Corus and the Climate Change Challenge

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Corus is part of the Tata Steel Group (TSG), and is one of the world's largest steelmakers, typically producing over 18mt crude steel per annum, with major manufacturing plants in the Netherlands and UK. Steel making is predominantly carried out via the blast furnace (BF) process, which feeds basic oxygen steelmaking (BOS).

Tremendous improvements in energy efficiency have been made by the steel industry in recent decades with specific energy consumption reducing by around 50% over the last 40 years. A large part of the CO_2 emissions from the industry are associated with the use of carbon as a reductant for iron ore, and due to ongoing efficiency improvements, the level of carbon input to the process is now approaching the theoretical minimum. The emissions from the industry constitute around 3-4% of global CO_2, however the total emitted is increasing due to increasing production of steel to satisfy global demand; around a 50% increase in steel manufacture was recorded between 1990 and 2006. The level of CO_2 output per tonne steel is generally lower in developed nations. National obligations under the Kyoto agreement cover roughly only a third of global steel production, predominantly in Europe and Japan, where much of the most efficient steel manufacturing takes place.

Against this background, TSG recognizes that climate change is one of the most pressing issues the world faces today. In response to this challenge, the Group is committed to being part of the solution and will achieve a leading position within the steel industry* whilst creating value through:

- continuing to improve its current processes, reducing emissions to <1.7 t CO_2/t steel by 2012 and to <1.5 t CO_2/t steel by 2020**
- investing in breakthrough technologies
- developing new products and services to reduce environmental impact over the product lifecycle, offsetting emissions in manufacture
- actively engaging its workforce
- further developing its pro-active role in global steel sector initiatives.

In reference to the last point, Corus has been active, through the World Steel Association (formerly the IISI) in developing a sectoral action plan for steel.

In terms of emissions from its processes, the medium term targets that have been set are recognized as being challenging and will demand a range of measures, covering projects requiring high levels of capital expenditure, lower cost schemes and improved 'housekeeping' practices. Further, use of greater additions of scrap at the BOS convertor and changes in the process burden will be needed, for example by using more ore pellet, increasing the levels of pulverized coal injection and reducing the amount of blast furnace slag produced.

An integrated iron and steelworks contains a multitude of interdependent processes and as such there are a variety of potential ways of reducing energy consumption and CO_2 emissions.

The approach being taken to determine forward plans is described, in terms of the identification and selection of measures, corporate support provided and top-down vs bottom-up methodologies. Examples are given of a range of energy reduction and CO_2 mitigation solutions and the potential for increased recovery of low-grade waste heat is discussed. A case study example is highlighted of a current project focused on BOS gas recovery, at the Port Talbot steelworks, UK, with projected direct CO_2 emission reductions of 240kt/annum.

It is recognized that in order to achieve step change reductions in CO_2 emissions and meet long term targets, radically different processes need to be developed. To this end Corus is a major player in a collaborative initiative called ULCOS – Ultra Low CO_2 Steelmaking. This is a groundbreaking €59m part EU funded multi-phased R&D project, advanced by 48 European companies and institutes, to identify and develop breakthrough technologies that could enable a significant (~50%) reduction, per tonne liquid steel, in CO_2 emissions from ore-based steel production by 2050. A wide range of potential options have been evaluated in Phase 1 of the project, including BF top gas recycling and CO_2 sequestration, advanced smelting and direct reduction technologies and alkaline electrolysis. The most promising of these have been selected for demonstration in Phase 2.

Further reducing the emissions from steelmaking processes is only part of the picture. Firstly, because for many products, such as vehicles, the CO_2 emissions from the in-use phase outweigh the emissions associated with manufacturing. Therefore there are opportunities for new steel products to reduce the in-use phase emissions. Examples of this are given, including advanced high strength steels in automotive applications and adaptable, energy efficient steel buildings. Steel is also vital in delivering the energy mix of the future, being a key component in power stations, wind turbines and high efficiency electrical motors and transformers.

Secondly, steel is highly sustainable because of the fact that it can be repeatedly re-used and recycled, without degradation of the quality of the material. For example in the UK, current recovery rates are 99% for structural steel work and 94% for all steel construction products.

Finally the environmental credentials of the steel industry are further exemplified in the use of byproducts to offset the emissions in other industries. A key example of this is in the use of granulated ground BF slag as a substitute for cement in the concrete sector. In 2007 alone, an estimated 2.6mt of CO_2 emission was prevented through the use of Corus BF slag as a cement replacement.

* Target percentile for 2020 to be determined upon publication of World Steel global benchmarking data
** Equivalent to a reduction of at least 20% compared to 1990