Sulphur Market Outlook

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The Fertilizer Institute Outlook and Technology conference
Fort Lauderdale, Florida
Founded in 2002, Integer Research is a leading consultancy in the fertilizer sector.

<table>
<thead>
<tr>
<th>SERVICES</th>
<th>PRODUCTS</th>
<th>GEOGRAPHY</th>
<th>PARTNERS</th>
</tr>
</thead>
</table>
| • Publications  
• Consultancy | • Nitrogen  
• Phosphates  
• Potash  
• Sulphur and sulphuric acid | • London  
• Beijing  
• Tokyo | • ICIS  
• LMC International  
• Environ  
• Expert sub-consultants |

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Sulphur market overview
Sulphur: changing market sentiment from by-product to ‘yellow gold’
Sulphur prices historically remained below US$100/tonne across major benchmarks, but the commodity bubble in 2007/2008 changed this.

Prices started increasing in 2007, as supply tightened and downstream markets were also buoyed.

Source: Integer, ICIS
Recent trends in global sulphur pricing

Sulphur quarterly average prices (US$ per tonne)

<table>
<thead>
<tr>
<th></th>
<th>China CFR</th>
<th>Middle East FOB</th>
<th>Vancouver FOB spot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3 2014</td>
<td>168</td>
<td>161</td>
<td>155</td>
</tr>
<tr>
<td>Q4 2014</td>
<td>153</td>
<td>140</td>
<td>146</td>
</tr>
<tr>
<td>Q1 2015</td>
<td>177</td>
<td>172</td>
<td>169</td>
</tr>
<tr>
<td>Q2 2015</td>
<td>151</td>
<td>144</td>
<td>137</td>
</tr>
<tr>
<td>Q3 2015</td>
<td>150</td>
<td>144</td>
<td>143</td>
</tr>
<tr>
<td>Q4 2015</td>
<td>131</td>
<td>124</td>
<td>120</td>
</tr>
<tr>
<td>Q1 2016</td>
<td>99</td>
<td>97</td>
<td>96</td>
</tr>
<tr>
<td>Q2 2016</td>
<td>87</td>
<td>80</td>
<td>82</td>
</tr>
<tr>
<td>Q3 2016</td>
<td>79</td>
<td>73</td>
<td>74</td>
</tr>
</tbody>
</table>

Δ% YoY Q3

-47%

-49%

-48%

Source: Integer, ICIS
Recent market developments

Europe/FSU
- Consolidation in the chemicals sector
- Erosion of production in West Europe
- Kazakhstan project progress

Americas
- Fort McMurray wildfires
- US sulphur production rebound
- Mosaic’s melter in Tampa
- Brazilian import demand easing
- Cuba sulphuric acid plant

Middle East, Africa & Asia
- Climbing inventories in China
- Barzan/Qatar progress and delays
- Indian sugar season
- Morocco processed phosphates expansion
Supply
The rise in Middle East sulphur production has materialised in 2016, to bring the region to the top global ranking.

Sulphur supply by region, 2015-2016

- **Middle East**: 13.4 million tonnes in 2015, increased to 15.8 million tonnes in 2016 (+6.1%)
- **South-East Asia**: 14.3 million tonnes in 2015, remained stable in 2016
- **Oceania**: 2.5 million tonnes in 2015, increased slightly in 2016
- **Africa**: 2.3 million tonnes in 2015, increased slightly in 2016
- **Central Europe**: 3.9 million tonnes in 2015, increased slightly in 2016
- **Latin America**: 10.3 million tonnes in 2015, increased significantly in 2016
- **East Asia**: 10.3 million tonnes in 2015, slightly increased in 2016
- **West Europe**: 10.7 million tonnes in 2015, increased significantly in 2016
- **FSU**: 2.6 million tonnes in 2015, increased slightly in 2016
- **South Asia**: 2.2 million tonnes in 2015, slightly increased in 2016
- **North America**: 13.4 million tonnes in 2015, increased slightly in 2016

Source: Integer
Gas based sulphur production has continued to grow through the year, forecast to represent over 50% of global output.

Global Sulphur Production, 2016

- **Oil based sulphur**: 43.4%
- **Gas based sulphur**: 51.6%
- **Other**: 5.0%

Global sulphur production by type (%)

<table>
<thead>
<tr>
<th>Type</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil based</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Gas based</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Integer
What does the low oil price environment mean for the sulphur industry?

Brent crude prices have been rising since the start of 2016, aiding a more stable outlook but downward pressure remains.

Source: Integer, Bloomberg
Sulphur production in the Midwest and Gulf Coast continues to recover, leading to a net increase in US sulphur output.

