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White Paper

SSAB and carbon dioxide emissions

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1 SSAB AND THE ENVIRONMENT

SSAB's vision is "a stronger, lighter and more sustainable world." The vision is based on the strategy of being the leader within high strength steels. High strength steels make it possible to produce products that weigh less and are more durable than products made of ordinary steel.

SSAB will be one of the best companies in the steel industry on environmental issues. Despite high emissions of carbon dioxide (CO_2), SSAB is among the leading companies in the world when it comes to restricting emissions from the production process. This document describes the work we are doing today and how we will contribute to further improvements in the short and long term.

1.1 SSAB's products generate lower emissions

SSAB's focus on high strength steels is a focus on an improved environment. Constructions made of light and high strength steels save materials and energy, both in the production process and the end use. Consequently, it is possible to use less steel when manufacturing, which reduces emissions. Vehicles, excavating machinery and lifting cranes constructed of SSAB's steels have lower fuel consumption and last longer, which in turn also reduces emissions.

A few examples:

- By manufacturing a dump truck body using SSAB's high strength steels, the weight has been reduced by 8 tonnes and fuel consumption by 10%.
- By using high strength steels in an aerial platform, the thickness of the plate has been halved, lifting height and load capacity increased, and the size of the vehicle has been reduced to light truck class.
- A truck bed with a framework constructed of SSAB's high strength steels becomes approximately 1,300 kg lighter compared with ordinary steels. Consequently, carbon dioxide emissions over the life of the truck are reduced by 30 tonnes.

In 2010[1], SSAB delivered 1.5 million tonnes of advanced high strength steels, representing 32% of the company's shipments. SSAB's strategy is to increase shipments of high strength steels to 50% of total volumes by 2015.

1.2 New initiatives to reduce emissions from the production process

SSAB is among steel companies that have progressed the most in terms of reducing emissions from production. With present day technology, it is not possible to advance in reducing emissions from iron-ore based steel production. Nevertheless, SSAB is taking measures to reduce emissions from production even further in the short term. In addition, actions are being taken to radically reduce emissions with long-term projects.

1.2.1 Short-term -reduce carbon dioxide emissions by 2% per tonne of steel in current production

SSAB already possesses a well-developed process for minimizing carbon dioxide emissions. We are executing new initiatives to increase efficiency in production processes so that, under normal conditions, carbon dioxide emissions per tonne of steel produced at our blast furnace-based plants will decline by another 2% in 2012 when compared with results in 2008. For SSAB, a reduction of 2% per tonne of produced steel corresponds to an annual reduction of 130,000 tonnes in carbon dioxide emissions.

Several comparisons:

- Passenger cars – the environmental benefit is the same as if more than 200,000 ordinary cars were to be replaced by new cars.
  According to the Swedish Transport Agency, a new passenger car from 2010 consumes on average 0.62 liters of fuel per 10 km and emits 153 grams of carbon dioxide per km, whereas an ordinary car

1SSAB's Annual Report 2010

consumes 0.78 liters per 10 km. SSAB's planned 2% reduction in emissions can thus be compared with more than 200,000 ordinary cars (2010) being replaced by new 2010 models.

- Vacation travel – it corresponds to the same emissions as 70,000 passenger flights to Thailand
  According to the Swedish Environmental Protection Agency's template for calculating carbon dioxide emissions from air travel, long-distance flights generate 0.113 kg carbon dioxide per person-kilometer. With a distance of more than 8,000 km from Sweden to Thailand, SSAB's planned 2%reduction corresponds to approximately 70,000 passenger round trips to Thailand.

1.2.2 Long-term - create conditions for new steel production technology with a significant reduction in CO_2 emissions

Together with the rest of the global steel industry, SSAB is engaged in long-term development work to produce new, feasible breakthrough technology for the production of steel. This is taking place in the European research project, ULCOS (Ultra Low Carbon dioxide Steelmaking). The goal is to develop new steel production technology with at least 50% lower carbon dioxide emissions. Commercial application of the new steel production technology can begin after 2020 at the earliest. In addition, SSAB is supporting a corresponding program in the US, the "CO_2 breakthrough program" under the auspices of the AISI (American Iron and Steel Institute).

