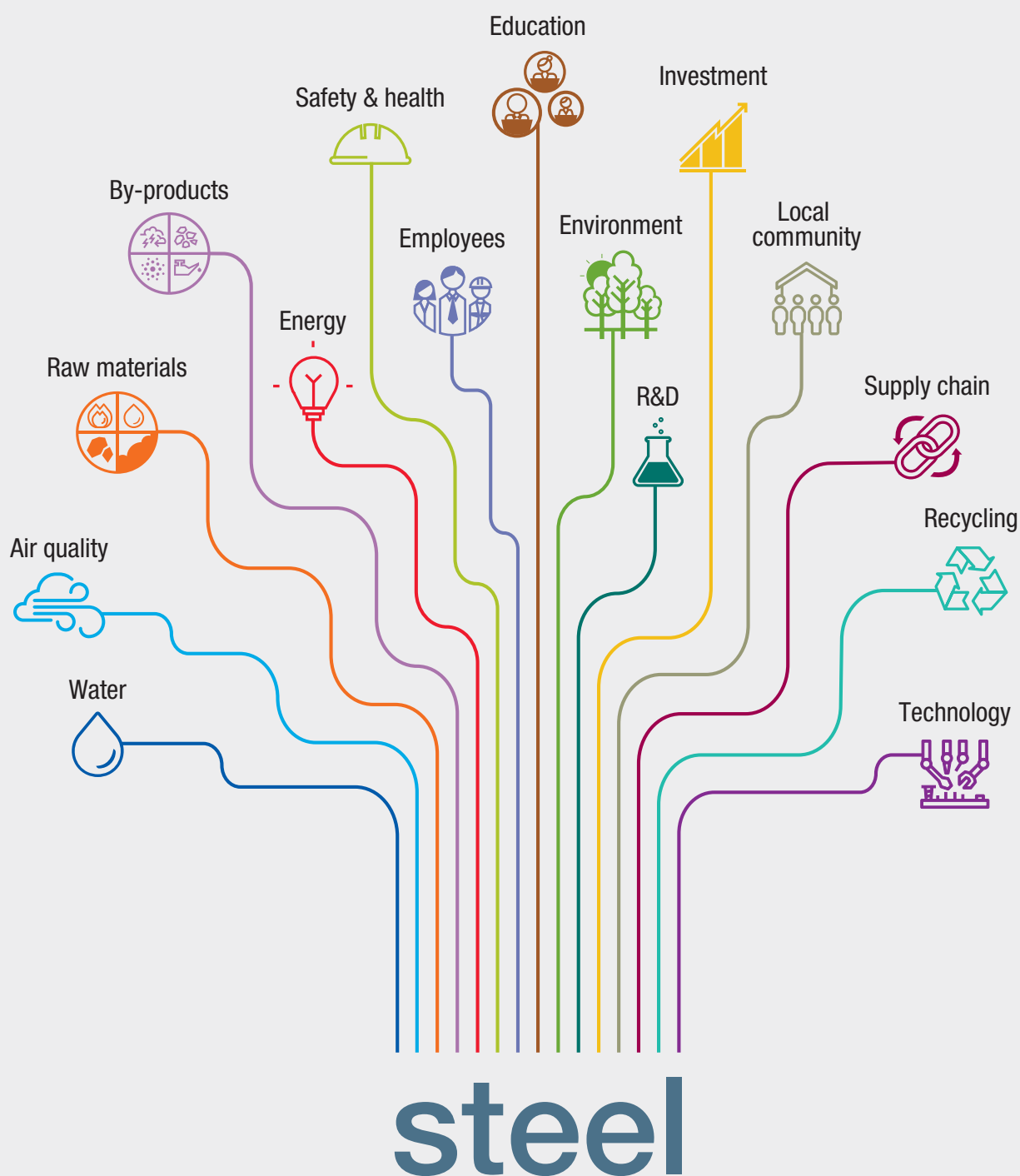


## SUSTAINABLE STEEL

Indicators 2017 and the future



# Sustainable development and the steel industry

A sustainable circular economy is one in which society reduces the burden on nature by ensuring resources remain in use for as long as possible. Once the maximum value has been extracted, the resources are then recovered and reused, remanufactured, or recycled to create new products. Society's needs for things such as food, housing, transportation and energy, can be met without the production of waste.

