Stainless Market Outlook & Impact on Ferroalloys

Dr. Gerhard C. Pariser

Heinz H. Pariser Alloy Metals & Steel Market Research
Xanten / Germany
Stainless Steel – A Longterm Success Story

Growth Rates 1975 - 2012
- Stainless Steel: 5.3%
- Copper: 5.4%
- Crude Steel: 3.4%
- Aluminium: 2.1%
- Plastics: 2.4%
- OECD IP: 1.9%

Sources: USGS, International Aluminium Institute, ICSG, Plastics Europe, Worldsteel, OECD, Heinz H. Pariser
Outline

1. Stainless Steel – Profitless Prosperity
2. Market Concentration …
3. … and it’s Impact on Raw Materials
4. Stainless Vision 2030
5. Conclusions
Stainless Steel: Profitless Prosperity
Return on Sales 2008-2012
(Selected Companies)

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* Year 2011
“Stainless Cluster” Return on Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>RSH-Stahl: 3.3%</th>
<th>Nickel &amp; FeNi (incl. Norilsk): 28.7%</th>
<th>FeCr (incl. ENRC): 27.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
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<td>2008</td>
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<td>2010</td>
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<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Global Stainless Melting Production

<table>
<thead>
<tr>
<th>Region</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Change 12/11 in %</th>
<th>2013</th>
<th>Change 13/12 in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>2,201</td>
<td>2,074</td>
<td>1,964</td>
<td>-5.3</td>
<td>2,213</td>
<td>12.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>433</td>
<td>399</td>
<td>391</td>
<td>-1.9</td>
<td>407</td>
<td>4.1</td>
</tr>
<tr>
<td>European Union</td>
<td>7,497</td>
<td>7,559</td>
<td>7,447</td>
<td>-1.5</td>
<td>7,344</td>
<td>-1.4</td>
</tr>
<tr>
<td>Other Europe</td>
<td>240</td>
<td>264</td>
<td>229</td>
<td>-13.5</td>
<td>237</td>
<td>3.6</td>
</tr>
<tr>
<td>Japan</td>
<td>3,427</td>
<td>3,256</td>
<td>3,132</td>
<td>-3.8</td>
<td>3,195</td>
<td>2.0</td>
</tr>
<tr>
<td>S. Korea/Taiwan</td>
<td>3,571</td>
<td>3,360</td>
<td>3,243</td>
<td>-3.5</td>
<td>3,284</td>
<td>1.3</td>
</tr>
<tr>
<td>S. Africa</td>
<td>478</td>
<td>444</td>
<td>505</td>
<td>13.6</td>
<td>512</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>17,847</td>
<td>17,355</td>
<td>16,910</td>
<td>-2.6</td>
<td>17,192</td>
<td>1.7</td>
</tr>
<tr>
<td>China</td>
<td>12,350</td>
<td>14,460</td>
<td>16,372</td>
<td>13.2</td>
<td>18,009</td>
<td>10.0</td>
</tr>
<tr>
<td>India</td>
<td>2,170</td>
<td>2,265</td>
<td>2,469</td>
<td>9.0</td>
<td>2,616</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>14,520</td>
<td>16,725</td>
<td>18,841</td>
<td>12.6</td>
<td>20,625</td>
<td>9.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32,367</td>
<td>34,081</td>
<td>35,751</td>
<td>4.9</td>
<td>37,818</td>
<td>5.8</td>
</tr>
</tbody>
</table>

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Global Demand is There

Quarterly Apparent Consumption vs Real Demand

China

Real Demand
Apparent Consumption

Europe (EU27)

Real Demand
Apparent Consumption

Stock Change

Quarterly Stainless Usage, in '000t

Apparent Consumption
Real Demand

Stock Change

Quarterly Stainless Usage, in '000t


Market Concentration
Changing Stainless Market Environment

Market Share (Crude Melting), in %

- USA
- EU
- Japan
- China

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Stainless Steel Market Concentration

**HHI Index**

- **StSt Production**
- **StSt Consumption**

**HHI** = Herfindahl Hirschman Index; illustrates the level of concentration in an industry.
China: The Industry Growth Driver…

Stainless Steel Demand Growth

China Stainless Steel Usage, in Mill t

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Long-term Ranking (1970-2012)

Stainless Output, in Mill t

1. Japan 126.4
2. China 88.9
3. USA 78.1

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Stainless Usage, in Mill t

1. China 96.7
2. Japan 74.3
3. USA 70.0

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..by far the biggest market...

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...Building further Capacity

Source: CSSC, Antaike, 51BXG, Heinz H. Pariser
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Impact on Stainless Raw Materials
## Stainless Steel Made of…?

