Specialty Polyamides
High Performance Materials segment

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Executive VP
Specialty Polyamides market

Transformational project: integration of Hipro and Casda in China

- #1 worldwide
- Niche market: 200 kT
- Market share: 35%
- Main competitors: Evonik, Ems, Ube
- Superior properties for high value niche applications

![Diagram showing properties of PA6 and PA11](image)

Price (€/kg)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Price (€/kg)</th>
</tr>
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<tbody>
<tr>
<td>PA6</td>
<td>5</td>
</tr>
<tr>
<td>PA10, PA11, PA12</td>
<td>10</td>
</tr>
</tbody>
</table>

![Graph showing commodities vs. specialties](image)

- BASF
- DSM
- Dupont
- Invista
- Solvay
- Lanxess

- Arkema
- Evonik
- Ems
- Ube
Unique range of long-chain polyamides

**petroleum**
- fossil resource -
  
  **CDT**
  
  **Lactame 12**
  - monomer -
    
    **POLYMERIZATION**
    
    **Polyamide 12**

**castor plants**
- renewable resource -
  
  **Undecanoic acid**
  
  **amino 11**
  - monomer -
    
    **POLYMERIZATION**
    
    **Polyamide 11**

  **Sebacic acid**
  
  **diamine 10**
  - monomer -
    
    **POLYMERIZATION**
    
    **Polyamide 10**
Arkema’s Specialty Polyamides business

**Major achievements**

- Successful repositioning on higher value applications
  - Oil & gas
  - Electronics
  - Lightweight materials
  - Sport
- Acquisition of Hipro/Casda
- Restructuring in Europe

**Competitive advantages**

- Proprietary advanced technologies and applicative know how developed over 50 years
- Only player with full range of specialty polyamides (PA10, 11, 12) with unique position in bio-based polyamides
- Sole producer of bio-based polyamide 11
- Global industrial footprint
- Premium brands (Rilsan®, Pebax®)
- Density of innovation projects
Main end-markets

Sales by end markets

- Transportation: 30%
  - Fuel lines
  - Air brake systems
- Energy: 27%
  - Flexible pipes for deep off shore oil recovery
- Consumer goods: 19%
  - Sport (shoes, ski boots, etc.)
  - Cosmetics
- Industrial coatings: 11%
  - Powder coating
  - Adhesives (hot melt)
- Other industrial applications: 9%
- Electronics: 4%
  - Covers for laptops and mobile devices

Key growth drivers

- **Transportation**
  - Lightweight materials for metal replacement
- **Energy (off shore)**
  - Development of non conventional recovery of oil
- **Consumer goods (sports, cosmetics)**
  - Increasing standard of living
  - Top of the range products
Two examples of high value applications

Flexible pipes for deep off shore oil recovery

- **Rilsan®**: material of choice for the barrier to gas and oil layer
  - Chemical resistance
  - High thermo-mechanical properties
  - Flexibility

- Supply star award from Technip in 2012 for the second time

- Growth drivers
  - Development of non-conventional production technologies
  - Rehabilitation of existing pipeline network

Rilsan® HT: 1st high temperature specialty polyamide to replace metal in tubing in automotive

- Combining outstanding properties with cost efficiency

Previous technology: metal + rubber assembly
New technology: flexible high temperature PA11 pipes

Component / system cost

![Graph showing 50% savings](chart.png)

- Assembly
- Processing
- Material

Metal tubing assembly
Rilsan® HT tubing assembly
Strategic lines

- **Take advantage of full range of Specialty Polyamides (PA10, 11, 12)**
  - The right product for the right application
  - Unique position in bio-based high performance polymers

- **Leverage Hipro-Casda acquisition**
  - Accelerate Hipro development leveraging Arkema’s strong applicative know-how with on-going capacity expansion project
  - Take advantage of fully integrated chain

- **Accelerate development in higher growth countries**
  - Asia: integration and development of Hipro-Casda
  - South America: support key customers developments in rapidly growing economies

- **Focus innovation on high value applications**
  - Transportation: metal replacement
  - Oil & gas
  - Bio-polymers in consumer goods
Unlock Hipro and Casda potential

**Casda Biomaterials: take advantage of fully integrated value chain**
- Worldwide leader in sebacic acid (55% market share)
- Strong base for future growth of PA10
- Enhance business value with external sales to other bio-polymers producers

**Hipro Polymers: leverage Arkema strong applicative know-how in specialty polyamides to achieve rapid expansion**
- On-going project to triple PA10 capacity in China (expected start-up 4Q’12)
- Global product portfolio enhancement
  - Shift PA11 / PA12 toward very high value applications
  - Develop positions of PA10 range on traditional applications
Specialty Polyamides key take-aways

- **Worldwide leader in Specialty Polyamides**
  - Full range of products (PA10, 11, 12)
  - Only player with bio-based PA10 and PA11
  - Only player with global industrial footprint

- **Market growth driven by increasing needs for highly technical solutions**
  - Deep off shore
  - New energies
  - Metal replacement in transportation

- **Arkema’s future growth supported by development of recently acquired Hipro/Casda**

- **Strong earning resilience with combination of high growth and high value**

  +5% /year
  CAGR 2012-2016
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The business segment information is presented in accordance with Arkema’s internal reporting system used by the management.

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