Outline

- India Polyethylene Market Drivers
- PE Technology Solutions for Success
- UNIPOL™ PE Process – The Strategic Solution
  - Product Capability
  - Process Flexibility
  - World-Class Performance
- Summary
India Polyethylene Market Drivers

**Dynamic Asian PE Markets**

- **USD / ton**
- Jan ‘10 to Oct ‘14
- LLDPE, HDPE

**India +3.3MT PE Growth**

- +0.5MT Specialty PE
- Metallocene, HDPE Pipe
- Conventional PE

**A Dynamic Market**

- Fast growing commodity market
- Periods of PE price volatility
- Feedstock advantaged competition

**Diverse and Evolving Needs**

- Cost-effective grades for large markets
- Specialty grades for premium markets
- Capability to capture new opportunities

**Constant New Developments**

- Infrastructure growth & renewal
- Increasing packaging sophistication
- Opportunity to replace import volumes

Sources: Nexant ChemSystems POPS Executive Report 2013, ICIS Pricing October 2014
PE technology solutions for long term success

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UNIPOL™ PE Technology
- Safe, streamlined process design
- Largest proven reactor capacities
- Lowest investment & operating costs
- Broadest product mix in single reactor
- Unparalleled catalyst development
- Track record of technology transfer
Univation Technologies & UNIPOL™ PE Process
Global Leader in PE Production

- **Exclusive licensor of the UNIPOL™ PE Process**
  - >40 years operating experience
  - >140 licensed UNIPOL™ PE Process lines
  - Over 1/3 global HDPE/LLDPE market position

- **The leader in operating & announced capacity**
  - >25 million tons operating capacity from 110 lines
  - >33 lines currently in design / construction
  - >2X larger than next closest competitor

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Source: Nexant ChemSystems POPS 2013, ICIS News and Univation Technologies internal assessment
UNIPOL™ PE Process
Simple, Streamlined Process Design

- Fewest pieces of major rotating equipment
- Reactor gas loop optimized to provide stable operation
- Technology enabling quick & efficient transitions
- Standard extrusion equipment for pelleting
- No cyclone solid/liquid separation system required
UNIPOL™ PE Process
Lowest Total Investment Costs

- Up to ~$45 million lower total investment cost
- Low investment cost leader for both LLDPE & HDPE production
- Lower overall operating costs vs. other gas phase & slurry loop technologies

Graph Source: Nexant Chemsystems POPS Technology Report, 2012; Total Investment Costs, 400 KTA capacity plant
UNIPOL™ PE Process

Technology leadership in largest proven capacity

Preferred, proven industry leader for single line ≥400kta capacities

- 20 lines in operation ≥400kta capacities
- 16 lines in design/construction ≥400kta capacities
- Plants in operation with capacities up to 650kta

Other LL/HD Technologies Maximum Operating Capacities

- Process A: Phase Gas 370 KTA
- Process B: Phase Gas 320 KTA
- Process C: Loop Slurry 300 KTA
- Process D: Tank Slurry 240 KTA

Graph Sources: Nexant Chemsystems POPS Executive Report, 2013
UNIPOL™ PE Process Delivers World-Class Operating Performance

**UNIPOL™ PE Process HDPE/LLDPE Operating Performance**

<table>
<thead>
<tr>
<th>Licensee Example</th>
<th>% Aim-Grade</th>
<th>% Operating Time</th>
<th>Total Monomer Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td>100.0</td>
<td>100.0</td>
<td>1.002</td>
</tr>
<tr>
<td>Top Quartile</td>
<td>99.3</td>
<td>99.2</td>
<td>1.006</td>
</tr>
</tbody>
</table>

- Outstanding operating performance across all key manufacturing metrics
- Most plants operate above original nameplate & maintain excellent performance
- Advanced premium technology runs at 5 – 15% higher rates vs. conventional catalysts
  - XCAT™ Metallocene Catalysts
  - ACCLAIM™ Advanced Chromium Catalysts
  - PRODIGY™ Bimodal Catalysts

