

INEOS Technologies

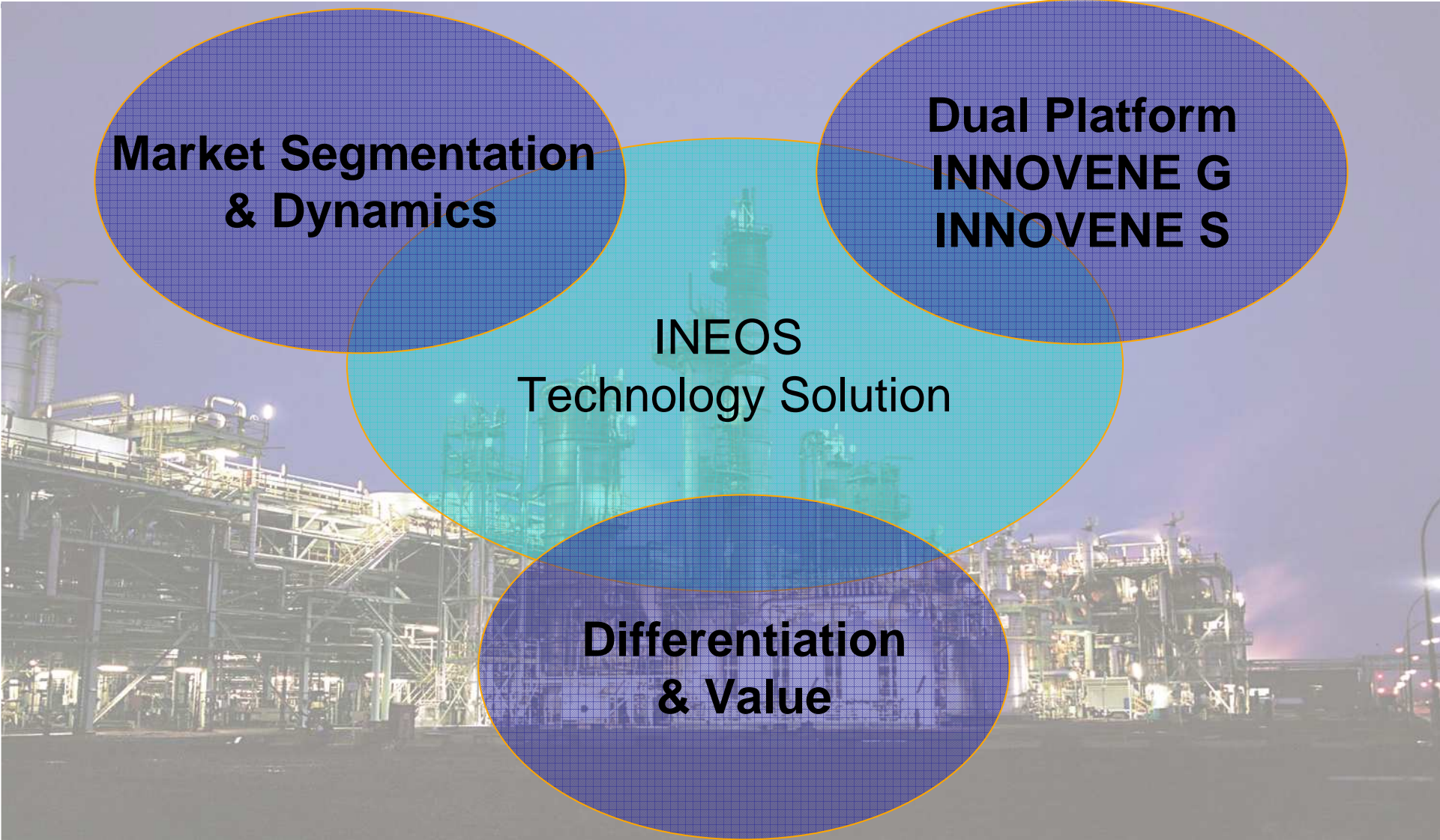
Differentiated Dual PE Technologies Platform