Steel is fundamental to the circular economy. Not only can steel products be reused and remanufactured, steel is also a permanent material which can be recycled over and over again without losing its properties.

The industry is continuing to expand its offer of advanced steel products for many different sectors, such as high-strength steels which reduce the weight of applications, and encourage circular economy practices. For society, the benefits include more efficient and durable products, reduced emissions, and the conservation of raw materials for future generations – a more sustainable future.


In addition, the steel industry is also making a concerted effort to ensure the safety and health of its employees and to engage with local communities where steel is produced. The industry also provides education and training opportunities that will foster the innovation needed for a circular economy, through company-specific and industry-led initiatives.

This year our sustainability report focuses on three aspects: steel as a critical enabler and partner for other industries in a sustainable society; steel as an industry which takes its commitments and responsibilities seriously; and the challenges facing the industry along with initiatives that are in place to address them.

## OUR SUSTAINABILITY REPORTING FACTS & FIGURES

8   
sustainability indicators

125   
steel companies worldwide contributed to data collection

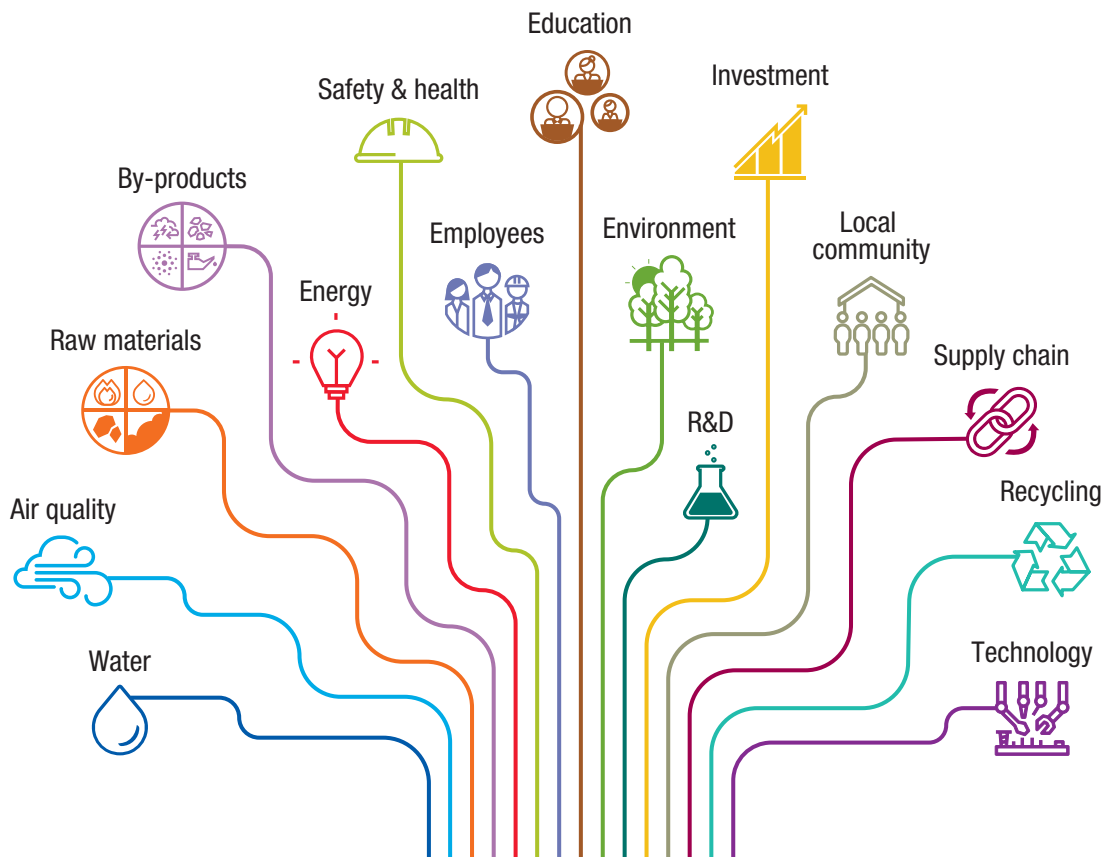
54 %   
of global crude steel production represented

