Global steel industry: outlook, challenges and opportunities

5th International Steel Industry & Sector Relations Conference
April 20th, 2017 - Istanbul
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Agenda

- World Steel Association
- Steel demand prospects
- Global steelmaking structure and steelmaking materials markets
- Environmental challenges and opportunities
- Conclusions
Key facts - worldsteel today

- Headquarters in Brussels, second office in Beijing
- Over 160 Members:
  - 73 Regular (production > 1.8 Mt)
  - 35 Associate (production < 1.8 Mt)
  - 53 Affiliated (Regional and National Associations and Steel Research Institutes)
- Membership HQs are located in over 50 countries
- 9 out of 10 of the world’s largest steel companies are members
- Members represent around 85% of global steel production
What is our role?

- worldsteel acts as the focal point for the steel industry.
- worldsteel provides global leadership on all major strategic issues affecting the industry, particularly focusing on economic, environmental and social sustainability.
- worldsteel promotes steel and the steel industry to customers, the industry, media, financial markets and the general public.
- worldsteel assists its members to develop the market for steel, managing major projects in a range of industry sectors.
What are our key goals?

- Steel is the most important, innovative, recyclable and sustainable material for the 21st century.
- Members will be profitable rewarding shareholders and re-investing in new products and processes.
- The safety goal is “zero”: an injury free, illness free and healthy workplace.
- The industry will minimise its environmental footprint and conduct its operations in a sustainable way.
- The steel industry should be free of government involvement which distorts the market and prevents fair competition.
Key facts – Benefits of membership

- Access to the latest technical and economic data on industry trends and performance affecting the steel industry through the member-only extranet.
- worldsteel regularly produces member-only data, reports, publications and authoritative works on specialist subjects.
- Become involved at an international level in common market development programmes and initiatives.
- Networking with other steel industry professionals from around the world at meetings, events and the annual conference.
- Join major industry wide working parties, forums and committees.
Steel demand prospects
Steel demand prospects

- Steel demand growth will be slow
  - China’s steel demand to decline in the medium-term
  - Pockets of growth with particularly strong fundamentals in emerging world
  - Circular economy concept
  - Slower growing and ageing population
Global steel industry at another inflection point

Evolution of global steel demand, 1950 - 2016

Source: worldsteel, steel demand in crude steel equivalent terms

Post WW-II restructuring
Stagnation
China boom

CAGR 1950-1975 +5.0%
CAGR 1976-2000 +1.1%
CAGR 2001-2007 +6.7%
CAGR 2008-2013 +3.7%
Chinese steel demand peaked in 2014 and might be expected to decline further: historical trend in the developed world

- Steel demand in US+Japan+Germany peaked in 1973, followed by sharp decline for 2 years, and pick-up for 4 years

Source: worldsteel
Circular economy concept is spreading with increasing impact on global steel demand

- With varying degrees, circular economy concept is spreading
- Impact on steel demand visible and likely to accelerate over time

### Circular economy processes

<table>
<thead>
<tr>
<th>Process</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Reduce</strong></td>
<td>• Reduce use of resources&lt;br&gt;• Optimise use of products, Improved yields&lt;br&gt;&lt;i&gt;Ex: car sharing&lt;/i&gt;</td>
</tr>
<tr>
<td><strong>Reuse</strong></td>
<td>• Reuse a product again in another function.&lt;br&gt;&lt;i&gt;Ex: washing machine drums, car parts, construction beams&lt;/i&gt;</td>
</tr>
<tr>
<td><strong>Remanufacture</strong></td>
<td>• Restoring of products to as-new condition.&lt;br&gt;&lt;i&gt;Ex: reconditioning of machines and equipment&lt;/i&gt;</td>
</tr>
<tr>
<td><strong>Recycle</strong></td>
<td>• Creation of new products from the recycled materials.&lt;br&gt;• Already applied</td>
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Slower growing and aging population to dampen future steel demand growth

- Global population growth is decelerating
- Ageing is a global phenomenon and Asia leads the next ageing wave

**Global population growth projection**

Source: UN, World Bank
Steel production structure and raw materials markets
Global steel production

- BOF: 1.2 Gt
- EAF: 405 Mt
- Share of EAFs in the total global steel production declining

Source: worldsteel's Raw Materials Demand and Scrap Availability Models September-16 update
Global metallics demand

- BF-iron: 1.2 Gt
- Scrap: 550-600 Mt
- DRI: 75 Mt

Share of ferrous scrap in the total metallics consumption of global steel sector declining
Iron ore and metallurgical coal – growth, restructuring and stability

- Seaborne iron ore and metcoal markets are moving into a stability phase from a growth phase, which has been driven by China’s surging raw materials demand
- We expect continued tightness for higher quality material
- Quality deterioration a growing concern
- High exposure to disruptions such as adverse weather conditions and accidents due to the concentrated supply structure
- Markets are exposed to unexpected changes in domestic iron ore and metcoal availability in China
Global ferrous scrap availability expected to increase to 1 bn tonnes in 2030 and 1.3 bn tonnes in 2050 from about 720 Mt in 2016

