller* What Went Wrong at Enron *(John Wiley, July 2002),* Energy Convergence: The Beginning of the Multicommodity Market *(John Wiley, 2002),* Energy Derivatives: Trading Emerging Markets *(2000), and* Energy Risk Management *(McGraw-Hill,1998). He is a contributor to* Distributed Generation: The Power Paradigm for the New Millenium *(CRC Press, 2001) and* Global Markets and National Interests: The New GeoPolitics of Energy, Capital and Information *(CSIS Press, 2002), and the author of a* Financial Times Report Asia Pacific Energy Derivatives.



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