Maack PEPP 2009

*Presented by
Frédéric ALARCON
Regional Licensing Manager*

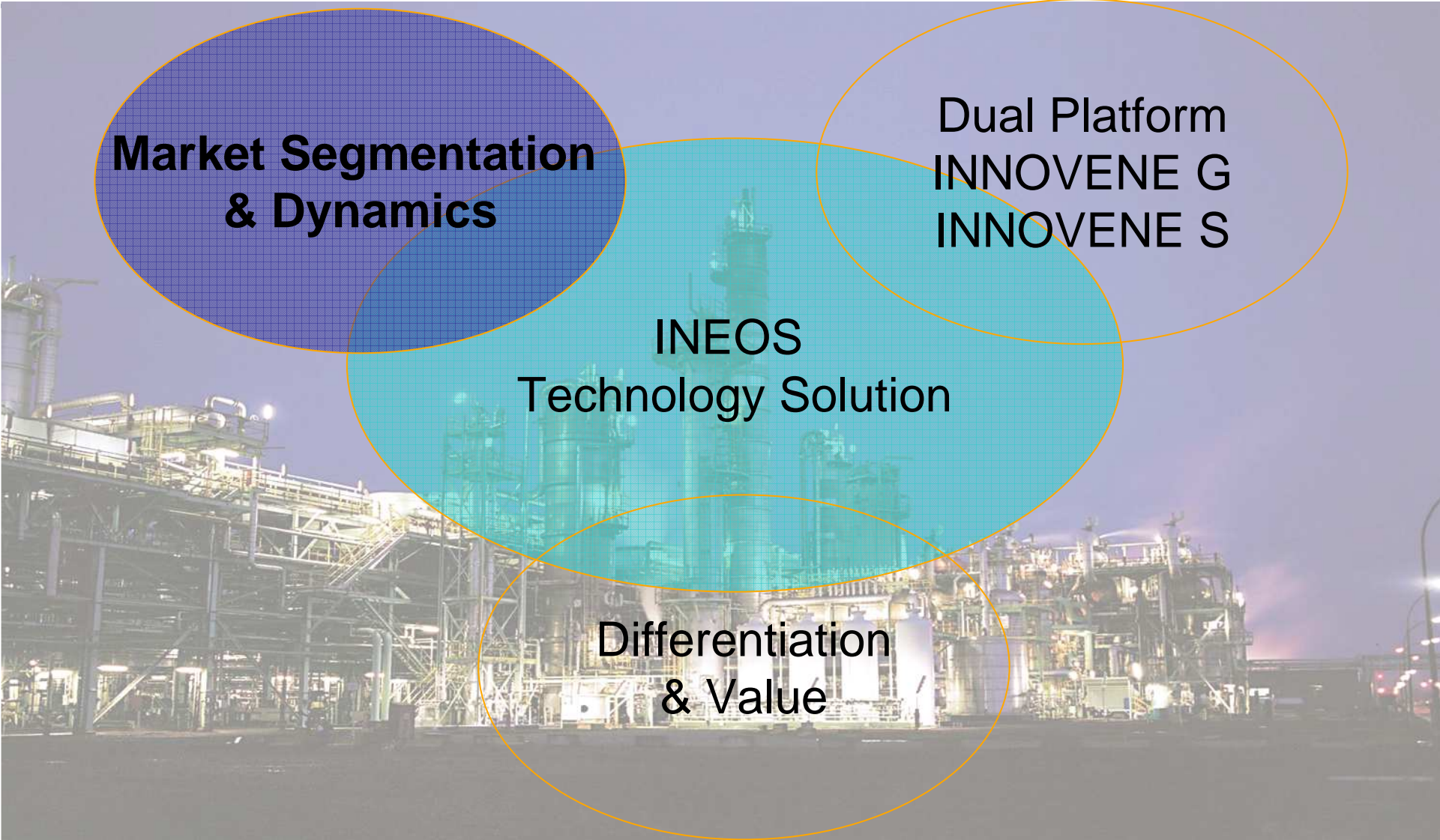


Presentation Agenda



Presentation Agenda

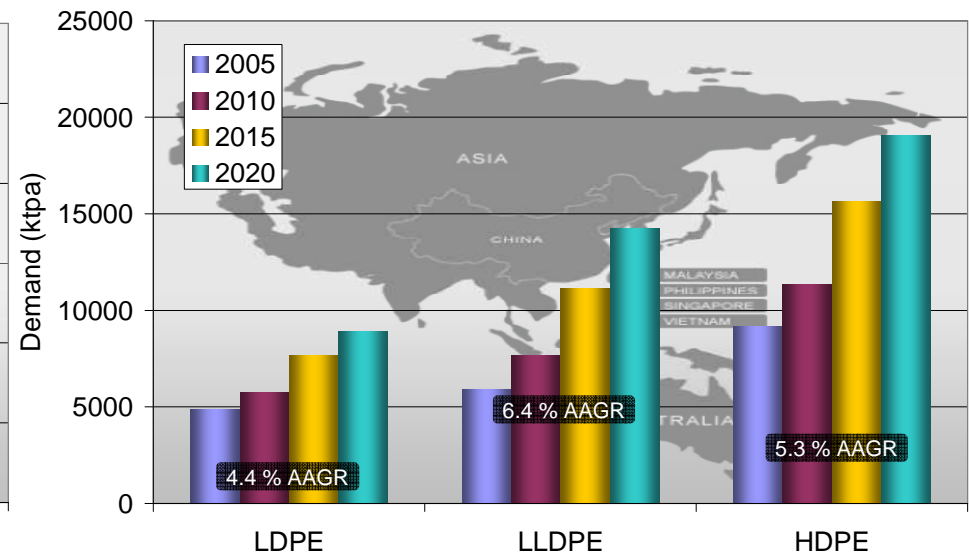
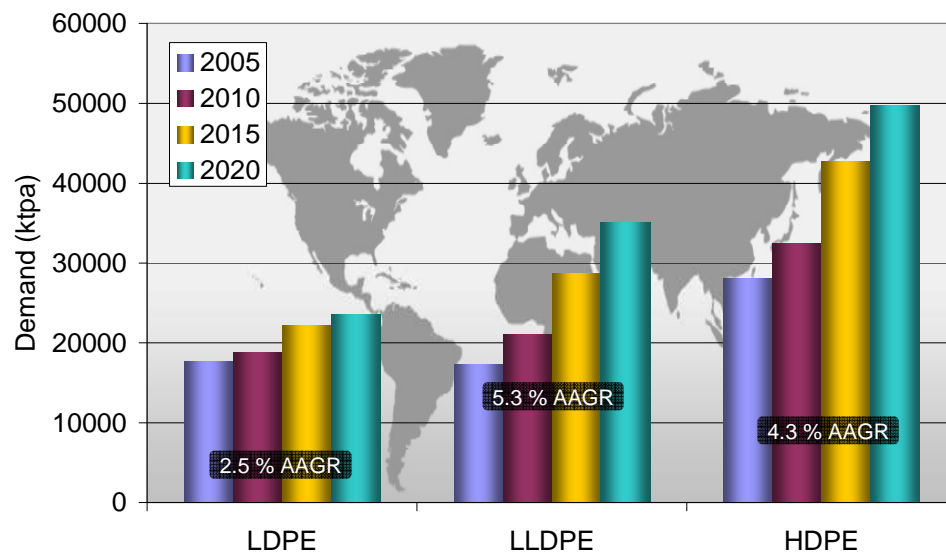
Part 1



PE Global Demand Trend World & Asia Pacific



- » LLDPE shows the greatest Average Annual Growth Rate (2008-2020 average) followed by HDPE
- » Asia Pacific region shows greater growth than average world growth for all polymers

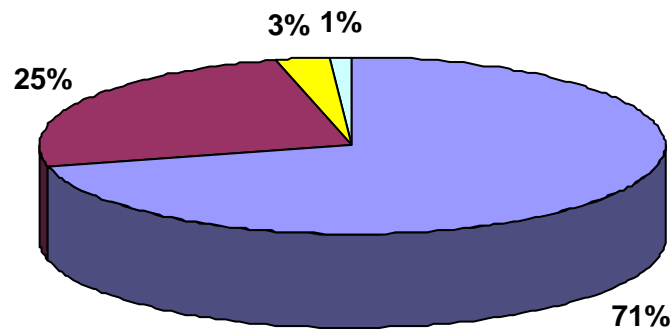


Based on Nexant POPS 2009

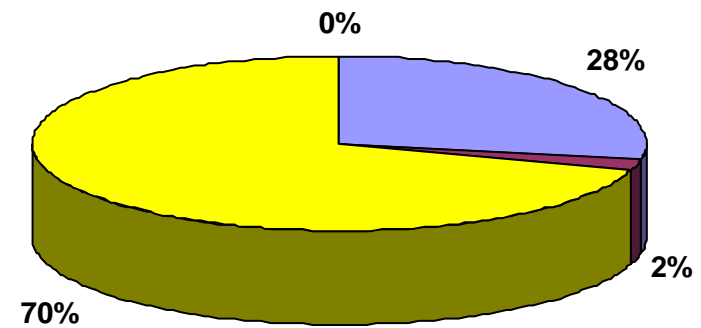
Installed Polyethylene Capacity



LLDPE / Swing



HDPE Dedicated



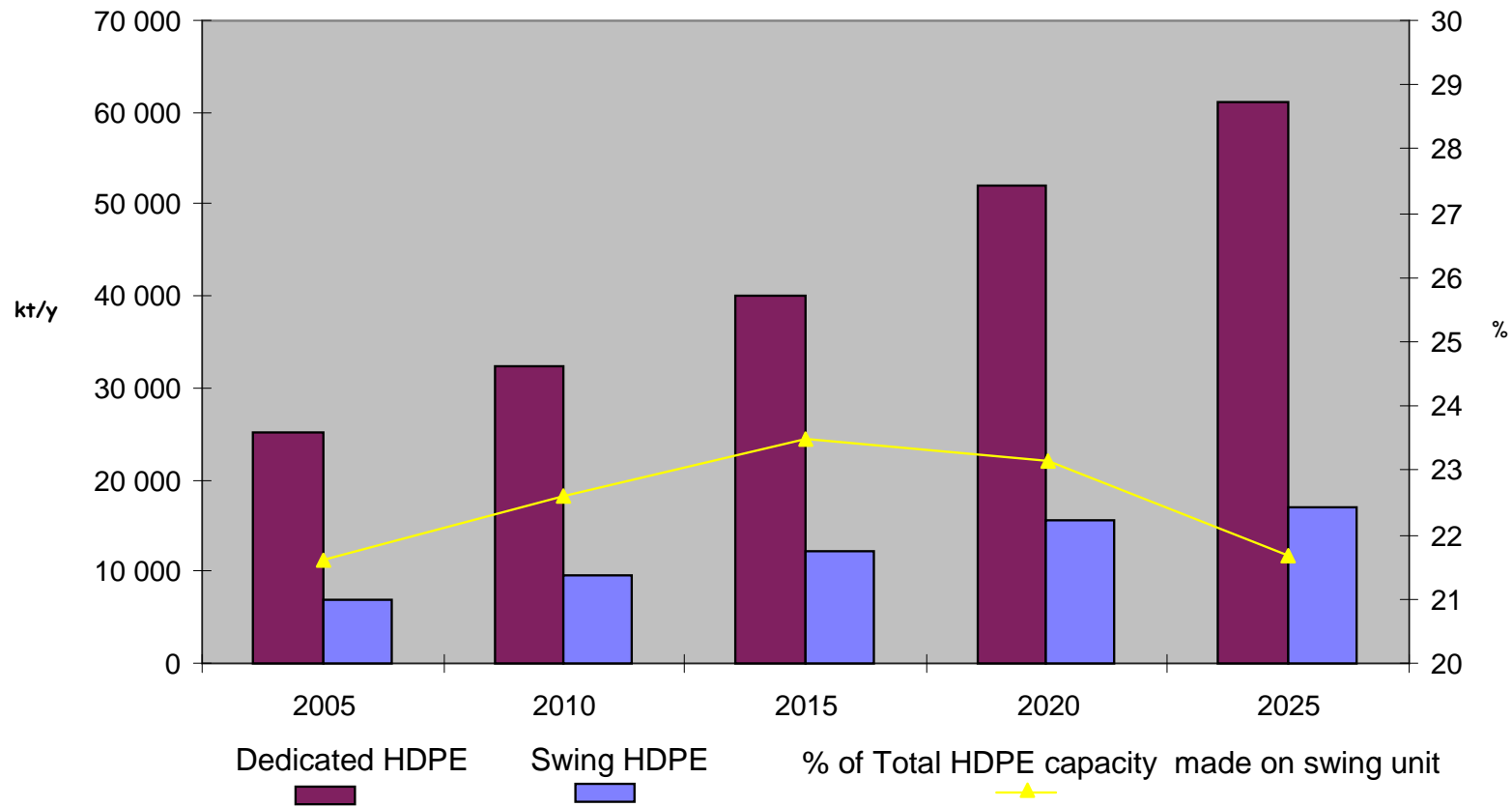
- Gas Phase
- Solution
- Slurry
- Others