1.2.3 Develop carbon capture and storage technology

SSAB is playing an active role in the development of CCS technology[2] in Sweden. Together with industry colleagues, the company is developing new technology for the capture of carbon dioxide from our processes, conducting studies into the infrastructure of transportation of carbon dioxide, and exploring storage possibilities.

2 BACKGROUND

2.1 Why is steel needed?

Steel is one of the resources for a modern, functioning society. It constitutes the framework in buildings, bridges and railways, and is used in many different machines and vehicles. Thus, demand for steel increases as society develops, and demand is increasing most rapidly in the emerging economies.

In 2010, global crude steel production amounted to 1,414 million tonnes, with China accounting for 44% of production.

2.2 Why does SSAB emit carbon dioxide?

Steel production includes several elements which are critical from an environmental perspective. SSAB's environmental work is aimed at developing more efficient processes in order to mitigate the impact on the environment. Two different process methods are used in the production of SSAB's steel.

In Sweden, hot metal based on iron ore is produced from iron ore pellets at SSAB's three blast furnaces located in Luleå and Oxelösund.

The production of iron takes place through iron ore being reduced through the addition of coal and coke in the blast furnaces. The process generates carbon dioxide. With present day technology, it is not possible to produce steel without carbon dioxide being formed. The process, which has been used for hundreds of years, has been continuously developed and improved to become extremely efficient, with waste energy being utilized in the form of district heating and for the production of electricity. A large number of useful byproducts also are produced in order to utilize as much of the material as possible.

International comparisons demonstrate that SSAB's blast furnaces are at the forefront when it comes to low emissions of carbon dioxide per tonne of hot metal. There are several reasons for this: high-quality raw materials in the form of iron ore pellets, high-quality coke, and efficient processes. It also is important the blast furnaces are able to produce without interruption.

2 CCS stands for Carbon Capture and Storage.

SSAB's plants in the US produce steel with recycled scrap as the raw material. A certain quantity of coal and natural gas is used in the production process, but electricity is primarily used to smelt the steel scrap. All in all, carbon dioxide emissions are less than 1/10 of those generated when steel is produced from iron ore. Consequently, since the acquisition of IPSCO in 2007, SSAB's carbon dioxide emissions per tonne of produced steel have been reduced for the Group as a whole.

In 2010, 65% of SSAB's total crude steel production was based on iron ore and blast furnaces, and 44% was based on recycled scrap and electric arc furnaces. (The crude steel from the iron ore-based production includes approximately 20% internally cast scrap; when this figure is included in the calculations, the percentages become largely reversed, i.e. 45% and 55%). This can be compared with the international average, which according to the World Steel Association, 27% of steel produced in 2010 consisted of recycled steel.

The molten steel produced in the process methods described above is refined and converted into slabs in various after-treatment stages before being cast in the casting line. The slabs produced in the casting line are further processed in the rolling mill into different grades of steel. Today, SSAB produces both strip and plate in Sweden and plate in the US.

Apart from steel, the process generates significant quantities of heat, gas, slag and particulates, which are utilized to a large extent in the form of byproducts. This also has a positive impact on carbon dioxide emissions in general. For example, the coke oven gas serves as a source of energy in our various ovens.

2.3 Can carbon dioxide emissions from the blast furnace be reduced?

2.3.1 Other production processes

Iron production using natural gas is carried out on a small scale. Such a production process also involves coal, but also hydrogen as a reduction agent. The actual reduction from ore (iron oxide) to iron then takes place in a fixed form to DRI (Direct Reduced Iron). The iron produced in this way must then be smelted to allow for further processing into the desired steel quality and cast to the desired shape. Smelting normally takes place using electricity in electric arc furnaces.

Trials have been carried out on reducing iron ore using pure hydrogen gas. The hydrogen gas can be produced using electricity; but currently, global electricity production is largely based on coal, even if here in Sweden electricity is derived mainly from hydroelectric and nuclear power plants. In a laboratory environment, reduction of iron law also has been carried out using electrolysis, i.e., exclusively using electricity.

