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ExxonMobil is energizing America

Largest U.S. natural gas producer

Largest U.S. chemical company

ExxonMobil Chemical Company has started construction of a multi-billion dollar ethane cracker at its Baytown, Texas complex and associated premium product facilities in nearby Mont Belvieu. This project, and major investments ExxonMobil has made to develop oil and natural gas resources in the United States, including the merger with XTO Energy, demonstrates the company's continuing commitment to American economic growth and job creation.

Chemical growth driven by the world's middle class

PRYOR: Shale is enabling a recapitalization of the U.S. chemical industry.

ExxonMobil ChemicalCompany has started construction of a multi-billion dollar expansion at Baytown, TX, that capitalizes on unconventional oil and natural gas resources in the United States.

"The project is made possible in large part by abundant, affordable supplies of U.S. natural gas for energy and chemical feedstock," says Steve Pryor, president of ExxonMobil Chemical. "Over my more than 40-year ExxonMobil career, I've seen many advances in energy technology reshape our industry, both here and abroad, but I've never seen anything as powerful as shale energy."

"Shale development provides U.S. chemical producers a double benefit as an energy source and as a key raw material to make plastics and other essential products, creating jobs and economic activity across the value chain," Pryor says.

Right now North America is the only region of the world with meaningful shale production, Pryor points out. The United States has nearly a 100-year supply of clean-burning natural gas, supporting a wave of capacity announcements within the chemical industry that recently topped $100 billion. "We are seeing a recapitalization of the U.S. chemical industry," he says.

These investments include ExxonMobil's chemical expansion at its complex on the Houston Ship Channel. "ExxonMobil was an early mover in response to the shale opportunity, and our startup at Baytown is planned for 2017," states Pryor.

He notes, "After three decades in which 75% of chemical capacity growth came from Asia and the Middle East, the United States is back in the game as a low-cost supplier of petrochemicals."

Much of the new U.S. industry investment is geared toward export markets. "There is strong demand in the developing world for chemical products, driven by an expanding middle class," Pryor says.

He offers this example. "Over the next 25 years, China will go from having just seven cars for every 100 people to about 30 cars for every 100 people, which, by the way, is about the same rate of vehicle ownership that the United States had when my dad bought his first car in the 1950s," says Pryor.

He points out that a big difference between then and now is that most manufactured goods are made with plastics and other petrochemicals.

Pryor explains, "My dad's first car was mostly steel, with chrome fenders, glass headlamps, and cotton cloth bench seats. Today's new cars are about 50% plastic by volume, because advanced plastics and synthetic fibers cost less, perform better and save fuel."

Pryor says it's not just cars and consumer products. "All the hallmarks of middle-class life, from better medical care to expanded food choices to increased mobility and productivity, are connected in some way to plastics and other chemical products," he states. The American Chemistry Council says that more than 96% of all manufactured goods are directly touched by the business of chemistry.

Rising prosperity is driving the growing demand for chemicals to meet the needs of the increasing number of upwardly mobile consumers, Pryor says.

According to the McKinsey Global Institute, within the next decade, three-quarters of China's urban consumers will

Up close: Economic development from the ExxonMobil Baytown expansion project

As part of the ExxonMobil planning process for expanding the Baytown Olefins and Mont Belvieu Plastics plants located near Houston, Texas, the company conducted an economics benefits study to understand the potential impacts. In the greater Houston area, the expansion is estimated to create approximately 10,000 construction jobs, 350 permanent ExxonMobil jobs at the Baytown complex, and 3,700 related jobs in the local community.

Nationally, the project will create 18,000 jobs during its three-year construction phase and more than 22,000 permanent jobs when the expansion's facilities become fully operational.

These jobs are not limited to the petrochemical and supporting industries, but will spread throughout the entire U.S. economy, including many consumer product and service industries. This project could generate regional economic benefits of nearly $1 billion annually and $3.3 billion each year nationally.

be middle- or upper-middle class, earning $9,000 to $34,000 a year. This emerging middle class will be willing and able to purchase not just basic necessities but discretionary goods that improve the quality of life and make it healthier and safer every day. McKinsey also says India's middle class will grow tenfold by 2025. The African Development Bank estimates that by 2030, most African countries will have a middle-class majority.

According to The Carnegie Endowment, there are about 70 developing countries, home to more than half of the people on Earth, in which a large share of the population stands "on the threshold of affluence."

"Crossing this threshold will mean better lives for billions of people and robust long-term demand growth for chemicals and the products they make," says Pryor.

