

1.2 Scope of Work

This proposal details the scope of work to be conducted, our recommended methodology, program costs, and timing. Objectives of the research are presented below:

Objectives: Determine the 2006 consumption of Polyurea in North America (primary focus), Europe and Asia, including market size and segmentation by Polyurea product type and end-use market.

Quantify Annual Production-Consumption of Polyurea:

1. End-use market applications, including:
 - a. Coatings
 - i. Bridge Coating
 - ii. Tank Coatings & Linings, Fuel Storage & Containment
 - iii. Aquarium Lining
 - iv. Landscape & Water Containment
 - v. Waste Water Treatment Linings
 - vi. Truck Bed Liners
 - vii. Railcar Lining & Track Containment
 - viii. Theme Park & Decorative Design
 - ix. Water Parks & Playgrounds
 - x. Marine
 - xi. Manhole & Sewer Linings
 - xii. Pipe / Pipeline Coatings & Linings
 - xiii. Flooring and Parking Decks
 - xiv. Line Striping (Pavement Marking)
 - xv. Roof Coating
 - xvi. Architectural Design
 - xvii. Others as identified through fieldwork
 - b. Caulks & Sealants
 - i. Joint Fill / Caulk
 - ii. Others as identified through fieldwork
 - c. OEM Products
 - i. Automotive Fascia and Body Molded Parts
 - ii. Truck Bed Liners
 - iii. Spray Molding
 - iv. Mold Making
 - v. Artificial Rock
 - vi. Others as identified through fieldwork

2. New end-use market segments

In order to identify new opportunities for Polyureas and assist PDA members in pursuing growth beyond traditional end-use applications, the research will dedicate a portion of the effort to exploring new end-use applications for Polyureas. These applications may include current uses that are not well tracked or understood as well as new end-uses where Polyureas are not being used though have an opportunity to compete.

- a. Identity of competitive materials within existing Polyurea end-use segments
- b. Tracking of competitive materials to other end-use segments where Polyureas are not used though its products' properties are viable
- c. Prioritized list of new end-use applications for Polyureas based on product properties, end-use application needs and competitive materials positioning

3. Segment by Polyurea product technology type, including:

- a. Pure (Aromatic) Polyurea volume
- b. Hybrid (Aromatic) Polyurea volume
- c. Conventional Aliphatic Polyurea volume (similarities to pure aromatic segment)
- d. Aliphatic (aspartic ester) Polyurea volume - *may need to be excluded in the analysis due to the presence of only one major supplier*

4. Segment by Polyurea component types. This effort will outline the supply side of the industry while also revealing insights on end use applications and application trends:

- a. Isocyanate/MDI and other prepolymers
 - i. Volume produced by primary manufacturer (Huntsman, Dow, BASF, and Bayer)
 - ii. Volume produced by formulators
- b. Resin
 - i. Amines (Albermarle, Lonza, Hanson Group, etc.)
 1. Polyetheramine (D2000, T5000, T403)
 2. Diethyltoluenediamine (DETDA)
 3. Secondary Diamines (e.g., Polylink 4200)
 - ii. Aliphatics/Hydroxyls (e.g., PPG2000, 500)
- c. Additives
 - i. Color
 - ii. Adhesion
 - iii. Flow
 - iv. Flame Retardant
 - v. Others

5. Segment by geographic region
 - a. North America
 - i. US – Primary focus
 - ii. Mexico – Secondary focus; to include key formulators, less emphasis on contractor input for applications/markets
 - iii. Canada – Secondary focus; to include key formulators, less emphasis on contractor input for applications/markets
 - b. Western Europe – Data will be collected from raw materials manufacturers as well as key formulators in order to achieve a high level view of this region. The emphasis will be on a supply side summary of the market (rather than demand side) for the following countries:
 - iv. UK
 - v. France
 - vi. Germany
 - vii. Italy
 - viii. Spain
 - c. Asia – Data will be collected from raw materials manufacturers as well as key formulators in order to achieve a high level view of this region. The emphasis will be on a supply side summary of the market (rather than demand side) for the following countries:
 - ix. Korea
 - x. China
 - a. Japan
 - d. Former Soviet Union, including:
 - a. Russia
 - b. Kazakhstan
6. Volume of product through the distribution channels for Polyurea prepolymers
 - d. Direct supply from raw materials manufacturers
 - e. Distribution through captive system formulators
 - f. Direct supply from raw material (prepolymer) formulators
 - g. Distribution to Contractors
 - h. Other intermediaries
 - i. Imports - Exports

Explore Market Trends and Shifts, Projected Market Growth:

1. Within each major end-use market segment, usage of Polyurea by application will be quantified and trends and shifts in those applications will be explored. Macroeconomic issues that influence volume by application also will be explored providing insight into possible future trends and shifts in Polyurea usage.
2. Polyurea usage by product type also will be explored from the standpoint of usage drivers, competitive materials as well as trends and shifts in market applications
3. Trends and shifts that may occur in the markets under study and in the way in which products are produced will be evaluated (e.g., use of pure versus hybrid, resin combinations, etc.)
4. Relative positioning of Polyurea vis-à-vis major competitive materials with determination of key drivers of selection
5. *Any other key questions or issues necessary to secure key sponsor members*