

HOUSTON'S CHEMICAL REACTION

SHALE GAS POWERS INDUSTRIAL BOOM

BY HAROLD D. HUNT

“The American chemical industry has had RIP written on its tombstone for the last 15 years,” laments Dennis Ohlmansiek, plant manager at the Brazilian company Oxiteno’s new Pasadena Texas plant. “But we got lucky. The discovery of cheap shale gas has turned this part of the state into chemical engineering heaven once again.”

The petrochemical industry is back with a vengeance in Texas, the largest chemical-producing state, which boasts \$145 billion in annual revenues. Nowhere is this more evident than in eastern Harris County.

Surrounding the 25-mile Houston Ship Channel are 16 communities known as the Economic Alliance Houston Port Region (EAHPR). Located within its boundaries is one of the world’s most important trade ports and energy-related industrial corridors (see map).

THE HOUSTON SHIP CHANNEL services vessels from 154 countries — more than any other U.S. port (right). OCTG Tubular owner David Siverling (below, right) and Vice President for Operations Bill McWhorter (below, left), at their plant.



Rapid economic growth is often accompanied by new challenges. This round of expansion will be no exception, but the resulting real estate opportunities in and around east Harris County may be some of the best in years.

Early Drivers

Early economic drivers favoring petrochemical development near the ship channel included the ready availability of product (oil and gas) and easy access to a rail and waterborne delivery system. Installation of a vast pipeline network further diversified the area's distribution capabilities. An interstate highway link completed the integrated transportation network.

Much of the chemistry developed to produce other vital products from oil and gas was initiated during the war years of the 1940s. The Bayport Industrial District, created in 1970, is now among the largest private industrial complexes in the country, with more than 60 chemical plants. Roughly 160 companies have acquired facilities along the ship channel between the turning basin and Barbours Cut.

Current Boom

The primary feedstocks for the petrochemical industry are natural gas, natural gas liquids (NGLs) such as butane, propane and ethane, and naphtha derived from crude oil. For decades, petrochemical production had been steadily drifting away from the United States toward emerging markets such as India or Indonesia, where feedstock prices and international transportation costs were cheaper.

The discovery of shale gas and the resulting drop in U.S. natural gas prices has totally changed the global dynamics of the petrochemical industry. The American Chemistry Council states that when the ratio of the price of oil per barrel to the price of natural gas per MCF (thousand cubic feet) is more than 7 to 1, the competitiveness of Gulf Coast petrochemical products is enhanced.

The U.S. oil to gas ratio increased from 5.5 to 1 in 2003 to more than 20 to 1 in 2013. The ratio has become extremely favorable for U.S. production of petrochemicals, plastics and other chemical products derived from natural gas and NGLs.

A recent report by the Houston Branch of the Dallas Federal Reserve found that prices for the NGLs ethane and propane had tumbled 40 percent to their lowest levels in at least two decades by 2012. In the United States, over 85 percent of ethylene, the major building block of most plastics, is derived from NGLs. The rest of the world primarily uses much more expensive naphtha.

The Fed report also stated that U.S. ethylene capacity is poised to increase almost 33 percent by 2017, pending completion



of all new plants, expansions, enhancements and restarts of shutdown facilities that have been announced. Texas accounts for 72 percent of U.S. ethylene capacity.

