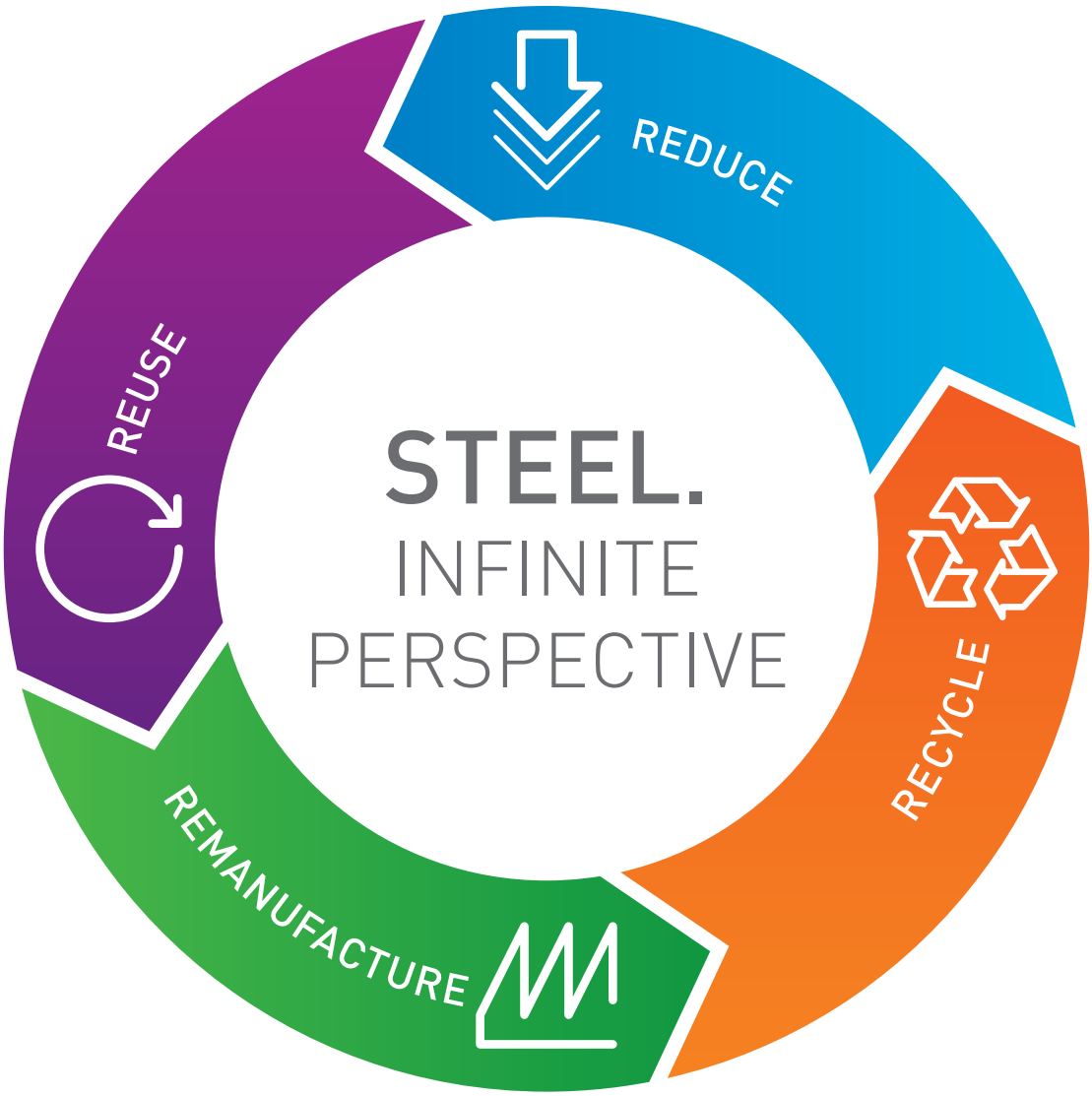
Fondazione
Promozione Acciaio



The sustainability of steel constructions

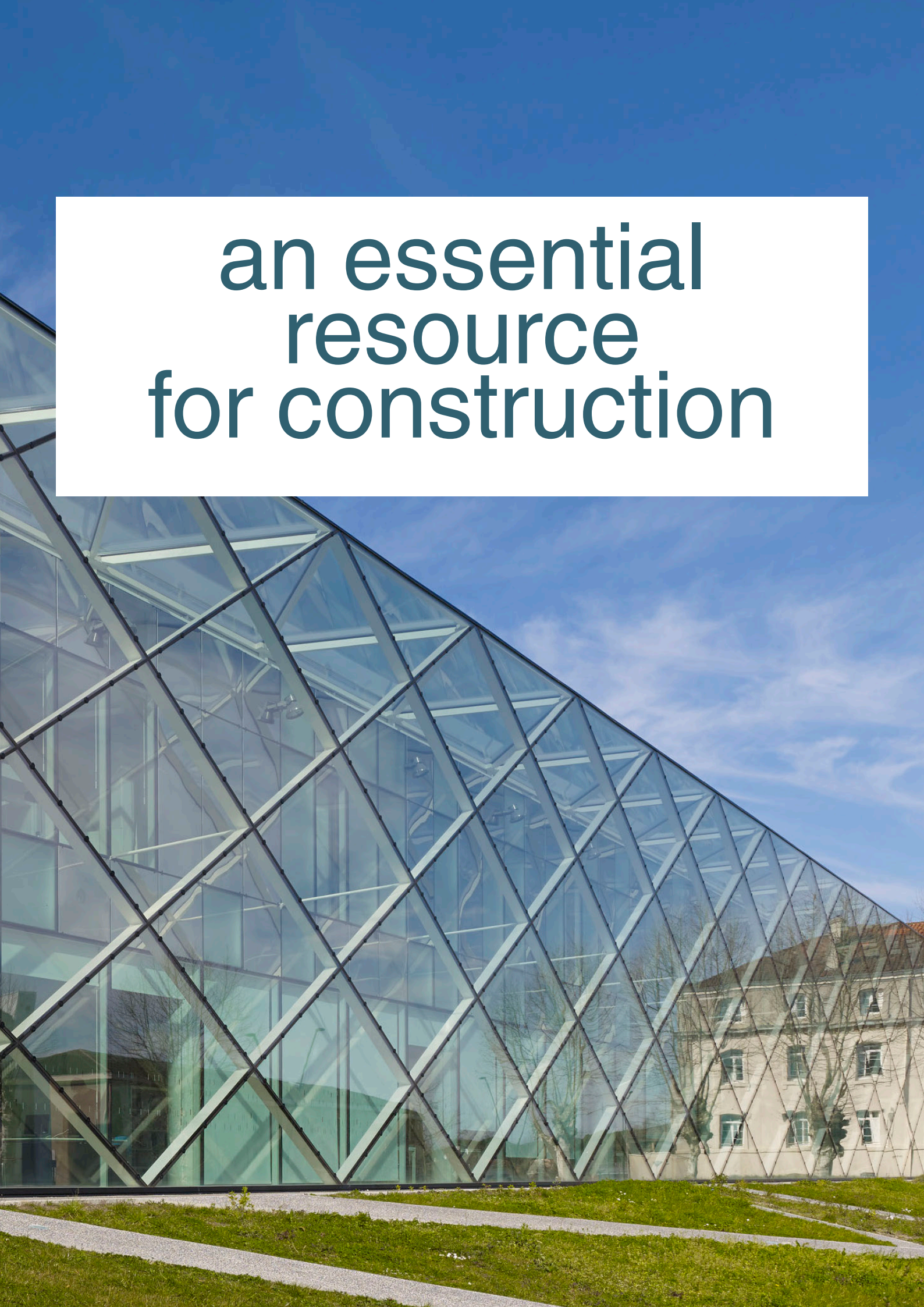
STEEL
IS A **LASTING** MATERIAL

100%
RECYCLABLE

ESSENTIAL
FOR GROWTH AND DEVELOPMENT

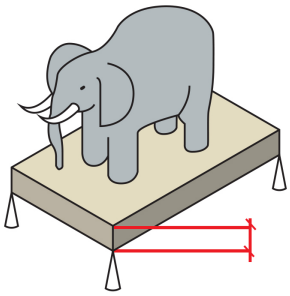
SUSTAINABLE
FOR OUR COUNTRY

an essential resource for construction

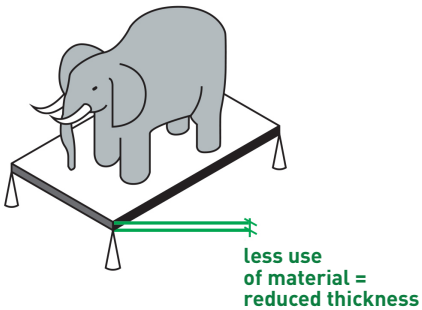


STEEL IS A MATERIAL WITH EXCELLENT STRENGTH AND DURABILITY WHICH PERMITS EXTREMELY STRONG AND LIGHT STRUCTURES TO BE BUILT.

