

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
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A POLICY TO REDUCE STEEL-RELATED GREENHOUSE GAS EMISSIONS

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Steel's Key Role in Sustainable Development

Steel is one of the most common materials that we come into contact with every day. There is hardly any object that people use that does not contain steel or that is not created with equipment made of steel. Progress would be impossible without steel.

Today we are all challenged to ensure that our way of life is sustainable. Steel helps us to meet this challenge easily. It enables us to improve our economic and social welfare now, without prejudicing the ability of future generations to do the same.

A Global Solution

The global problem of climate change requires a global solution. Policies to encourage improved energy efficiency and reduced CO₂ emissions are important in all regions. The growing importance of steel production in developing countries such as China and India means that the steel industry in these countries has a particularly important role to play. Policies imposing extra taxes and charges on steel production in Kyoto-countries merely results in a switch of production to other parts of the world. This is likely to increase, rather than reduce, global greenhouse gas concentrations. A competitive global industry such as steel requires new and imaginative approaches in the post-Kyoto period.

The steel industry has made significant reductions in its CO₂ emissions since 1990. The industry is committed to take positive action to achieve further reductions in its own CO₂ emissions. Through the use of its products and byproducts the steel industry also helps other sectors tackle the problem of rising greenhouse gas emissions and climate change.

The steel industry believes that the new policy should be applied globally, voluntary, technology-focused and intensity based. The new policy should also accommodate the production growth required to provide the world with the steel it needs.

The steel industry's new global approach needs new commitment from both the steel industry and governments around the world.

Part A - The Commitment from the Steel Industry

The steel industry's commitment will be demonstrated by seven main actions:

- 1. Expanding the use of current efficient technologies, widely used in modern steelmaking sites, to minimise the generation of carbon dioxide.**

Many steel companies are already operating close to the lowest emissions levels possible with today's technology based on the major technical innovations introduced by the steel industry over the last 20 years. However, there are steel plants with much poorer performance. The industry is committed to help transfer efficient technologies to speed up the replacement of steel plants that

bring down the global performance of the steel industry. It is also critical to perform energy and CO₂ analysis - when considering new additions to a plant - to ensure that such concerns are included in the overall decision-making and expansion process.

2. **Undertaking research and development for new technology solutions to radically reduce the level of CO₂ emissions into the atmosphere for each ton of steel produced.**

With efforts coordinated by IISI, steel companies and steel associations around the world are funding co-operative research with universities, research institutes and other industries to identify and develop new approaches to steel production. The targets are ambitious. However, the timescale for such new technology is 15-20 years. By working together and with the support of government research funding around the world, the timetable and chances of success are improved.

3. **Continuing to optimise and maximise the recycling of steel scrap.**

Steel is already the most successful material in terms of both total amounts and percentage rates of recycling. Yet more can be done to ensure all end-of-life steel is recycled. This involves working with local governments to maximise the recycling of steel in household waste, and working with customers to help design steel-using products in a way that facilitates end-of-life recycling. The steel industry is committed to maximise the recycling of steel worldwide.

4. **Maximising the value of steel industry by-products.**

The use of steel industry by-products, such as slags, can save energy and emissions. Slag that would have been dumped in the past is now used in the cement industry to dramatically reduce CO₂ emissions in cement production. The steel industry is committed to spreading this practice worldwide.

5. **Facilitating the use of the new generation of steels to improve the energy efficiency of steel-using products in partnership with our customers.**

The steel industry continues to develop new steels to reduce CO₂ emissions over the lifecycle of the end product. For example, new electrical steels have been developed which improve the energy-efficiency of electrical motors. Similarly, new ultra high-strength automotive steels have achieved major reductions in passenger-car weight, without comprising safety.

6. **Adopting common and verified reporting procedures that account for and report progress towards achieving CO₂ emission reductions.**

7. **Adopting a global sector-specific approach.**

The steel industry has launched a task force to develop Global Sector Specific Approaches for CO₂ reductions in the post-Kyoto period.

Part B - The Commitment from Governments

Governments need to:

1. Replace cap and trade emission regimes with policies that allow the most efficient steel companies in terms of CO₂ emissions to expand and the least efficient to decline.
2. Engage with industry to adopt a Sector Specific framework which involves all major steel producing countries.

3. Establish recycling programmes that encourage market-based steel to steel recycling as used in the steel industry.
4. Encourage the closure and replacement of the least efficient steelmaking plants.
5. Support long-term research initiatives for radical new technology solutions proposed by the steel industry. Governments also need to develop policies that encourage demonstration of these innovative technologies.
6. Engage with industry to develop reporting procedures that account for and report progress towards achieving CO₂ emission reductions.

CLIMATE CHANGE AND STEEL: MEETING THE CHALLENGE

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty produced in 1992 at the United Nations Conference on Environment and Development (UNCED). The treaty aimed to combat climate change by reducing emissions of greenhouse gases and has been signed by 189 countries.