He emphasizes, "Our industry has a tremendous opportunity to meet the growing demand for chemicals, driven by a rising middle class in the developing world. And, thanks to shale, the United States has the opportunity to play a leading role, and, in the process, create more high-paying American middle-class jobs across energy, chemicals and manufacturing." ■

Shale energy impact felt across U.S. economy

Although petrochemicals, particularly ethane-based ethylene and derivatives, are some of the strongest beneficiaries of shale energy, the impact is being felt across the U.S. economy.

New supplies of shale oil and gas are expected to add up to 3.2%/year to U.S. gross domestic product (GDP) through 2025, according to a recent study from IHS. The rate of GDP increase builds rapidly, reaching a peak in 2016. By 2025, shale energy could support nearly four million new U.S. jobs and contribute more than a half-trillion incremental dollars to annual GDP, IHS estimates.

Chemicals will outperform thanks to their energy intensity and use of natural gas feedstocks. IHS estimates that unconventional energy lifted organic chemical production by 1.5% in 2012. That figure ramps up to 4.9% in 2015, 7.1% in 2020, and 9.5% in 2025. The figures for plastics resins are 1.7% in 2012, 4.4% in 2015, 7.1% in 2020, and 8.1% in 2025.

The American Chemistry Council revealed earlier this year that announced U.S. chemical industry investment linked to affordable natural gas and gas liquids from shale exceeded the $100-billion threshold. More than 150 U.S. projects are being tracked by ACC.

These projects—new factories, expansions, and process changes to increase capacity—could lead to $81 billion/year in new chemical industry output and more than 600,000 permanent new jobs by 2023, according to ACC. In addition, the potential projects would lead to $16 billion in permanent and new federal, state, and local tax revenue by 2023, ACC estimates.

ExxonMobil is adding a 1.5-million m.t./year steam cracker at Baytown, where the company currently has 2.2 million m.t./year of ethylene capacity.

10,000 workers will install new olefins and polymers units

ExxonMobil Chemical Baytown expansion grows jobs, local economy

LACHENMYER: ExxonMobil Chemical has committed $1 million to workforce training.

ExxonMobil Chemical has begun an ambitious olefins and polymers expansion at its 3,400-acre Baytown, TX, integrated refining and chemicals complex – the largest in the United States.

A 1.5-million-m.t./year steam cracker is under construction at Baytown, where the company currently has 2.2 million m.t./year of ethylene capacity. Downstream on the value chain, two new 650,000-m.t./year high-performance polyethylene lines are being built at its Mont Belvieu Plastics Plant, just a few miles away. ExxonMobil Chemical already has 1 million m.t./year PE capacity there. It is the chemical company's largest U.S. investment.

"We started this journey two years ago with design and contracting," says Lynne Lachenmyer, senior v. p./basic chemicals/intermediates/synthetics for ExxonMobil Chemical. "We began construction in May at both sites at the same time, and expect to complete construction around the middle of 2017."

The bonanza of natural gas now being produced as a result of shale energy development across the United States has created a competitive advantage for U.S. petrochemical producers. This is resulting in a recapitalization of the chemical manufacturing industry, which currently supports nearly 25% of U.S. GDP, provides over 15% of the world's chemicals, and is the largest exporter in the U.S., accounting for over 12% of exports.

ExxonMobil is the largest U.S. producer of natural gas, and is also the largest chemical manufacturer in the country, so little surprise that it is an early mover in the revival. "The change is so dramatic, and ExxonMobil Chemical has been able to move quickly to be early in the queue to gain economies of scale," notes Lachenmyer.

The greater Houston area in particular will see significant economic benefits from the expansion, Lachenmyer notes. The ExxonMobil project will provide 10,000 construction jobs. The multiplier effect of new economic activity created by the facilities will add nearly 4,000 other jobs in the area, including the addition of 350 jobs at ExxonMobil's Baytown complex, which currently employs 6,000. Regional economic activity is expected to increase by nearly $1 billion/year.

The project is a powerful example of how shale energy can revitalize the U.S. economy in an environmentally responsible manner, says Lachenmyer. The expansion will be contained within the existing footprint of facilities, and state-of-the art environmental technology will enable the expansion to operate within existing permitted emission limits, she states.

Being able to meet existing permits is not just a good thing, it is also a competitive advantage, Lachenmyer says. "We are able to achieve that through continuous improvements in reductions at the existing facilities—especially in emissions recovery—and also small incremental increases from the new units."