Due to its high strength,
steel can withstand high loads
with less material or be
used for reinforcing other materials

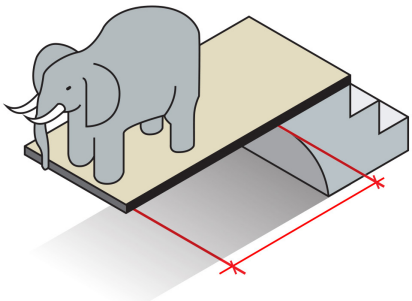


other materials

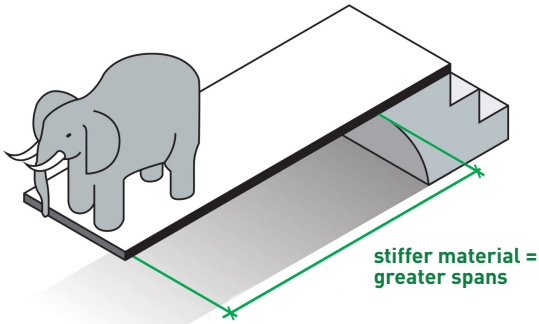


steel

Due to its high stiffness
steel resists greater deformations
covering greater spans, offering
more design freedom



other materials



steel

STEEL ALLOWS STRUCTURES TO BE BUILT WITH GREATER SPANS THAN WITH ANY OTHER MATERIAL.

GREAT FREEDOM OF DESIGN AND ARCHITECTURAL FLEXIBILITY THAT USES LESS MATERIAL AND REDUCES THE CONSUMPTION OF RESOURCES.

Steel is a first-class material for structures, reinforcements, coatings, roofing and doors/windows.
It is widely used for construction and infrastructures in ancient and historical buildings as well as in new and modern architecture.

Strength, durability and high ductility of the material, combined with the low weight of steel structures, allow safe, reliable and high-performance buildings to be built in earthquake zones.

Metal framing constructions absorb seismic energy due to the high plasticity reserve of the material.
The high ratio of strength/stiffness to its specific weight makes steel the best material for use also in the restoration of historical-artistic heritage and in the strengthening of existing buildings, integrating perfectly with the other building materials and systems.

