METHANOL
AGENDA

- Demand
  - MTO
  - US
- Supply
  - North American projects
- Tradeflows
  - Iranian Sanctions
- Pricing and Margins
  - Methanol and Crude Oil Current Conditions

Q&A
Methanol Demand
2010 Global Methanol Demand By End-Use

- Formaldehyde: 34%
- Acetic Acid: 11%
- MTBE/TAME: 12%
- MMA: 2%
- Gasoline Blending: 7%
- Biodiesel: 4%
- DME: 9%
- Methylamines: 4%
- Solvents: 6%
- Chloromethanes: 3%
- Others: 8%
- Others: 8%
# 2015 Global Methanol Demand By End-Use

The pie chart below illustrates the distribution of 2015 global methanol demand by end-use. The chart shows the following end-uses and their respective percentages:

- **Formaldehyde**: 27%
- **MTO**: 18%
- **Acetic Acid**: 9%
- **MTBE/TAME**: 8%
- **MMA**: 2%
- **Gasoline Blending**: 9%
- **Biodiesel**: 3%
- **Chloromethanes**: 2%
- **DME**: 8%
- **Solvents**: 4%
- **Others**: 7%
- **Methylamines**: 3%
- **Chloromethanes**: 2%
- **Acetic Acid**: 9%
# Strong Demand Growth into MTO - Existing Plants

<table>
<thead>
<tr>
<th>MTO/P Company</th>
<th>Location</th>
<th>Time on stream</th>
<th>Max. Methanol Consumption</th>
<th>Methanol Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhongyuan PC</td>
<td>Puyang, Henan</td>
<td>Oct. 2011</td>
<td>600</td>
<td>Long term contract with plants near by and merchant market</td>
</tr>
<tr>
<td>Fund Energy (Ningbo)</td>
<td>Ningbo, Zhejiang</td>
<td>April. 2013</td>
<td>1800</td>
<td>Contract and merchant market</td>
</tr>
<tr>
<td>Nanjing Wison</td>
<td>Nanjing, Jiangsu</td>
<td>Oct. 2013</td>
<td>900</td>
<td>Self supply and merchant market</td>
</tr>
<tr>
<td>Shandong Shenda (Levima Group)</td>
<td>Tengzhou, Shandong</td>
<td>Dec. 2014</td>
<td>1200</td>
<td>Long term contract with nearby plants and merchant market</td>
</tr>
<tr>
<td>Zhejiang New Energy</td>
<td>Jiaxing, Zhejiang</td>
<td>April. 2015</td>
<td>1800</td>
<td>Contract and merchant market</td>
</tr>
<tr>
<td>Shandong Hengtong</td>
<td>Tengzhou, Shandong</td>
<td>July. 2015</td>
<td>900</td>
<td>Long term contract with nearby plants and merchant market</td>
</tr>
<tr>
<td>Shenhua Xiwan</td>
<td>Yuli, Shaanxi</td>
<td>Dec. 2015</td>
<td>1800</td>
<td>Long term contract with nearby plants and merchant market</td>
</tr>
<tr>
<td><strong>Total Max. methanol demand</strong></td>
<td></td>
<td></td>
<td><strong>9000 Kt</strong></td>
<td></td>
</tr>
</tbody>
</table>
New US Methanol Demand

• Thus far, basically only fully integrated projects that consume methanol:
  - ZeoGas – MTG
  - EmberClear – MTG
  - BASF – GTP

• Only exceptions are:
  - Momentive adding 90 Kta of methanol demand in formaldehyde
  - Mitsubishi potentially adding 170 Kta of methanol demand in MMA
  - Celanese adding 75 Kta of methanol demand in acetic acid
Methanol Supply
Improving Methanol Operating Rates

Global Methanol Supply Demand

- Demand
- Total Capacity
- Operating Rate
- Effective Operating Rate

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• Production from unconventional sources will continue to expand rapidly

• By the end of the forecast period, gas production from shale gas and tight oil plays will represent over 75% of total gas production
2019 World Methanol Industry Production Cash Cost

World Cost Curve: Methanol

(Price Basis = IHS, Cost Basis = Plant Gate,
Operating Rate Basis = IHS Baseline)
Methanol Tradeflows
Global Methanol Trade Shift – South America

2014

4.3 Mt

1.1 Mt
Global Methanol Trade Shift – South America

2014

2015

4.3 Mt

4.0 Mt

1.8 Mt

1.1 Mt
Global Methanol Trade Shift – 2020 North & South America

- 5.0 Mt (North America) to 0.98 Mt (South America)
- 1.2 Mt (South America) to 5.0 Mt (Europe)

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Global Methanol Trade Shift – 2020 North & South America

+6.2 Mt

5.0 Mt

0.98 Mt

0.65 Mt

1.2 Mt
An Update on Iranian Sanctions
Iran: Sanctions Update

• Iran and the P5+1 countries reached a historic agreement on 14 July 2015 that curbs Iran's nuclear programme in return for sanctions relief
• The agreement has now effectively passed US Congress
• The US and Iran adopted the nuclear agreement on the official “Adoption Day”, 18 October 2015
• “Implementation Day” is likely to be between in the first half of 2016, IF Iran satisfies the IAEA it has fulfilled its nuclear obligations
• However, these are only part of a network of sanctions; earlier US sanctions will remain in place, as will congressional restrictions on US companies and their subsidiaries' ability to do business in Iran
Iran: Impact on the Methanol Market

• Short-term:
  • Rather than being mainly restricted to China and India, Iran could export to other markets, maximising its netbacks
  • This is likely to have the effect of minimising regional price differentials
  • Plant reliability could improve if Iran has better access to items such as spare parts, catalyst charges etc.
  • Current margins are breakeven at best for importing into China at a price of $215 CFR