Based on Nexant POPS Technology Review 2008

HDPE Units Production Share



HDPE Worldwide Capacity



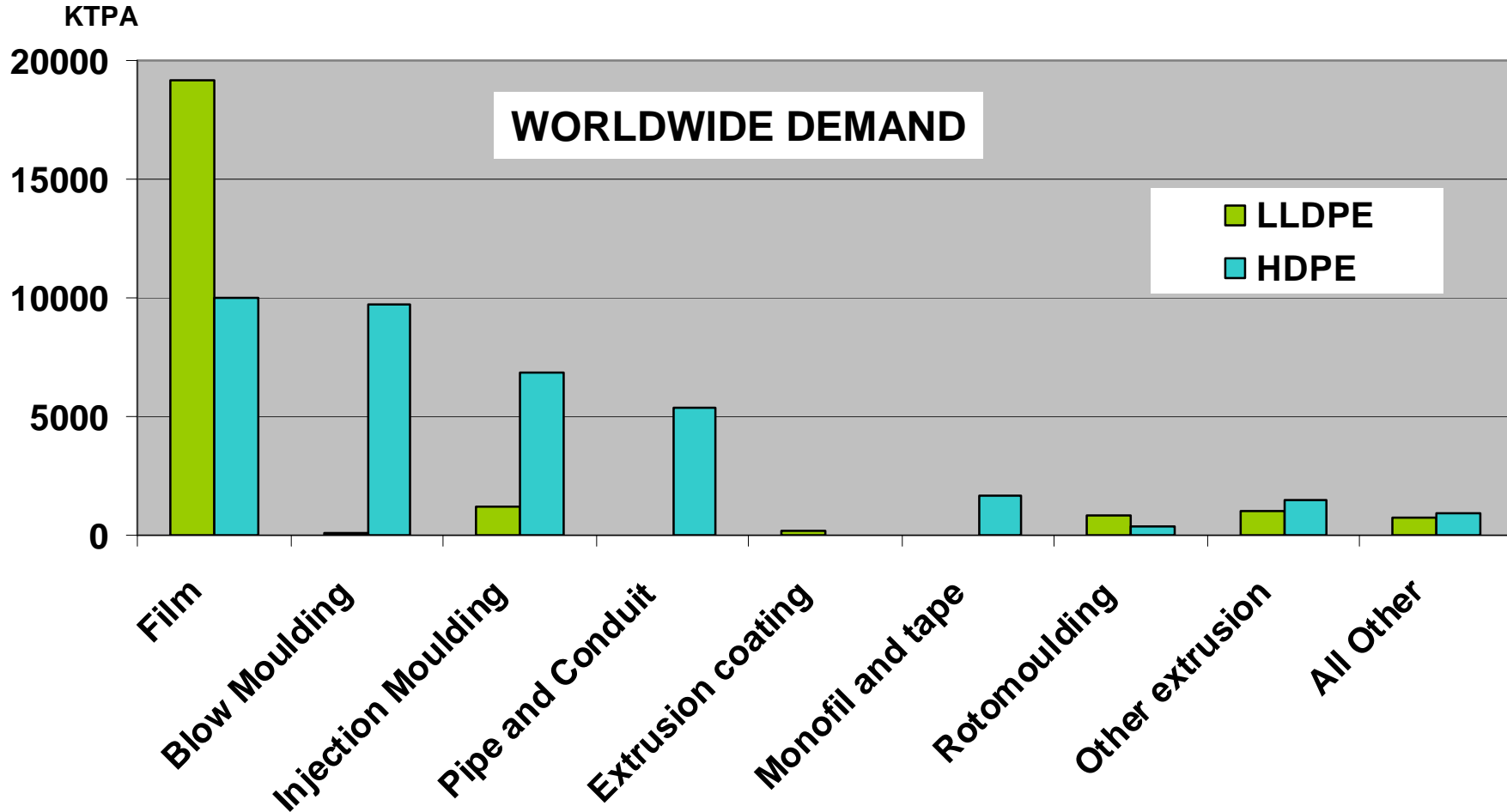
Based on Nexant POPS 2007

LLDPE & HDPE Applications



Market Applications

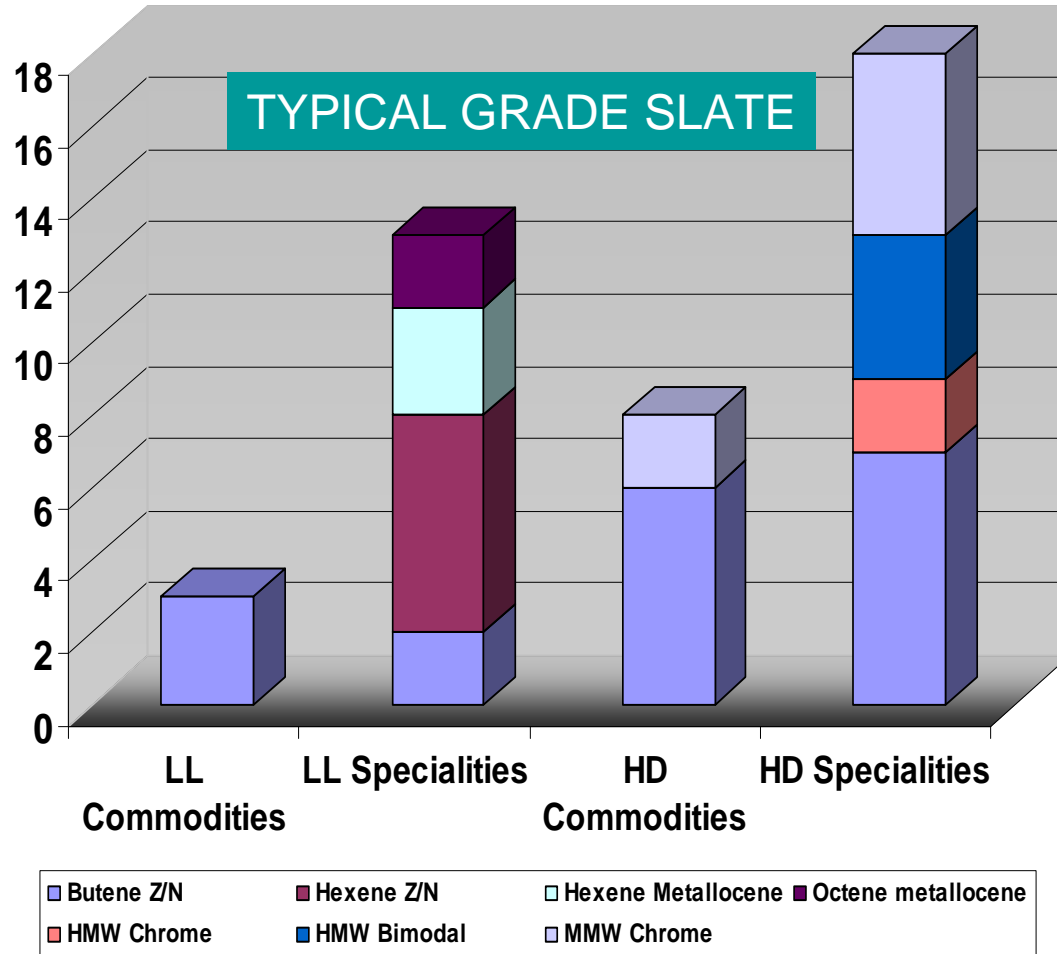
HD Market Fragmentation



PE Market Fragmentation



N° of Reactor Grades



HD market more fragmented than LL market

Dedicated plants for full product flexibility

Comonomer and catalysts flexibility is key for market coverage