75   
steel companies signed the sustainability charter

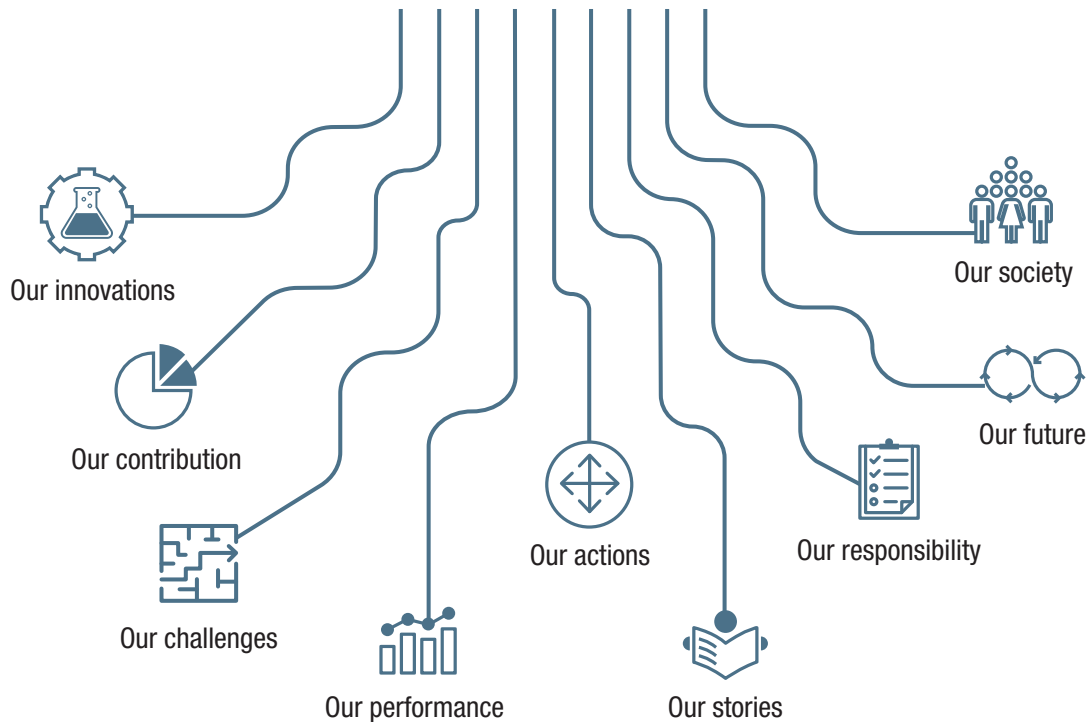
2004   
year our annual reporting started

1   
of very few industries reporting at a global level

OUR MATERIAL ISSUES



steel



OUR REPORTING

## Sustainability performance of the steel industry

The steel industry recognised the need for a systematic method to measure and report on its sustainability performance. To this end, worldsteel established a set of sustainability indicators in 2003. The indicators are aligned to the principles in worldsteel's sustainable development policy and to the UN Sustainable Development Goals.

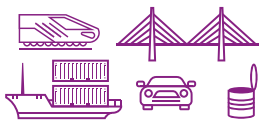
Sustainability reporting at a global level is one of the major efforts that the steel industry undertakes to manage its performance, demonstrate its commitment to sustainability and enhance transparency. It is one of the few industries that reports at a global level and has

done so since 2004, when the first steel industry sustainability report was published.

Steel companies report on up to 8 sustainability indicators every year. Reporting is voluntary. In 2017, 125 steel companies and 6 associations participated. Crude steel produced by companies who reported on one or more indicators for fiscal year 2016 was 875 Mt, representing 54 % of global crude steel production. The average indicator results, participation by indicator, as well as the performance trends of the steel industry over a decade, are provided in the sustainability section on [worldsteel.org](http://worldsteel.org).

