50 worldsteel ASSOCIATION 1967 - 2017

Steel and CO_2 – a global perspective

IEA workshop 20th November 2017

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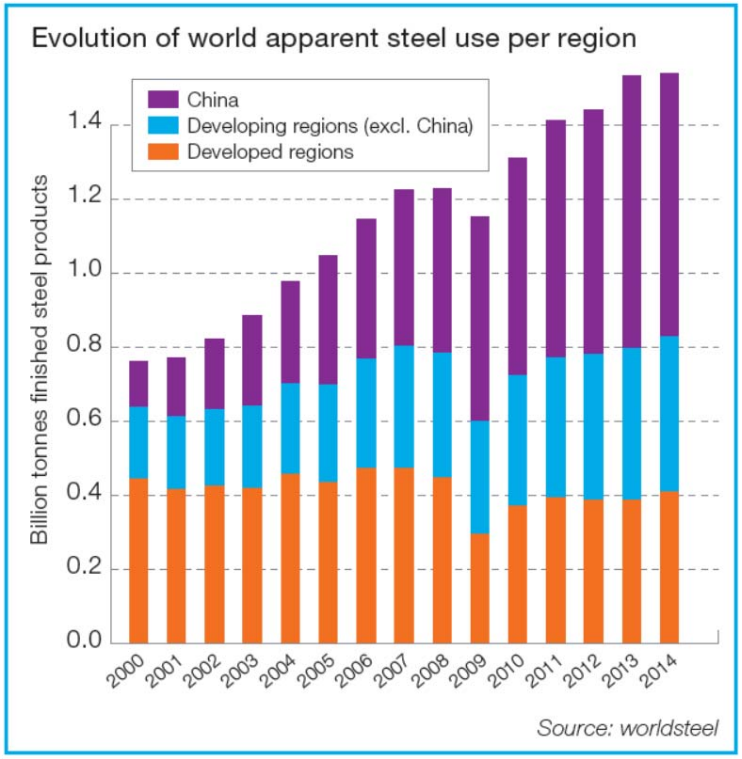
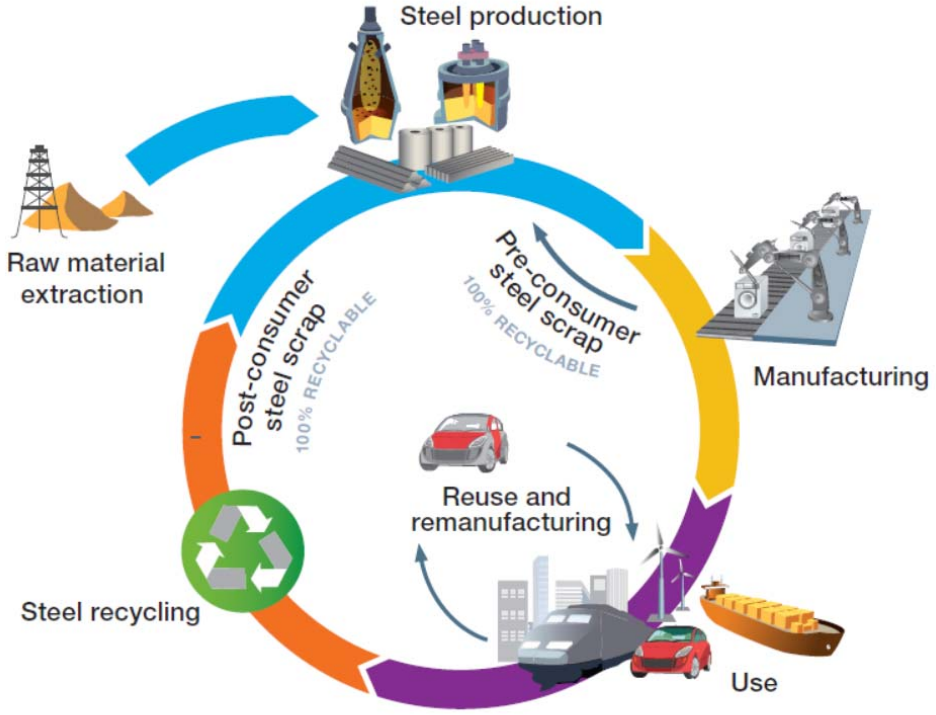
The importance of steel



Steel is the world's most important engineering and construction material. It is used in every aspect of our lives; in cars and construction products, refrigerators and washing machines, cargo ships and surgical scalpels.