Largest capacity plants are oriented towards commodities

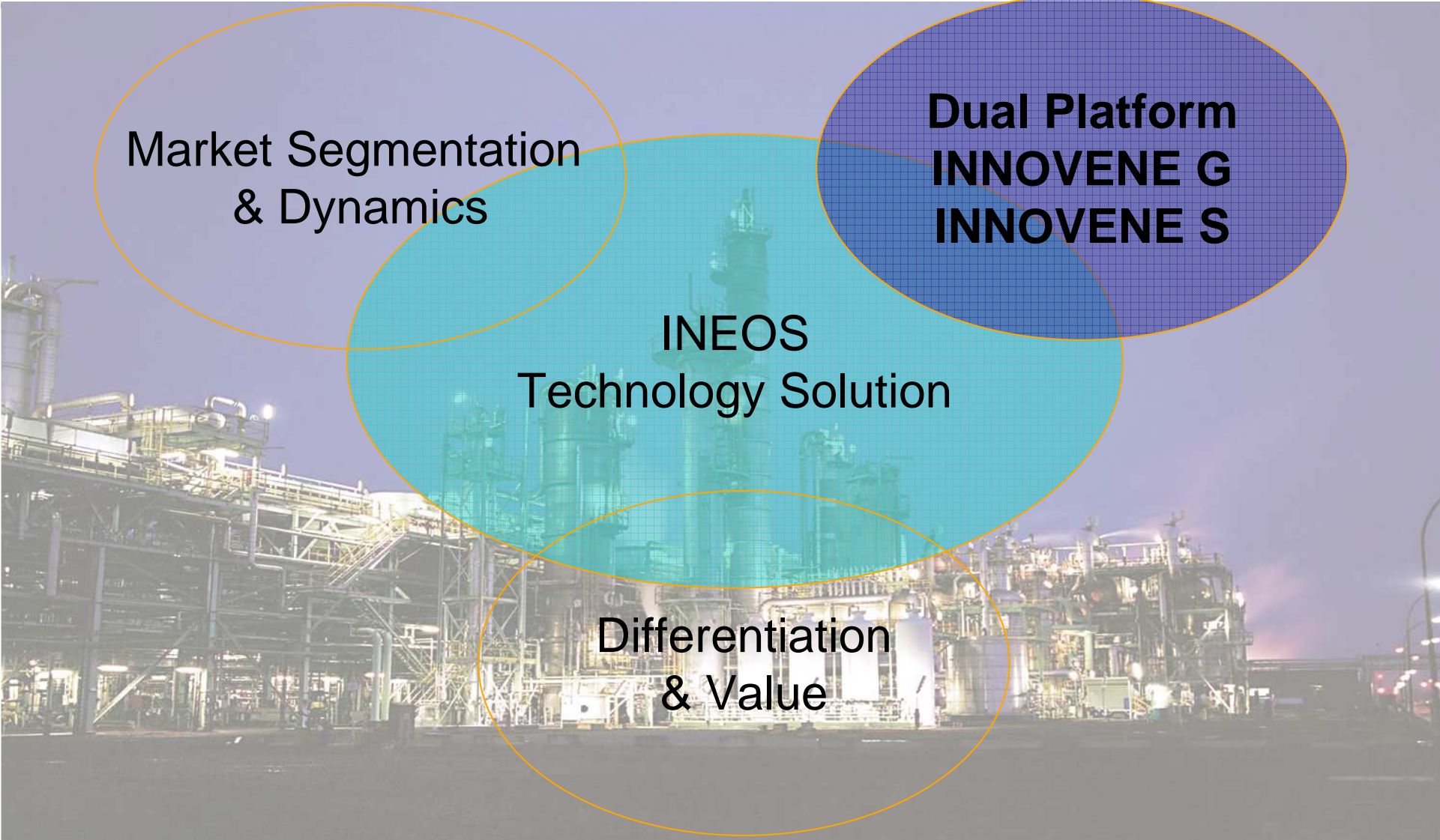
Source INEOS Technologies

Market Requirements & Technology Capability



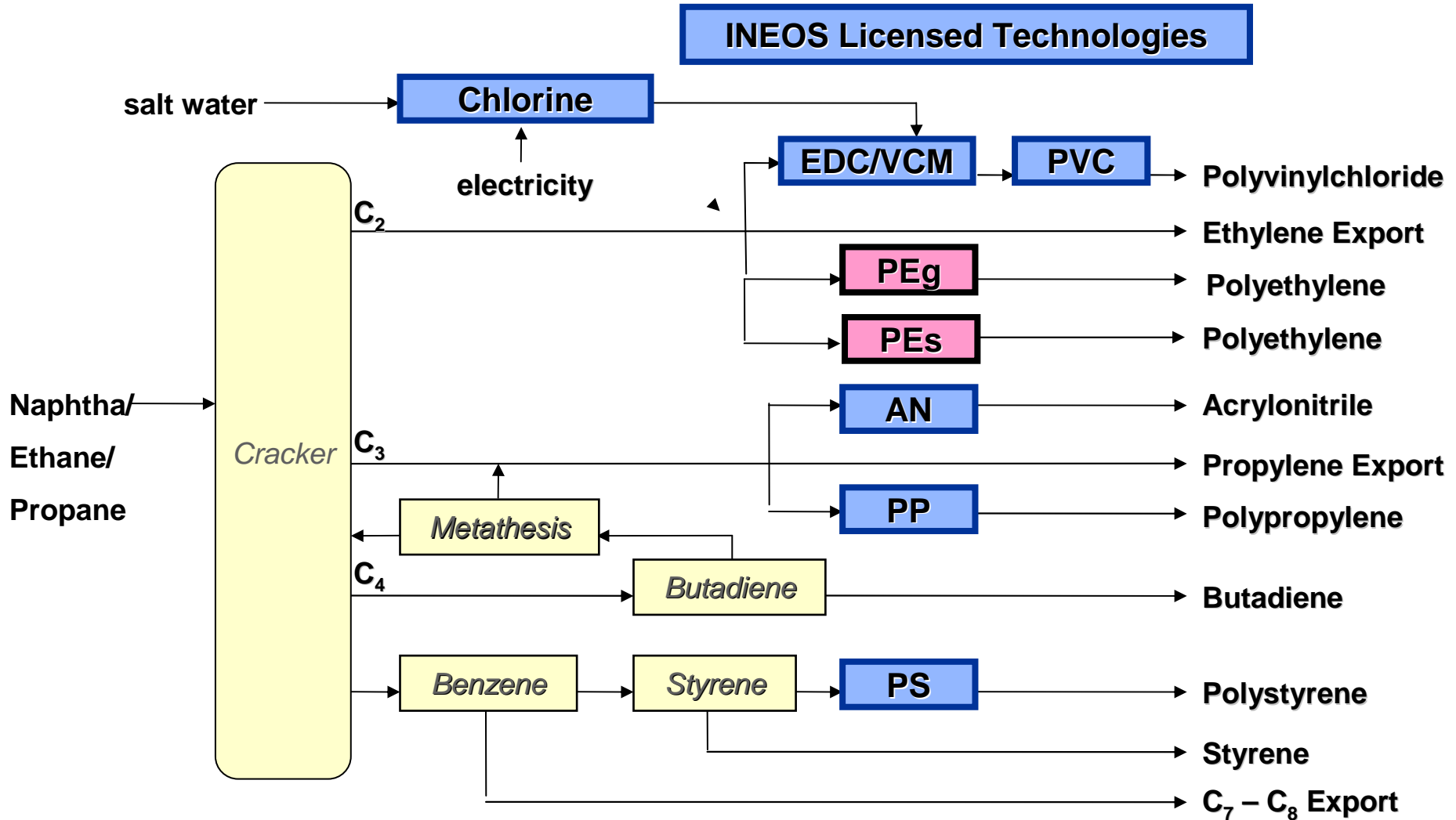
- » **LL & HD market demand will grow sustainably in the next 20 years**
- » **HD demand is more fragmented than LL**
- » **Dedicated plants are better fit for the PE market demand dynamics**
- » **Dedicated technologies are better fit for the LL and HD demand requirements**