Reducing environmental impact has been an ongoing strategy for ExxonMobil at Baytown. "As a community partner in Baytown for nearly 95 years, we are proud of our accomplishments," Lachenmyer says. Over the past decade, the site has invested over $1.3 billion in environmental improvements, reducing NOx and VOC emissions by more than 50% and achieving double-

ExxonMobil expects more than 10,000 construction workers to be employed at its multi-billion dollar Baytown expansion project.

digit improvements in energy efficiency, Lachenmyer says.

These environmental improvements have not been made in a vacuum, she comments. "We have worked closely and transparently with expert environmental regulators from the U.S. Environmental Protection Agency and the Texas Commission on Environmental Quality, as well as the global networks within ExxonMobil," Lachenmyer explains.

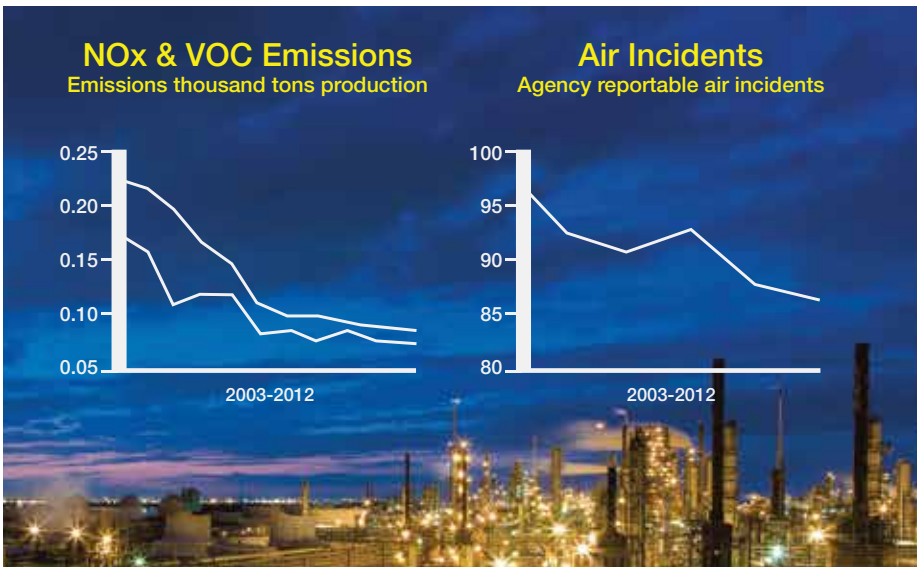
She points out that ExxonMobil leads the industry in advancing and applying Ultra Low NOx burner technology, working with equipment vendors to optimize and commercialize six different families of burners that lower emissions while operating safely and reliably over a wide range of conditions.

In addition, ExxonMobil's Olefins Technology group has developed proprietary Ultra Low NOx burner technology for steam-cracking furnaces. The cost-effective NOx-reduction technology significantly lowered NOx emissions at the Baytown Olefins Plant.

For the expansion at Baytown, Mitsui Engineering & Shipbuilding Co., Ltd. and Heurtey Petrochem are building the steam-cracker furnaces using proprietary ExxonMobil Chemical technology, and Mitsubishi Heavy Industries is building the polyethylene plants at Mont Belvieu. The polymer trains will use Univation technology, a joint venture between ExxonMobil Chemical and Dow Chemical. Linde Engineering and Bechtel are providing the technology for the cold end, olefins recovery. Jacobs Engineering is handling the interconnections between the two sites, and ExxonMobil Chemical is providing overall project management.

Efficiency was a driver in ExxonMobil's planning of the expansion. "The idea was to make the most of our existing infrastructure to tap into the abundant and affordable natural gas now available in the U.S., both for energy and for ethane feedstock," says Lachenmyer.

At the original concept phase, Lachenmyer says that ExxonMobil Chemical "looked first at locations with space available, as well as good logistical connections both for feedstocks and for finished products. With the feedstocks and olefins pipeline and storage hub at Mont Belvieu, and access to deep water via the Houston Ship Channel, we made the decision to build at our existing Baytown and Mont Belvieu sites."



At the Baytown complex, ExxonMobil has reduced NOx and VOC emissions by 55% and 48%, respectively, since 2003. At the same time, air-incident performance has improved by 67%.

ExxonMobil is already one of the largest customers for the Port of Houston and has been working with the port authority to prepare for increased chemical operations activity both in construction and once the new units are in service.

While Lachenmyer is the executive leading the project, it is taking a cast of thousands to make it a reality. "There were about 500 on the job sites at mid-year, and we expect to ramp up quickly to about 2,000 by the end of the year," she says. "The headcount will peak at 5,000 workers by 2015 and then taper down as the project nears completion and commissioning."

