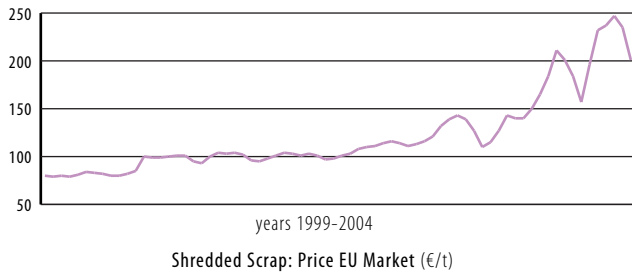


The steel industry has been operating steel scrap recycling systems on a large scale for more than 150 years, and operates via a well-established market that has developed without any public incentive. Furthermore, recycling has grown in parallel with increased steel consumption. Recycling of steel scrap has economic as well as environmental advantages for the steel industry by saving resources and energy.

The steel recycling system is very efficient and all the steel in collected end-of-life products is recycled, irrespective of the percentage of steel in the products. Products that are easy to disassemble, with easily separated steel parts, have a greater potential to be recycled. The magnetic properties of steel make it very easy and economic to separate from other materials for recycling.

Steel scrap, including new scrap from the steel making process, scrap from the manufacturing industry and post-consumer scrap, e.g. end of life products, represents an important and much desired raw material for the steel industry. However, with steel consumption continuing to grow in conjunction with the long service life of an average steel product, current demand for steel scrap cannot be satisfied.

Figure 5: There has always been a strong economic incentive to recycle steel scrap



There is already an economic incentive to recycle steel, due to the inherent value of scrap. The European steel industry is working to maximise the efficiency of scrap collection from all waste streams.

Published by

EUROFER
European Confederation of Iron and Steel Industries

© EUROFER 2006

This brochure is for information only. EUROFER assumes no responsibility or liability for any errors or inaccuracies that may appear. No part of this brochure may be reproduced in any form without the prior written permission of EUROFER.

All rights reserved.

STEEL RECYCLING

One aspect of the steel industry's contribution to the sustainable use of natural resources within an integrated product policy.

Steel can be recycled over and over again without loss of properties.

Steel's 100% recyclability is demonstrated by the existing high recycling rates, without the need to specify minimum recycled content levels.

EUROFER
European Confederation of Iron and Steel Industries

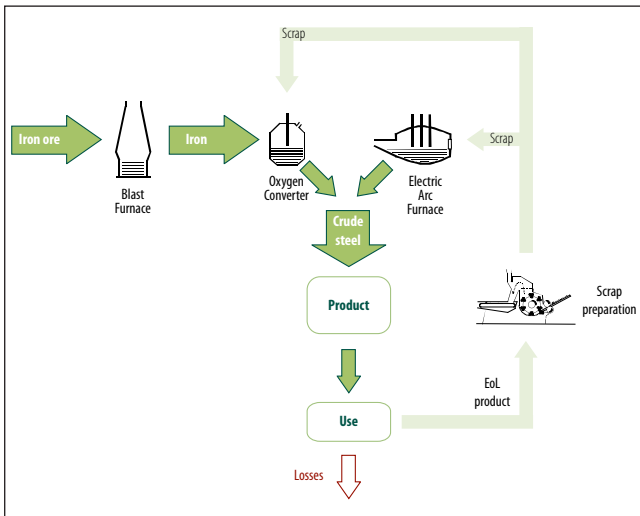
Rue du Noyer, 211
B-1000 Brussels
Tel: +32 (2) 738 79 20
Fax: +32 (2) 736 30 01
Email: mail@eurofer.be
<http://www.eurofer.org/>

STEEL PRODUCTION

There are two process routes that dominate modern steel production:

- Iron ore based production – the so called integrated route – where hot metal (pig iron) is produced by reduction of iron oxide in the Blast Furnace, followed by refining in the Basic Oxygen Furnace to produce steel. In the refining process, excess heat is produced which allows steel scrap to be added to the melt.
- Scrap based production – the so called electric arc route - where steel is produced by melting steel scrap in the Electric Arc Furnace, sometimes followed by refining. Highly alloyed steel grades, like stainless steel and tool steels, are generally made from scrap. Alloying elements, such as chromium and nickel, come from the type of scrap used as well as from extra additions to the melt.