INDICATOR		UNIT	2014	2015	2016
ENVIRONMENTAL PERFORMANCE					
1.	Greenhouse gas emissions	tonnes CO <sub>2</sub> / tonne crude steel cast	1.9	1.9	1.9 (p)
2.	Energy intensity	GJ / tonne crude steel cast	20.2	19.1	19.1 (p)
3.	Material efficiency	% of materials converted to products and by-products	97.5	97.3	97.6
4.	Environmental management systems	% of employees and contractors working in registered production facilities	94.0	93.6	97.1
SOCIAL PERFORMANCE					
5.	Lost time injury frequency rate	injuries / million hours worked	1.4	1.2	1.0
6.	Employee training	training days / employee	6.4	6.8	7.0
ECONOMIC PERFORMANCE					
7.	Investment in new processes and products	% of revenue	7.4	12.6	13.0
8.	Economic value distributed	% of revenue	96.6	96.7	98.8

Notes:  
(p) = preliminary; data collection in progress  
Indicators 1 & 2: These indicators are calculated using route-specific energy and CO<sub>2</sub> intensity for the basic oxygen furnace and electric arc furnace. The indicators are also weighted based on the production share of each route. Indicator 1 includes CO<sub>2</sub> emissions only as these make up approximately 93% of all steel industry greenhouse gas emissions. The 2015 figure for Indicator 2 (energy intensity) is lower due to increased use of scrap in the EAF route and increased use of by-product gas in the BOF route.  
Indicator 5: Lost time injury frequency rate includes fatalities and is calculated based on figures including contractors and employees.  
Indicator 7: Investment in new processes and products includes capital expenditure and R&D investment.  
Values for Indicators 2 and 8 have been updated for 2015.



Essential in all sectors of the economy

There are more than 3,500 different grades of steel. **New modern steel products are lighter and stronger** than before, helping other industries to reduce their environmental footprint.

Taking action to fulfil responsibility

The well-being of the community and the health of the environment are priorities for us. Abiding by environmental regulations is a prerequisite for acceptance by society. We aim to continually reduce our environmental impact.



Innovation is crucial

New and innovative steels are continually developed and provide sustainable solutions. In 2016, the steel industry **invested 13% of revenue in new processes and products**.

Contributing to society

Steel is vital for making modern society sustainable. In 2016, the steel industry **distributed an estimated 1,029 billion USD, 98.8% of its revenue, to society** directly and indirectly.



Safety first, nothing is more important

We are working towards zero incidents. In 2016, the industry's **Lost Time Injury Frequency Rate was 1.0**, an improvement of 78% from 2006.

Human capital is a key asset

Worldwide 6 million people work for the steel industry. In 2016, steel companies provided each employee with **7.0 training days on average**.



A systematic approach brings effective results

Environmental management systems (EMS) help to improve environmental performance and operating efficiency. In 2016, about **97.1% of steel industry employees and contractors worked in EMS-registered production facilities**.

Biggest challenge of the industry

In 2016, on average **1.9 tonnes of CO<sub>2</sub> were emitted for every tonne of steel produced**. The majority of this comes from the chemistry of steelmaking. Breakthrough technologies are being developed worldwide to address this challenge.



Significant improvement in energy consumption

In the last 50 years the steel industry has **reduced its energy intensity per tonne of steel produced by 60%**. The average in 2016 was 19.1 GJ/tonne.

Responsible management of natural resources

Very little waste is produced. In 2016, **97.6% of the raw materials used for steelmaking were converted to steel products and by-products**.



Optimal resource efficiency, nothing to waste

Steelmaking by-products are valuable resources and used in e.g. concrete, fertilisers, plastics, paints and cosmetics. **Nearly 100% of our industry by-products can be used**.

Informed decisions on material choice

We provide **life cycle inventory data for 16 key steel products**. This helps customers to select the most sustainable materials and to understand the overall environmental performance of their products.