<table>
<thead>
<tr>
<th>Primary Metals</th>
<th>Internal Scrap</th>
<th>External Scrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrome (Charge, HC, MC, LC FeCr)</td>
<td>300 Series</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Nickel (FeNi, NPI, Ni Metal, NOS)</td>
<td>400 Series</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td>Others (FeMn, SiMn, FeSi, MoO,...)</td>
<td>200 Series</td>
<td></td>
</tr>
</tbody>
</table>

### Stainless Making Processes
(EAF, AOP, VOD, IF)

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Charge / HC Ferrochrome Production

- China: G.R.: 25.8%
- South Africa: G.R.: 1.8%
- Global Charge/HC FeCr Production: G.R.: 6.3%
Ore & Concentrate Trade Flow
2012e, in ‘000 t

South Africa
Russia
Kazakhstan
Europe
Albania
USA
India
China
Pakistan
Oman
Iran
Turkey
South America
95
212
200
340
176
95
4,026
510
372
84
537
510
13
1,822
891
567
333
526
Refined Nickel Production

Global Nickel Production
G.R.: 3.5%

China
G.R.: 26.6%

RoW
G.R.: 0.0%

Primary Nickel Production, in '000 t


1,197 1,197 1,197 1,822 1,822 1,822 1,822 1,822 1,822 1,822 1,822

China / RoW Share of Production, in %
Nickel Ore & Concentrate Trade Flow 2012
in '000 t Nickel Content

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China`s Role in Other Ferroalloys

**Ferromangan**

- **Global FeMn Demand**
  - 2002: 727,000 t
  - 2012: 1,743,000 t
  - **G.R.: 8.0%**

- **Share in %**
  - China: 12.4 in 2002, 50.6 in 2012
  - RoW: 87.6 in 2002, 49.4 in 2012

**Silicomangan**

- **Global SiMn Demand**
  - 2002: 4,462,000 t
  - 2012: 11,563,000 t
  - **G.R.: 9.3%**

- **Share in %**
  - China: 25.3 in 2002, 66.0 in 2012
  - RoW: 74.7 in 2002, 34.0 in 2012

**Molybdenum**

- **Global Mo Demand**
  - 2002: 143,000 t
  - 2012: 239,000 t
  - **G.R.: 4.8%**

- **Share in %**
  - China: 9.1 in 2002, 30.1 in 2012
  - RoW: 90.9 in 2002, 69.9 in 2012
## China's Role in Selected Commodities

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Autarky Quota</th>
<th>% of Global Supply</th>
<th>% of Global Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>66</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>Nickel</td>
<td>66</td>
<td>30</td>
<td>46</td>
</tr>
<tr>
<td>Ferrochrome</td>
<td>68</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>80</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Ferromanganese</td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Silicomanganese</td>
<td>100</td>
<td>65</td>
<td>66</td>
</tr>
</tbody>
</table>

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China’s Role in Selected Commodities

Index-based Prices, in %

- LME Nickel Cash
- LME Copper Cash
- Charge Cr EU Benchmark
- Mo Oxide
- FeMn
- SiMn

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Stainless Vision 2030
Long-term „Megatrends“

- Globalisation
- Population
- Urbanisation
- Technology
- Knowledge
- Resources
- Climate Change

2030

Future Stainless Market

„Megatrends“ – Source: Roland Berger, Thoughts
Stainless Demand Growth Potentials

**Base Case: 4 - 5%**
- Led by growth in China and India, coupled with a
- Revitalisation of "traditional" markets

**Historical: Up to 6%**
- Return to historic levels of expansion
- Assumption CAGR of 6%

**“China Saturation”: < 4%**
- China reaching saturation at earlier stages
- Or other negatively impacting scenarios

- **1970 - 2012**
  - Long-term Growth Rate: 5.26%
- **Base Case**
- **“Historic” Expansion**
- **“China Saturation”**

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Impact on Stainless Raw Materials 2030

**Ferrochrome Demand**
- 2012: 9.7 Mill t, G.R.: 4.4%
- 2030: > 20 Mill t

**Stainless Market Expansion**
- Base Case: 4 - 5%

**Primary Nickel Demand**
- 2012: 1.7 Mill t, G.R.: 4.6%
- 2030: 3.7 Mill t

**Ext. Stainless Scrap Input**
- 2012: 7.7 Mill t, G.R.: 5.7%
- 2030: > 20 Mill t
Conclusions
Conclusions

- Stainless Steel is a successful and versatile material that can look back on a long track record of healthy historic growth of between 5 and 6%.

- During the last decade, however, markets concentrated more and more on one country: China. And China’s industrial landscape is still in an expansion mode. This has pushed stainless from one volume record to another, as other markets, in particular the EU, became weaker.

- However: (global) market growth does not necessarily translate into a profitable industry! This is true for stainless steel, but has become more and more a reality in steel making raw materials as well.

- On a global scale, medium to long-term demand for stainless steel looks bright, albeit at somewhat reduced growth rates. While this will also increase the need for steel making metals and ferroalloys, it does not imply that profitability is to return fast!
Contact Details

Dr. Gerhard C. Pariser

Heinz H. Pariser
Alloy Metals & Steel Market Research
Scharnstr. 51
46509 Xanten

Germany

Tel.: +49 2801 77 11 0
Email: info@heinzpariser.de

You are always welcome to contact us.