A switch in technology whereby "clean electricity" is used to produce hot metal may represent the future, but a few more decades of development will be required before such electricity is available on a large scale and before the new technology for the actual reduction of iron ore is adapted to it. SSAB believes that a more secure and faster way of developing steel production technology is to focus on capturing the carbon dioxide generated in the steel production process and storing it at a safe depth below ground, (so-called CCS technology). CCS technology is under development and carbon dioxide capture is being tested at LKAB's experimental blast furnace in Luleå. This is within the scope of the five-year European research project, ULCOS, in which SSAB is participating. The project ended in 2010, but is continuing in the form of preparations for a demonstration plant. The aim is to develop steel production processes that include CCS technology, in which carbon dioxide emissions will be cut by 50%. The first commercial plant of this type may be in operation after 2020.

SSAB has actively participated in a study[3] carried out by McKinsey & Company on behalf of the Confederation of Swedish Enterprise. The study, entitled "Possibilities and costs for reducing greenhouse gas emissions in Sweden," was presented in April 2008. The study shows that the only possibility to reduce

3 Possibilities and costs for reducing greenhouse gas emissions in Sweden, report from McKinsey & Company, April 2008

carbon dioxide emissions significantly in the coming decades is through storage. SSAB is playing a central role in several CCS projects in Sweden that are partly financed by the Swedish Energy Agency.

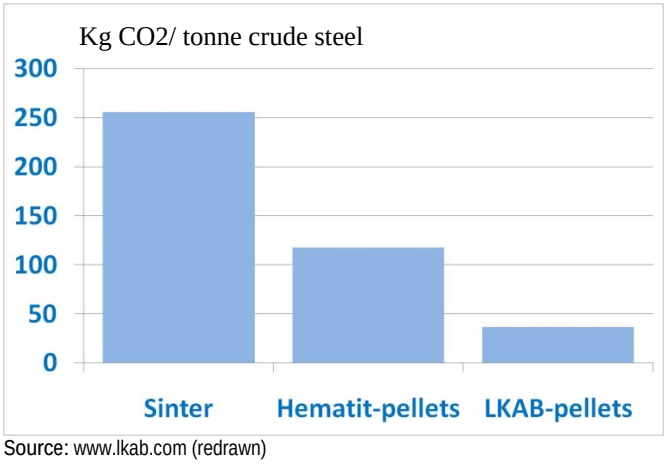
2.3.2 Our position compared with others

For many years, SSAB has worked hard on cutting carbon dioxide emissions from our production. Today, SSAB is one of the most efficient steel companies in the world when it comes to restricting carbon dioxide emissions. Prior to the EU's 2013 – 2020 carbon dioxide trading period, Eurofer compiled benchmark values for carbon dioxide emissions from blast furnace-based production. In the compilation, SSAB's blast furnace in Luleå is ranked as the one with the lowest emissions (see the graph below from Eurofer that is supplemented with markings indicating SSAB's blast furnaces).

SSAB's emissions are among the lowest in the world

Source: Eurofer

The difference in performance is due in part to the conditions available in terms of iron ore quality and coke quality and, in certain cases, also the desired hot metal quality. SSAB's blast furnaces use LKAB's iron ore pellets with a very high ferrous content. Thanks to the use of the iron ore pellets from LKAB, the impact on the environment has been reduced by more than 200 kg carbon dioxide per tonne steel compared with a normal steel mill.



Source: www.lkab.com (redrawn)

Comparisons over time show that the use of coal and coke has fallen dramatically. Current blast furnace technology is approaching the theoretical limit for what is achievable in regards to reduction in carbon dioxide emissions. Stahl-Zentrum, the German counterpart to the Swedish Steel Producers' Association, has compiled a summary of activities that have contributed to a diminished use of reduction agents (coal, coke, or oil, etc.).

Reductions in emissions over time

Source: Stahl-Zentrum

The use of coal and coke in blast furnaces is now very close to reaching the theoretical limit for what can be achieved. As mentioned above, any significant reduction in carbon dioxide emissions from blast furnace production, compared with the current situation, requires a switch in technology that includes carbon capture and storage. Until any switch in technology is implemented, it is unavoidable that emissions will increase if production increases.