The original treaty set no mandatory limits on greenhouse gas emissions for individual nations and contained no enforcement provisions. Rather, the treaty included provisions for updates (also known as "protocols") that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

The Kyoto Protocol aims to reduce the impact of man-made greenhouse gases on the environment. The Protocol, which came into force on 16 February 2005, lists six greenhouse gases. Of these, carbon dioxide (CO₂) is the most significant for the world steel industry as the manufacture of iron and steel involves the production of CO₂.

The steel industry favours taking action to reduce global greenhouse gas emissions. Over the past 25 years the steel industry has engineered a revolution in its performance through massive investment in new products, new plants and technology and in new methods of working. The result has been a dramatic improvement in the performance of steel products, as well as a related reduction in CO₂ emissions, energy usage and the consumption of raw materials in the production of steel.

Our Current Efforts

Steel is the most recycled material in the world. More steel is recycled than all other materials combined. In 2006, the world produced 1.24 billion tons of steel. More than 40% of the new steel was created using recycled steel. High recycling rates mean the steel industry has been able to significantly reduce both its energy use and the volume of greenhouse gas emissions.

The unique properties of steel mean that its inherent properties remain unchanged, regardless of how many times it is recycled. Products containing steel can be recycled back into "new" high quality steel ready for other applications. Steel is easy to handle and separate from the waste stream because of its natural magnetic properties.

However, there is not enough recycled steel available to meet society's increasing demand for steel. The need for steel must be met through the combined use of iron ore and the recycling and remelting of recovered steel. Both methods are inter-related and are necessary to further the industry's economic, environmental, and social sustainability performance.

The process of creating steel results in the production of valuable co-products. For example, slag can be processed into building materials such as cement and aggregates. Blast furnace gases can be recovered to produce heat for use in the steel plant or in the local community. Re-use of waste products provides a major contribution to the environment by further reducing carbon dioxide emissions and the need to extract new raw materials.

There are thousands of different steel grades available today. The properties of these steels are highly engineered to provide corrosion resistance, increased strength, reduced weight or high energy-efficiency while in use. The variety of steels available make it possible for steel industry customers to improve their

products and further reduce their impact on the environment. Modern steels often have a longer life-span, extending the time between installation and replacement.

One example of these new advanced products are Advanced High-Strength Steels (AHSS). AHSS are a range of lightweight steels that exhibit unique strength properties, they are ideal for use in automotive applications and lead to increased safety for the consumer, and lower emission levels. For example, the weight of a mid-size passenger car is reduced when designed with AHSS. This reduces emissions by the equivalent of 2,800 kg of CO₂ over the life of the vehicle. Emissions are reduced both in the steel-production process (by the equivalent of 460 kg of CO₂) and during the use of the vehicle (by the equivalent of 2,340 kg of CO₂).

Continuous Improvement

The world steel industry will continue to work to reduce the impact of our industry on the environment. We will continue to work with our customers to design better, longer-lasting, energy-efficient and material-efficient products. There is also potential to optimise the use of currently-available high-tech steels. We will also continue to develop and introduce new steels that promise to deliver further benefits.

The steel industry already enjoys a high level of recycling. However, the steel industry aims to improve further in this area. We work with our customers to ensure that steel-based products are designed to facilitate end-of life recycling.

Most of the CO₂ generated by steel industry comes from the chemical interaction between carbon and iron ore in a blast furnace. This process is called iron reduction. It produces molten iron which is converted to steel. The maturity and efficiency of conventional technology means that in the most advanced facilities, the iron-reduction process operates close to thermodynamic limits. Using conventional technologies, making substantial further reductions in CO₂ emissions will be next to impossible.

However, the steel industry recognises the need to seek breakthrough technologies to the issue, and different approaches have been taken on both regional and national levels. In the past these projects have been independent of each other, mainly due to different strategies in terms of goals, timeframe, targeted technologies and funding arrangements.

The steel industry views radical CO₂ reduction as a noncompetitive technology. We would not use this technology to compete with each other but would rather share the technology for the benefit of society. Therefore to ensure cooperation and a coordinated response, the membership of IISI unanimously agreed that an international collaboration programme should be launched to address the issues and set a challenging goal for lower emissions. IISI's unique CO₂ Breakthrough programme is taking a multiphase approach to radically reduce CO₂ emissions from the steel industry. By adopting a proactive approach, the world steel industry is anxious to demonstrate to all stakeholders its commitment towards the reduction of greenhouse gas emissions.

The production of steel is only one stage in the process of producing useful steel-containing products and services for society. Life cycle assessment evaluates the environmental impact of a product over its complete life span, from raw material through manufacture to end-of-life. The steel industry has collected, and will maintain, the most comprehensive set of environmental data for its products. Included in this detailed assessment are CO₂ emissions on a process-by-process or product basis. IISI makes this data widely-available to enable steel's impact on the environment to be properly evaluated.