

# Ethane cracking spurs need for on-purpose butadiene technologies

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Several companies are teaming up to develop technology to produce butadiene from the suddenly-abundant butane supplies from the US shale boom.

The ongoing shale boom has generally been a welcome development for the US petrochemical sector, but some niche markets have been left out. With olefins producers cracking shale-gas-derived ethane rather than oil-based naphtha, one downside is fewer co-product volumes.

That's especially the case in the US butadiene (BD) industry, which has seen rising shortages as producers switch their feedstocks from naphtha to ethane. The shortfall in butadiene, often used to produce styrene-butadiene rubber (SBR) for tire makers, could be as little as 7% over the next decade if the industry shift to gas-based feedstocks is limited to North America, or up to 27% if Europe and Asia also embrace the trend.

But the shale revolution that has helped create the problem might also present the solution. Like ethane, butane is also a popular natural gas liquid (NGL) derived from shale, and several companies are teaming up to develop technology to produce butadiene from the suddenly abundant butane supplies.

"Whenever there is a gap that opens up in the petrochemical world, people are going to throw capital and technology at it until they solve it," said John Roberts, a New York-based chemical industry analyst at UBS Securities, in an interview with Bloomberg.

## ***TPC Group works with Honeywell's UOP***

One partnership that could work is between the Houston-based TPC Group and Honeywell's UOP. TPC plans to have a plant ready by 2017 or 2018 to produce butadiene by on-purpose production rather than capturing it as a byproduct.

To accomplish this, TPC is working with UOP to update technology that hasn't been used since the 1980s. The companies say they will jointly develop further enhancements to the OXO-D technology, which they say is the most efficient and low-cost method to make on-purpose butadiene.

"We believe our OXO-D technology is the most efficient, competitive and commercially proven technology in the world for the on-purpose production of butadiene," said Mike White, senior vice president of operations and technology for TPC. "We look forward to working jointly with UOP to continue to advance our leading on-purpose butadiene technology through UOP's depth of knowledge and experience as a licensor within our industry."

The companies say they plan to have their technology ready by the end of 2014 and are already talking with potential licensees. Demand could lead to as many as 20 or 30 new plants worldwide, according to UOP officials.

## ***BASF, Linde offer an alternative***

But TPC and UOP aren't the only companies working together for the mission of on-purpose butadiene. In early June, The Linde Group and BASF (Fig. 1) announced plans to cooperate in developing and licensing processes for linear butenes and butadiene.

BASF says it has developed process technology, catalysts and extraction technologies, while Linde is providing expertise for the integration, optimization and commercialization.

"We focus on elaborating a solution that provides an efficient process characterized by optimal integration of the whole process chain," said Dr. Ernst Haidegger, head of the product-line petrochemical plants in Linde's engineering division.

The new BASF technology is currently being developed in a pilot-plant operation in Ludwigshafen, Germany, according to Dr. Heinrich Josef Blankertz, senior vice president of global technology within BASF's petrochemicals business.

"We are optimistic that we can offer a new best-in-class technology for the manufacturing of on-purpose butadiene to help producers meet the increasing global demand," he said.

## ***Specifics remain unclear***

But until the processes are commercially available, the specifics of each process will not be disclosed. TPC and UOP hope to have theirs ready by the end of 2014, while BASF said it was too early to offer a timetable for when theirs would be ready.

In China, several plants are similarly being built for on-purpose production of butadiene, two of which are expected to begin operations in the second half of this year. But, as with their American rivals, the technology has yet to be proven.

In the meantime, the butadiene shortfall continues to increase, and industry innovators are racing to find the best solution.

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