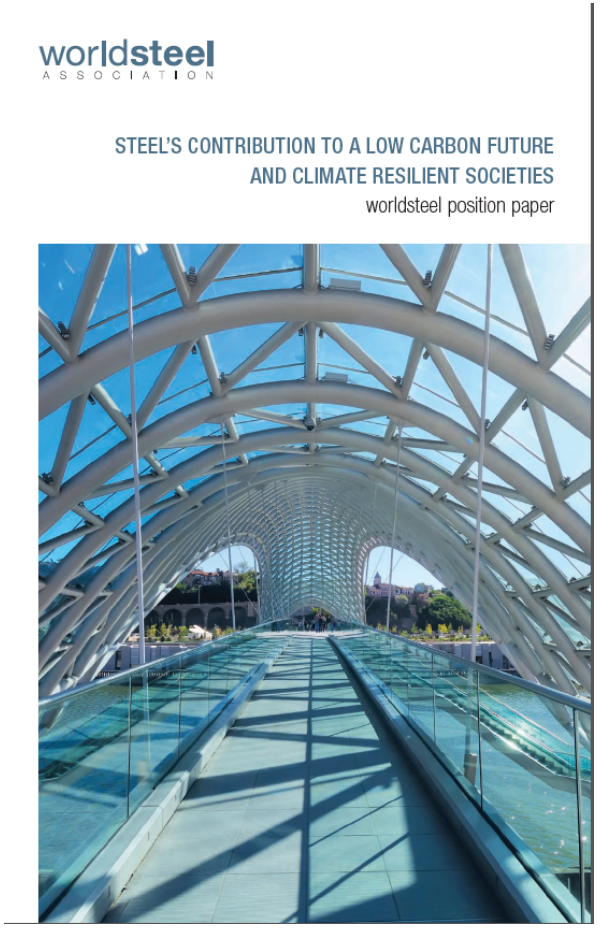
Steel in use

- Any balanced consideration of the Environmental impact of steel needs to look beyond the issue of direct emissions

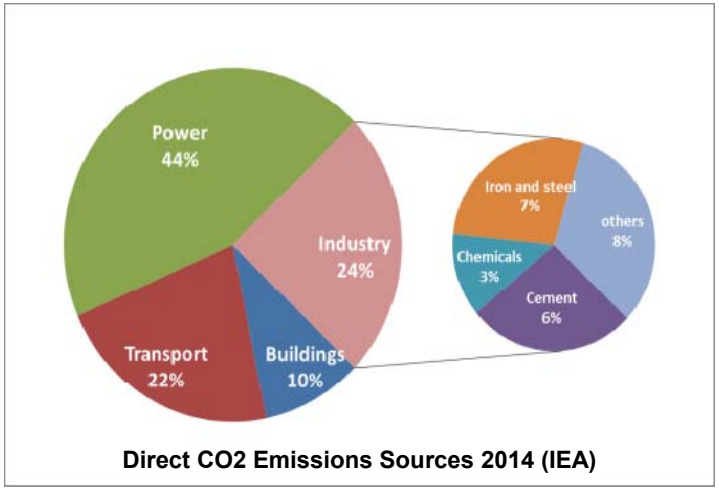


Steel industry position

- Governments need to recognise and embrace the importance of a strong and healthy industrial base in a sustainable economy. The role of the steel industry needs to be considered within the context of a progressive industrial policy and governments need to engage with the steel industry when developing a carbon policy that would impact the industry.
- Steel is a CO_2 and energy intensive, but highly competitive industry that also enables major CO_2 mitigation in other sectors. However, there is a risk that inequities introduced by carbon pricing mechanisms could jeopardise fair competition
- A life cycle approach is an important tool for future environmental policy
- Governments should promote and encourage a circular economy approach leading to: innovative design, a reduction in the amount of materials used, encouragement of reuse and recycling of all materials and minimised waste
- Progress in breakthrough technology development in steelmaking and implementation must be maintained or accelerated requiring the financial burden to be shared by both government and the private sector.



Ways of visualising steel's total CO_2 footprint



Direct CO2 Emissions Sources 2014 (IEA)