• Longer-term:
  • Iran could add to its current 5m tpa methanol capacity
  • Existing projects could be re-invigorated
  • New projects, potentially with overseas finance and know-how, could be implemented
  • By 2025-2030 Iran’s methanol capacity could grow by more than 10m tpa
### Methanol Projects Announced in Iran

<table>
<thead>
<tr>
<th>Company</th>
<th>Project</th>
<th>Capacity in Kta</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaveh Methanol Co</td>
<td>New Facility</td>
<td>2,300</td>
<td>Medium Term</td>
</tr>
<tr>
<td>Marjan PC</td>
<td>New Facility</td>
<td>1,650</td>
<td>Medium Term</td>
</tr>
<tr>
<td>Fanavaran PC</td>
<td>Expansion</td>
<td>1,650</td>
<td>Long Term</td>
</tr>
<tr>
<td>Kharg</td>
<td>Expansion</td>
<td>1,400</td>
<td>Long Term</td>
</tr>
<tr>
<td>Sabalan PC</td>
<td>New Facility</td>
<td>1,650</td>
<td>Long Term</td>
</tr>
<tr>
<td>Siraf Energy Invest.</td>
<td>New Facility</td>
<td>1,650</td>
<td>Long Term</td>
</tr>
</tbody>
</table>
Methanol Pricing and Margins
The 4Q 2015 US spot methanol price was $269 vs $415 in 4Q of 2014 and that is approximately $80 lower than we expected six months ago.

Our outlook for 2016 pricing is $263 vs $327 in 2015.

In general the US methanol market came under significant pressure at the end of 2015.

- WHY?
  - Planned: new capacity onstream in the US
  - Environmental: further falls in the crude oil price
  - Unplanned: postponement of some MTO unit start-ups in China
Global Methanol Demand Crude Derivatives vs. Traditional

Global Methanol Consumption

<table>
<thead>
<tr>
<th>Year</th>
<th>Traditional derivatives</th>
<th>MTO/MTP</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>10</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>2011</td>
<td>15</td>
<td></td>
<td>10</td>
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<td>2012</td>
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<td>2013</td>
<td>25</td>
<td></td>
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<td>2014</td>
<td>30</td>
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<td>2015</td>
<td>35</td>
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<tr>
<td>2016</td>
<td>40</td>
<td></td>
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<td>2017</td>
<td>45</td>
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<td>2018</td>
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</tr>
<tr>
<td>2019</td>
<td>55</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>2020</td>
<td>60</td>
<td></td>
<td>55</td>
</tr>
</tbody>
</table>

Note: The chart shows the consumption of methanol over the years from 2010 to 2020, with a breakdown of traditional derivatives, MTO/MTP, and fuel use.
The crude oil supply glut is not expected to be absorbed before late 2016
Methanol vs Crude Oil

Methanol vs. Crude Oil Pricing

Methanol, Dollars Per Metric Ton

Crude Oil, Dollars Per Barrel

0 20 40 60 80 100 120 140
0 100 200 300 400 500 600 700 800


Crude Oil

Methanol
Lower Production Costs and Oversupply are Expected to Keep Coal Prices Low

Dollars per metric ton

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Methanol Affordability Into DME

Global Dimethyl Ether Energy Value

- DME valued at volume equivalence to propane
- DME valued at energy
- NEA Forecast price range for propane
- Equivalent methanol value based on 1.4 metric tons of methanol per metric ton of DME

2016

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Methanol Affordability Into Gasoline

**Methanol Values Into Direct Gasoline Blending**

- **Equivalent energy price for methanol**
- **Equivalent volume price for methanol. One gallon methanol equals one**
- **Forecast price range of gasoline, 2016**
Domestic Methanol Spot Affordability: December 2015 vs. November 2015 (based on spot domestic derivative pricing)

**Descriptor:** Price in columns indicates what the maximum price is for methanol based on cash cost and price for each derivative before consumers operate at a loss.

- **China Spot Methanol:**
  - **December '15:** RMB 1767
  - **November '15:** RMB 1885

### Methanol Affordability

- **Acetic Acid:**
  - December 2015: 265
  - November 2015: 385
  - China Spot Methanol December 2015: 2131

- **Formaldehyde:**
  - December 2015: 2238
  - November 2015: 1884

- **DME:**
  - December 2015: 2003
  - November 2015: 1809

- **MTO:**
  - December 2015: 1809
  - November 2015: 1775

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Methanol Affordability Into MTO

Breakeven Methanol Price

Domestic Spot Methanol

Margin Index
How has the low oil price affected methanol demand?

<table>
<thead>
<tr>
<th>DME</th>
<th>Gasoline blending</th>
</tr>
</thead>
</table>
| • Profitability poor  
• 2015 demand essentially flat | • Low growth  
• But much blending on a volumetric basis |
| • Issue of ongoing profitability: may reduce operating rates  
• Especially for facilities with no units downstream of propylene | • Profitability eroded  
• But gasoline demand healthy given low oil price  
• Healthy growth 2014-15 |

MTO/MTP | MTBE
Methanol prices 2010 - 2020

Methanol Prices

- US Spot, Gulf Coast
- Rotterdam Spot, T2
- China Spot, CFR
Conclusions

• Demand growth in 2016-2017 depends heavily on the MTO market:
  • New MTO capacity start-up
  • MTO Operating rates/profitability

• Prices forecast to recover slightly but stay in a narrow range in 2016-2017

• New North American projects announced but unlikely to come on stream between now and 2020

• If the Iranian sanctions are permanently suspended:
  • Iran will be free to export to countries other than China and this will reduce regional price differentials
  • Iran will progress its methanol projects and potentially develop new projects
Q & A