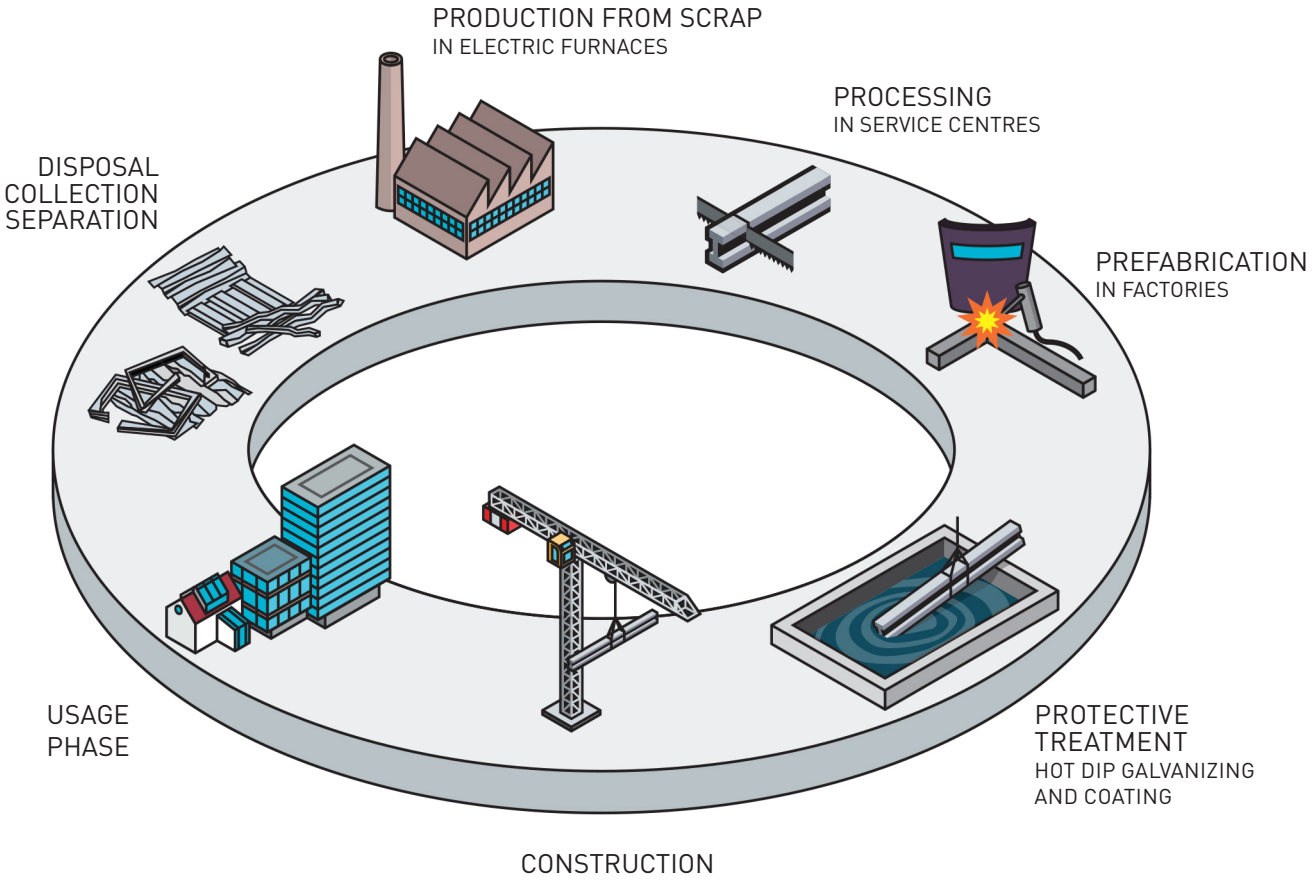
Furthermore, the lightness of steel structures significantly reduces the extent of foundation works.

STEEL DRY CONSTRUCTION TECHNOLOGY, characterised by frame structures to which light, thin, large, flat panels are fixed, (structure-cladding technology), leads to buildings with high energy efficiency due to systems having reduced thickness cladding high-performance insulation materials.

The costs and time of demolishing buildings made of structural steel are much lower than traditional construction systems by virtue of the lightness of the metal framing construction and the dry assembly of building products.
Steel does not have any disposal costs, rather: scrap iron is a useful resource for exchange which is purchased by scrapping companies.

steel remains steel

STEEL IS INFINITELY RECYCLABLE AND THE WORLD´S MOST RECYCLED MATERIAL.



