Expanding petrochemicals

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Capturing growth in petrochemicals
More cracker capacity needed to meet continuously rising demand

Main polymer demand
Mt/y

<table>
<thead>
<tr>
<th>Year</th>
<th>Polyethylene</th>
<th>Polypropylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2025</td>
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</tbody>
</table>

~40 Mt/y new capacity needed
~30 Mt/y capacity sanctioned
A clear path to creating value
Profitability driven by access to cheap feedstock

Main polymer feedstocks

Polymer price is oil-linked

Feedstock prices
$/t

US shale underpinning ethane and LPG discount
Implementing a two-pillar strategy
Expanding gas-based cracker capacity, increasing naphtha cracker flexibility

Expanding gas-based cracker capacity
- US ethane market
- Middle East long-term contracts

Increasing flexibility of historic naphtha crackers
- Leveraging integration to valorize refinery off-gas
- Converting to cheaper, increasingly available LPG
Upgraded European platforms cracking LPG and ethane
Antwerp and Normandy positioned among leaders

Normandy cracker processing up to 60% LPG

Antwerp modernization completed
- 60% ethane, off-gas & LPG cracker feedstock
- Shut down oldest cracker and polymers

Shut down Carling cracker
Expanding worldclass petrochemicals in the US
Total-Borealis-Nova joint venture, an integrated polyethylene leader

Low-cost ethane to high-end polyethylene

50% interest in a best-in-class JV
• 1.7 B$ Capex for 1 Mt/y ethane cracker
• Low-cost expansion, maximum synergies with existing cracker and refinery
• Expanding Bayport polymer to 1 Mt/y

~1 B$ CFFO from US R&C operations

Evaluating further growth prospects in land of opportunity for petrochemicals
Expanding giant integrated platform in South Korea
Highly competitive brownfield project from low-cost propane

Best-in-class integrated platform
• 8 Mt/y highly flexible condensate splitter
• 1.1 Mt/y cracker and polymers
• 3.5 Mt/y aromatics

Low-cost debottlenecking
• ~450 M$ Capex, ~20% IRR
• +30% ethylene capacity
• Polymers 20% cheaper than China greenfield

Increasing cracker flexibility to 25% LPG feedstock
Expanding worldclass operations in the Middle East
Evaluating 3 projects to double cracking capacity to >4 Mt/y

**Growing Qatar petrochemicals** by up to 40%
- 100% ethane cracking
- Ras Laffan debottlenecking to ~1.4 Mt/y
- New 0.8 Mt/y Qapco side cracker

**Building on SATORP refinery success**
- Evaluating 1 Mt/y cracker
- >75% off-gas, ethane and LPG feedstock

**Memorandum of Understanding to study**
Iran and Algeria petrochemicals

* In 2016, 100% view
Developing high-end polymers
Tailor-made solutions supporting margins

**Specialty polyethylene**

- **#1 in China** for orange pressurized gas & water pipes
- **6% per year** demand growth for metallocene grades
- **Antwerp** investment

**Lightweight solutions**

- **Polypropylene compound**
- **5% per year** demand growth
- **Doubling compounding capacity** 2016-22
- **Polyblend, Carling** investments

**High performance bioplastics**

- **75 kt/y polylactic acid JV**
- **>10% per year** demand growth
- **Biosourced, biodegradable**
- **Thailand JV, world #2 player**
Expanding high return petrochemicals
Strong business taking advantage of favorable outlook

- Relentlessly **improving competitiveness**
  - Capturing >3% per year **demand growth**
  - Best-in-class projects **adding >20% capacity**
    - Maximizing synergies on giant platforms
    - Adding value to advantaged feedstock
    - Securing low cost energy

- ~1.8 B$ CFFO in 2017
- ~30% ROACE in 2017
- ~20% CFFO growth 2017-22*

*In constant petrochemical environment*
Increasing R&C organic free cash flow by >30%
Expanding petchems, selectively upgrading platforms, reducing costs

R&C organic free cash flow
B$

<table>
<thead>
<tr>
<th>Year</th>
<th>ERMI $/t</th>
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<tbody>
<tr>
<td>2012</td>
<td>36</td>
</tr>
<tr>
<td>2017</td>
<td>37</td>
</tr>
<tr>
<td>2022</td>
<td>35</td>
</tr>
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* In 2017 petrochemical environment

3 B$ Free cash flow in 2017
1 B$ Free cash flow 2017-22
>25% ROACE