2.4 Why not use only scrap?

SSAB in Sweden uses approximately 20% scrap in its steel production. In the US, SSAB's production is 100% based on scrap. Approximately 27% of total global steel production is based on scrap. Even if, largely speaking, steel can be reused innumerable times, the scrap steel currently available is simply not sufficient. Since global steel production has increased in recent years, scrap steel is currently in short supply.

SSAB also has the advantage of using LKAB's high-quality iron ore in its steel production. This makes it easier to produce advanced high strength steels; this is a factor that, in turn, contributes to reduced carbon dioxide emissions.

3 SSAB's ONGOING ENVIRONMENTAL WORK REGARDING CARBON DIOXIDE EMISSIONS

SSAB's objective is to be at the forefront of the steel industry in terms of environmental work. This means that SSAB manufactures products and uses plants that efficiently conserve raw materials, energy and other natural resources. The environmental work is conducted in a systematic, target-driven and preventive method in order to constantly mitigate the impact on the environment.

SSAB also has a goal to recycle as much as possible by returning material and energy to the production processes and by producing sought-after byproducts. SSAB works to disseminate knowledge on how the use of advanced high strength steels can make the customer's products even more energy efficient and environmentally friendly.

3.1 SSAB's products

A global focus on the issue of climate change and an increased awareness of environmental issues on all markets are factors that make SSAB's high strength steels attractive. A construction made of abrasion-resistant and high strength steel requires smaller quantities of steel than when traditional steels are used. A reduced use of materials mitigates the environmental impact throughout the entire chain. Advanced high strength steels make it possible to create designs for vehicles that weigh significantly less; it increases payload efficiency, and also reduces emissions from transportation. From a life cycle perspective, high strength steels generate lower carbon dioxide emissions when compared with ordinary steel.

The South African company Van Reenen Steel Ltd's winning contribution to the Swedish Steel Prize 2010 is an example of an environmentally-adapted product. They have developed a dump truck body for transporting ore from opencast minesthat has a significantly longer lifespan than with a traditional design. The floor and sides of the body are made of Hardox wear plate, while Weldox has been used for the sidebars, substructure and safety screen. For the users, the vehicle's weight is cut by 8 tonnes, or 19%, and fuel consumption is cut by 10%.

Source: Swedish Steel Prize 2010 Dump truck body from Van Reenen Steel Ltd

Ruthmann GmbH & Co KG (DE) from Germany was one of the finalists in the Swedish Steel Prize 2010 competition, with a new telescoping boom for an aerial platform. By using SSAB's high strength Docol steel, they have increased the lifting height and load capacity with a retained total weight for the light truck (3.5 tonne). The impact of buckling on bearing strength lifting power and rigidity has been taken into account by means of the cross-section form of the boom being adapted to the halved thickness of the plate (1.5 and 1.8

mm) and the high strength steel. Other advantages include smaller dimensions of the vehicle, greater flexibility in regards to driver's license classes, and a lighter and cheaper chassis.

Source: Swedish Steel Prize 2010 Aerial platform from Ruthmann GmbH & Co KG

3.2 SSAB's investments

The focus on niche products has been important for SSAB's earnings growth. To build further on this strategy, SSAB has decided to invest in developing the production of high strength steels. This is taking place primarily at the plants in Mobile, Alabama, and in Borlänge. The investments are being carried out in stages and are expected to be completed in 2012.

3.3 SSAB's production

3.3.1 Measures for more efficient production

- In 2010, new hot stoves were installed at one of the blast furnaces in Oxelösund, thereby resulting in a significant reduction in coke requirements for the blast furnace and in more stable production.
- In Luleå, a project is underway to optimize the process flow from hot metal to steel. This involves efficiency improvements in a number of aspects, including resources and energy. It also will have a positive impact in the form of reduced carbon dioxide emissions.
- More efficient burners for heating steel have been installed at several plants in SSAB's operations.
- More modern control systems have been installed for certain equipment, so that they are used only as required, instead of operating continuously.
- In Borlänge, a project has been underway for several years aimed at reducing total specific energy use by 10% in 2012.
- Work is taking place to review the possibility of granulating all slag from the blast furnaces. This is done in order to produce a raw material for the cement industry that will then not need to cut limestone – a process which generates carbon dioxide (1 tonne of cement raw material produced from slag saves 1 tonne of carbon dioxide emissions).
- Ongoing projects are taking place within SSAB to utilize waste energy in various ways. Among other things, there is the possibility to store low value energy for transportation to potential users. In Oxelösund, the conditions are being studied for utilizing the gas formed in the steel mill when hot metal is converted into steel—the so-called LD-gas [4].
- The possibility is being studied to replace oil with natural gas in the heating ovens in Borlänge.
- In a cooperation project being carried out with the rest of the Swedish steel industry, the possibility of replacing a certain quantity of energy from fossil fuel with bio-energy is being studied.