Lachenmyer says the company already is hiring for the new, full-time positions that will be needed to operate the expanded facilities and plans to have about one-quarter on board by the end of the year.

As the largest chemical manufacturing state, Texas has a lot to gain from the U.S. chemical industry renaissance, Lachenmyer says. In the past few years, almost 200 chemical industry projects, representing $117 billion in potential U.S. investment, have been announced, including new plants, equipment upgrades, and efficiency investments. Most of the expansions are along the Texas Gulf Coast.

These industry investments could lead to more than 600,000 new jobs within a decade, Lachenmyer says. To help ensure an adequate supply of skilled labor and technical workers for the chemical and energy industries, ExxonMobil has committed $1 million to a network of nine community colleges to support their recruitment and training of students in a range of skills including process technology, welding, and machinery.

Lachenmyer says, "Over the next five years we expect this program will expand the pool of qualified talent by as many as tens of thousands of students to compete for the jobs opening in our industry."

The average wage for full-time employees in the chemical industry in Texas is $100,000, says Lachenmyer. "These will be some very well-paid young individuals—once they have the skills."

She adds this is just more evidence of how America's energy sector is helping transform the U.S. economy with investments and innovation. ■

On the move

Effective September 1, 2014, Lynne Lachenmyer will become v.p., Safety, Security, Health & Environment, for Exxon Mobil Corporation.

ExxonMobil's Baytown olefins-polymers expansion is 'an export machine'

Made in America is back. The abundance of natural gas and feedstock from shale energy in the United States is prompting a wave of chemical capacity investment. This includes ExxonMobil's ethylene and polyethylene (PE) expansion at its Baytown, TX complex.

Neil Chapman, senior v.p./polymers at ExxonMobil Chemical, says that "in the last 20 years, we have seen very large waves of polyethylene capacity growth in China and the Middle East. For those of us who have been around this industry for all that time, it is extraordinary to think that the next wave will be here in the U.S."

The U.S. will be in a very strong position to compete in the world markets, Chapman says

And that growth is not a zero-sum game achieved at the cost of other regions. Quite the contrary. ExxonMobil's Energy Outlook, the company's forecast of global energy supply and demand, shows that in the coming decades, rising prosperity will improve the quality of life for billions of people in the developing world. Many will join the middle class, meaning that they will have the discretionary income to afford amenities such as cars, appliances, and other consumer products made from chemicals.

The ExxonMobil Energy Outlook projects that global demand for ethylene, the largest petrochemical building block, will rise by 150% by 2040, or about 3%/year. That is faster than energy demand, faster than GDP.

PE demand is also growing above global GDP, Chapman notes, with virtually all the growth in the developing regions of the world.

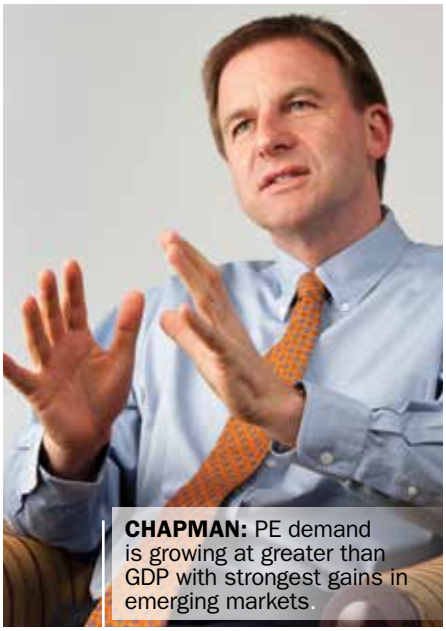
ExxonMobil projects that by 2025, North America could double its exports of PE, polypropylene, and para-xylene, the three largest petrochemicals by volume.

Astride the U.S. natural gas and chemical businesses, as well as global trade lanes, ExxonMobil is in a unique position. "Lower energy cost and access to shale-based feedstock is a huge opportunity," says Chapman.

He explains that ExxonMobil is "progressing a unique project that builds on our proven integration model. In addition to capitalizing on the abundance of low-cost ethane feedstock, it will be enhanced by advantages in integration, scale, and premium products."

He says, "Based on our competitive advantages, we believe the Baytown expansion project, with start-up planned for 2017, is well-positioned to outperform other announced projects in North America."

ExxonMobil Chemical has designed its polyethylene expansion on the Texas Gulf Coast to be an 'export machine.'