Presentation Agenda Part 2



Solutions for Projects

Cracker Example



INEOS Differentiated Polyethylene Technologies



INNOVENE G Swing LLDPE / HDPE FullFlex Gas Phase



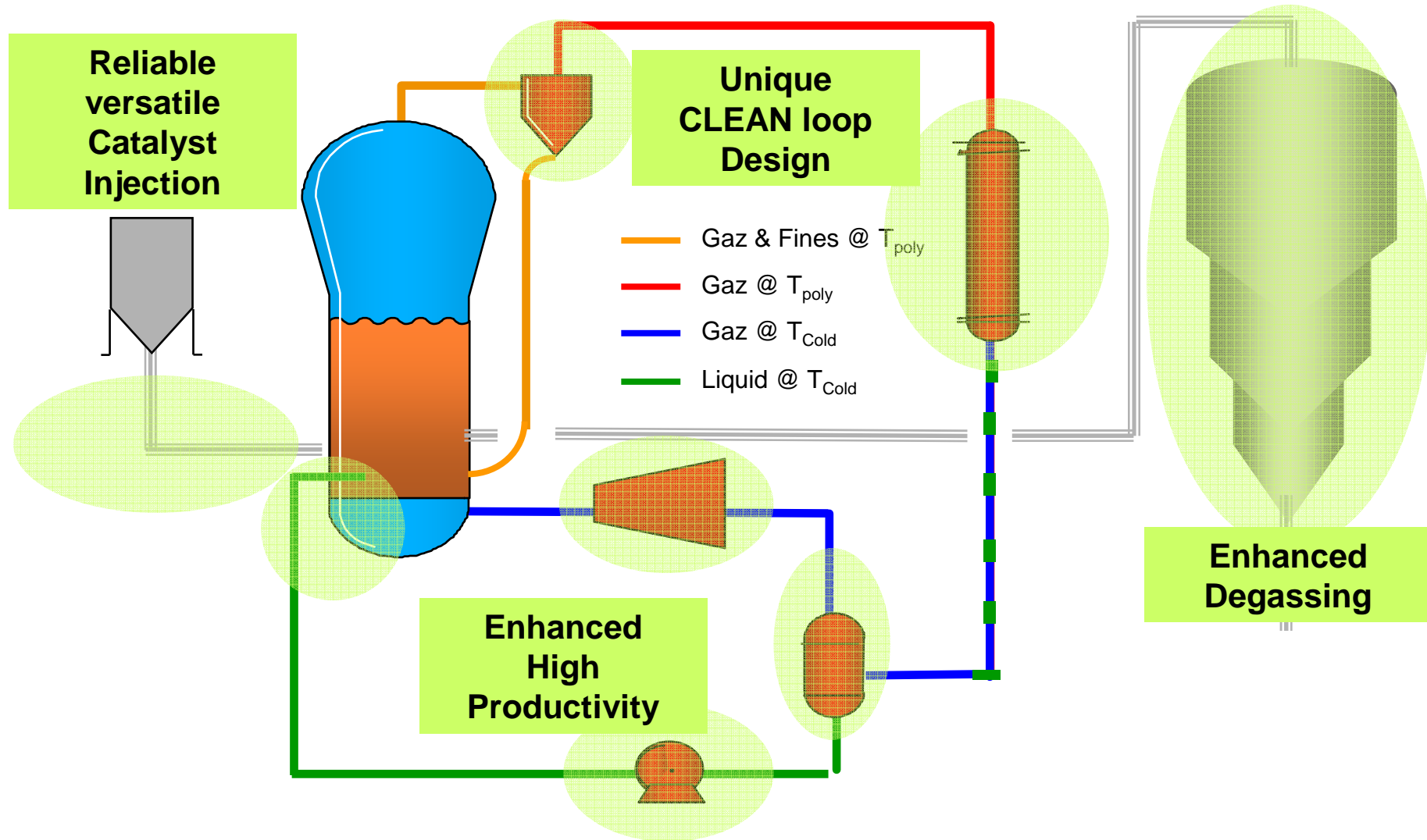
- Extensive Grade Slate LL/HD
- Advanced Clean Loop Design
- Cost Competitive Operations

INNOVENE S Bimodal HDPE / MDPE Slurry Phase



- Established HD/MD Mono-Bimodal
- State of the Art Loop Design
- Cost Leading Slurry Technology