3.4 Research and initiatives to reduce carbon dioxide emissions

3.4.1 Technological breakthrough with Ultra Low Carbon dioxide Steelmaking (ULCOS)

As previously mentioned, SSAB has been participating in the long-term European cooperation project, ULCOS[5], since 2004. The objective of the project – through a switch in technology – is to cut carbon dioxide emissions generated from steel production by half. The project was concluded in 2010, but is continuing in the form of preparations for a demonstration plant. Through SSAB's operations in North America, we are contributing to the "CO_2 Breakthrough" program that also is developing new technology.

3.4.2 The CCS project

4 LD stands for Linz-Donawitz, which is a variant of a steel converter process. The gas' energy value is approx. 7 MJ/m3.

5 ULCOS stands for Ultra Low Carbon diOxide Steelmaking, see www.ulcos.org .

One way of reducing emissions from the steel production process is through capture and storage of carbon dioxide deep below ground. This technology is referred to as CCS (Carbon Capture and Storage). SSAB has played an active role in the development of this technology and is participating in various cooperation and development projects.

3.4.3 The Steel Eco-cycle

SSAB also is participating in the Steel Eco cycle project, which is financed jointly by the Swedish steel industry and Mistra (The Foundation for Strategic Environmental Research). This is a four-year environmental research program. The first phase took place between 2005 and 2008. A second phase extends between 2009 and 2012, and a possible continuation is under discussion. The program is focused on conserving natural resources, energy, and recycling. The vision is "a closed-loop production and use of steel in society." SSAB is particularly active within the areas of utilization of vanadium from slag, as well as obtaining recyclable slag; the further development of high strength steels in an energy-efficient manner; and removing zinc coating from scrap steel to enable the recycling of both the scrap and the zinc. Steel is often treated with zinc to obtain anti-rust protection, but such scrap creates problems for the processes currently in use.

3.5 Transportation

Transportation takes place primarily by railway and by ship, but also by truck. SSAB's logistics departments have the objective of making transportation as efficient and economical as possible. No other company in Sweden transports such a large volume of goods by rail as SSAB.

Raw materials are transported to Luleå and Oxelösund by train or ship. Steel slabs are transported by train between the production plants. The return trips are utilized for the transportation of strip products to the export port in Oxelösund and for transports from Borlänge to Plannja in Luleå, as well as other customers in the North. Goods to and from SSAB constitute the single largest railway tonnage in Sweden.

The burden placed on the railway system in Sweden is high and the railways are sometimes a congested sector. One way of increasing infrastructure capacity is by improving the carrying capacity of the freight cars. SSAB has participated in several projects in which the payload has been increased significantly by reducing the car's deadweight. As an example, the pellets trains between LKAB in Kiruna and SSAB in Luleå, which are manufactured of high strength steel, have a 25% increase in payload.

For several years, SSAB in Sweden has been awarded Green Cargo's SSAB Green Cargos "Climate certificate for transportation", meaning that the company meets the Swedish Environmental Protection Agency's criteria for Good Environmental Choice for Transportation. Activities also are taking place to reduce emissions of particulates and nitrogen oxide from the transports.

The location of the electric steel mills in Montpelier and Mobile were chosen due to the potential market and access to the scrap raw material. This strategy minimizes the environmental impact of transportation since all plants have access to the railway network. In North America, the inland waterway network also is used.

3.6 Recycling

SSAB currently uses approximately 20% of scrap metal in steel production in Sweden and 100% in the US. Because our operations in Sweden are based on blast furnace technology, there are only small possibilities to increase the percentage of scrap metal. A switch to 100% scrap in Sweden would result in difficult manufacturing of our most advanced grades of steel. On the other hand, when we return scrap to the steel process, carbon dioxide emissions are reduced since we need to produce less hot metal. A number of replacement projects are underway within SSAB in which the volume of finished steel compared to hot metal will increase.

