

Public policy paper

Life cycle assessment in the steel industry

A life cycle approach is the only way
to establish the true environmental
performance of any given product.

Introduction

Climate change and the sustainable and responsible use of natural resources are among the main challenges for society today. This puts them at the top of the political environmental agenda, where they are likely to remain for the foreseeable future.

Product design and consumer behaviour can affect the overall sustainability performance and efficiency of a product. Companies making the products are paying closer attention to manufacture, utilisation, reuse and end-of-life, which are increasingly important for material specifiers.

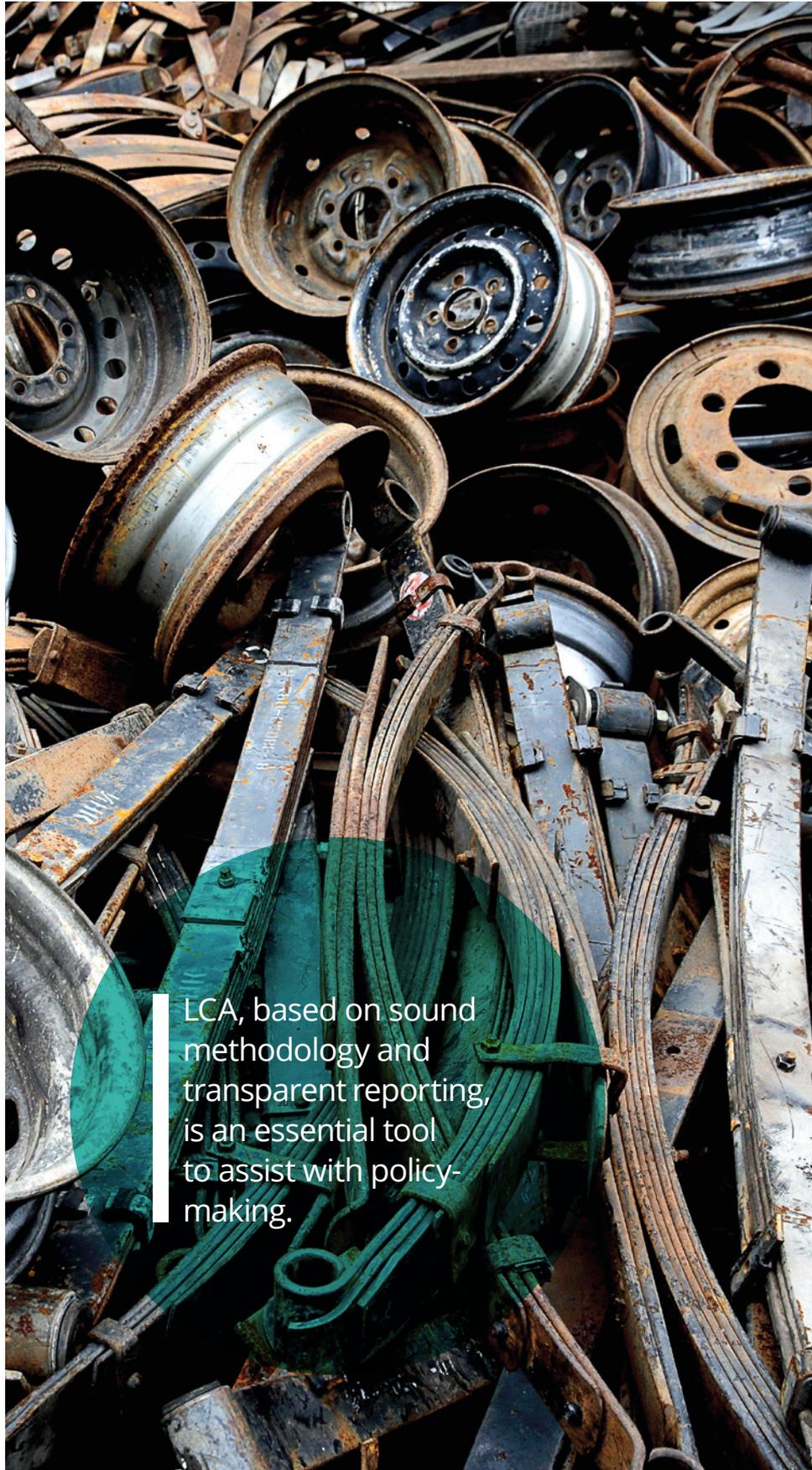
Among the tools and methodologies available to evaluate the environmental, economic and social performance of materials and consumer products (including their impact on climate change and natural resources), life cycle assessment (LCA) provides a holistic approach that considers the potential impacts from all stages of manufacture, product use and end-of-life (reuse, recycling or disposal).

A full life cycle approach is the only way to assess a product's impact on the environment.

