

Biofuels technologies and opportunities - Role of catalysis in refinery transformation

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1. Introduction

Neste has been active in processing both fossil and renewable feedstocks for production of fuels, lubes, and other derivatives. Neste's aim is to deliver outstanding value with renewable and circular solutions. We are continuing our growth and transformation as the world's leading producer of sustainable aviation fuel and renewable diesel and a forerunner as producer of more sustainable raw material solutions for the polymers and chemicals industry. Gradual transformation of crude oil refinery in Porvoo, Finland has been started, and carbon neutrality and climate commitments are targeted to be reached by 2035. An investment of some 2.5 billion euros will be allocated to both upgrading existing technologies and new builds such as pretreatment units. The company expects the long-term capacity potential after the transformation to be about 3 million tons of renewable and circular products.

Transformation of a crude oil processing refinery into a bio-refinery requires complex modifications throughout multiple interdependent units within multiple processing areas. Hence, significant engineering expertise and operational knowledge on both crude oil and renewable feedstocks processing are needed for successful implementation. Many of the refinery units need to undergo significant modifications to handle the intake of renewable feedstocks, processing and product separation. Hence, the choice of the bio-based feedstock materials to be processed in the existing assets with minimal need of a revamp is naturally the most preferred option.

Catalysts will continue to play a crucial role in processing renewable feedstock as they have done in processing crude oils throughout the years. Due to the nature and chemical composition of the bio-based feedstocks the choice of the catalysts used should be revised to maximize the yield of fuels and base chemicals. This also implies that the operational conditions must be optimized. Additionally, as the impurities in the renewable and circular feed stocks are different from those commonly seen in crude oil, the selection of the pretreatment technology, the selection of the catalytic reactors and impurity removal approaches will be different.

This presentation will describe opportunities in processing renewable feedstocks in the oil industry overall, their chemical nature, and approaches/challenges in/to crude oil refinery transformation to process fully bio-diet. The role of catalysis in the success of such a transformation will be highlighted for a few standard refinery units.