# Steel Innovation

## RENEWABLE ENERGY

Steel helps to turn buildings into power stations. Innovative integrated steel building components are used to generate, collect, store and release solar and geothermal energy.

## FERTILISERS & LIMING MATERIALS

Steel slags are a valuable resource in agriculture. They are used as fertilisers and liming materials, improving plant nutrition and soil quality.

## CEMENT PRODUCTION

Blast furnace slag, a steel industry by-product, is used in cement production. Substituting clinker with granulated blast furnace slag would allow significant reductions in CO<sub>2</sub> emissions up to 200 Mt of CO<sub>2</sub> annually.

## SHIPS & CONTAINERS

Steel ships and containers allow for enormous loads to be transported in one go. Shipping consumes less energy and emits less GHGs compared to other modes of transport.

## PACKAGING & RECYCLING

Globally, about 7.2 Mt of steel packaging is recycled each year. This saves 11 Mt of CO<sub>2</sub>, equivalent to taking about 280,000 cars off the road.

Steel products and applications help other industries to reduce their environmental footprint.



# You can rely on steel. Together we find sustainable solutions.

## ELECTRIC MOBILITY

There would be no electric mobility without steel. Electrical steels are essential to build high-speed motors for electric and hybrid vehicles.

## REPURPOSED BUILDINGS

Steel's long product life and adaptability enable old buildings to be reused or converted for different purposes. CO<sub>2</sub> emissions savings from building reuse are estimated at 1 to 1.5 kg CO<sub>2</sub>/kg steel.

## STRONGER BUT LIGHTER VEHICLES

Modern cars are increasingly built with new Advanced High-Strength Steels that are stronger and can achieve at least 35% mass reduction. They help reduce overall vehicle life cycle GHGs.

## AIRCRAFT ENGINES & LANDING GEAR

Highly valuable steel parts, like engines and landing gear, are extracted from decommissioned aircraft and are remanufactured and reused as spare parts for aircraft in service.

## DECOMMISSIONED OIL RIGS

Steel is the main component of rigs. Decommissioned rigs are reused as offshore wind turbines, diving resorts, artificial reefs and cruise ship ports-of-call.

## SEA FORESTATION

Steel slag sea forests provide a high proportion of minerals like iron and calcium. They dramatically boost biomass and capture up to 0.5 tonnes of CO<sub>2</sub> per tonne of the structure.

## LONGER & STRONGER BRIDGES

High performance steels build longer and stronger bridges that shorten distances and carry more vehicles. The Sydney Harbour Bridge has saved 12 Mt of CO<sub>2</sub> equivalents from reduced distance travelled over 80 years.

## ARTIFICIAL REEFS

Retired steel applications have been used to create more than 400 artificial reefs worldwide, from subway cars and ships to retired armoured personnel carriers.

More detailed information is available on [worldsteel.org](https://worldsteel.org).

