

The New Normal in Petrochemical Feed Stream Markets

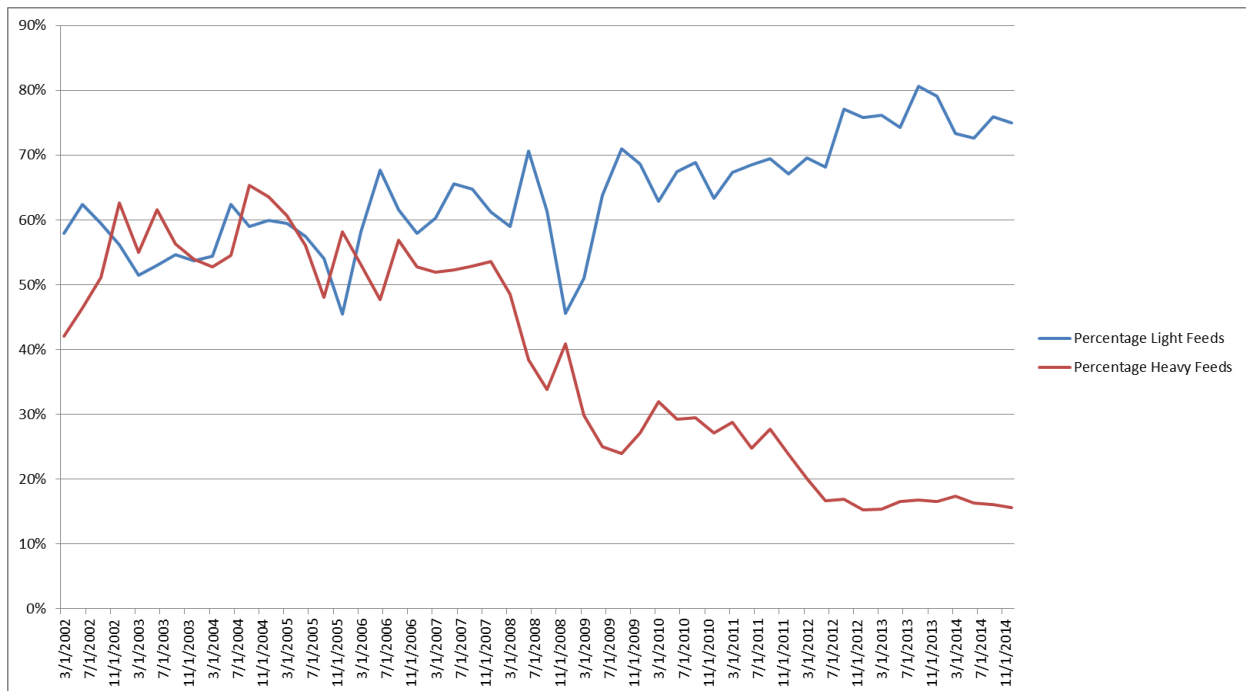
The development and implementation of new technologies enabling access to tight oil and shale gas has had a significant and long term impact on the feed streams and thus the markets for petrochemicals. Although the emergence of these technologies is primarily in North America, the effects on the global energy markets are clearly evident.

Increased access to tight oil in the United States has brought crude oil (heavy feeds) output to its highest level since the 70's. Output in 2015 should reach nearly 11 million barrels per day. At this level of output, the U.S. becomes the second largest producer of crude oil globally, outside of Saudi Arabia. What's more, the newer technology enables much more flexibility in adjustment of output to demand.

In addition to increases in capacity in the United States, other non-OPEC sources have increased their collective capacity such that in 2008 OPEC's share of global markets was 60% and in 2014 is now down to approximately 40%.

During this same period of time we have seen rapid growth in capacity and output of natural gas (light feeds) in the United States. With increased availability of low cost gas, a great deal of investment in steam cracking has been made in order to take advantage of these light feeds. Cracking of light feeds in the production of petrochemical intermediates provides approximately 80% gross margin versus 40% using heavier, liquid feeds, such as naphtha or gas oil.

As a result, petrochemical feeds have transitioned from heavy feeds to light feeds in dramatic fashion. As of today, approximately 75% of steam cracker feeds are light whereas up until 2008 there was an even split.



This swing in feed streams has had a significant impact on the supply and demand for petrochemical intermediates, not only in available capacity, but also volatility. Operators of light feed crackers have a great deal of flexibility in moving between different light feeds such as Ethane, Butane and Propane. Depending on margins, driven by feed costs and mix, feed stocks can readily be changed. As a result, the proportional output of intermediates may be dramatically altered. Therefore, the petrochemical market today has more available access to “on purpose” produced material, however, short term economics may drive more fluctuations in supply and demand balance for specific molecules.

Specific Yields Per Feed

<i>(Yield by weight)</i>	Ethane	Propane	Butane	Naphtha	Gasoil
Hydrogen & Methane	13%	28%	24%	26%	18%
Ethylene	80%	45%	37%	30%	25%
Propylene	2%	15%	18%	13%	14%
Butadiene	1%	2%	2%	5%	5%
Mixed butenes	2%	1%	6%	8%	6%
C5+	2%	9%	13%	8%	7%
Benzene	0%	0%	0%	5%	5%
Toluene	0%	0%	0%	4%	3%
Fuel Oil	0%	0%	0%	2%	18%

In summary, new oil and gas extraction technology has changed the playing field for the energy complex in the U.S. With the U.S. being the single largest consumer of energy in the world, the impact of increased capacity here has global implications. Impacts to the petrochemical industry are no less meaningful. New investments in steam crackers for lighter feeds have reduced the correlation between crude oil and petrochemical prices and at the same time provided an entirely new set of incentives to produce petrochemicals on purpose.