



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

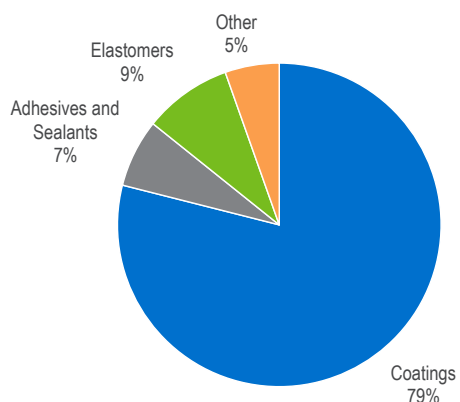
## Overview

The isocyanate market is dominated by the major aromatic isocyanates, methylene diphenyl diisocyanate (MDI) and toluene diisocyanate (TDI), but there are many other isocyanates that are commercially important as a polyurethane feedstock or intermediate. Hexamethylene diisocyanate (HDI), isophorone diisocyanate (IPDI) and methylene dicyclohexyl diisocyanate (H<sub>12</sub>MDI) are the largest specialty isocyanate markets by volume and of commercial significance as they improve the polyurethane's weatherability and light stability under external conditions. Their demand has grown above global GDP growth since 1990 due to their growing acceptance over MDI and TDI in polyurethane coatings and the development of the Chinese coatings market.

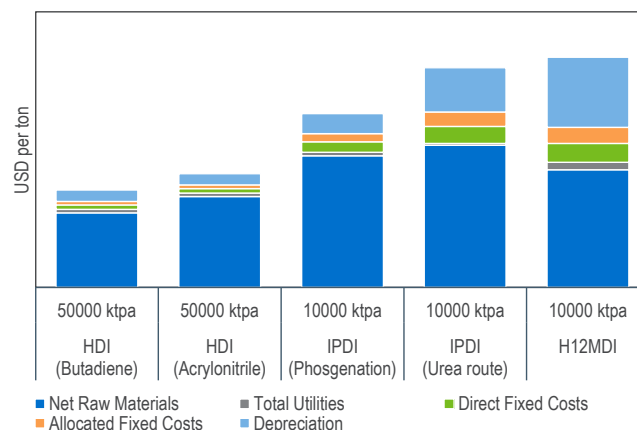
This report provides an overview of technological, economic and market aspects of HDI, IPDI and H<sub>12</sub>MDI. The following issues are addressed in the report:

- What is the major technology used in the production of specialty isocyanates?
- What are the value chains for each isocyanate and what process technologies are used along the chain?
- How much does it cost to produce each isocyanate and how does plant location, integration and time affect the competitiveness of each route?
- What are the key end-uses for specialty isocyanates and what are the key market drivers currently?

### Specialty Isocyanate Demand by End-Use, 2019



### Specialty Isocyanate Cost of Production, USGC 2019-Q3



## Technology Analysis

Nexant has analyzed the process technologies required for the production of HDI, IPDI and H<sub>12</sub>MDI as well as their feedstocks. The focus of the report is primarily on phosgenation technology for the production of isocyanates; it also covers the development of new liquid phase and gas-phase phosgenation as well as non-phosgene production routes.

## Economic Analysis

The economic analysis provides an overview of production costs for HDI, IPDI and H<sub>12</sub>MDI in Western Europe, the United States, China and South-East Asia. Sensitivity analysis on the impact of integration and level of competitiveness with time are also included.

## Global Market Analysis

Specialty isocyanates (HDI, IPDI and H<sub>12</sub>MDI) are primarily used in the production of polyurethane coatings where they improve the coating's color and gloss retention. Other CASE industries also use these isocyanates for their improved color and gloss retention but in smaller amounts. The supply and demand for each isocyanate is analyzed on a global basis from 2010 to 2019 with major producers and feedstock suppliers and their capacity identified for 2019. Demand is evaluated on a geographical basis and the key market drivers for demand evolution over the medium-term outlined.

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## TECH 2019S3: Specialty Isocyanates

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