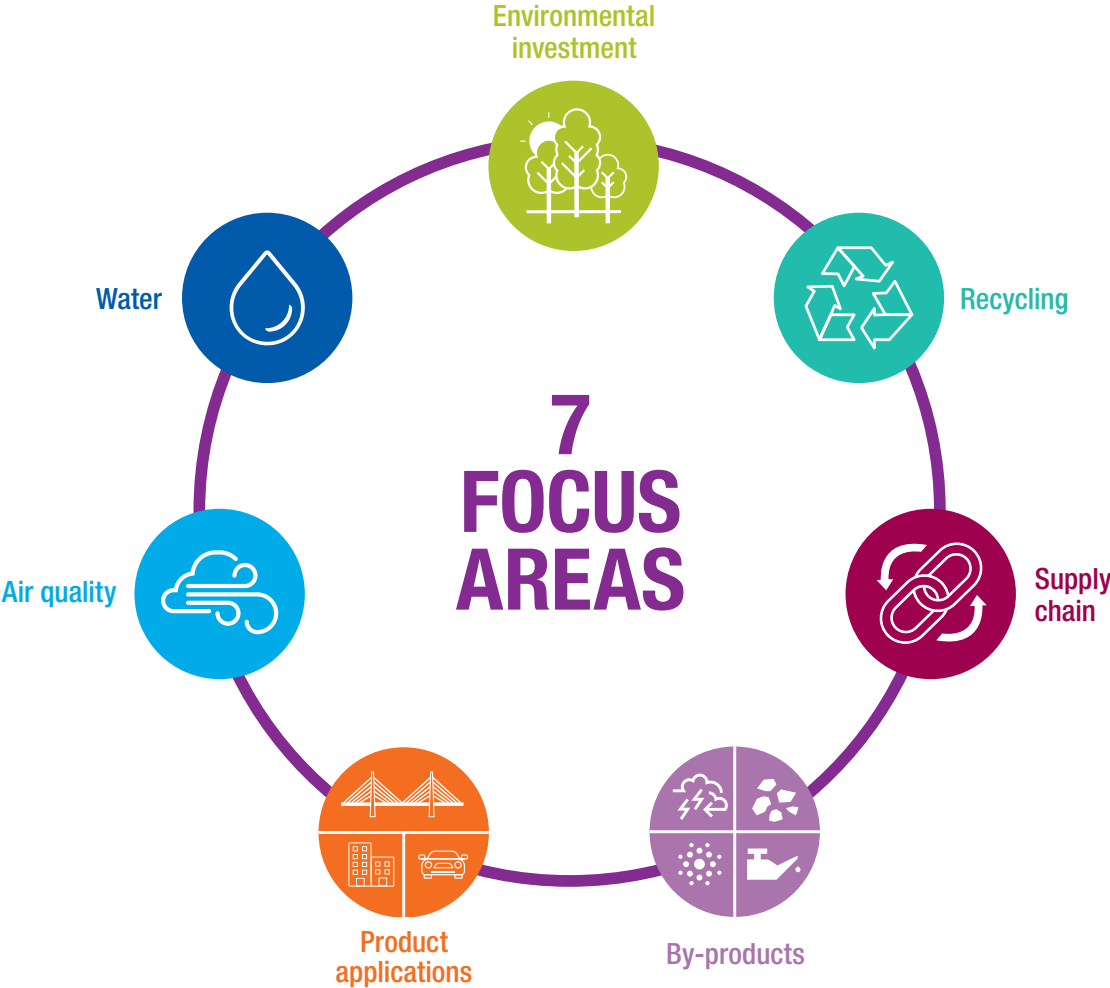
### Tackling our material issues

Materiality is a principle to help define and determine the economic, social and environmental topics that matter most to a business and its stakeholders. A materiality assessment is a process through which an organisation’s most important, or “material”, sustainability issues can then be prioritised, based on relevance to stakeholders and impact on society.

