

## Appendix 3

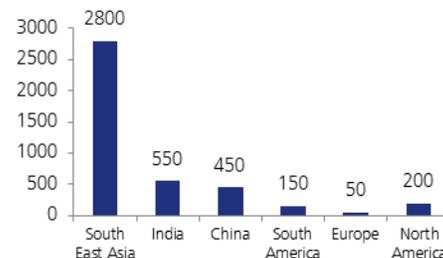
### Oleochemicals: Driving consumers towards GREENER products

Oleochemicals are derived from natural oils and fats taken from animals and plants. Growing demand for green products and sustainable solutions, coupled with regulatory changes in recent times, has brought oleochemicals into focus. Oleochemical-based products are becoming popular across specialty chemicals segments owing to their advantages including their eco-friendly image, low toxicity and fine dermatological compatibility. Oleochemicals are mainly used in personal and household care products, pharmaceuticals, food and beverages. With constant growth of raw material availability and emerging end use in areas such as bio-lubricants and surfactants, the global oleochemicals market is expected to reach c.USD 26bn by end-CY19, with a c.4.2% CAGR over CY14-CY19. By region, Asia-Pacific is the production leader and the fastest growing market. We believe oleochemicals will continue to grow at a faster rate but may face challenges such as feedstock unavailability and growing number of alternative uses for its raw materials

- Asia-Pacific to be the production leader – India emerges as a frontrunner:** Asia-Pacific will remain the major manufacturer of oleochemicals due to widespread availability of raw material and consequent up-stream integration for all major companies. Apart from production, Asia-Pacific is the fastest growing oleochemicals market, with consumption recording c.5.1% CAGR during CY14-CY19. Within Asia-Pacific, India is a key market with market size of c.USD 1.6bn in FY15, expected to grow at c.5% over FY15-FY20 due to increasing consumption of oleochemical-based products such as personal care items and detergents. Therefore, there is also potential for new installed capacities for the manufacture of oleochemicals in India.
- Higher crude oil prices will boost oleochemicals capacity:** In CY15, fatty acids and alcohols ranked #1 and #2 in terms of market share by type in the global oleochemicals segment. The production capacity for fatty alcohols and fatty acids was only 4.5 million and 11.5 million tonnes, respectively in CY15. A capacity increase for both will be strongly influenced by crude oil prices (synthetic alcohols). Higher crude oil prices will drive the demand for alternate sources of raw materials for personal and household care products, leading to a focus on increasing oleochemicals’ capacity. Additionally, major capacity additions are likely in the Asia-Pacific region owing to high dependence on crude oil imports and the expanding market for oleochemicals-based products.
- Emerging applications to drive rapid expansion:** Oleochemicals are gaining popularity among companies that manufacture lubricants, polymers and surfactants. The use of biolubricants will help bypass the high cost of disposing synthetic lubricants. Biolubricants have a c.3% market share and industry reports indicate that by FY20, it will account for 9% of the market, implying a CAGR of 19%. Like biolubricants, biopolymers are substituting synthetic polymers. Although the biopolymers market is in the infancy stage, it is expected to post a CAGR of 40% to reach c.20mn tonnes by FY20, accounting for 7% of the global polymers market. Among surfactants, Methyl Ether Sulphonate (MES) is an oleochemical-based substitute for the commonly-used Linear Alkyl Benzene Sulfonate (LABS). MES’ performance is better than LABS due to excellent characteristics such as high purity and active level with no volatile organic compound.

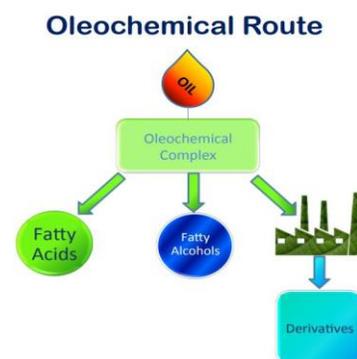
**Challenges ahead:** The key challenge for the oleochemicals segment is linked to the affordability of oleochemical-based products. Oleochemical prices are affected by: (1) **Feedstock availability** – Feedstock availability is a key concern for companies operating in the oleochemicals segment or those planning to enter it. Historically, 12%-14% of the world’s vegetable oil production has been used to manufacture oleochemicals. Oleochemicals’ production depends on favourable climatic conditions and only geographies such as India, Malaysia and Indonesia offer climates suitable for palm tree plantations. (2) **Alternative uses of vegetable oil:** Increased requirement of biodiesels (derived from vegetable oils) could push price of vegetable oil. Thus, manufacturers of chemicals may find it less attractive to use oleochemicals vs. petroleum feedstocks.

Exhibit a. Expected increase in oleochemical production (2016-2025)



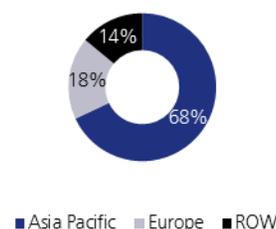
Source: Industry, JM Financial

Exhibit b. Oleochemical route



Source: JM Financial

Exhibit c. Global oleochemical market



Source: Industry, JM Financial