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Ethylene to Alkylate Process by Next Wave Energy

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Girish Ballal
Director of Fuel and Chemical Processes

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Abstract

Alkylate has emerged as an ideal gasoline blending component in recent years due to the combination of high-octane value, absence of olefins or aromatics, low sulfur content, and low RVP. In the usual refinery context, alkylation refers to the reaction of light olefins from the FCC unit with isobutane to produce isooctane isomers. However, the advent of shale oil on the USGC region has provided another attractive option for alkylate production. The abundance of NGLs, especially ethane, associated with shale oil has resulted in abundant and inexpensive supply of ethylene. Ethylene can be catalytically dimerized to produce butylene, which may be used as a high-purity alkylation feedstock. This route provides an option to produce gasoline (alkylate) from NGL via ethylene, without the usual refinery operations. With this context in mind, Next Wave Energy Inc has recently announced the proposed construction of an alkylate production plant, starting with the ethylene feedstock. The project dubbed as "Project Traveler" involves the construction of an alkylate production plant at a Pasadena, TX location, adjacent to the Houston Ship Chanel, on the US Gulf Coast and is stated to start production by mid-2022. The project was conceived to benefit from two emerging trends; growing demand for higher octane fuel and abundant supplies of natural gas liquids and their derivatives on the US Gulf Coast.

In this review, we present technoeconomic analysis of the integrated ethylene-to-alkylate process by Next Wave Energy, Inc. The processing capacity is 1,043,000 MT/year (~2,300 million lb/year) of alkylate production. This corresponds to approximately 28,000 bbl/day of alkylate.

The production economics assessment in this report is based on a US Gulf Coast location. However, an iPEP Navigator module (an excel-based computer costing model developed by IHS Markit) is attached with this report to allow a quick calculation of the process economics for five other major regions also—Germany, Japan, China, Canada, and Saudi Arabia. For every process, the module also allows production economics to be reported in English or metric units in each region.

The technological and economic assessment of the processes is PEP's independent interpretation of the companies' commercial processes based on information presented in open literature, such as patents or technical articles, and may not reflect in whole or in part the actual plant configuration. We do believe that they are sufficiently representative of the processes and process economics within the range of accuracy necessary for economic evaluations of the conceptual process designs.

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IHS Markit Customer Care:

CustomerCare@ihsmarkit.com
Americas: +1 800 IHS CARE (+1 800 447 2273)
Europe, Middle East, and Africa: +44 (0) 1344 328 300
Asia and the Pacific Rim: +604 291 3600