THE LIFE CYCLE OF STEEL USED
IN STEELWORK CONSTRUCTION AND ENGINEERING

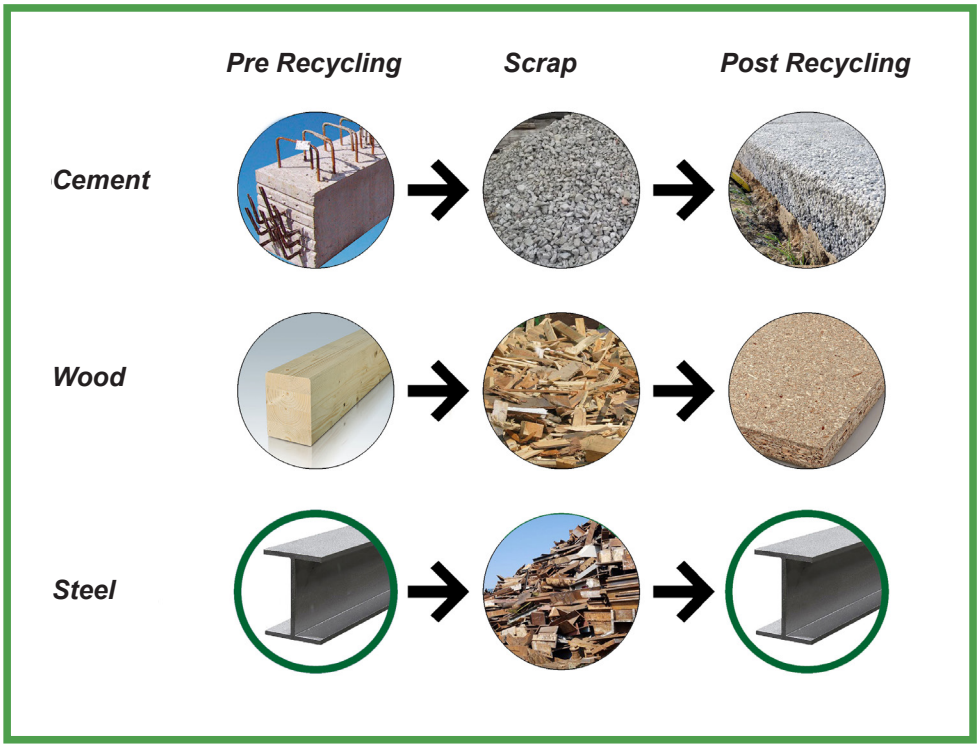
STEEL IS 100% RECYCLABLE: AT THE END OF THE USEFUL LIFE OF A CONSTRUCTION PROJECT DISPOSED STEEL CAN BE EASILY RECYCLED UP TO 99%

due to its easy separation from other building components,
thus obtaining a new first grade material,
while the remaining part (1%) is recovered
as inert for road use.

Steel is recycled without any loss of quality
from the moment that the metallic bonds are restored during solidification;
the mechanical properties of the steel produced will be the same as or better than
those of the original steel, even after several recycling operations.

This allows us to use it over and over again for the same application.

On the contrary, the performance characteristics
of most construction materials deteriorate after recycling,
becoming at best a by-product.
These characteristics make steel
a true and real PERMANENT RESOURCE
essential for a circular economic vision.



STEEL REMAINS STEEL

production and recycling

AT 85%, ITALY HAS THE HIGHEST
RATE OF STEEL RECYCLING
WITHIN THE EUROPEAN UNION,
DUE TO THE PREDOMINANT SPREAD
OF THE ELECTRIC FURNACE
AND THE IMPORTANT INVESTMENTS
THAT STEEL PRODUCERS HAVE MADE IN ADOPTING
THE BEST AVAILABLE TECHNIQUES (BAT)
AND ISO 14001 CERTIFIED ENVIRONMENTAL
MANAGEMENT SYSTEMS,
AS WELL AS IN THE ENVIRONMENTAL CERTIFICATION
OF THEIR PRODUCTS, ONE OF WHICH IS EPD.

THE MAJORITY OF CONSTRUCTION STEEL PRODUCTS ARE THE RESULT OF RECYCLING SCRAP IRON IN ELECTRIC FURNACES IN STEELWORKS.

RECYCLING AVOIDS THE CONSUMPTION OF NEW RAW MATERIALS AND OF OTHER ENERGY RESOURCES THAT WOULD OTHERWISE BE NECESSARY FOR THEIR EXTRACTION, WHILE SIMULTANEOUSLY REDUCING THE ENVIRONMENTAL IMPACT AND EMISSIONS.

Due to the high percentages of recycled material used,
certified by Environmental Product Declarations,
the supply of steel products fully meet the requirements defined by CAM
(Minimum Environmental Criteria).

Depending on the thermal processes and rolling techniques,
it is possible to obtain steels of different qualities
which may have better characteristics in terms of strength
(such as high-strength steels),
ductility, toughness at low temperatures, weldability (such as fine-grained steels)
and improved corrosion resistance (such as weathering steels).

The complete recyclability of steel
fully complies with the requirements of the CAM
requirements for public works,
contributing to the achievement of the environmental objectives
by public authorities,
in line with the policies adopted by European countries.

CAM and environmental product certifications

IN RECENT YEARS, IN ITALY,
STEEL PRODUCERS HAVE MADE LARGE INVESTMENTS
IN THE ENVIRONMENTAL FIELD
BY OBTAINING PRODUCT CERTIFICATIONS
THAT CERTIFY THE MINIMUM CONTENT
OF RECYCLED MATERIAL.