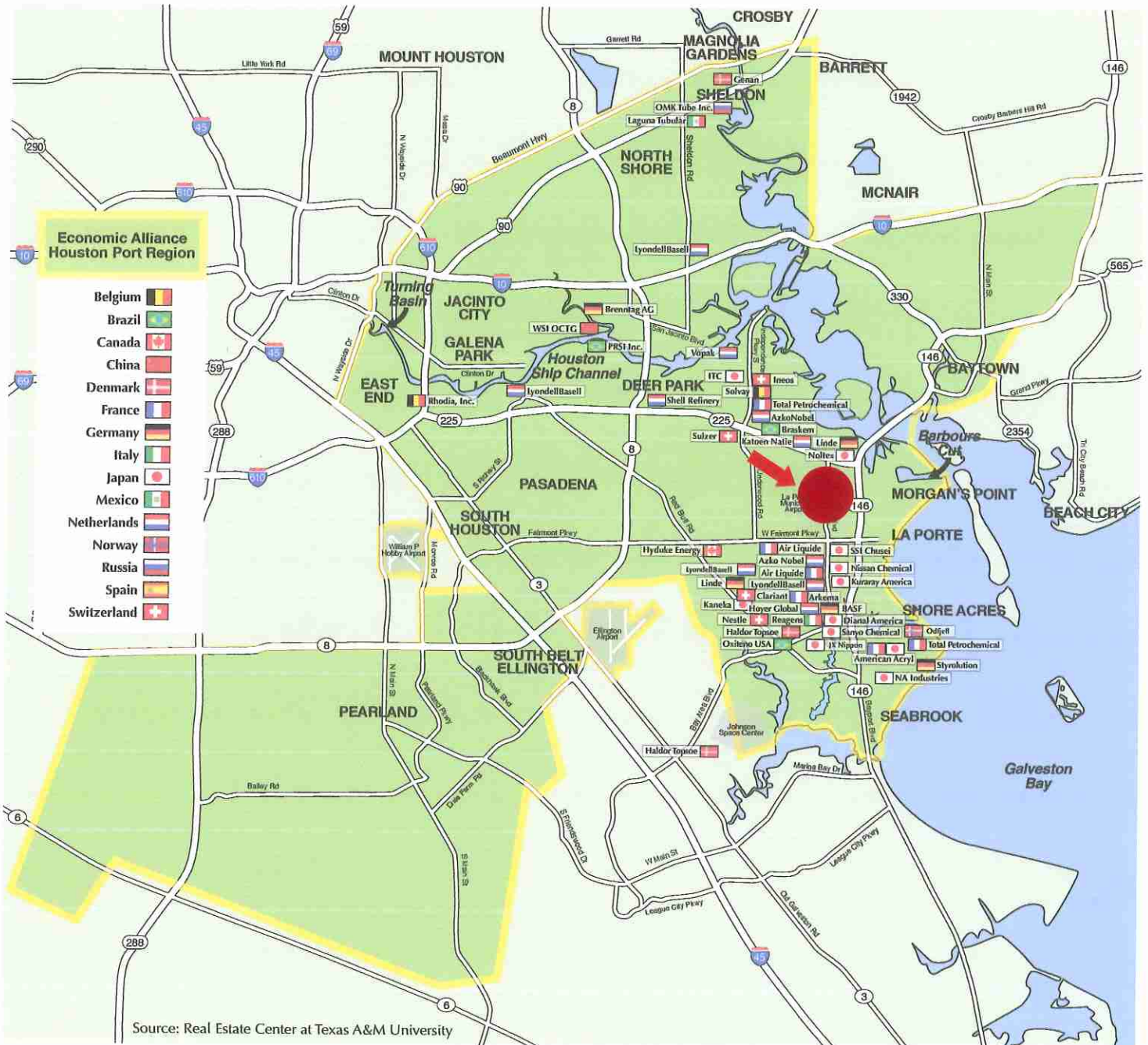
The report contends that the increase in domestic ethylene production will outstrip projected domestic demand growth in the next several years. As a result, U.S. petrochemical exports, particularly from Texas, will expand significantly. This is more good news for the Port of Houston.

Synergy Abounds

Interdependence plays a big part in understanding the appeal to companies, big and small, that have chosen to locate in the EAHPR. For example, steam generated in one facility may be used to generate electricity for another. Gases produced in refining or processing applications like hydrogen may be used in a nearby chemical plant as a feedstock for specialty chemicals. The connections between the firms are massive.

Interest in the region from foreign companies has always been strong and should continue to improve with the increase in available domestic feedstocks (see map). Foreign direct investment in plants and facilities can be attributed to a number of factors.

"The Japanese originally chose this area to locate facilities based on availability of raw materials, the workforce, the support industries, low energy costs and reasonable taxes,"



says Steven Skarke, executive vice president of Kaneka North America, a Japanese specialty chemical company in Pasadena. "Port access is also critical since our products are sold around the world."

"It's also important to have access to things like a common wastewater facility, steam, oxygen and multiple natural gas suppliers," says Doug Mathera, plant manager at the Dutch-based LyondellBasell's Choate Road chemical plant in Pasadena.

"The great thing about Texas is it looks for enlightened solutions to problems. Recreational boats, shrimpers and plants all work and play together in this region. That just doesn't happen on the East or West Coasts," says Mathera.

Regarding wastewater, common practice is for each entity to build and operate its own waste management facility. The Texas legislature took a different approach, creating the Gulf Coast Waste Disposal Authority in 1969, initially to clean up Galveston Bay.

"About 80 industrial users send their wastewater to our treatment facility today," says Scott Harris, facility manager at Gulf Coast Waste Disposal's Bayport facility. "Another 11 companies or expansions are being considered as well, so we are continuing to grow."

Pipe Technology

The EAHPR's northern boundary along Highway 90 and Sheldon Road is ground zero for the latest in OCTG pipe, an old oilfield term that stands for "oil country tubular goods" used in producing or transporting oil and gas.