Global ferrous scrap demand increased strongly during 1990 – 2008 and hit about 600 Mt

Interestingly, global ferrous scrap demand has stagnated for the last couple of years, and the share of ferrous scrap in the total metallics demand declined
Scrap availability to surge in developing world; increase to come mainly from obsolete scrap availability

- Scrap availability to grow in the developing world, particularly in China
- Increase in scrap availability to mainly come from obsolete scrap

Source: worldsteel's Scrap Availability Model September-16 update
Steel production shows different characteristics at different regions

<table>
<thead>
<tr>
<th>Source: worldsteel</th>
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<tbody>
<tr>
<td>Scrap charge ratio for BOFs, kg/t cs</td>
</tr>
<tr>
<td>EU28</td>
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<tr>
<td>NAFTA</td>
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<tr>
<td>Brazil</td>
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<tr>
<td>China</td>
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<tr>
<td>Japan</td>
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</tbody>
</table>

Share of EAFs in different regions, %

- **Japan**
- **NAFTA**
- **China**
- **EU**

Share of EAFs in different regions, %

- **Africa & ME**
- **Other Europe**
- **Brazil**
- **Other Asia**
Environmental challenges and opportunities
CO2 emissions by sector

- Share of iron & steel in global CO2 emissions is about 7%

Source: IEA 2011 CO2 emissions from fuel combustion
Steel industry has and will continue to provide the basis for sustainability of the modern society

- Considerable improvement in productivity and environmental footprint
- Further improvement:
  - Modernisation & usage of best available techniques
  - Innovative Technologies / changes in steel production structure
    - Directly avoiding CO2 emissions: hydrogen, electricity
    - Process integration: eliminating need for coke making, IO agglomeration
    - Carbon capture and storage, and utilisation
Steel has superior environmental characteristics

- **Innovative use** of steel saves six times as much CO2 as is caused by the production of the steel

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<tbody>
<tr>
<td>Efficient fossil fuel PPs</td>
<td>29.5</td>
<td>&lt;0.1</td>
<td>~400 : 1</td>
</tr>
<tr>
<td>Wind power plants</td>
<td>14.2</td>
<td>0.4</td>
<td>32 : 1</td>
</tr>
<tr>
<td>Other renewables[^2]</td>
<td>5.0</td>
<td>0.03</td>
<td>~200 : 1</td>
</tr>
<tr>
<td>Efficient transformers</td>
<td>2.1</td>
<td>0.1</td>
<td>14 : 1</td>
</tr>
<tr>
<td>Efficient e-motors</td>
<td>1.9</td>
<td>0.7</td>
<td>3 : 1</td>
</tr>
<tr>
<td>Weight reduction cars</td>
<td>11.2</td>
<td>8.4</td>
<td>1.3 : 1</td>
</tr>
<tr>
<td>Weight reduction trucks</td>
<td>1.0</td>
<td>0.9</td>
<td>1.1 : 1</td>
</tr>
<tr>
<td>Combined heat/power</td>
<td>9.2</td>
<td>1.0</td>
<td>9 : 1</td>
</tr>
</tbody>
</table>

[^1]: HH = households, CTS = commerce, trade, and service
[^2]: Geothermal, biomass, hydro
[^3]: CO₂ expenditure for other materials not examined; values are rounded
[^4]: Ratio relates exclusively to the emissions

Source: BCG analysis
Steel has superior environmental characteristics

- **Life cycle thinking** reveals the advantages of steel

> Intelligent lightweight design leads to less emissions during the lifecycle

- Source: Volkswagen
Steel has superior **recyclability**, when compared with competing materials

- **Recyclability**
  - Steel has superior recyclability when compared with competing materials.

**END-OF-LIFE SCENARIOS**

What happens to a building’s structural frame once it is demolished?

**CONCRETE**

This diagram shows a cycle of concrete re-use, re-cycling and reuse in structural concrete. This is important in terms of reducing the emissions impact of concrete. Reducing concrete production by 15% would reduce CO2 emissions by 1.5 million tonnes per year.

**TIMBER**

Timber is sustainable and recycled. It’s much better than paper recycling (90% re-use) and aluminium (95%). Recycled timber is also much better than new timber (recycling 90% CO2 emissions vs 100% new timber).

**STEEL**

Steel is the most sustainable material when compared to other materials. The life cycle of steel is compared to other materials. The steel cycle is much more closed-loop compared to other materials.

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**Source:** BCSA, updated June 2014
Conclusions
Conclusions

- Steel demand prospects: global steel industry at the end of a rare cycle as China completes its rapid economic growth phase.
- Share of EAFs in the total global steel production and the share of ferrous scrap in total metallics demand recently declining.
- However, global scrap availability is expected to grow strongly, suggesting that steel industry can increase its use of ferrous scrap considerably in the medium and long-term.
- Steel industry has shown considerable improvement in productivity and environmental footprint.
- Steel has superior environmental characteristics.
Thank you for your attention.

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