

Steel's contribution to a low carbon future

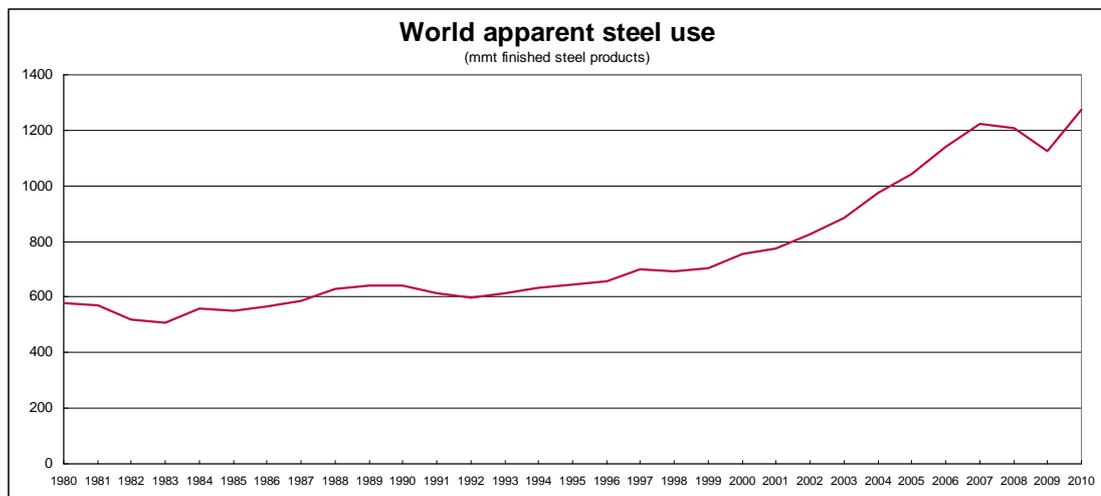
A position paper issued by the World Steel Association (worldsteel)

Introduction

Steel is essential to the modern world and the use of steel is critical in enabling man to move towards a more sustainable future. Steel is fundamental in a greener world, whether in lighter more efficient vehicles, renewable energy generation, new highly efficient power stations and construction of smart electrical grids or transport infrastructure development and high energy efficient residential housing and commercial buildings.

Over 1.3 billion tons of steel are manufactured and used every year. Currently close to 50% of steel is produced and used in mainland China. There will be continuing strong growth in the volume of steel produced, particularly in developing areas such as Latin America, Asia, Africa and the Indian sub-continent where steel will be vital in raising the material and social welfare of developing societies. In these regions more than 60% of steel consumption will be used to create new infrastructure.

The greenhouse gas of most relevance to the world steel industry is carbon dioxide (CO₂). On average, 1.9 tonnes of CO₂ are emitted for every tonne of steel produced. According to the International Energy Agency, the iron and steel industry accounts for approximately 4-5% of total world CO₂ emissions.

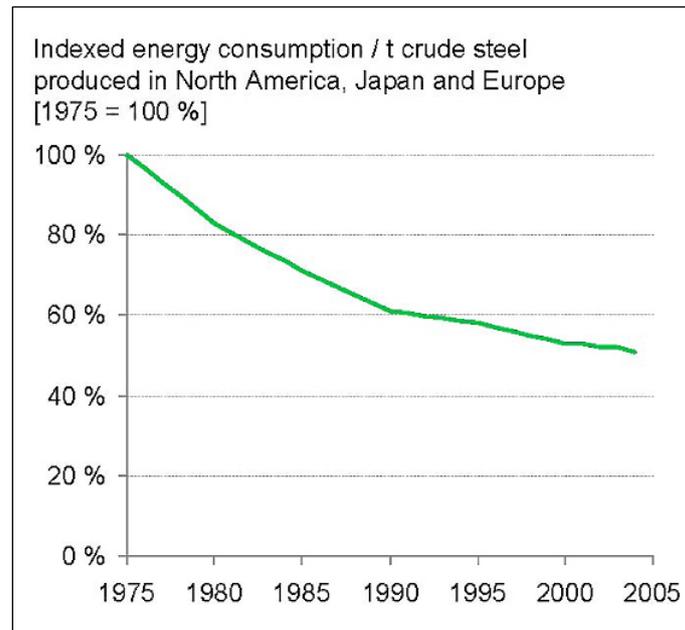


This continued growth prevents the demand for steel being met by means of recycling of end-of-life steel products alone, hence, making it necessary to continue converting virgin iron ore into steel.

