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offer a global market
outlook for gas processing.**

MARKET WATCH

Increasing global demand for natural gas is leading to complementary growth in demand in its associated markets, including gas processing. While the gas processing market is fragmented and affected by a variety of factors, including competition from other fuels, economic patterns and plant locations, three factors are the most significant market drivers:

- The demand for natural gas has a huge impact on the gas processing market. Currently, demand growth is anticipated to reach 4.3 trillion m³ by 2030, up from current levels of approximately 2.8 trillion m³.¹ As exploration and production for natural gas increase, the need to separate the heavier hydrocarbons, or NGLs, from the natural gas becomes more pronounced.
- Because NGLs such as ethane, propane and butane (which make up 10 - 20% of raw natural gas compositions) are the primary feedstocks for the production of ethylene and propylene, the gas processing market is affected by demand in the petrochemical industry. Currently, ethylene demand is anticipated to grow 4.2%/yr through 2010, while propylene demand is expected to increase 4.5%/yr.² As such, growth in these industries is driving gas processing for NGL feedstock.
- Finally, growth in the gas processing market will depend greatly on the number of LNG liquefaction facilities being built around the world in response to rising gas demand. Many companies have engaged in large integrated gas projects where the construction of an LNG liquefaction terminal also includes the installation of a gas processing plant. This is because it is economically feasible to use available resources on an integrated project, so the capital expenditures do not

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exceed the value of the products produced by gas processing plants. Furthermore, if the NGLs are not removed from the natural gas, problems can occur due to pipeline specifications on heat content. As a result, the construction of more LNG liquefaction facilities indicates an increase in gas processing plants.

By examining announced and planned projects in the natural gas industry, an estimate of the future market for gas processing facilities can be determined. Based on the most recently announced projects, the market forecast is estimated to be US\$ 25 - 30 billion over the next five years³.

So where will these projects be located? Presently, the world has a total of around 1800 gas plants, the majority of which are located in the USA and Canada². Despite the anticipated increase in natural gas demand, North America and Europe will not see heavy growth in the industry, because of lower gas reserves in these regions.

That is not to say there will not be some degree of growth in the USA, particularly in Utah, Wyoming and Colorado's 6000 square mile Piceance Basin, which may contain as much as 200 - 300+ trillion ft³ of gas resource in place. Operators with holdings in that area are hoping to recover 60 - 80% of that estimated potential, and thus far, many of them have achieved average per-well recoveries of 1.2 - 1.4 billion ft³⁴. While this has led to the construction of several gas processing plants in the basin, it will not result in a boom for the US gas processing market. In fact, the number of plants has decreased in both the USA and Canada.

So, which regions will command the largest percentage of the market? The following is a look at three regions where the most growth is anticipated in the gas processing industry through 2030.

Growth in the Middle East

It should come as no surprise that the Middle East is expected to command the largest percentage of the gas processing market. For the past several years, the Middle East has experienced a boom in gas related project activity as the region monetises its stranded gas, once considered a byproduct of oil exploration and production, for LNG export, petrochemical feedstock and power generation.

This boom can be attributed to rising gas prices, as well as increasing environmental concerns over gas flaring and venting. Historically, whenever associated gas was recovered from the crude oil being brought to the surface, it was either flared or vented, particularly in the Middle East and Africa where little infrastructure existed to bring it to market. Although this practice has been curbed dramatically, it is estimated that more than 3.5 trillion ft³ of gas is still flared or vented worldwide annually⁵.



In an effort to reduce these emissions, many countries have signed the Kyoto Protocol, which went into effect 16th February 2005. The Kyoto Protocol is an international effort to limit emissions from greenhouse gases by setting mandatory target reductions for industrialised countries. To meet their targets, several countries have adopted 'no flaring' policies and are investing in more infrastructure to convert their associated gas into a source of income.

In addition, the World Bank recently launched a voluntary global standard to provide more incentives for commercialising associated gas, particularly in Africa and the Middle East. So far, the countries responsible for more than 70% of flaring and venting globally have signed on to the partnership⁶.

These environmental initiatives have resulted in an increase in gas related projects throughout the region. As more gas is harvested and brought to market, the demand for gas processing plants has also increased.

Gas processing projects are also being driven by the need for more LNG liquefaction terminals, as well as the need for more petrochemical

feedstock. Worldwide, the demand for LNG liquefaction facilities is stronger than ever, with a projected market value of approximately US\$ 39 billion between 2006 - 2010. In fact, export capacity is expected to reach more than 300 million tpy by 2010 when/if all of the projects under construction, in planning or under study are completed⁷. Many of these liquefaction facilities are being built or proposed for Middle Eastern countries such as Iran, Qatar and Yemen, which all have significant natural gas reserves. Furthermore, because focus in the Middle East has shifted to large integrated gas projects, which dominate the region, many gas processing plants are expected to be built as well.

In the petrochemical industry, the Middle East is expected to increase ethylene capacity from current levels of 14 million tpy to nearly 27 million tpy by 2010. In addition, propylene facilities that will utilise LPG/propane as a feedstock are also being installed, which will make the Middle East the world's largest exporter of propylene by 2010 at nearly 4.5 million tpy⁸.

