Overview of Industrial Urea Markets: Applications and Opportunities

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**Agenda**

- **Industrial urea markets:**
  - How big is the market?
  - Key applications: resins, NOx controls, feed and others
  - Global and regional breakdown
  - North American market drivers
  - Europe’s integrated structure
  - Influencing factors: legislation

- **Opportunities:**
  - Future opportunities and challenges
Market size and breakdown
Non-fertilizer urea represents 11% of global urea consumption.
# Industrial urea applications & industries

## Applications

- Resins and adhesives;
- Melamine;
- Environmental controls;
- Animal feed;
- Pharmaceuticals;
- Cosmetics;
- Foliar applications;
- Hydrazine;
- Cyanuric acid

## Industries

- Chemicals;
- Wood-working;
- Textile and paper;
- Automotive;
- Industrial pollution controls;
- Agriculture;
- Medicine;
- Cosmetics;
- Specialty fertilizer

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## Industrial urea demand drivers by region: legislation & economic growth

<table>
<thead>
<tr>
<th>North America</th>
<th>South America</th>
<th>Europe</th>
<th>Asia Pacific</th>
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<tbody>
<tr>
<td>1 Mobile (on and off-highway) and stationary NO\textsubscript{x} abatement legislation</td>
<td>Construction industry growing strongly</td>
<td>On and off-highway and stationary NO\textsubscript{x} abatement</td>
<td>Resins market to grow strongly driven by investment in the region</td>
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<td>2 Economy and construction industry looking up and immigration trends underpinning resins rebound</td>
<td>On-road heavy-duty trucks NO\textsubscript{x} abatement legislation kicked in in Brazil 1 Jan 2012</td>
<td>Resins are strong but have suffered a setback. Increasing activity in Russia?</td>
<td>Pull from NO\textsubscript{x} abatement legislation has been strong in Japan, Korea and Australia and NZ, and China is moving</td>
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<td>3 Legislation and lobbying on formaldehyde content in wood-based furniture</td>
<td>Cattle feed consumption to increase with disposable income and more meat-based diets</td>
<td>Cattle feed and pharmaceuticals to remain resilient</td>
<td>Cattle feed use is growing but unevenly according to disposable income. Weather is a strong variable.</td>
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<td>4 Cattle feed and pharmaceuticals to remain resilient</td>
<td>Pharmaceuticals also developing strongly in some countries</td>
<td>Pharmaceutical industry to develop in the East of the region</td>
<td>Pharmaceutical use is resilient in advanced economies, has potential in developing countries</td>
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Source: Integer
UF and MUF resins represent just over 80% of the industrial urea market globally.

- Just over 80% of consumption is represented by resins. UF and MUF resins are used by the wood-working industry as adhesives and glues in furniture and buildings.

- The second largest use for urea in industrial applications is as a protein supplement in animal feed and, growing fast, the third use is as urea solution or AUS 32 in SCR-equipped vehicles, targeted at lowering NOx emissions from on and off-highway vehicles, as well as from stationary sources such as power stations, cement factories and industrial boilers and incinerators. SCR is also a good choice to meet 2014 GHG targets.

- Other uses include pharmaceuticals and other minor segments.

2010: 17.2 million tonnes

Source: Integer
In North America, the share of resins has shrunk since the peak of urea consumption in 2006/2007. Environmental use is the fastest growing.

- Resins and glues/adhesives used to represent 80% of the market for industrial-grade urea in North America before the recession of 2008/2009 took hold of the building and construction industries, prompting a major step change in consumption for these products.

- Demand for all types of resins, adhesives and sealants used in the building and construction sectors peaked in 2006-2007, with the abrupt end of the housing boom and has shrunk dramatically since 2008 and 2009, in some extreme cases even by as much as 50% in some areas of the region, and at least by 30% in others.

- SCR applications - stationary and mobile - are now a larger segment for urea consumption and represent around 16% of the market. Cattle feed comes in at around 17% and pharmaceuticals and others at 2% - with pharmaceuticals accounting for around 1.4%.

2010: 1.7 million tonnes

Source: Integer
Market drivers in North America
Environmental uses have been and are likely to continue to drive industrial urea growth in North America.

