

**Abstract**  
**Process Economics Program Report 29G**  
**ETHYLENE PLANT ENHANCEMENT**  
**(April 2001)**

The prospects for ethylene demand remain strong but much of the future increase in production capacity may come from incremental enhancement of existing plants, rather than from new "grass-roots" production facilities. Steam cracking for ethylene originated as early as the 1920s and was commercialized in the 1950s. The importance of ethylene continues to drive research and development of this technology along with the exploration of nonconventional technologies in order to achieve higher yields of olefins and lower capital and operating costs. However, as recently discussed in PEP Report 29F, *Ethylene by Nonconventional Processes* (August 1998), it is unlikely nonconventional processes will replace steam cracking for ethylene production in the foreseeable future. This study examines potential improvements in conventional steam cracker operations with emphasis on improving the competitive edge of existing plants.

Ethane, LPG and naphtha are the dominant steam cracker feedstocks. Natural gas condensate is abundant in North America and the Middle East while naphtha is commonly used in Asia and Europe. Since the 1970s many new ethylene plants have been built with feedstock flexibility. In PEP Report 220, *Ethylene Feedstock Outlook* (May 1999), SRIC currently projects that generally ethylene feedstocks supply will be adequate over the next decade even considering that the demand for ethylene is increasing twice as fast as petroleum refining (4-5%/year versus 2%/year).

Significant technological developments exist for all sections of the ethylene steam cracker that could be implemented in plant revamps. Examples include new large capacity yet compact and efficient furnaces; coke inhibition technology; larger, more efficient compressors; fractionation schemes; mixed refrigerants; and advance control and optimization systems.

This report should provide a useful overview of process developments since PEP Report 29E, *Ethylene*, issued in 1991 for people involved in research and development or planning investment in new ethylene plants as well as those involved with planning, managing, operating, and designing existing plants.

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