Continuing to fulfil a positive role in our sustainable future comes with some major challenges:

- **Energy efficiency**

In the last 30 years the steel industry has reduced its energy consumption per tonne of steel produced by 50%. However, due to this dramatic improvement in energy efficiency, it is estimated there is now only room for marginal further improvement on the basis of existing technology. In the longer term it will be necessary to identify and introduce breakthrough steelmaking technologies that are viable.



- **Recycling**

A critical element in reducing the carbon emissions from the steel life cycle is to optimise the use of recycled materials. Steel is an almost unique material in its capacity to be infinitely recycled without loss of properties or performance. This in combination with a long history of significant efforts to increase recycling rates has resulted in steel leading the recycling statistics, for example in cars and cans. Policies can provide further support for recycling by putting emphasis on recyclability and design for dismantling.

- **Use of by-products**

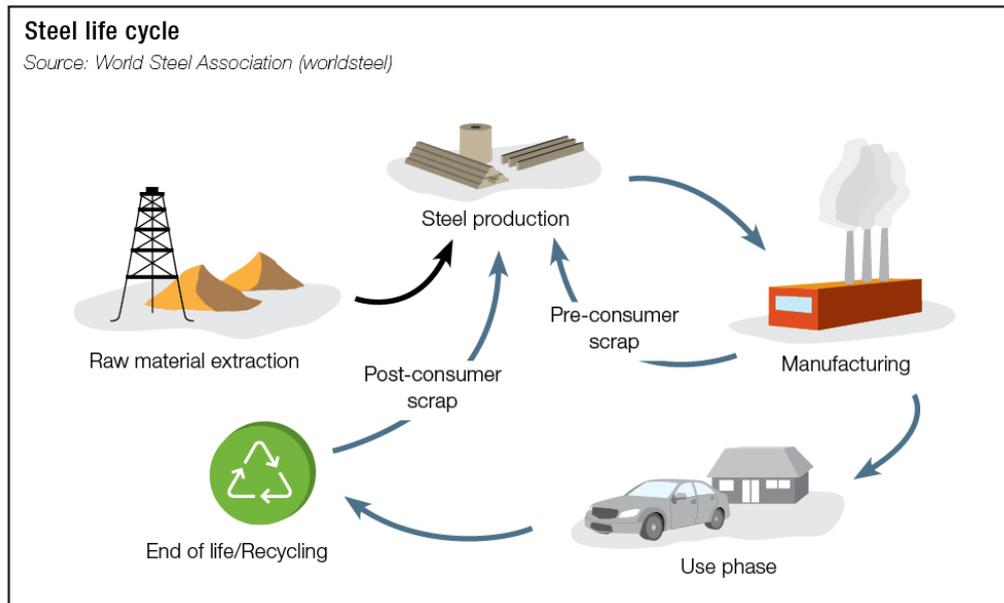
The production of steel results in the generation of by-products that can reduce CO₂ emissions by substituting natural resources in other industries. For example, blast furnace slag is used by the cement industry allowing it to reduce its CO₂ emissions significantly. Steel making slags are used as civil works aggregates thereby saving natural resources and environmental impact. Industrial by-products and mined raw materials need to be subject to the same legal framework.

- **Use of finished steel**

In many applications, steel has a very long life and as a result the contribution of modern steels in improving the energy efficiency of buildings, plants, machinery and transportation are much more important in helping man reduce its carbon footprint than the emissions associated with the initial steel production. For example electrical steels produce much more efficient transformers and motors thereby significantly reducing the total energy needed throughout their lives. This saving amounts to more than the CO₂ emissions created from the original production phase. The key contribution from the steel industry is to work closely with its customers in optimising the design and use of steel in steel-using products.

A sustainable life cycle approach

In order to continue these efforts and to identify all the opportunities to reduce the carbon emissions from steel's life cycle, it is essential to take a full life cycle approach. This approach not only considers the emissions associated with the manufacture of steel products, but also the reduction in energy consumption associated with the use of new generation-steels in lighter and stronger products. Further, the inherent recyclability of steel must be given prominent consideration in the search for sustainable materials for the future.



This diagram shows how, over the complete life cycle of steel, the opportunities for improvement can be identified.

The use of a life cycle approach is important not just to identify the areas for potential improvement at each stage, but also to understand the potential impacts so that the correct policies are pursued.

For example, implementing vehicle regulations which consider only the driving phase of a vehicle's life may result in an increase in greenhouse gas emissions. While substituting lower density materials for steel may result in some small emissions savings during driving, the much greater greenhouse gas emissions during production of these materials compared to steel far outweigh any driving phase savings. Vehicle regulations should consider emissions during the vehicle's life cycle to ensure the lowest emitting vehicles are designed and manufactured.