INNOVENE G FULLFLEX Process Technology



INNOVENE G

The FullFlex Technology

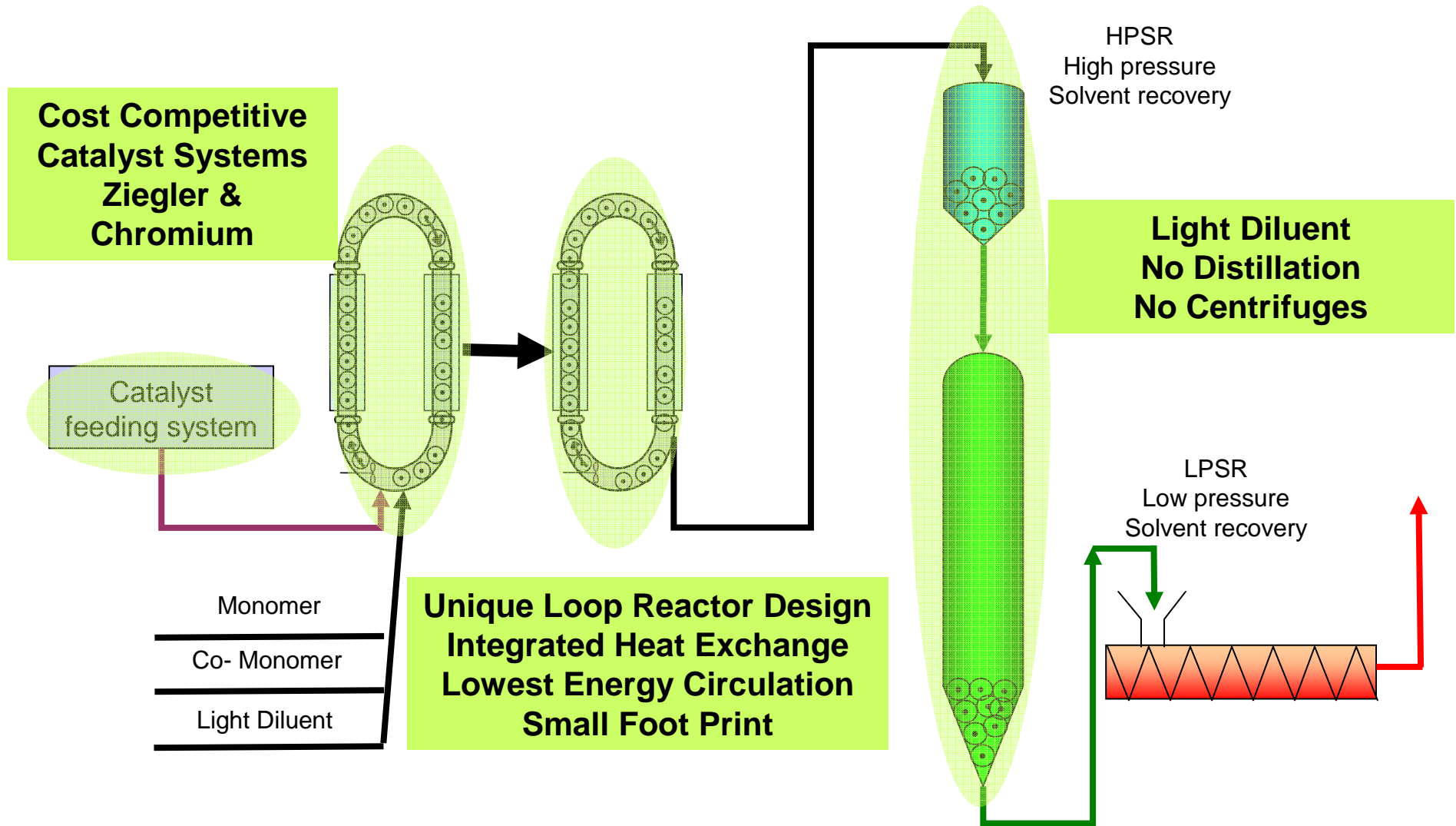


- **Best in class** mLLDPE / mMDPE
 - Processability, mechanical & optical properties for film and/or rotomolding
- LLDPE
 - Best in class **LL C6** film grades
 - Very competitive LL C4 for film & injection
- HDPE
 - Extensive **Ziegler & Chromium** grades offer with differentiated ESCR properties
- **C4 / C6 / C8** unique comonomer versatility



The Cost Efficient & Versatile Gas Phase Technology

INNOVENE S Process Technology



INNOVENE S

Leading Slurry Technology



- Fully commercial **HD / MD** grades
 - Mechanical properties, processability, applications requirements
- **Market leading pressure Pipe** resins
 - Leading PE 100 resins, access to colored compounds technology
- Advanced **Z/N bimodal** technology
 - For pipe, film and blow moulding
- Maximum **product flexibility** at low production costs



