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What slowing additions to refining capacity will mean to the industry

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Announced refining capacity additions remain high relative to recent history, but will be lower than previously forecast. Conversion investments continue to exceed distillation and will increase complexity in the refining industry with potential opportunities for refiners, traders, suppliers, shippers, and the EPC industry.

Refining capacity additions will be higher than in the recent past

The latest results from the McKinsey Refinery Capacity Additions Survey¹ indicate that future net refinery capacity additions will be high in comparison to recent history.

Net distillation additions from 2016 to 2021 are forecast to be 6.7 million barrels/day globally—a 1.3 percent annual growth rate, higher than 2010–2015, which saw a net increase of 4.1 million barrels/day, but lower than 2004–2009, which witnessed a net increase of 9.0 million barrels/day (Exhibit 1). Most future growth will come from large greenfield projects, especially in the Middle East, Asia, and Africa.

Conversion additions also will be higher than in the recent past, adding 5.1 million barrels/day from 2016 to 2021—a growth rate of 1.8 percent per year. This accelerating growth rate indicates that the global refining system will continue to become more complex.

2016 forecast lower than 2015

Net distillation capacity due to come on stream between 2016 and 2021 is 1 million barrels/day lower than the last McKinsey survey forecast in August 2015—equivalent to 18 percent less added capacity. This is due to several delayed or canceled greenfield projects, most of them in Asia (Exhibit 2). Three projects in China now look much less likely to be completed, even if they have not explicitly been canceled. This seems to be a response to lower oil product demand forecasts in China, and the wish of Chinese refiners not to become long-term, structural product exporters.

Project cancellations and delays are partially balanced by the firming up of previously uncertain projects and new project announcements. The former amount to 700,000 barrels/day of

¹ McKinsey's Oil & Gas Practice has compiled a biannual survey of refinery capacity additions for a number of years. The survey is a detailed, bottom-up view of additions covering 20 refinery process units. It adopts a conservative methodology which applies rigorous criteria to announced projects, including assessment of EPC and other contracts, technology licenses and financing plans. The consistent methodology in this survey allows us to assess how forecasts for capacity additions have changed over time—this article specifically compares the August 2015 survey with the latest, August 2016 survey.

Exhibit 1

Distillation and conversion capacity will continue to be added at high levels over the next five years.

Refinery capacity additions,^{1,2} million barrels/day

■ Projects ■ Creep

Distillation



Conversion (fuel oil destruction)³



¹Includes projects classed as firm and probable; forecasts are net of any planned capacity reductions or closures.

²Forecast includes 0.5% per annum creep.

³Fuel oil destruction defined as 100% coking, 85% FCC, 100% HCU, and 38% of thermal processes (derived from LP modeling).

McKinsey&Company | Source: McKinsey refining capacity additions database

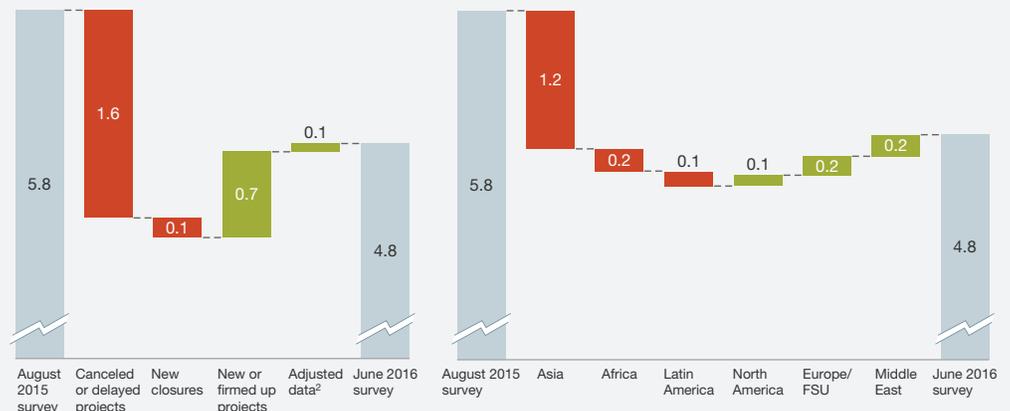
growth and are concentrated in the Middle East (specifically in Oman and Bahrain). Newly announced distillation projects, such as refinery expansions in Egypt and the United States, are relatively small.

Conversion additions are also lower, but by a noticeably smaller amount than distillation (which, as noted, will be 1 million barrels/day less from 2016–2021 than previously forecast). Aggregate coking, hydrocracking, and FCC/RCC capacity additions from now through 2021 will be 200,000 barrels/day less, that is 6 percent, than forecast last year (Exhibit 3).