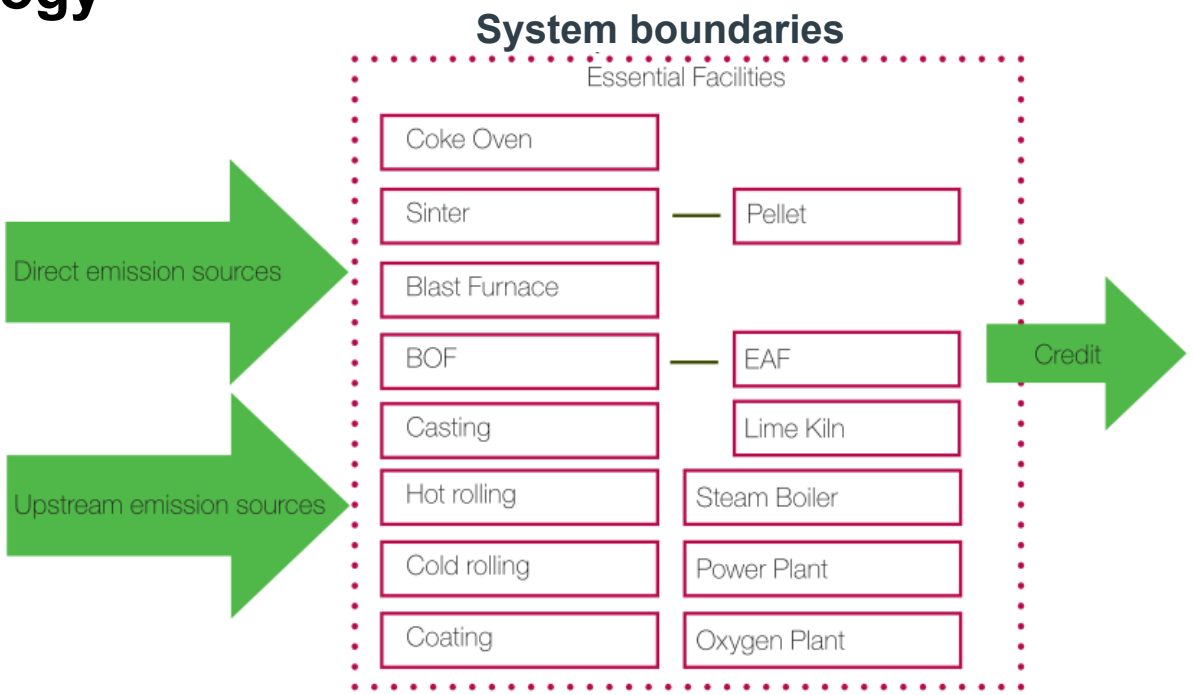
- In Ore based steelmaking most emission are Scope 1 (direct). Scrap based steelmaking is mainly Scope 2 (electricity purchase & use)

- Direct emissions from our industry represent about 7% of the global total

worldsteel CO_2 data collection

- Common methodology, definitions and boundaries agreed by the Climate Change Policy Group in worldsteel
  - Site-by-site
  - 3 process routes: BF/BOF, EAF, Others
  - Distinction between Scope 1, 2, and 3 emissions
- Similar to GHG protocol 2004 (revised in 2012 & 2014)
- Approved ISO standards for calculation on I&S industry emissions
  - ISO 14404-1 : Steel plant with blast furnace (BF)
  - ISO 14404-2 : Steel plant with electric arc furnace (EAF)
  - ISO 14404-3 : Steel plant with EAF with DRI feed under development by ISO
- Open to all steel companies including non-members
- Strictly confidential and secure system for data entry.

Methodology



- CO_2 emissions = Direct + Indirect – Credit
- CO_2 intensity = CO_2 emissions(tonne) / crude steel(tonne)

Scope of emissions

- Scope 1 emissions
  - Direct emissions from site stacks determined by a straight carbon balance calculation from their own carbon contents from all processes on site
    - Scope 1.1 emissions : Direct emissions of exported by-product gas
      = Direct emission factor of by-product gas × (Purchased-Sold)
- Scope 2 emissions
  - Upstream emissions or credits related with procurement and delivery of electricity, steam and exported by-product gas considering the potential savings in electricity generation.
- Scope 3 emissions
  - Other upstream emissions or credits related to procurement and delivery of pre-processed materials or by-products from site
  - Coke, pellets, DRI, pig iron, burnt lime & dolomite
  - Industrial gases (O_2, N_2, Ar)
  - Imported processed fuels (heavy oil, light oil, kerosene).