Green, unfinished pipe is transported to this location from around the world or produced locally from rolled steel in new state-of-the-art pipe plants. Value-added processes, including heat treatment, finishing and final inspection, finalize the creation of a joint of downhole casing or production tubing.

Heat treatment strengthens the pipe to handle harsh drilling conditions. Finishing involves threading the ends or attaching custom connectors for special applications.

"The surge in horizontal drilling and hydraulic fracking has really increased the need for higher performance downhole pipe," says Bill McWhorter, vice president of operations for OCTG Tubular Finishing.

"When we drilled vertical holes, gravity worked fine to help us drop well casing in place. But with horizontal wells, a joint of casing may have to be pushed a mile or more. That's introduced a whole new level of stress on today's pipe."

"There is a global land rush to be right here if you're in the downhole pipe business," says OCTG Tubular's owner David Siverling. "This is the spot on the planet on the cutting edge of downhole pipe technology."

Workforce Challenges

The upswing in economic activity has increased the demand for skilled workers in the area. Many companies are forced to lure talent away from each other or train new people in-house.

"It will take us four to six months to train an operator," says Meredith Zauflik of Oxiteno. "We want to retain our talent and avoid retraining as much as possible by offering a great work environment. What we don't want to be is some other company's training ground."

"Unfortunately, America has a missing generation in the skilled labor pool," says McWhorter. "We've been forced to bring in older talent, some of them retired, to get by until younger folks can be trained to fill the void. I spend a lot of my time recruiting, and I can tell you that finding good labor is a real problem."

With its perception as a blue-collar area, the east side of Harris County has not traditionally been a place young people are drawn to. "These are not sexy jobs," says Ohlmansiek. "But they pay quite well and, with the shortages, there is a lot of opportunity to move up the ladder quickly."

The bulk of new-hires picked up by the major industrial employers will have two years in a trade school or the equivalent in on-the-job experience. San Jacinto College (SJC) offers a number of technical training programs. However, SJC reports that companies that overprojected labor needs in the last downturn remain hesitant to communicate their exact staffing needs.

Conflicts of Interest Over LNG

A big unknown in the petrochemical and manufacturing sectors is how large the effect of exporting U.S. liquefied natural gas (LNG) to other countries would be on the domestic price of natural gas. The concern is that our advantage of cheap fuel and feedstocks for local industrial uses could disappear if the price of gas increased too much.

Currently, only one LNG export facility, Cheniere Energy's Sabine Pass location, has completed the Federal Energy Regulatory Commission's (FERC) authorization process and obtained

signed long-term contracts from global buyers. The facility's first two stages, under construction since last August, will have an export capability of about 2.6 billion cubic feet (BCF) per day. Natural gas production in the lower 48 states averages about 65 BCF per day.

Twenty-five applications for permission to construct LNG export facilities have been filed as of March 2013, according to an April 2013 report by the Congressional Research Service. Energy analysts believe it is highly unlikely that all 25 projects will be built.

Cheniere Energy's CEO, Charif Souki, has described the 25 export applications as "20 ideas and four or five true projects." If all 25 projects were to be constructed, they would represent a total export capacity of 29.7 BCF per day according to the congressional report.

Proponents of natural gas as a transportation fuel argue that it makes no sense to export our clean domestic natural gas while continuing to import dirty crude oil. Most companies involved in U.S. petrochemical and manufacturing agree.

Alternatively, exploration companies argue that exporting LNG could help bring the price back to a level sufficient to encourage drilling for natural gas again, thought to be somewhere around five dollars per MCF.

Interest in drilling for natural gas declined significantly in the last year due to a steep drop in price. The U.S. natural gas rig count fell from more than 800 in 2012 to less than 400 today, a level not reported since 1999.

The decision regarding how much U.S. LNG to export will ultimately be decided by politicians. However, IHS Global Insight reports that the U.S. petrochemical sector is ramping up to spend \$95 billion for plant expansions and new projects. This would indicate that they believe the eventual natural gas price increase will be manageable over the next 15 to 20 years. These expansions also will immediately create construction jobs and increase full-

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time employment as well.

Marie McDermott, vice president of business development for the EAHPR, agrees. "In 2012 we had six major specialty chemical or manufacturing companies commit to spend more than \$1.5 billion in our area for new capital investment. That makes us pretty optimistic about the future of our industrial sector." ♦

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THE TAKEAWAY

The U.S. petrochemical industry is benefiting from cheap and plentiful natural gas feedstock that allows it to compete with countries that derive their feedstock from crude oil. Indications are that the boom created by low-cost natural gas will not be a short-term phenomenon.