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# Propane Dehydrogenation (II)

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## PEP Report 267B

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**Mike Kelly**  
Director



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#### Abstract

Propylene is one of the most important raw materials for the production of other organic chemicals. It was produced almost exclusively as a by-product in ethylene plants (steam crackers) and refinery operations (primarily fluid catalytic cracking) until about ten years ago. The supply landscape has changed dramatically over the last decade as propylene output from these traditional sources has slowed, due largely to developments in shale gas and the associated impact on relative feedstock pricing. The resulting imbalance in propylene supply/demand has led to an increasing reliance on other, on-purpose technologies for manufacturing propylene.

Propane dehydrogenation (PDH) is one on-purpose technology that has gained much traction in the marketplace. Dozens of new PDH installations have been announced worldwide, and many are already under construction. The single feed/single product feature is one of the most attractive aspects of propane dehydrogenation, but despite the simple chemistry, industrial implementation is complicated by equilibrium constraints, side reactions, and coke formation.

PEP previously evaluated the three leading commercial PDH technologies, but the focus of this report is on alternative/emerging technologies that have not yet been commercialized for propane dehydrogenation. A general review of the technical field is provided along with detailed economic evaluations for the following processes:

- Dow Fluidized Catalytic Dehydrogenation (FCDh)
- Linde/BASF PDH
- Snamprogetti/ Yarsintez Fluidized Bed Dehydrogenation (FBD-3)

The analysis and technoeconomic results that follow are based on a design capacity of 550,000 metric tons (1.2 billion pounds) per year of polymer-grade propylene. Alternative investment and production cost estimates are also provided for plant capacities that are half and double the base case. While the capital and production cost results herein are presented on a US Gulf Coast basis, the accompanying iPEP Navigator Excel-based data module (available with the electronic version of this report) allows for viewing results for other major regions along with conversion between English and metric units.

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