Source: Integer

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USA – Urea consumption into resins falls in 2008-2009

US housing permits (monthly series), ‘000 units

Urea consumption into resins, ‘000 tonnes

Source: US Census Bureau, Integer
Going forward? Towards a five-year high for housing permits

US housing permits (monthly series), ‘000 units

Source: US Census Bureau, Integer Industrial Urea Market Report

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Urea consumption into Diesel Exhaust Fluid (DEF) in the USA

'000 short tonnes

- Light-duty & pickups
- Off-highway equipment
- On-highway Class 4-8

Source: Integer, excludes stationary, rail, marine and barge

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Europe’s integrated structure
Strong industrial use for urea in West Europe

Fertilizer vs non-fertilizer use

- Fertilizer use: 51%
- Non-fertilizer use: 49%

The BASF model

- Urea
- Melamine
- AdBlue
- UF/MUF resins
- Crosslinking with PU/acrylates

Source: Integer
Environmental uses to drive West European demand growth, while resins look strong in East Europe.

Source: Integer
Russian industrial N markets are recovering

Source: Azotecon

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Influencing factors
# Influencing factors for resins: legislation

## Legislation limiting formaldehyde use in wood

### Japan
- JIS/JAS F**** (0.05mg/m²h)

### Europe
- E1 (<0.75ppm)
- E0 (<0.07ppm)
- Formacare

### USA
- CARB (<0.75ppm)
- Greenguard
### NOx Abatement Legislation timeline (USA)

<table>
<thead>
<tr>
<th>Application</th>
<th>Legislation</th>
<th>Targets</th>
<th>Start date</th>
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<tbody>
<tr>
<td><strong>ON-HIGHWAY APPLICATIONS</strong></td>
<td>Use of DEF compulsory to reduce NO(_x) emissions</td>
<td>New heavy-duty vehicles</td>
<td>EPA 2010 - January 2010</td>
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<tr>
<td><strong>OFF HIGHWAY APPLICATIONS</strong></td>
<td>Reduction of NO(_x) and other pollutants</td>
<td>Ag/construction and mining machinery</td>
<td>Transition 2010-2014 from T4 interim to T4 final</td>
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<tr>
<td><strong>STATIONARY APPLICATIONS</strong></td>
<td>NO(_x) and mercury emissions reduction</td>
<td>Power plants</td>
<td>‘Transport Rule’ approved 2010 and aiming to reduce NO(_x) emissions by 52% by 2014</td>
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<td>NO(_x) and mercury emissions reduction</td>
<td>Cement factories</td>
<td>Approved 2010 to reduce mercury, soot, smog and NO(_x) emissions. Comes into effect 2013</td>
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<td>NO(_x) and mercury emissions reduction</td>
<td>Industrial boilers and waste incinerators</td>
<td>Approved 2011 to establish work practice standards. Public review closing July 2011</td>
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<tr>
<td><strong>MARINE APPLICATIONS</strong></td>
<td>Reduction of NO(_x) and other pollutants</td>
<td>Ships and ocean-going vessels</td>
<td>US EPA Tier 4 from 2016 for US flagged vessels</td>
</tr>
</tbody>
</table>

Source: U.S. EPA, Integer
Opportunities & challenges
Opportunities & challenges

- Strongest industrial urea markets are still North America and Europe in terms of diversification and margins

- Environmental uses have taken over as the main driver for industrial urea growth

- Fastest developing markets for industrial urea are Latin America, Turkey, Russia, Southeast Asia and East Asia, chiefly China

- Industrial urea fetches a premium to fertilizer-grade urea for high-purity grades

- Legislation and strict standards are important drivers for most applications

- Opportunities for growth in the resins and environmental sectors

- What does the supply/demand balance look like?
Global urea demand growth projections 2011-2030

Source: Integer Nitrogen Cost and Profit Margin Service
Implications

• Total net capacity additions are likely to total 99 million tonnes 2011-2030, responding strongly to demand growth in fertilizer and industrial applications

• Most of the additions will take place in low-cost locations, with some closures taking place in high-cost locations

• North America is attracting strong interest for N investment and industrial applications are on existing producers’ and newcomers’ lists

• ETS III will impact N costs in Europe and is prompting closer scrutiny of the region’s nitrogen assets

• Overall, demand growth will be met by expansions or new builds
Thank you!

For more information: 
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Data and analysis from:

Industrial Urea Market Survey
AdBlue & DEF Monitor/DEF Tracker
The Emerging DEF Market
Nitrogen Cost & Profit Margin Service