IN-DEPTH ANALYSIS WHITEPAPER

US ETHYLENE CRACKERS: PROJECT STATUS UPDATES

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Introduction

Welcome to Petrochemical Update’s 2017 U.S. ethylene cracker construction outlook. In this white paper we examine the status of cracker projects on the Gulf Coast and the Northeast, including projects planned and under construction. We also share our latest insights into the oil to gas price ratio.

This white paper has been produced for anyone involved in petrochemical project development in the U.S. With Exxonmobil planning a second gulf coast mega project in partnership with SABIC, and sustained interest from many other international players in new facilities, the second wave of projects looks to be shaping up to add even more capacity than the first.

There has been more progress in the North East as Shell became the first company to approve a major petrochemical complex in the region in June, when it announced it would begin construction of an ethylene cracker with a polyethylene derivatives unit in Potter Township, Beaver County.

If petrochemical construction is topic of interest for you and your organisation, I hope you will join me at the Downstream Engineering, Construction & Maintenance Conference June 15-16, in New Orleans.

Those interested in attending are invited to Register Here

I hope you find this white paper useful and I welcome any feedback.

Kind regards,

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Project Outlook

There are seven U.S. projects included in the first wave of new cracker investment in the US. The first wave is defined here as those plants starting operations over 2016-2021. Six of these plants are already under construction and due to start production on the U.S. Gulf Coast over 2017-2019. While one of the crackers has not yet started construction, it is believed it will proceed and be completed by 2021.

Cost of the First Wave

The aggregate, estimated total capital cost for the first wave crackers and their derivatives expansions will be approximately $22 billion as summarized. That figure includes estimates of the cost for a new ethylene cracker complex at an existing site. Also included are the capital costs for the major downstream derivatives associated with each cracker investment including polyethylenes (HD, LD and LLDPE), EO/EG, and alpha-olefins (hexene/octene). Certain investments were excluded for EO/EG, EDC and alpha olefins because intended capacities for these units were unknown. None of the new crackers complexes is assumed to be bringing on new PVC capacity.

Given these qualifications most first wave competitors are calculated to invest between $2 and $5 billion each in their projects. Of the total $21.88 billion capital cost of the First wave, 52% reflects new ethylene units and expansions. The remaining 48% covers new derivative investments which will be primarily polyethylene. The estimates given here are defined as actual project cost estimates. As such the estimates do not include more extensive site preparation and logistics (e.g., rail sidings, rail cars, etc.). Sasol, for example, is thought to have allocated approximately $800 million for site development and with other derivative investments could spend more than the $5 billion estimated.

The total also does not include the less than world scale ethylene cracker for Oxichem/Mexichem, specialty derivatives such as elastomers, EPDM and oxo-alcohols. Specialties are excluded as costs as these plants are of proprietary nature. Finally estimates do not assume new EDC/VCM/PVC production capacity since the market is believed to currently have adequate capacity. Taken together the above mentioned elements could add $3-4 billion to the rolled up company costs.

Estimates take into account increasing labor costs but these appear to have moderated a little in particular for managers and supervisors and also for workers with selected skill sets. A labor shortage for certain skilled crafts such as welders, crane operators, riggers and iron workers, whose salaries have increased over 2016, could cause delays in meeting construction schedules.

The Second Wave

A second wave of investments will follow the first wave with operations to begin in 2022 through the next five years. The second wave is defined here as the six potential new crackers and one Canadian expansion that are in the planning stage and could start up in 2022 or later. A number of companies had announced new cracker investments but not finalized approvals or started construction before the oil price collapse in 2015. In contrast to first wave cracker projects, which will continue to move forward, the oil price and lower with shrinkage of ethylene margins, has meant that some second wave projects have been delayed.
Project Status Updates

**Chevron Phillips:** CPChem’s U.S. Gulf Coast Petrochemicals Project will cost an additional 5-10%, $250 million to $500 million, due to construction delays. Greg Garland, Chairman & CEO of Phillips 66, which owns a 50% share in the joint venture, said in a Q3 earnings call. Speaking alongside Garland, President Timothy Taylor explained that each contractor has a different workforce, and that while the polyethylene aspect of the project will be completed on time and budget, the ethane cracker had been more of a struggle. CPChem has since reorganized the way it works with the contractor, and is now seeing better productivity, he said. The plant was 85% complete as of the end of October 2016, according to Garland, with the polyethylene business on track to start by mid-2017, and the ethane cracker to start up in the second half of the year.