Figure 1: Schematic showing how scrap is used in both steelmaking processes



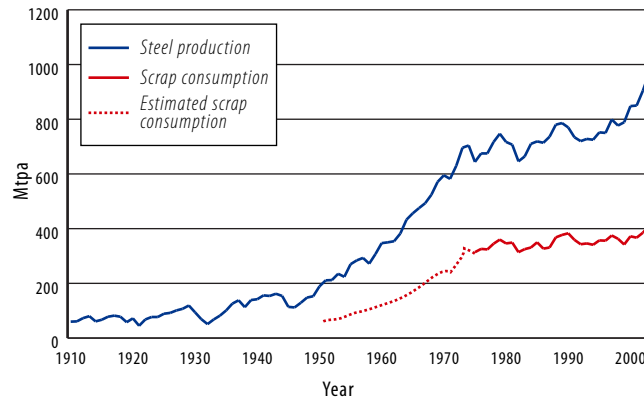
The choice of the production route is determined by a global market in which the steel industry makes the best use of the iron resources i.e. iron ore and steel scrap.

STEEL RECYCLING

Both production routes use steel scrap as a secondary raw material substituting primary raw material, i.e. iron ore, and saving energy. Steel scrap is sorted in categories according to the alloying elements it contains to ensure the best use of the resources. The use of scrap as a raw material does not change the properties of the steel products, thus steel can be recycled infinitely without any 'downgrading'.

The increasing demand for steel, in conjunction with the long service life of an average steel product, means that for the foreseeable future, the total demand for steel cannot be satisfied solely by recycling of scrap. Attention should be focused on improving recycling rates, in order to maximise the utilisation of all available scrap, rather than focus on recycled content.

Figure 2: Global steel production vs. scrap consumption

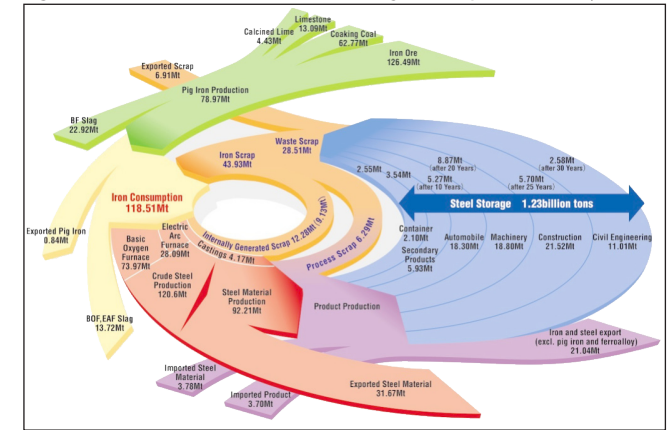


Source: IISI

Criteria for minimum recycled content has no environmental relevance for steel products, because:

- Steel is 100% recyclable and already has very high recycling rates e.g. >95% for cars.
- The recycling of scrap is already optimised in the two steelmaking routes.
- Due to the longevity of steel products in circulation, scrap availability is not rising as fast as the demand for new steel products.

Figure 3: Illustration of steel flows through the Japanese society



Source: Japanese Iron & Steel Federation

PRODUCT DESIGN – DESIGN FOR RECYCLING

In order to facilitate re-use and recycling, environmentally optimised product design should incorporate ease of dismantling and separation of all steel components. By maximising re-use and recycling, more steel can be kept in circulation.

An important design criterion is the potential for material-to-material recycling at the end-of-life. As steel at the end-of-life can be recycled back into new steel products without loss of properties, it can be classed as being in a closed material loop. This means that steel can be recycled over and over again, which saves resources for future generations and reduces environmental burdens overall.

Figure 4: Multiple recycling reduces the average energy requirement per kg of steel