Climate Action Recognition

- Scheme recognises that a steel producer has fulfilled its commitment of the worldsteel CO_2 data collection program
- Data must be complete, verified and approved

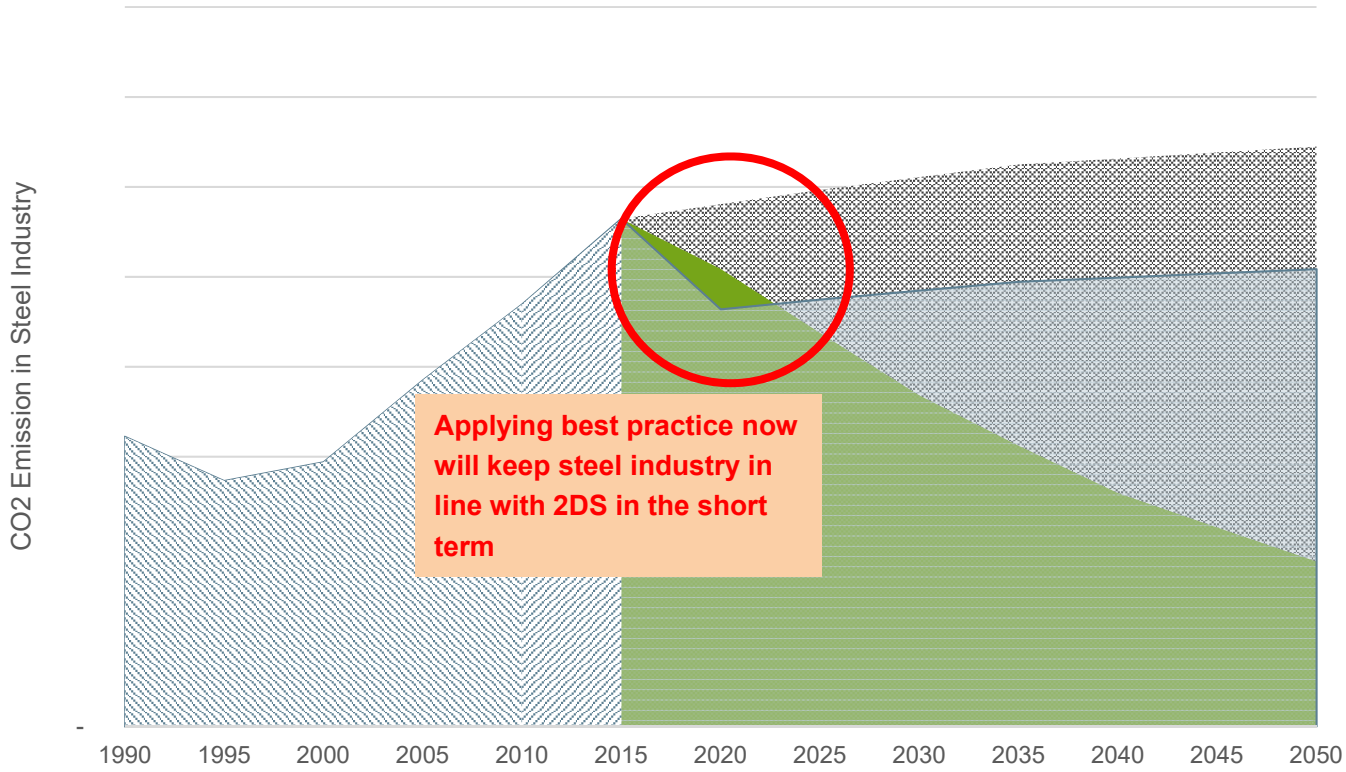
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Company	38	49	45	51	52 (33*)	50 (37*)	49 (37*)	50 (36*)	48 (35*)
Site	188	207	208	212	212	210	212	215	198

* Companies that submitted data for 5 consecutive years

- Participants are noted on worldsteel website.

https://www.worldsteel.org/steel-by-topic/sustainability/environmental-sustainability/climate-change/Members.html

Improving performance levels – V1 S1x3 and IEA 2DS



Good operations = Low energy consumption = Low CO2

- High performing plants –
  - Low Energy Intensity ∝ CO2 Emissions , BF Energy Intensity is critical
    - Energy intensity of worst 15% BFs is 65% higher than best
    - Energy intensity of worst 15% SPs is three times higher than best
    - worldsteel on-line energy intensity system available to assess best practice
  - Low Yield losses ∝ CO2 Emissions – low levels of home scrap
  - worldsteel on-line yield performance system available to assess best practice
  - Sound Maintenance Practices – provide high levels of reliability reducing re-work and yield losses with improved throughput and less energy and CO2.
  - worldsteel on-line reliability system available to benchmark best practice.

Summary

- worldsteel will work with IEA to support the development of the Industry Roadmap
- Efficient, safe and well run plants are also environmentally efficient plants
- Top 15% performance should be achievable by all
- We need to understand why the best plants do so well
- Achieving top 15% levels of performance buys time to develop and deploy breakthrough technology
- There is need to develop breakthrough technology.

Thank you for your attention.

For further information contact:

Andrew Purvis | Director Safety, Health and Environment
World Steel Association
purvis@worldsteel.org | T: +32 (0) 2 702 88 93 | worldsteel.org

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