Sources: Univation information on UNIPOL™ PE operating line process performance (2012 – 2013)

Total Monomer Ratio (TMR): \( \frac{\text{ethylene + comonomer}}{\text{total resin production}} \)
UNIPOL™ PE Process
Broader Product Capabilities in a Single Reactor

<table>
<thead>
<tr>
<th>State-of-Art Catalysts</th>
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<tbody>
<tr>
<td>UCAT™ J Catalyst</td>
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<tr>
<td>XCAT™ Metallocene Catalyst</td>
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<tr>
<td>ACCLAIM™ Unimodal Catalyst</td>
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<tr>
<td>PRODIGY™ Bimodal Catalyst</td>
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<tr>
<th>Over 150 Resin Grades Offered</th>
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<tbody>
<tr>
<td>Full HD/LL Application Range</td>
</tr>
<tr>
<td>Metallocone LLDPE</td>
</tr>
<tr>
<td>Conventional LLDPE</td>
</tr>
<tr>
<td>Unimodal HDPE</td>
</tr>
<tr>
<td>Bimodal HDPE</td>
</tr>
</tbody>
</table>
Univation Technology Leadership

Extensive patent estate with wide-spread technology acceptance

HD & LL Patent Family Filing Activity

- Leading patent portfolio
  - >12,000 patent filings provide competitive FTO advantage
  - Coverage across HD, LL, MCN platforms
  - IP includes products, process & catalysts technologies

- Leading advanced technology licensor
  - Advanced ACCLAIM™, PRODIGY™ & XCAT™ Catalysts
  - Since 2005, 82% customers licensed advanced technologies
    - >14 million tons licensed advanced catalyst capacity
    - ~50% licensees select multiple advanced technologies

IP Source: UT 3rd party IP benchmarking study
Note: Univation patent filing data reflects Univation’s licensable patent portfolio
XCAT™ Metalloocene Catalysts
Providing World-Class Metalloocene Leadership

Global Metalloocene Producing Capacity

- **India**: ~170KTA @ >10% AAGR (’14 – ’24)
  - Dependence on imported metalloocene LLDPE to meet demand
  - Global metalloocene LLDPE ~5000KTA @ >8.5% AAGR (’14 – ’24)

- **XCAT™ Metalloocene Catalyst Technology**
  - >35% of total metalloocene LLDPE marketplace
  - >19 yrs commercial experience
  - >16,000KT cumulative commercial metalloocene LLDPE resin

Global Licensed Metalloocene Technology Capacity

- **Univation success with XCAT™ Catalyst**
  - ~75% of licensed metalloocene capacity
  - >10 producing commercial reactors
  - Licensee & UT parent lines: 100 - 650KTA

Sources: Townsend Solutions HAO LLPDE / mLLDPE 2012, Nexant Chemsystems POPS 2013, Nexant Global Metalloocene Review 2014 & Univation estimates
UNIPOL™ PE Process
Quick & seamless product transitions

- Full HDPE/LLDPE product wheel capability
- PREMIER™ APC+ optimizes running grade transitions
  - Transition recipes pre-loaded for all UNIPOL™ PE Resin grades
  - Minimizes off-grade with transitional resin segregation
- Quick Transition Technology enables faster transitions
  - Transition time reduced up to 60%
  - Selected by 15 licensees since 2009
- Efficient product transitions achieved
  - Minimizes transition time enabling up to 99.5% aim-grade
Univation Technologies
Extensive Technology Support Across UNIPOL™ PE Plant Lifetime

- Life-long on-site support from plant commissioning through advanced catalyst implementation
- Industry leading safety performance with >2,400 reactor-years of safe operations
Univation Technologies
Delivering Strategic Solutions for the Indian PE Producer

UNIPOL™ PE Technology

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- Lowest investment & operating costs
- Broadest product mix in single reactor
- Unparalleled catalyst development
- Proven record of technology transfer
Univation Technologies

Proven to deliver. Designed to adapt.