Exhibit 2

Downward revisions to distillation capacity additions are driven by project cancellations and delays, mostly in Asia.

Distillation capacity additions, 2016–2021,¹ million barrels/day



¹Excludes capacity creep.

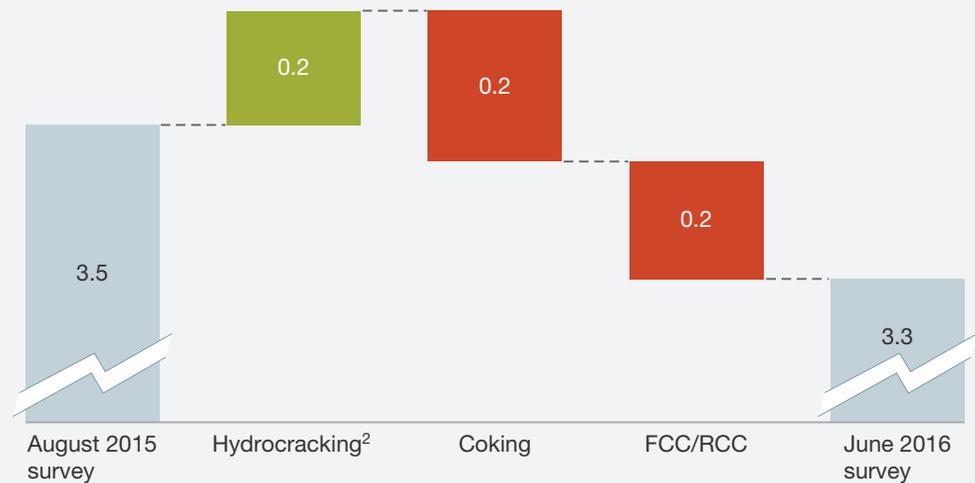
²Adjusted data refers to cases where better or updated data on capacity or configuration becomes available.

McKinsey&Company | Source: McKinsey refining capacity additions database

Exhibit 3

Conversion capacity additions have been revised downward, although the hydrocracking forecast has increased.

Conversion capacity additions, 2016–2021,¹ million barrels/day



¹Excludes capacity creep.

²Includes VGO and resid hydrocrackers.

McKinsey&Company | Source: McKinsey refining capacity additions database

This outlook for conversion capacity is supported by hydrocracking, which is forecast to be higher than the 2015 survey by 170,000 barrels/day, or 15 percent, because of the inclusion of the firm-up Middle East projects. Coking and FCC/RCC additions are down, albeit by a slightly lower proportion than distillation. This is primarily caused by delayed or canceled greenfield projects, which mostly have coking/FCC configurations.

The net result of these changes is an intensification of the trend towards an increasingly complex global refining system. This complexity derives from the fact that new plants are usually more sophisticated than old refineries, and that refiners are continuously seeking to upgrade their facilities. However, this new outlook suggests that refiners might be moving away from large greenfield plants toward smaller projects that add conversion capacity.

Implications across the downstream value chain

- **For refiners**—Lower than previously forecast distillation capacity additions may be a response to lower oil product demand growth and serve to reduce the risk of excess capacity in refining. The revisions in China might help Asian refiners, where high capacity additions in the region (and in the Middle East) might result in utilization pressure by the end of this decade.

However, an increasingly sophisticated refining system has some implications for margins:

- More complex capacity means that lower refinery runs are needed to meet light product demand, as refineries that are more complex have higher light product yield. This lower call on refining implies a more complex marginal break-even capacity and lower margins.
- Increasing complexity also increases the likelihood of tighter fuel oil markets, as new conversion capacity increases refinery demand for residuals. Tighter fuel oil markets

indicate narrower fuel oil price discounts to crude, and therefore lower light/heavy product price differentials, and lower conversion margins.

- Similarly, increasing complexity suggests that competition from refiners to run heavy crude will intensify, possibly leading to narrower heavy crude discounts, assuming heavy crude supply conditions remain equal.
- *For traders and the shipping sector*—Lower capacity additions indicate a more balanced market, especially in Asia, where, subject to levels of demand growth, product exports and trade flow growth could slow. However, elsewhere, trends support increasing flows; the outlook for Latin American capacity growth is unchanged, so the region should continue to rely on product imports from the United States. The prospects for Russian capacity growth are also stable. With this, and the firmed up Middle East projects, Europe is likely to continue to see growth in product imports and pressure on utilization between now and the end of the decade.
- *For suppliers and the EPC industry*—Lower capacity additions will reduce refining construction activity and therefore EPC potential in this sector. However, many global opportunities remain as the canceled projects are mainly in China, where domestic EPC firms dominate. □

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