The Unique Cost Leading Access to Bimodal Products

Presentation Agenda Part 3



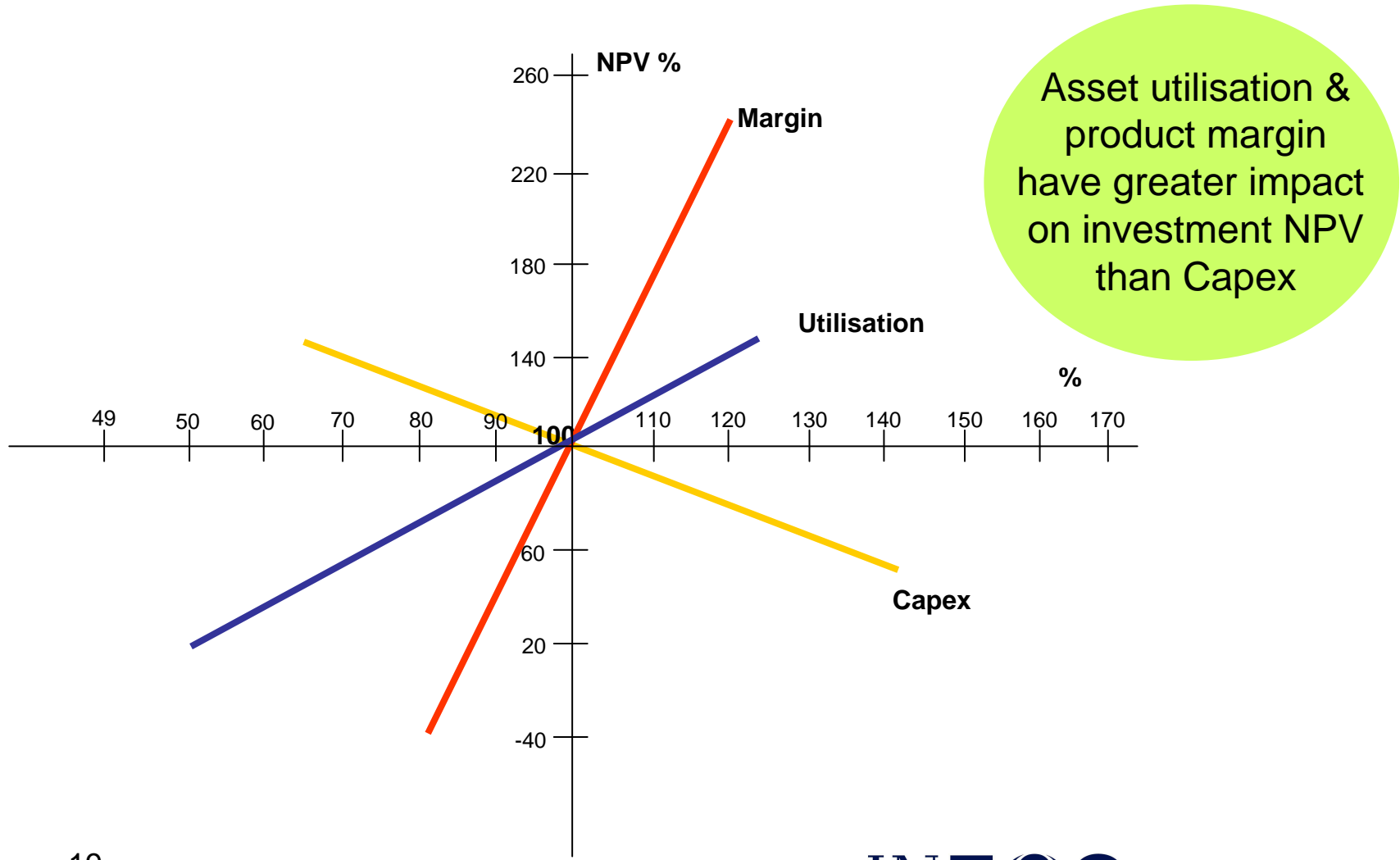
Market Segmentation
& Dynamics

Dual Platform
INNOVENE G
INNOVENE S

INEOS
Technology Solution

Differentiation
& Value

Investment Criteria Sensitivity Analysis

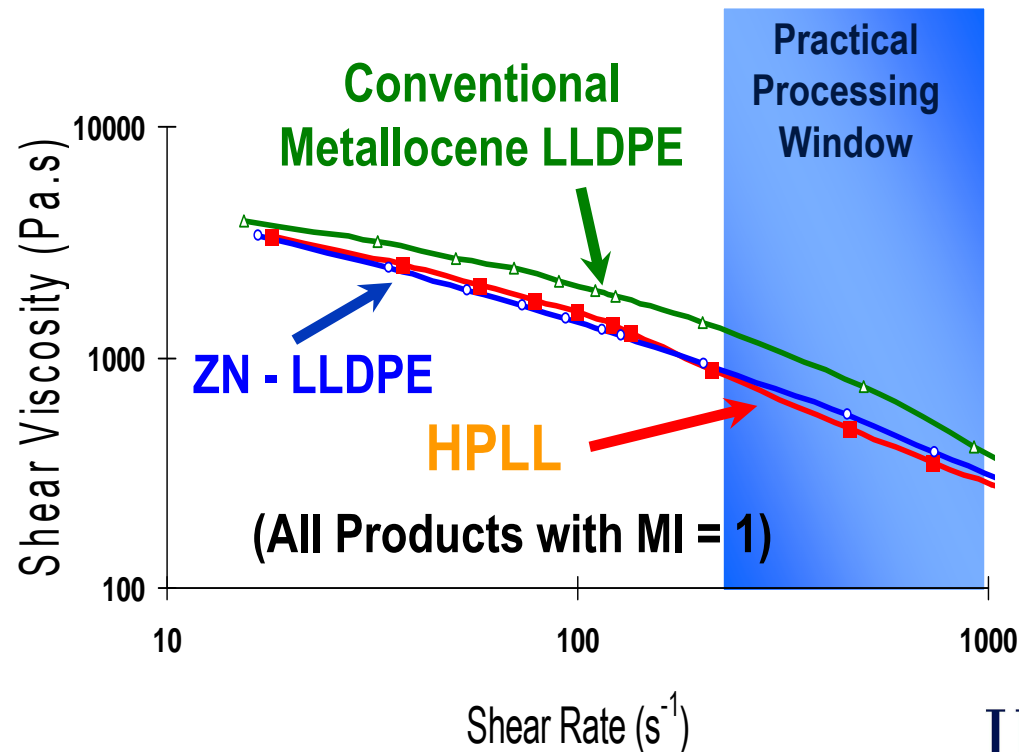


INNOVENE G

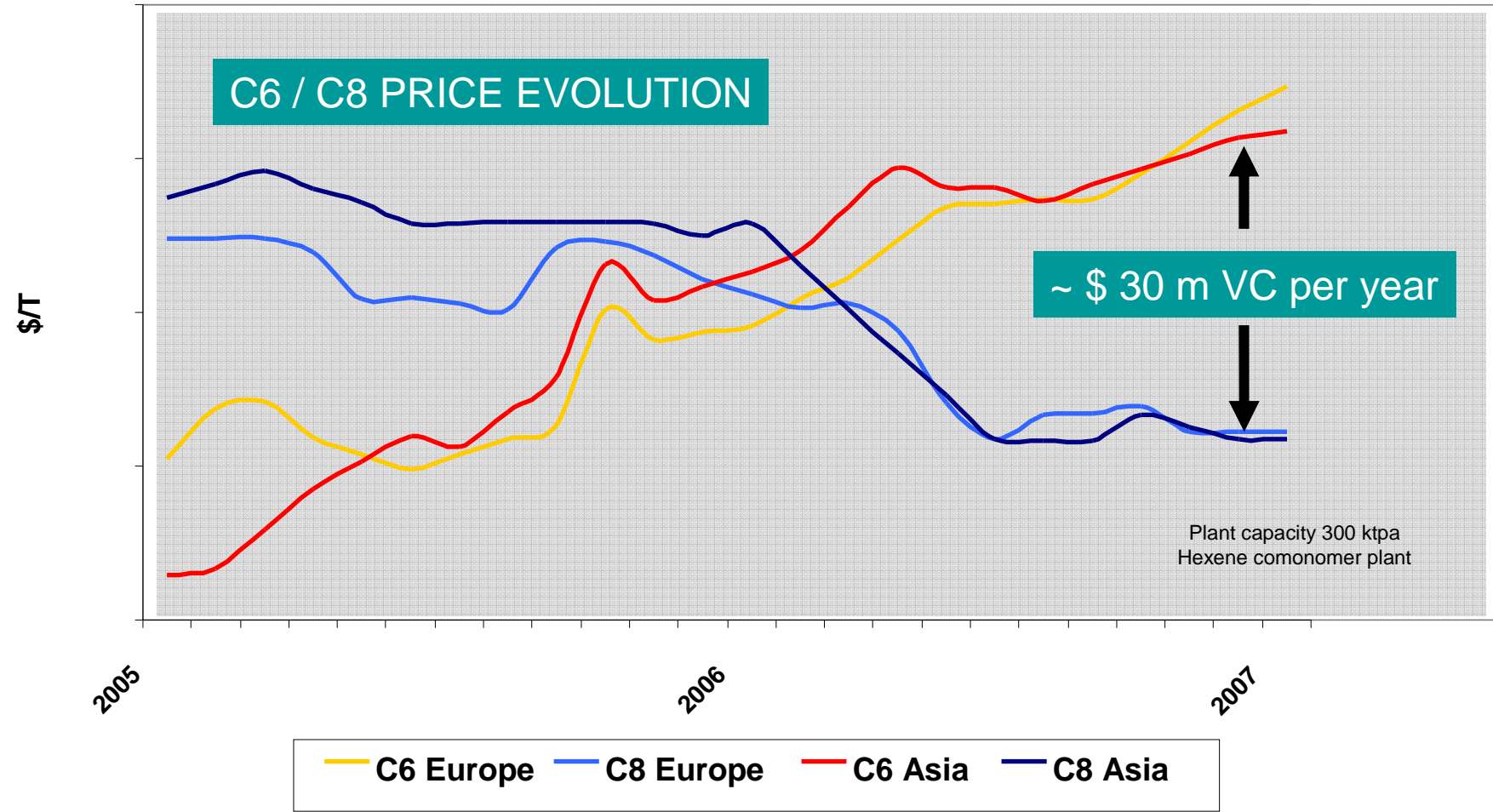
Premium High Performance LL



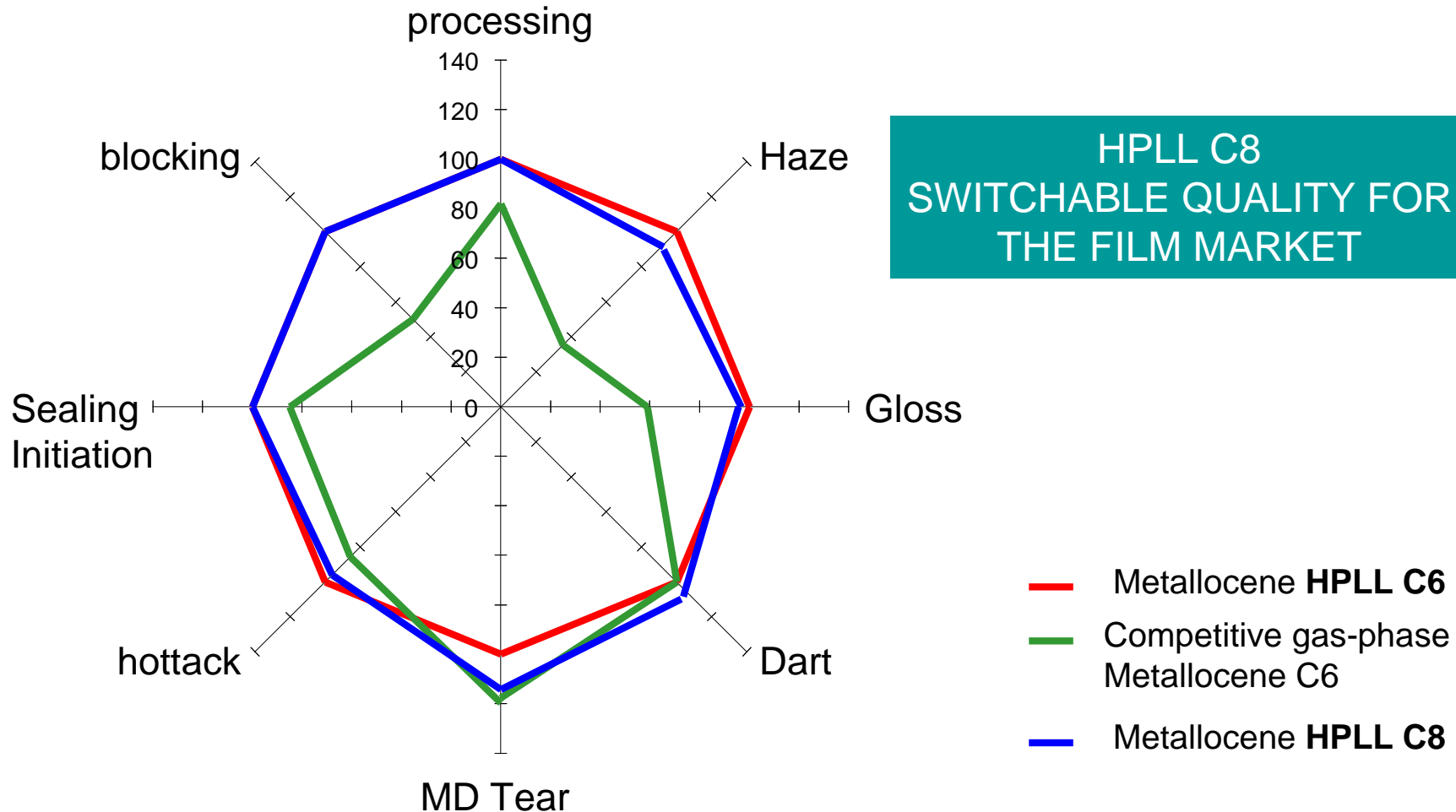
- » **Lower viscosity** during extrusion reduces melt pressure and motor load, thereby saving power
 - Up to **20%** higher machine output demonstrated on commercial extruders
 - Savings in energy costs by lower load on extruder motor (**€10-20/t**)