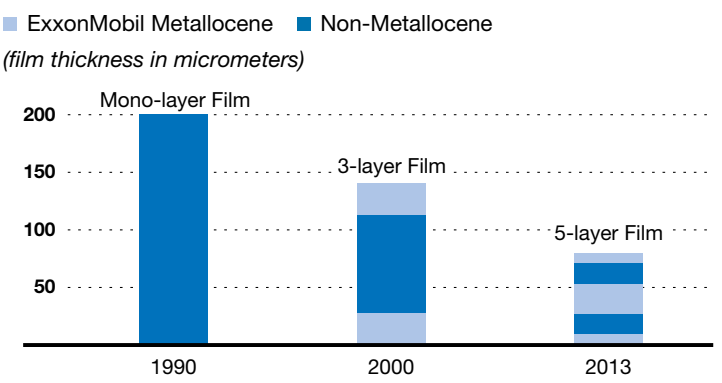
CHAPMAN: PE demand is growing at greater than GDP with strongest gains in emerging markets.

Chapman is frank about the Baytown, TX, expansion: "Our facility has been designed as an export machine. We are targeting sales in the developing regions of the world: Asia, South America, and Africa. We will be adding two of the largest polyethylene reactors in the world at our Mont Belvieu site, making Texas our largest polyethylene supply point anywhere in the world. We will be using Univation's gas-phase technology with advanced single-site catalyst systems to target the growing demand for new packaging."

Baytown becomes the jewel in the crown

ExxonMobil Chemical global PE capacity is close to 9 million m.t./year. "We have built an industry-leading global polyethylene footprint with manufacturing capacity in North America, Europe, Middle East, and Asia," Chapman says. "This allows us to access markets easily on each continent and supply our customers from multiple facilities. In tandem, we have

Thinner Packaging Films with ExxonMobil Metallocene Resins



Through consistent investment in metallocene research over the last 30 years, ExxonMobil deploys this technology to produce an industry-leading range of plastics.

developed a commercial organization that spans every region of the world. It is a unique combination: highly competitive global supply points and commercial and technical resources on the ground in every key market."

Both new polymer reactors at Mont Belvieu will be metallocene-capable but also have the flexibility to produce a mixed slate of our traditional polyethylene, allowing ExxonMobil to meet the rapid demand growth in the developing economies with a range of types and grades, Chapman says. He also notes that the company was a pioneer in metallocene catalyst technology in the 1980s. "Through consistent investment in metallocene research over the last 30 years, we now deploy this technology to produce an industry-leading range of plastics."

Metallocene-based grades deliver high-performance, tough materials that allow converters to downgauge their products without any loss of performance, says Chapman. "The customers use less plastic, the consumers see no deterioration in performance, and the environment wins with lower total plastic consumption. We are selling these metallocene resins in virtually all the film markets—shrink, stretch, agricultural, collation shrink, and of course food packaging. Improving the packaging performance in the developing world is key to reducing food waste."

Chapman says one of the key aspects to deriving the benefits that ultimately sustain growth lies in application development. ExxonMobil Chemical works closely with converters and customers to bring solutions to the market, not just grades of polymer. "In the agriculture business, for instance, we can say, 'If you use our materials in these combinations you can downgauge and get better clarity while retaining critical film toughness'," says Chapman.

Applications today are more sophisticated, he adds, using combinations of resins in blends and multi-layer arrangements, as well as incorporating polymer modifiers. "We are not just bringing a product; we are delivering a solution based on the toolkit we offer. The ability to downgauge is a critical attribute – using less material is a very attractive value proposition." ■

IHS Chemical: North America PE exports will expand

According to IHS Chemical, the magnitude of the PE capacity increase by producers in North America will far exceed domestic demand and that exports will expand. In all, IHS projects that exports will rise 38% from 2013 through 2018, while domestic demand will increase by 18%.

IHS Chemical also projects that China will continue to be a key market. IHS says the Chinese economy and the resulting robust demand for PE for both domestic consumption and re-export to the rest of the world as finished goods has been driving global PE growth for some time. PE demand growth in China during the 2012-2017 timeframe is expected to account for 40% of total global demand growth for PE, with an average growth rate that is more than twice the country's gross domestic product. In order to feed this demand, North America exports of PE to China will continue to grow.

ExxonMobil

We're producing something new in Houston, Texas. 4000 new jobs.

Shale gas is driving economic growth and investment across America. This includes the multi-billion dollar expansion at ExxonMobil's integrated refining and chemical complex on the Houston Ship Channel. The new facilities will convert natural gas liquids into ethylene and then into premium polyethylene plastic. The project will employ about 10,000 construction workers and create 4,000 new jobs in the Houston area – including 350 new jobs at ExxonMobil.

Energy lives here™

exxonmobilchemical.com/growingplastics