Low Carbon Ethylene Production via E-furnace Powered by NET Power Cycle

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Abstract

Steam cracking of hydrocarbons is one of the largest carbon dioxide (CO₂)-emitting processes in the chemicals industry. Conventional cracking generates 0.85–1.8 metric tons of CO₂ for every metric ton of ethylene produced. Globally, that amounts to more than 260 million metric tons (MMt) of CO₂ emissions per year.

It appears inevitable that there will be an increased focus on the development of net-zero carbon emission ethylene production processes; either by using redesigned net-zero-emission technologies or by capturing and sequestering the CO₂ produced in the conventional processes.

In this review, we examine one such process for manufacture of ethylene from ethane. The cracking furnace is electrified and is powered by zero-emission electricity produced by NET Power cycle.

The CO₂ captured in the NET Power cycle is disposed of, either by sequestration, or it is used as a chemical raw material by others.

The selected configuration will reduce atmospheric emission of CO₂ by approximately 1.1 million metric tons per annum (MMtpa), over the conventional process for 1.5 MMtpa ethylene production. We have also computed levelized cost of carbon abatement (LCCA), which will be useful to the reader for comparative economic analysis with other net-zero carbon configurations for ethylene production.

This review is part of a series that IHS Markit plans to publish on ethylene technologies with the potential to reduce carbon emissions by 90% or more. This set of reviews will be a valuable resource for planners, producers, and designers who are looking for an authentic comparison of comparative capital and production costs for different strategies of deep carbon emission reduction for ethylene production.
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