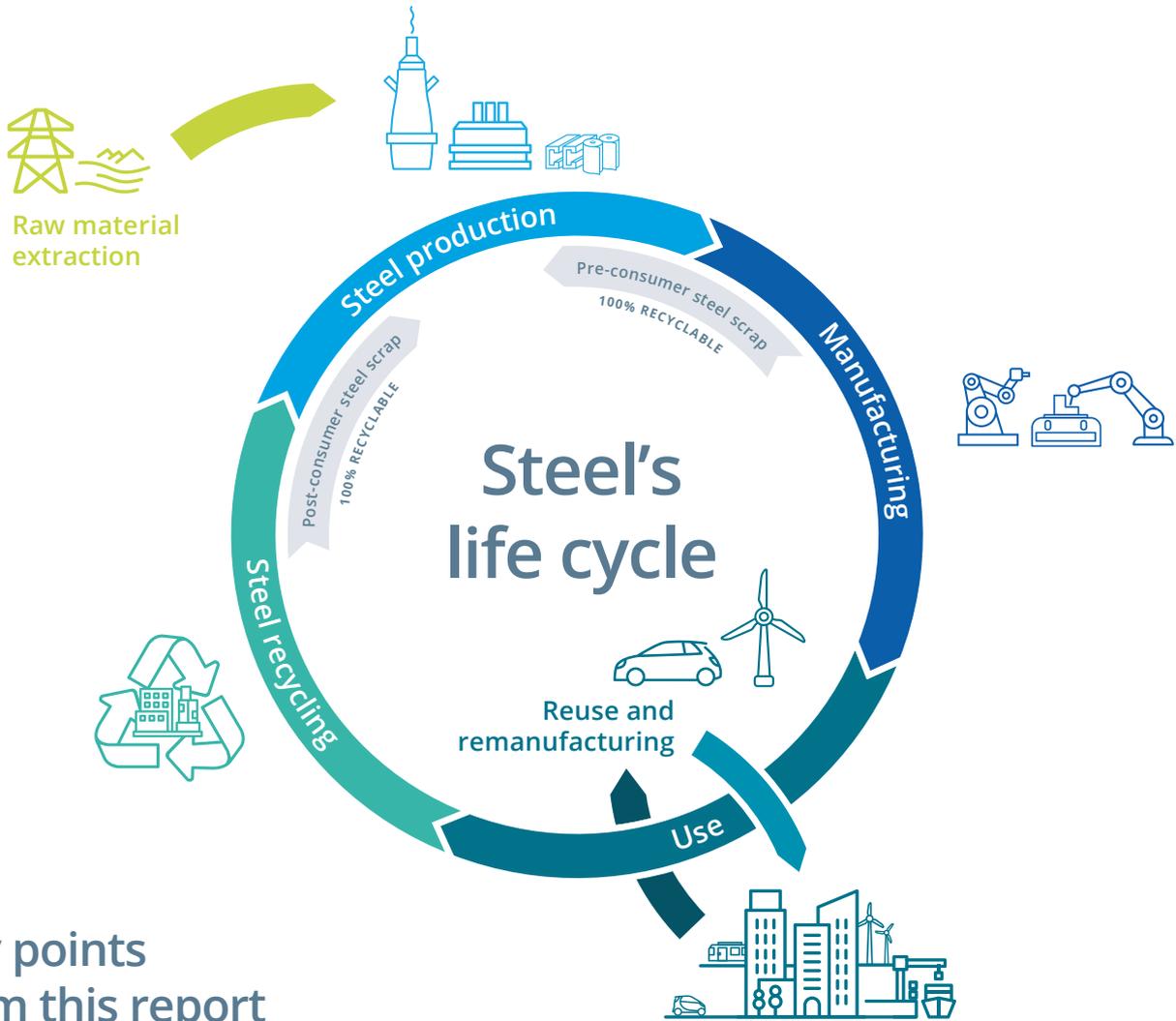
It is also, therefore, the best way to help society make informed decisions on the use of materials and their economic importance.

Focusing solely on one aspect of a product's life, such as the material production or a single impact such as Global Warming Potential (GWP), distorts the real picture and could lead to unintended consequences because it might ignore increased impacts during another life cycle phase (e.g. the use phase) or in another environmental impact category. LCA ensures that these unintended consequences are understood and avoided.

An LCA ensures that improvements in one life cycle phase do not result in unintended consequences in another phase or impact category.



LCA, based on sound methodology and transparent reporting, is an essential tool to assist with policy-making.



Key points from this report


 worldsteel encourages the use of an LCA methodology to enable designers to make informed material choices.

The worldsteel LCA Expert Group engages all stakeholders to make better use of LCA as a tool for inter-material competition and steel promotion.



 worldsteel supports the use of a rigorous LCA methodology and has developed its own methodology for steel products, based on relevant ISO standards.

The worldsteel LCA methodology provides a common basis of measurement of environmental and efficiency performance of steel products around the world.


 worldsteel encourages an LCA approach to be considered for the development of appropriate legislation to ensure that the true environmental impact of products is assessed correctly and consistently, avoiding unintended consequences.

New companies are joining the worldsteel life cycle inventory (LCI) data collection each year, enabling worldsteel to publish annual LCI data for steel products.