Steel's contribution

The member companies of worldsteel are the major steel producers in all the major steel producing countries of the world. We have agreed a framework for our common endeavour to reduce the carbon footprint associated with the manufacture and use of steel.

The framework consists of four building blocks. These are:

1. The development and application of new steels to improve the energy efficiency of steel-using products in society.
2. The need for major expenditure on research and development to identify breakthrough steelmaking technologies with potential to reduce steel's CO₂ emissions associated with steel production very significantly.
3. The importance of enabling all steel plants to move up to the level of performance of the best, in terms of current available technology through benchmarking and technology transfer.
4. The establishment of a common measurement and reporting system for steel plant CO₂ emissions that can be used by all steel companies around the world for benchmarking and to identify the scope and priorities for their own improvement programmes.

worldsteel's contribution

worldsteel has an important role in helping its members use each of these four building blocks and has a number of dedicated initiatives.

- **CO₂ breakthrough programme**

worldsteel provides a forum where the various national and regional research and development programmes on identifying breakthrough technologies for steel manufacture can exchange information on their projects. These include the ULCOS programme funded by the European Commission and the European steel industry; the COURSE 50 research programmes in Japan; the US steel industry and US Department of Energy programmes; the POSCO programme in Korea and many others.

- **Market development programmes**

worldsteel has a number of market development programmes which focus on improving energy efficiency of important steel-using sectors. The WorldAutoSteel partnership has a major programme on designing optimal steel-use in future vehicles including electric and hybrid. The Living Steel programme is aimed at designing steel residential housing with a high degree of energy efficiency in utilisation.

- **LCI database**

Over the last 15 years worldsteel has established, and made available, the largest and most authoritative database of life cycle inventory data for the production of a wide range of steel products based on actual data received from its members worldwide. This LCI database is increasingly being used by steel customers, governments and others in taking a life cycle approach.

- **Climate Action recognition programme**

worldsteel encourages all its members, and indeed non-member companies, to participate in its climate action programme which is the collection and reporting, on a confidential basis, of CO₂ emissions plant-by-plant. The reporting framework uses a common agreed methodology and we are now working to have this methodology recognised as an ISO Standard. It is important that every steel plant in the world actively measures where it is today in terms of CO₂ emissions, if it is to establish the correct priorities for improvement and to monitor progress in reducing its emissions.

The following companies are accredited members of the Climate Action programme:

Acciaieria Arvedi	Georgsmarienhütte Holding
Acerías Nacionales del Ecuador	Gerdau Aza
Acroni	Gerdau LAISA
Altos Hornos de México (AHMSA)	Hüttenwerke Krupp Mannesmann
ArcelorMittal	ISDEMIR
BlueScope Steel	JFE Steel Corporation
CELSA	Jindal Steel & Power
ÇEMTAŞ	Kobe Steel
China Steel Corporation	Kroman Çelik San
Compañía Siderúrgica Huachipato	Metalloinvest
Corporación Aceros Arequipa	Metinvest
DEACERO	Nippon Steel Corporation
Diaco	Nisshin Steel
Electrotherm (India)	Nucor Corporation
Empresa Siderúrgica del Perú	OneSteel
Essar Steel	Ovako

POSCO	SSAB
Qatar Steel Company	Sumitomo Metal Industries
Ruukki	Tata Steel
Saarstahl	Tenaris
Saudi Basic Industries Corporation (HADEED)	Ternium
Salzgitter	ThyssenKrupp
Siderúrgica del Orinoco Alfredo Maneiro	Trinecke Zelezarny
Siderúrgica Tutitlán	United States Steel Corporation
SIDETUR	voestalpine

Governments working in partnership with the steel industry

Partnership between governments and the steel industry is key to the reduction of carbon emissions.

First, governments at national and regional levels need to work actively with the industry and our customers in maximising the collection and recycling of end-of-life steel products.

Second, governments need to use a life cycle approach if they create regulations and standards for energy efficiencies in domestic appliances, passenger cars, building codes etc.

Third, the steel industry cannot, on its own, be expected to fund the long term research and development of new technologies to radically reduce steel's emissions. This has to be done in a partnership with significant financial contribution from governments.

Reducing greenhouse gas emissions is a global problem that requires a global solution. The steel industry believes it is very important that all steel companies and all major steelmaking countries are actively engaged in the search for a future low carbon society.

An active and ongoing dialogue is required between governments and industry. Steel is one of the most CO₂ intensive, highly competitive industries, with over 40% of steel traded internationally. Policies must create a level playing field to ensure that steel companies in one region are not put at a competitive disadvantage.