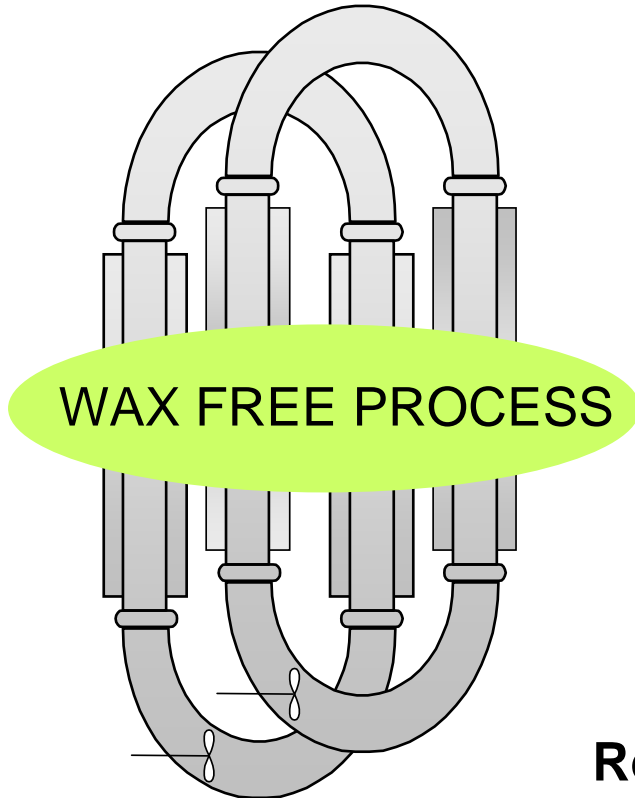
Comonomer Flexibility



INNOVENE HPLL C6 / C8 Substitution



INNOVENE S Wax Free Process



Lower Investment Costs

No equipment for wax removal

Lower Utilities Costs

For electricity and steam

Lower Fixed Costs

No dedicated manpower for wax management

Better Product Quality Acceptance

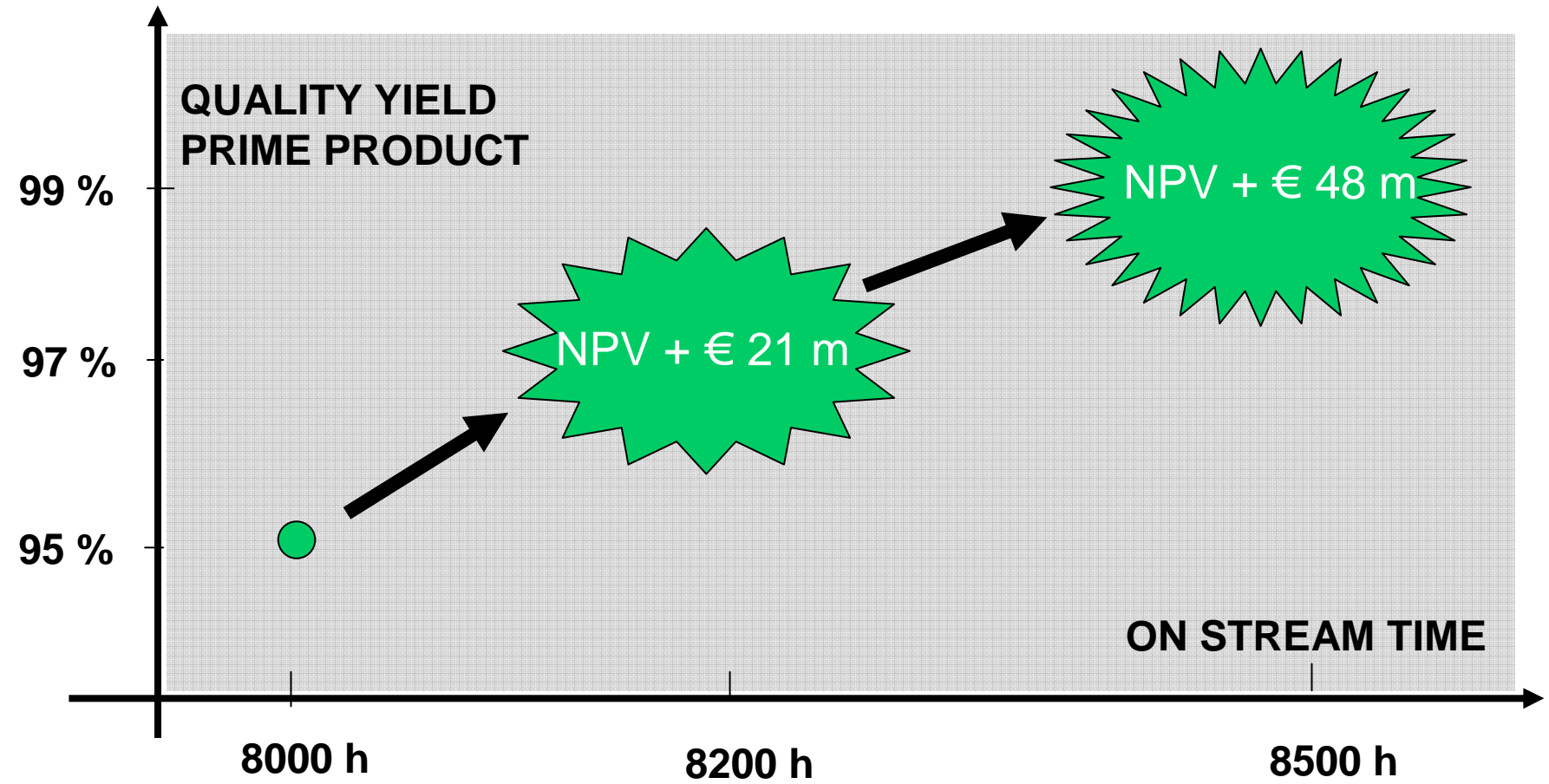
No quality impact due to residual wax content

+

Revenue Opportunity in excess of \$ 4.0 m / Year

- 350 ktpa slurry plant
- 4500 t of wax per year
- 750 \$ discount on ethylene price for wax

Plant Life Time Value



NPV 10 years
9 % discount
Margin discount 150 €
Plant capacity 450 ktpa

Presentation Agenda Conclusion



Market Segmentation
& Dynamics

Dual Platform
Innovene G
Innovene S

**INEOS
Technology Solution**

Differentiation
& Value

Conclusions



- » **Market Dynamics** for LL & HD require **Dedicated Technologies**
- » **Technology Flexibility** & **Product Differentiation** create **Value**
- » **INNOVENE G** (gas-phase) / **INNOVENE S** (slurry) dual platform proves to be an attractive solution for **Polyolefins Investments**

INEOS Technologies

Solutions for Petrochemical Projects