**Dow Chemical:** Dow’s 1.5 mtpa ethane cracker in Freeport, Texas passed 85% mechanical completion during the third quarter 2016, James Fitterling, President and Chief Operating Officer, said in a Q3 earnings’ call on October 27. His comments came six weeks after Howard Ungerleider, Chief Financial Officer, told a conference that the cracker was 75% complete. Fitterling said the cracker, known as Texas 9, remained on target to come online in mid-2017.
Formosa: Formosa Plastics Group has $15 billion worth of investment projects under evaluation by U.S. authorities, Chairman Wang-Wen-yuan said at a banquet with the group’s labor union officials, according to a report by Taiwan’s Central News Agency. According to the report, the chairman listed $10 billion in proposed investments in Louisiana, and $4-5 billion in proposals for Texas. Formosa has an ethane cracker under construction at Point Comfort in Texas, and is known to be evaluating a 1.2 mtpa cracker in Louisiana.

OxyChem/MexiChem: Joint-venture partners OxyChem and MexiChem remained on track to commission the Ingleside ethylene plant by mid-January and to begin producing ethylene in the first quarter of 2017, OxyChem CFO Christopher Stavros said in a Q3 earnings’ call on November 1. OxyChem will use the ethylene to manufacture vinyl chloride monomer, which will then be sent to Mexicchem’s plants in Mexico and Colombia to produce polyvinyl chloride and PVC piping systems.

Indorama: Thailand’s Indorama Ventures has signed a long-term agreement with Targa Resources for all its ethane and propane feedstock supply requirements for its new ethylene cracker in Lake Charles, Louisiana, the company announced December 12. Under the deal, Targa, a supplier of natural gas liquids based in Mont Belvieu, Texas, will also provide storage for these gases locally at Lake Charles. Indorama announced the acquisition of the Lake Charles ethylene cracker in September 2015. It is currently undergoing refurbishment and is expected to start up in the fourth quarter of 2017. The cracker will process both ethane and propane feedstock to produce about 420,000 tons per annum of ethylene and 20,000 tpa of propylene.

PTT/Marubeni: PTT Global Chemical is expected to make a final investment decision on Ohio’s first ethane cracker by the end of March 2017. Site preparation for the planned cracker in Belmont County, Ohio (located on the other side of the Ohio River from Wheeling, West Virginia) is nearly complete, and all signs of the former R.E. Burger power plant are “nothing more than a memory.” Thailand’s PTT and minority stakeholder Marubeni of Japan have spent more than a year evaluating the viability of the project. The project cleared a significant hurdle in the first week of January when the Ohio Environmental Protection Agency agreed to let the company discharge wastewater into the Ohio River. The Ohio EPA is still reviewing the air permit for the project, according to an agency spokesperson.

ExxonMobil/SABIC: ExxonMobil and SABIC are in the final stages of buying land in Texas for the ethane cracker they are proposing to build in a joint venture, the San Antonio Express News reported on December 23, and SABIC later confirmed. The land is 1,400 acres of mostly open fields between the small cities of Portland and Gregory, and across Nueces Bay from Corpus Christi. According to the Express News, Portland’s City Council unanimously voted to urge the joint-venture partners to choose another location. However, they have no power to block the land being used for an ethane cracker as it falls outside the city limits.
Gas prices in the US are expected to remain below $4/mmbtu for 2016 and into 2017, keeping ethane projects profitable. The EIA expects the Henry Hub natural gas spot price to average $3.55 per million British thermal units (MMBtu) in 2017.

The ratio of oil to gas prices in Q4 2016 ranged between 13 and 20. The ratio hit a Q4 high of 20 in November on the back of the OPEC deal to curb production growth. The limit came into effect in November and is aiming to cap production to a range of 32.5-33.0 million barrels per day (bpd). OPEC estimates compliance levels have been 80% and are approaching 100%.

The ratio has fallen as oil prices have dropped back down to $52/bbl, as US oil production continues to increase. U.S. drillers added the most rigs in nearly four years in the third week of January, extending an eight-month drilling recovery according to data from Baker Hughes.