Circular economy and life cycle assessment

In a sustainable world, circular economy models maximise the value of raw materials by encouraging practices such as reducing the amount of raw materials consumed/material used, reuse, remanufacturing and recycling. However, to ensure a genuine circular economy is achieved, a life cycle approach should be considered to measure the true environmental benefits of the model.

There is an increasing number of national or regional LCA databases which cover major industrial sectors. Many manufacturing organisations have LCA departments and there are more and more LCA software packages on the market. It is also a subject taught at universities.

The procedures of LCA are part of the International Standards Organisation (ISO) 14040 series of standards. LCA

takes into account the environmental impacts of the manufacturing processes of a product, the extraction of the raw materials used by these processes, the use and maintenance of the product by the consumer, its end-of-life (reuse, recycling or disposal) as well as the various methods of transport occurring between every link of the chain.

In 2018, ISO 20915: 'Life cycle inventory calculation methodology for steel products' was published. This standard specifies guidelines and requirements for conducting life cycle inventory (LCI) studies of steel products.

Construction, automotive and packaging are examples of just three market sectors where life cycle thinking is being incorporated into regulations but a more widespread application is crucial.



LCA in worldsteel

At a very early stage, the steel industry recognised the need to develop a sound methodology to collect worldwide LCI data, to support the markets and customers.

As the global body for steel, worldsteel is in a unique position to provide the most consistent and accurate information about LCA in the steel industry.

In the mid-1990s worldsteel established the LCA Expert Group to undertake a work programme on LCA.

A thorough set of guidelines was developed for companies that carry out or use LCA, which recommended maintaining the highest standards in both the undertaking of LCA studies and their disclosure.

This is to prevent the reduction of complex issues to simplistic and partial analysis, which is especially important when using LCA to compare the use of alternative materials in product design.

worldsteel has been collecting life cycle inventory data from its member companies worldwide since 1995, when worldsteel first launched its LCI methodology and data collection.

Data is provided, on request, as cradle-to-gate data. The net benefits associated with recycling steel scrap at the end of the product's life are also provided to enable cradle-to-grave studies to be carried out, demonstrating the importance of steel in the circular economy.

This data is used worldwide in LCA studies, not only by industry, but also by universities, governments and customers to ensure informed material selection decisions can be made. The worldsteel programme helps to identify ways to improve the eco-efficiency of steelmaking.

The worldsteel LCA methodology provides a common basis of measurement of environmental and efficiency performance around the world.

worldsteel's LCA methodology and LCI data helps the industry to:

- provide up-to-date and consistent LCI data for steel products to our customers, as well as their customers, the consumer, stakeholders, academics and governments
- increase public knowledge of the life cycle environmental benefits of using steel in applications and where it can be effective in improving environmental performance
- understand the contribution of steel to the environmental performance of product systems in different applications
- understand the performance of steel in relation to competitor materials
- support technology assessment (benchmarking, determination and prioritisation of environmental improvement programmes)
- increase the coverage of steelmaking sites within the new datasets
- determine global LCIs for additional steel products
- carry out impact assessments to reduce the impacts of their own processes on the environment and to work closely with their customers to gain knowledge about the total impact of steel-using products on the environment, over the complete life cycle.

The LCI data quantifies 'cradle to gate' inputs (resources, energy) and outputs (environmental emissions) of steel production from:



the extraction of resources and use of recycled materials,



production of steel products to the steelworks' gate,



reuse and remanufacturing, and



end-of-life recovery and recycling of steel.

LCA plays a vital role in companies' environmental and greenhouse gas reporting requirements, marketing and sales support, and ensuring compliance with regulations and voluntary initiatives such as environmental product declarations.

Contribute, improve and communicate

worldsteel started collecting LCI data in 1995 and now collects data on an annual basis. The sixth LCI database was completed in 2019.

As the exercise is repeated and improved over time, the LCI framework can also be used as a powerful tool

for measuring progress by the steel industry. Thirty-four companies worldwide participated in the data collection exercise for the 2019 data release, including data from 121 sites.

The data is reviewed annually and updated with the latest upstream

datasets available. Steel company production data is added to and refreshed each year to ensure it is less than 5 years old.

New companies are joining the data collection each year and worldsteel strongly encourages this trend.



The LCA Expert Group engages all stakeholders in the LCA process, to make better use of LCA as a tool in inter-material competition and decision-making.

Future mission

worldsteel has a clear mission to achieve the following objectives in the coming years:



provide updated information so that the environmental implications of the use of steel within different sectors can be quantified and understood as well as to support responses to environmental claims against steel.



maintain and develop the LCA Expert Group's position as the most authoritative source for steel LCI data and LCA methodology.



advocate for LCA to be used to promote life cycle thinking, to support policy and decision-making.



continue discussions and harmonisation with other industries, particularly the metals industry, to help improve the credibility of LCI data and LCA methodology, whilst ensuring that elements that truly reflect steel's positive position are maintained.



provide customers with accurate information as they analyse the environmental impacts of their products that contain steel.



LCI data and all related documents are available via worldsteel.org. If you are carrying out an LCA study, you can fill in the data request form at worldsteel.org.

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