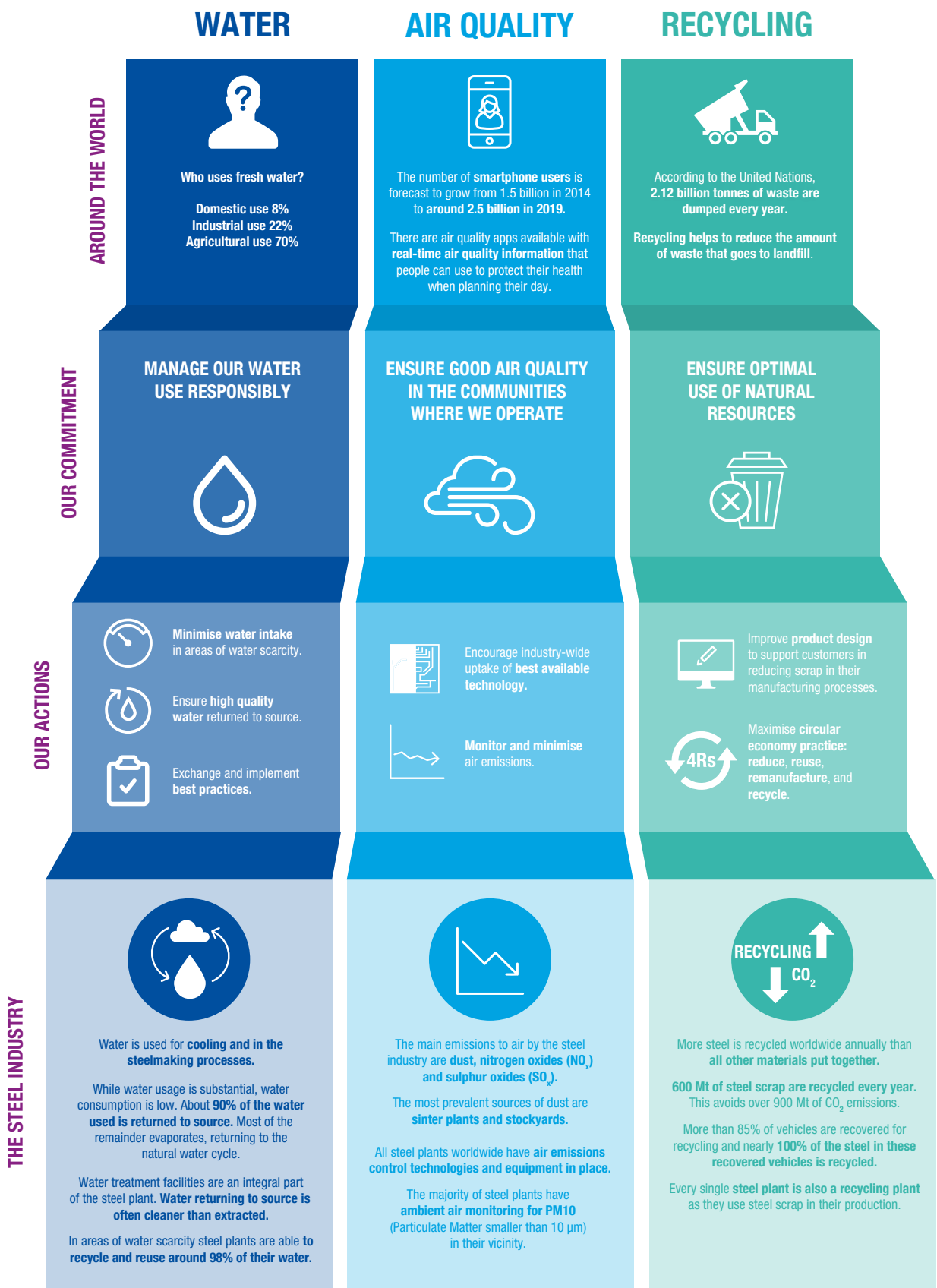
worldsteel performs materiality assessments on a regular basis to ensure that the industry’s reporting is relevant and meaningful to its stakeholders. This includes a review of the materiality assessments of our own member companies, and a broad range of

reporting guidelines and standards, such as those of the Global Reporting Initiative (GRI).

Through these assessments we identified 7 key focus areas for further development to supplement and go beyond our 8 sustainability indicators. We plan to broaden our sustainability communications with our stakeholders by addressing these areas in more detail over the coming years. Our intention is to understand the industry’s performance, identify areas for improvement, and provide meaningful reporting of the industry’s contributions and impacts on society.







## Steel Initiatives

In order to address its challenges and ensure the sustainable development of the steel industry, steel companies are taking action both on the individual company level and are collaborating on a global level on a range of initiatives through worldsteel. Some examples are summarised below. Further details can be found at [worldsteel.org](http://worldsteel.org).

### CLIMATE ACTION

The programme recognises steel producers that submit CO<sub>2</sub> emissions data for worldsteel's data collection, according to the worldsteel methodology – now a standard, ISO 14404. It enables individual steel plants to compare themselves against both average and best performers, to track their performance over time and to identify their scope for improvement.



