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HP Viewpoint

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The need for change—Why the industry is looking at crude-to-chemicals

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As the world's population increases and living standards continue to improve, the demand for energy and chemicals is stronger than ever before. Global demand for chemicals is expected to outpace global gross domestic product (GDP) by nearly 40% over the next 10 yr (**FIG. 1**).

The surge in global chemical demand is driven by the increase in the middle class population. According to The Brookings Institution, the number of people who earn enough to be considered middle class will increase by more than 2.5 B from 2015–2030 (**FIG. 2**). The increase in the middle class population will mostly occur in Asia and other developing regions. Just as we saw in developed nations during the previous century, the rise of a global middle class will create new demands for products made from chemicals—everything from appliances to homebuilding materials to vehicles.

Similar to chemicals, demand for energy and fuels products is increasing, as well. However, growth rates are limited due to large efficiency improvements. Energy demand in commercial transportation continues to increase as growing economic activity and personal income drive more trade of goods and services. For light duty vehicles (LDV), personal mobility and consumer choices continue to change the fleet mix toward more efficient vehicles, including hybrids and electric vehicles. With efficiency improvements and shifts away from liquid fuels, energy demand in the LDV sector is forecast to peak in the 2020s, before trending back down to current levels by 2040.

Efficiency gains, along with shifting to less carbon dioxide (CO_2)-intensive energy, are not limited to the LDV segment, but are trending across all energy sectors, which will help substantially moderate global emissions.

While the world's economy is expected to double by 2040, CO_2 emissions are projected to increase by a modest 10% during this period, reflecting the expectation of more sustainable economic growth (**FIG. 3**).

Demand for crude-to-chemicals technology. As a result of these trends toward more sustainable growth, refiners have continued to focus on reducing energy consumption and their emissions footprint, and are beginning to explore options to invest in higher-value chemicals.

Options range from upgrading existing refineries with state-of-the-art process technologies, to building new, large, integrated refinery/chemical grassroots complexes with technologies and configurations that allow them to maximize yields from crude to chemicals.

Many factors influence refiners' approach and investment objectives, including desired product slates/market, feedstock choices, energy/utility balances, capital/operating efficiency and safety, health and environmental (HSE) performance.

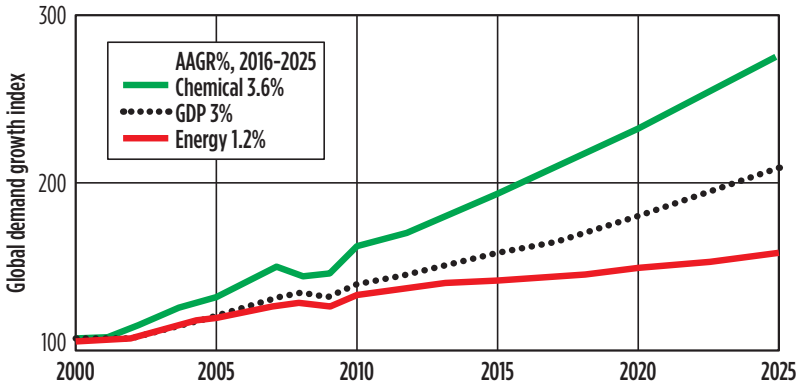

FIG. 1. Global chemical demand growth is forecast to outpace GDP and energy demand. Source: IHS, ExxonMobil 2018 Outlook for Energy, ExxonMobil estimates.

The time is now. From the early days of lamp oil and kerosine production, the product slate from refining crude oil has evolved over time to modern transportation fuels such as gasoline, diesel and jet fuel.

The product slate has further evolved to producing higher-value chemical products. The crude-to-chemicals trend is a reality driven by the shift in market supply and demand, with higher-margin chemicals/derivatives yielding improved profitability for producers compared to traditional transportation fuel refineries.

As a result, the challenge for refiners is to upgrade their technology and process configurations to meet the emerging demands of the rising chemicals market. HP

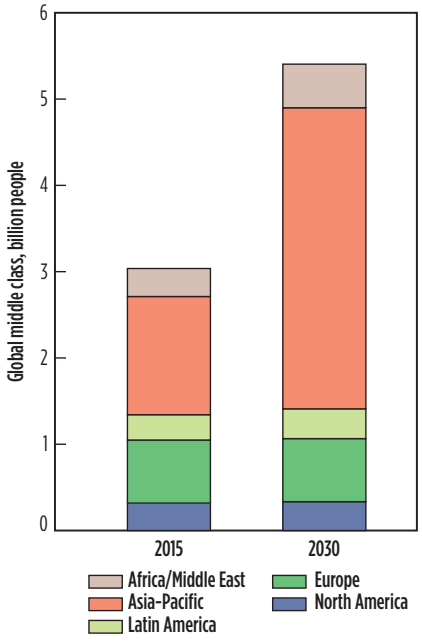

FIG. 2. A growing middle class is creating new demand for products made with chemicals. Source: The Brookings Institution.

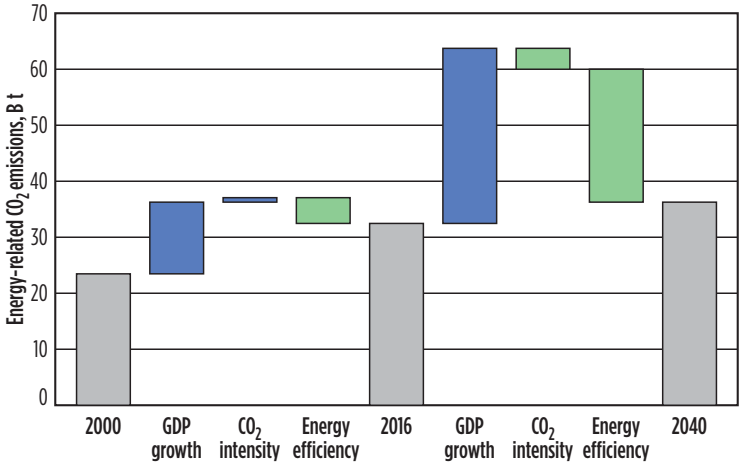

FIG. 3. Energy efficiency gains are expected to nearly double by 2040, while carbon emissions are projected to increase by a modest 10%. Source: ExxonMobil 2018 Outlook for Energy.