It should also be noted that NGLs are typically more expensive than natural gas, which is an area of concern for petrochemical manufacturers and gas processors. If the price of NGLs ranges too high, petrochemical manufacturers will turn to oil based feedstock such as gas oil or naphtha. Fortunately, the price differential has not been too significant in the Middle East, where natural gas remains inexpensive. In more mature markets such as the USA, Canada and Western Europe, the price of NGLs is monitored closely.

Long term opportunities in Russia

With the world's largest natural gas reserves, the potential for developing Eastern Russia's gas infrastructure is huge.

Russia's proven natural gas reserves amount to 48 trillion m³, or 26% of the world's total, and it is both the largest producer and largest exporter of natural gas⁹. However, Russia's current energy strategy includes only modest production growth through 2010; and with its current production now in decline at a rate of 20 billion m³/yr, Russia must now develop new fields in Siberia and other environmentally harsh regions to compensate for the depletion of its current fields, or else risk a steep rise in production costs.

Russia must confront several issues to grow its gas production: the need to develop the capacity to export significant volumes of gas to Asia and the USA; the need to replace existing natural gas pipelines; and the political stability of the Russian government.

Currently, Russia has an immediate need to develop an infrastructure to export its available gas, as the country's consumption growth will not be sufficient by itself to continue to increase production. This is necessary not only to keep production costs low, but also to meet Russia's emissions targets in the Kyoto Protocol. Because Russia does not have an adequate gas transportation system or processing capacity, significant volumes of gas are flared annually. In fact, according to World Bank estimates, Russia is responsible for 11% of global flaring or venting⁶.

To achieve its international Kyoto Protocol commitments, as well as make better use of its gas resources, several natural gas pipelines have been proposed. A 2700 mile pipeline from Russia to China and then on to Korea has received preliminary approval, and a subsea pipeline from Russia to Western Europe has also been proposed. However, both of these projects have been delayed until certain sociopolitical issues can be resolved.

In addition to building new infrastructure, several existing natural gas pipelines must likewise be repaired or replaced. In 2004, methane emissions accounted for approximately 60% of Russia's total greenhouse gas emissions and were due to leaks from pipelines and compressors during normal operations, maintenance, repairs and accidents⁹. Many of these gas pipelines are now beginning to fail due to old age, harsh climate conditions and insufficient regulation of the temperature of the natural gas transmitted through them. While many of these pipelines need to be replaced in the next few years, these projects will have to compete for funding with new pipelines needed to carry gas from replacement fields, as well as new export pipelines.

Finally, these infrastructure projects depend largely on the political situation in Russia, which remains erratic and poses a certain degree of risk for foreign investors. While many companies are interested in providing additional transportation networks and gas processing capacity, there is nervousness regarding the country's willingness to use its growing strength in natural resources to pressure investors. Nonetheless, there is still tremendous interest and momentum driving projects in this region. Most companies view Russia as a long term opportunity and, depending on political conditions, look to take part in many of these future projects.

In terms of gas processing, there are substantial opportunities associated with these infrastructure projects. Currently, there are four new production centres to be established in eastern areas with significant reserves of natural gas. Those areas are located near Krasnoyarsk, Irkutsk, Yakutiya and Sakhalin¹⁰. The geographic proximity of Sakhalin to the Asian market is a major advantage for projects there, while natural gas development in the other regions will depend

on the ability to build pipelines that can get the gas to China and other domestic users.

Gas processing projects in Africa


Like the Middle East, Africa's gas processing market is being driven by growth in associated industries such as LNG, as well as environmental concerns over flaring and venting. With crude oil prices remaining high on the world market, many African oil importing countries have turned to natural gas for their domestic energy consumption needs.

Currently, Africa's proven natural gas reserves amount to approximately 14.4 trillion m³. Approximately 68% of these reserves are in Nigeria and Algeria; however, new exploration is expected to increase reserves in countries such as Egypt, Angola, Libya, Mozambique, Namibia and Tanzania¹¹. While not a key source of energy, the amount of gas flared in Africa is significant. In fact, Nigeria alone is responsible for 16% of the world's gas flaring and venting, more than all of Russia⁶.

Like other regions of the world, many countries in Africa have implemented 'no flaring' policies, which have increased gas related projects in the region. Egypt is looking into building additional liquefaction facilities in the Nile Delta where there are thought to be deposits of 430 billion m³, while additional production facilities are being planned or proposed in Algeria, Angola, Nigeria and Equatorial Guinea. Combined, all of these projects could provide an additional 30 million tpy of LNG to Africa's export capacity if they are built⁷. In addition, many gas processing facilities will need to be installed as well, especially as Africa continues to develop its gas pipeline network.

Of course, security issues, as well as the political pressures that exist in many of these countries, including disputes between governments and the international oil companies over product/wealth sharing, could influence future liquefaction projects.

The outlook for gas processing

As previously mentioned, global natural gas consumption is projected to increase to 4.3 trillion m³ by 2030, up from current levels of approximately 2.8 trillion m³. This demand for natural gas, coupled with growth in the petrochemical industry and the number of large integrated LNG projects being executed throughout the world, will determine the future development of the gas processing market. And while little growth is expected in Europe and North America, the development of the natural gas industry in such regions as the Middle East and Africa, as well as the potential development of Russia's immense natural gas reserves, will ensure that the outlook for the gas processing industry remains promising. 

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