



Urea is one in a series of reports published as part of Nexant's 2019 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Urea is the most used and traded fertilizer in the world; approximately 56 percent of global ammonia production is converted to urea. It is produced in many countries, but economics favor those with inexpensive natural gas. Urea makes a major contribution to food supply, particularly in the third world. With 46 percent nitrogen, it is the most concentrated form of solid nitrogenous fertilizer, and therefore, has a logistic advantage over ammonium nitrate fertilizers.

This TECH report provides an updated overview of the technological, economic, and market aspects of urea. The following issues are addressed in this report:

- What are the major technologies for urea production? Who are the major technology holders? What are some of the differences across the various technologies?
- How do the process economics compare across processes and different geographic regions?
- What is the major application for urea? How does growth compare in different regions? Where will future capacity additions take place?

Commercial Technologies

Today, all urea is made commercially with ammonia and carbon dioxide in a two-step reaction. In the first step, ammonia and carbon dioxide combine on a 2:1 basis to give ammonium carbamate, also known as ammonia carbonate. The second step is the relatively slow dehydration of ammonium carbamate to yield urea. Its production consists of five process steps: synthesis, decomposition, recovery, concentration, and finishing.

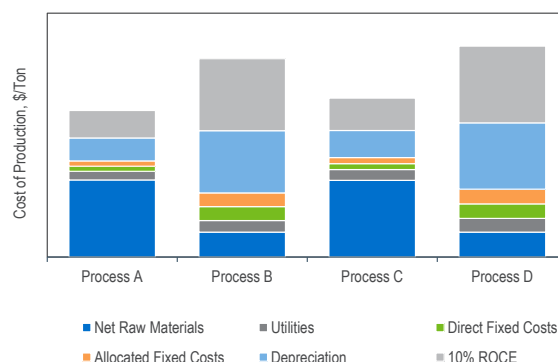
Process technology for urea has been under the tight control of few players where the main routes used today are stripping processes. Licensors utilize different feed ratios based on their individual processes. Three key licensors account for almost 90 percent of the urea plants in operation worldwide (excluding China).

There are currently no bio-urea facilities and the only companies that offered technology in ammonia production from biomass gasification have switched focus or had financial difficulties.

Process Economics

Detailed cost of production estimates for various technologies are presented for USGC, China, and India locations. Estimates are developed for two commercial routes to urea. Sensitivity analyses on feed pricing, economy of scale, and capital investment were also developed. Additionally, a historical analysis of the cash cost of production over the last five years is provided for the routes and regions studied in this report.

Urea Production Costs



Commercial Overview

Global urea consumption was approximately 173.3 million tons in 2018, with its direct application as a fertilizer being the largest end-use. Urea demand is heavily driven by the fertilizer and food production industries as urea is used in many parts of the world as the primary source of nitrogen for crop nutrition. Demand is expected to grow at around 2 percent annually until 2024.

An overview of the supply, demand, and trade of urea on a global and regional (North America, South America, and Asia Pacific) basis is provided in this TECH report.

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The TECH program (formerly known as PERP) is globally recognized as the industry standard source of process evaluations of existing, new and emerging of interest to the energy and chemical industries.

TECH's comprehensive studies include detailed technology analyses, process economics, as well as commercial overviews and industry trends. Reports typically cover:

- Trends in chemical technology
- Strategic/business overviews
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- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
- Regulatory and environmental issues where relevant

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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