New ExxonMobil and Saudi Aramco Technologies Produce Ethylene Directly from Crude Oil, Cutting Refining Costs, IHS Says

Release Date:
Wednesday, July 6, 2016 6:00 am EDT

Terms:

Dateline City:
HOUSTON

Contacts:
IHS Media Relations
Melissa Manning

IHS review is first bottom-up feasibility analysis and economic assessment of these new commercial processes

HOUSTON (July 6, 2016) – Two new steam-cracking processes developed by ExxonMobil and Saudi Aramco, respectively, allow petrochemical producers to essentially skip the refining process in converting crude oil directly to light olefins. These new processes could potentially save refiners as much as $200-per-ton of ethylene produced, according to a comprehensive engineering analysis conducted by IHS (NYSE: IHS), the leading global source of critical information and insight.

“In 2014, ExxonMobil commissioned a world-scale facility in Singapore that produces 1 million tons per year of ethylene directly from crude oil,” said Anthony Pavone, director of engineering at IHS Chemical, and one of the authors of the IHS Chemical Process Economics Report: Steam Cracking of Crude Oil. “We at IHS Chemical believe this process nets ExxonMobil about $100 to $200 per metric ton above traditional naphtha cracking.”

“This new crude-to-olefins process is about production cost savings, and takes advantage of the premium that naphtha commands over crude oil in Southeast Asia. It is this ‘feedstock spread’ that contributes most of the cost-savings advantage,” Pavone said.

The ExxonMobil process completely bypasses the traditional naphtha cracking process. Saudi Aramco has its own process for crude oil to olefins, and in June 2016, Aramco announced a joint venture with SABIC to study building a ‘crude oil-to-chemicals’ complex in Saudi Arabia. Though the exact process configuration for the potential joint-venture was not disclosed, it is possible this complex will employ the Aramco process, at least in part.

According to the IHS report, the ExxonMobil process completely bypasses the refinery and feeds crude oil to the cracking furnaces. These have each been modified to include a flash pot between the convective and radiant sections of the furnaces. Next, the crude oil is pre-heated and then flashed, IHS said, essentially ‘topping’ the lighter components from the crude.

This extracted vapor, the IHS report said, is then fed back into the furnace’s radiant coils and cracked in the usual fashion. The heavier liquid that collects at the bottom of the flash pot is either transferred to the adjacent ExxonMobil refinery, or sold into the merchant market.

“This analysis was conducted at a $50 per barrel cost for crude oil,” Pavone said. “As you might expect for Singapore, this process requires the local availability of light, sweet crude.”

The Aramco process, IHS said, works along an entirely different concept from that of the ExxonMobil crude-to-olefins process. As of yet, IHS cautioned, the Aramco process is still only a proposed project; no facility actually has been built to test the process.

The IHS report said the Aramco process begins by feeding the whole barrel of crude to a hydrocracking unit, which removes sulfur and shifts the boiling point curve significantly toward lighter compounds. The gas-oil and lighter products are sent to a traditional steam cracker, while the heavier products are
sent to a proprietary, Aramco-developed deep-fluid catalytic cracking unit (FCC) that maximizes olefin output.

“We at IHS Chemical estimate the cash-cost for this Aramco crude-to-olefins process would be $200-per-ton cheaper than for a naphtha cracker,” Pavone said. “The hydrocracker and deep-fluid catalytic cracker add significant capital costs, though, so at 15 percent pre-tax return on investment (ROI), we estimate the Aramco process would pencil in at roughly equivalent costs to naphtha cracking in Saudi Arabia.”

The IHS report is based upon a “bottoms-up” Class-3 process design and proprietary steam cracking kinetic reaction software simulation of both the ExxonMobil and Saudi Aramco crude-to-olefins processes. “To the best of our knowledge,” Pavone said, “our IHS Chemical analysis is the first in-depth independent analysis of these new crude-to-olefins technologies.”

To speak with Anthony Pavone, please contact Melissa Manning at melissa.manning@ihs.com. For more information on the IHS Chemical Process Economics Report; Steam Cracking of Crude Oil report, please contact Nisha.keskar@ihs.com.

###

**About IHS** (www.ihs.com)

IHS (NYSE: IHS) is the leading source of insight, analytics and expertise in critical areas that shape today’s business landscape. Businesses and governments in more than 140 countries around the globe rely on the comprehensive content, expert independent analysis and flexible delivery methods of IHS to make high-impact decisions and develop strategies with speed and confidence. IHS has been in business since 1959, and became a publicly traded company on the New York Stock Exchange in 2005. Headquartered in Englewood, Colorado, USA, IHS is committed to sustainable, profitable growth and employs nearly 9,000 people in 33 countries around the world.

_IHS is a registered trademark of IHS Inc. All other company and product names may be trademarks of their respective owners. © 2016 IHS Inc. All rights reserved._

“If you prefer not to receive email messages from IHS, please email (melissa.manning@ihs.com). To read our privacy policy, click here.”

**Language:**

English