Work is constantly taking place to minimize waste by returning as much as possible to the production processes or creating sought-after byproducts. Certain materials that contain coal can be returned to the

process, for example, furnace dust to the blast furnaces or worn out car tires are used at the electric arc furnaces in the US. In this way, SSAB is able to reduce both waste and the use of coal in the production of new steel.

3.7 Byproducts

SSAB's production processes also create byproducts sold for various purposes. Thanks to very exact control of the steel production process, valuable byproducts are produced that are well-defined and quality-adapted.

In Sweden, SSAB Merox develops high-value products based on byproducts from the steel business. Examples include Hyttsten, which is used for road construction purposes and gives the road a significantly longer life, thereby allowing roads to be built using smaller quantities of materials. The cement and concrete materials Merit 5000 and Merolit, which replace burnt lime, uses one tonne of slag as a raw material to reduce carbon dioxide emissions by one tonne. Paddex is used for riding tracks, as well as an organic plant fertilizer called M-kalk. Another example is Black Iron, which is sold for the manufacture of ferrite magnates, which today are included in almost all modern electronics, ranging from mobile phones to cars. In the United States, the largest byproducts are steel slag and oxide scale. These are used, among other things, in asphalt and cement production.

SSAB engages in active research work together with third parties in order to identify new areas in which the byproducts can be used as a raw material.

3.8 Electricity supply and district heating

- The energy-rich coke oven and blast furnace gases that are not used in steel production are used in heat & power plants to provide SSAB with approximately 50% of the electricity needed in Swedish operations. In addition, district heating is supplied to more than 70% of the population in the urban areas of Oxelösund and Luleå, and to 15% of the population in the Borlänge urban area.

4 EMISSIONS TRADING AND EMISSION RIGHTS

- Within the scope of the Kyoto protocol, the member states of the EU have jointly undertaken efforts to cut carbon dioxide emissions by 8% from 1990 to 2012. Within the EU, this is addressed to a certain extent through a system for trading in carbon dioxide emission rights, which covers approximately 13,000 plants throughout the EU. This corresponds to 40% of emissions within the Union. SSAB's operations in Sweden are included among the more than 730 Swedish plants covered by the system.[6]
- The aim is that companies will reduce their emissions when it becomes more expensive to purchase emission rights than it is to carry out environmental improvement measures. Thus, a shortage of emission rights on the market is a prerequisite if the trading system is to lead to reduced emissions. Industry has partially received a free allocation of emission rights, since to a large extent they are exposed to global competition from countries not covered by the trading system.
- During the current trading period, i.e. 2008 – 2012, no allocations were made to plants within the power and district heating sector. Rather, they were obligated to purchase their needs. Industry, on the other hand, received part of its emission rights needs free of charge, since they are considered to be more exposed to competition outside Europe. The allocation of emission rights is based on historical emissions and forecasts made in 2006. If industry lacks emission rights, they must be purchased.If they do not use the rights, they can be sold.
- The trading period that began in 2008 extends until 2012. SSAB's plants in Borlänge, Luleå and Oxelösund were allocated emission rights in 2008.
- According to the International Energy Authority IEA, (quoted by the World Steel Association) the iron and steel industry accounts for 4-5% of total global carbon dioxide emissions, but most of the world's steel production is not covered by the EU's trading system. The table below shows steel production and carbon dioxide emissions for 2004. Steel production has markedly increased since then. No new

[6] www.utslappshandel.se

calculation of carbon dioxide emissions has been carried out, but a projection may be obtained when comparing steel production in 2010, as is shown in the table.

- In order to avoid a situation in which efficient European steel production relocates to countries outside the emission trading system, SSAB is working to achieve a global solution as it relates to the steel industry's undertakings and trading in carbon dioxide. During the EU's 2013 – 2020 trading period, the European steel industry will obtain free allocation of emission rights up to a standard value for emission rights per tonne of produced steel, in order to avoid so-called leakage of industry out of the EU.