USA: Total sulphur production by PADD (1-5), for H1 2015 vs H1 2016

<table>
<thead>
<tr>
<th>Region</th>
<th>H1 2015</th>
<th>H1 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>PADD 1: East Coast</td>
<td>952,000</td>
<td>279,000</td>
</tr>
<tr>
<td>PADD 2: Midwest</td>
<td>673,000</td>
<td>917,000</td>
</tr>
<tr>
<td>PADD 3: Gulf Coast</td>
<td>654,000</td>
<td>714,000</td>
</tr>
<tr>
<td>PADD 4+5: Rocky Mountain/West Coast</td>
<td>661,000</td>
<td>70,000</td>
</tr>
</tbody>
</table>

Source: Integer, USGS
As many oil sands projects have become unfeasible in the low oil price environment, the outlook for Canadian energy has shifted.

Source: Integer, CAPP (June 2016)
Canadian gas production is expected to continue to decrease, leading to a net decline in sulphur output for North America in the outlook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Million tonnes</th>
<th>Oil</th>
<th>Oilsands</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>6.3</td>
<td>0.6</td>
<td>2.0</td>
<td>3.7</td>
</tr>
<tr>
<td>2012</td>
<td>6.0</td>
<td>0.6</td>
<td>2.0</td>
<td>3.5</td>
</tr>
<tr>
<td>2013</td>
<td>5.9</td>
<td>0.6</td>
<td>2.1</td>
<td>3.3</td>
</tr>
<tr>
<td>2014</td>
<td>5.6</td>
<td>0.6</td>
<td>2.1</td>
<td>3.0</td>
</tr>
<tr>
<td>2015</td>
<td>5.4</td>
<td>0.6</td>
<td>2.1</td>
<td>2.8</td>
</tr>
</tbody>
</table>

- Limited growth from the oilsands sector
- Depletion of wells and challenging economics
- Impact on sulphur exports from Vancouver
- Utilization of long term sulphur storage
- Increase in forming facilities

Source: Integer
Trade: changing dynamics
China remains a central focus for sulphur trade

Million tonnes


<table>
<thead>
<tr>
<th>Year</th>
<th>Million tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>9.6</td>
</tr>
<tr>
<td>2008</td>
<td>8.4</td>
</tr>
<tr>
<td>2009</td>
<td>12.2</td>
</tr>
<tr>
<td>2010</td>
<td>10.5</td>
</tr>
<tr>
<td>2011</td>
<td>9.5</td>
</tr>
<tr>
<td>2012</td>
<td>11.2</td>
</tr>
<tr>
<td>2013</td>
<td>10.6</td>
</tr>
<tr>
<td>2014</td>
<td>10.2</td>
</tr>
<tr>
<td>2015</td>
<td>11.9</td>
</tr>
<tr>
<td>Jan-Sept 2015</td>
<td>8.8</td>
</tr>
<tr>
<td>Jan-Sept 2016</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Source: Integer, GTIS
China supply sources continue to shift through 2016. Saudi Arabia remains the number one supplier while molten sulphur supply from Japan and South Korea increased by over 30%. 

China monthly sulphur imports, January 2015 – September 2016
Moroccan sulphur imports have grown through the year as new processed phosphates capacity has been brought online.

Morocco monthly sulphur imports, January – August 2015 vs 2016

Source: Integer, GTIS
Moroccan sulphur imports have grown through the year as new processed phosphates capacity has been brought online.

Imports from the UAE have increased 48%.

Tonnes from Poland have also increased, up by 23%.

Shipments from the US have increased significantly, up by 63%.

Russian imports have dropped by 32%.

27% drop in trade from Kuwait.

83% drop from Saudi Arabia. Volumes from Europe have also been declining.

Source: Integer, GTIS
We expect the US share of Canadian sulphur trade to decline in the outlook.
Vancouver exports have improved following the production disruption earlier in the year. Exports to China have gained ground through 2016.

Despite the disruption to oilsands production in Q2 2016 due to the Fort McMurray wildfires, sulphur exports out of Vancouver have firmed.
Demand
Sulphur demand is set to grow by over 2% year on year in 2016, led by developments in Africa.
Integer forecasts around 4 million tonnes of sulphur demand will emerge over the next ten years in the non-fertilizer sector.

Net sulphur non-fertilizer demand growth between 2016 and 2026, split by region

Source: Integer
Global sulphur balance
The market remains largely balanced in our upside scenario, while the base case surplus hovers around 3-4 million tonnes through the medium term forecast period.
Conclusions
Key factors influencing long term sulphur market trends

• Utilization of long term sulphur storage
• Investment in energy sector – shifts in oil prices to impact
• Development in processed phosphates markets
• End user ability to switch between sulphur and sulphuric acid
• Metals markets and commodity pricing for non-fertilizer demand
• Continued rise of new Middle East supply
• Domestic sulphur production in China
Thank you for your attention
Any questions?

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All data in the presentation is taken from Integer’s Sulphur Market Dynamics Service