### GLOBAL TECHNOLOGY INNOVATION FORUM

The reduction of CO<sub>2</sub> emissions is one of the biggest challenges facing the steel industry. These emissions are mostly due to the chemistry of steelmaking and cannot be significantly improved with current technology. The industry is working together on a number of initiatives to develop breakthrough steelmaking technologies that can reduce CO<sub>2</sub> emissions by at least 50%, potentially revolutionising the way steel is made. The success of many new projects depends on a supply of carbon-free energy or hydrogen. worldsteel facilitates a global technology innovation forum for its members to exchange information on these initiatives, share improvements and identify gaps or overlaps in research.



### ONLINE BENCHMARKING SYSTEMS

worldsteel offers free online benchmarking systems for its members on reliability, process yield, and energy intensity for each process of the basic oxygen furnace and electric arc furnace production routes. These systems allow companies to understand their performance, including the influence of raw materials, on a site or process level, for both in-house benchmarking and with best performers, fostering greater material and energy efficiency across the industry.



### STEEL SAFETY DAY

A safe and healthy working environment for all employees and contractors is the number one priority for every worldsteel member. Established in 2014, Steel Safety Day was set up to reinforce awareness of the five most common causes of safety incidents, to identify and mitigate hazards on site, and to create a safer working environment across the entire steel industry worldwide. Significant improvements in safety performance have been observed globally over the past decade.



### STEELCHALLENGE

To inspire innovative thinking and to provide education and training for both future and existing employees, steeluniversity was established and now hosts an annual competition, steelChallenge, for students and young industry employees to test their knowledge and skills using sophisticated simulations. Over 10,000 people have participated in the competition since it began in 2005.



### LIFE CYCLE ASSESSMENT

worldsteel recently released its 2017 global and regional steel life cycle inventory (LCI) data which has been developed following international standards on LCA. The datasets provide the most accurate and comprehensive data worldwide on the environmental profile of 16 key steel products used in a broad spectrum of industries. The data enables a full life cycle approach to be utilised when determining the environmental performance of steel-containing products, including their carbon and water footprints. The LCI data is often used by customers and specifiers for material decision making and product design. worldsteel has developed two market-sector specific LCA models, autoLCA and buildLCA, which help understand the environmental performance of steel in the automotive and construction sectors.



Excellence in Sustainability Steelie Award

worldsteel’s Excellence in Sustainability Steelie Award seeks to recognise an initiative that has made a positive impact, or provided benefits in all three areas of sustainability: economic, environmental and social performance. The sustainability initiatives presented below are the 2017 finalists, and demonstrate actions being taken by worldsteel members to respond to sustainability challenges in their region. More details are available on [worldsteel.org](http://worldsteel.org).

**Acindar Grupo ArcelorMittal and Techint Group:  
Steel reuse for the conservation of jaguars**

These companies have teamed up with NGOs and local authorities to promote biodiversity and reintroduce the native jaguar, which has been declared as a National Natural Monument, in a 35-hectare Breeding Center in Argentina’s Iberá reserve. The Center, including 4 steel pens, was constructed using 400 tonnes of steel, 75% of which was recovered steel, avoiding the use of new steel products and raw materials. The creation of a world-class eco-tourism destination is benefiting 200,000 people in 20 districts in the Iberá area.



**ArcelorMittal Tubarão and Usiminas:  
Paving rural roads in Brazil with steel by-products**

ArcelorMittal Tubarão has developed REV SOL Plus® using steelmaking slag, avoiding the extraction of natural aggregate. This is a low-cost, environmentally sound product used to coat 650 km of previously unpaved roads in the state of Espírito Santo, benefiting 30 municipalities. Usiminas has also developed a slag product, SIDERBRITA, to pave 750 km of rural and urban roads in the state of Minas Gerais, benefiting 650,000 residents in 26 municipalities. These communities now have access to basic services such as transportation, garbage collection, schools, ambulances, and police.



**China Baowu: Renewable energy in steelmaking**

China Baowu has created the world’s largest roof-top solar energy installation covering 25 steelmaking buildings at two urban sites in the Shanghai and Nanjing areas. The installation includes 1.3 million m² of photovoltaic panels, producing 80 million kWh per year - enough to power 59,000 average Chinese households. All of this energy is being used in their steelmaking operations, reducing energy costs and improving air quality for society.



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