FOR FOR METALLIC CARPENTRY WORKS,
CAM REQUIRE A MINIMUM CONTENT OF STEEL OF:
- 75% FOR NON-ALLOY STEEL FROM ELECTRIC FURNACE FOR STRUCTURAL USE AND 65% FOR STEEL FOR NON-STRUCTURAL USE.
- 60% FOR ALLOY STEEL FROM ELECTRIC FURNACE.
- 12% FOR STEEL FROM THE INTEGRATED CYCLE.

The Minimum Environmental Criteria (CAM) are environmental requirements defined by the National Action Plan on Green Public Procurement (PAN GPP) for the various stages of the procurement process by Public Administrations in various sectors, including construction, in order to achieve certain environmental objectives.

These objectives can be achieved through a series of actions such as reducing energy consumption and waste, reducing emissions of polluting substances and the use of recycled materials and products. According to art. 34 of the Procurement Code, the design of renovation, new construction and maintenance for public works must be based on Minimum Environmental Criteria. These criteria aim to identify the best design solution, the best product or service from an environmental point of view throughout the whole life cycle, taking into account market availability.

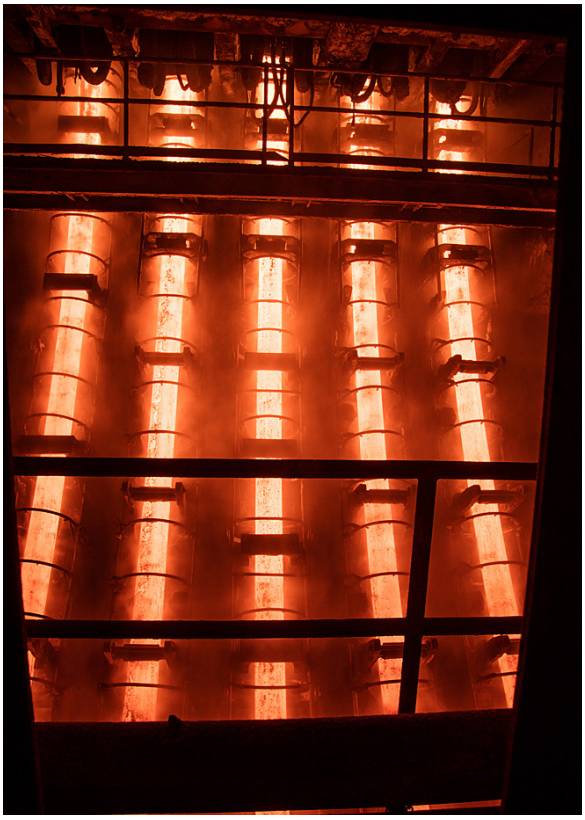
CAM are regulated by decrees, issued by the Ministry for the Environment and Protection of Land and Sea, now the Ministry of Ecological Transition. The latest update defining CAM in the building sector was published in the Decree of 23 june 2022 *- Minimum Environmental Criteria for the award of design and execution service for building interventions services -* which stipulates that, a certain minimum recycled content in each construction material, must be certified by a valid environmental certification.

THE MOST COMPREHENSIVE OF ALL ENVIRONMENTAL CERTIFICATIONS, IS CERTAINLY THE EPD (ENVIRONMENTAL PRODUCT DECLARATION).

EPDS QUANTIFY THE ENVIRONMENTAL IMPACT ASSOCIATED WITH THE ENTIRE LIFE CYCLE OF THE PRODUCT AS A RESULT OF AN LCA (LIFE CYCLE ASSESSMENT).


1

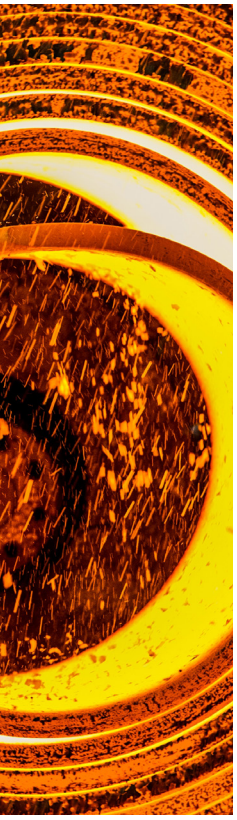
Italian steel industry

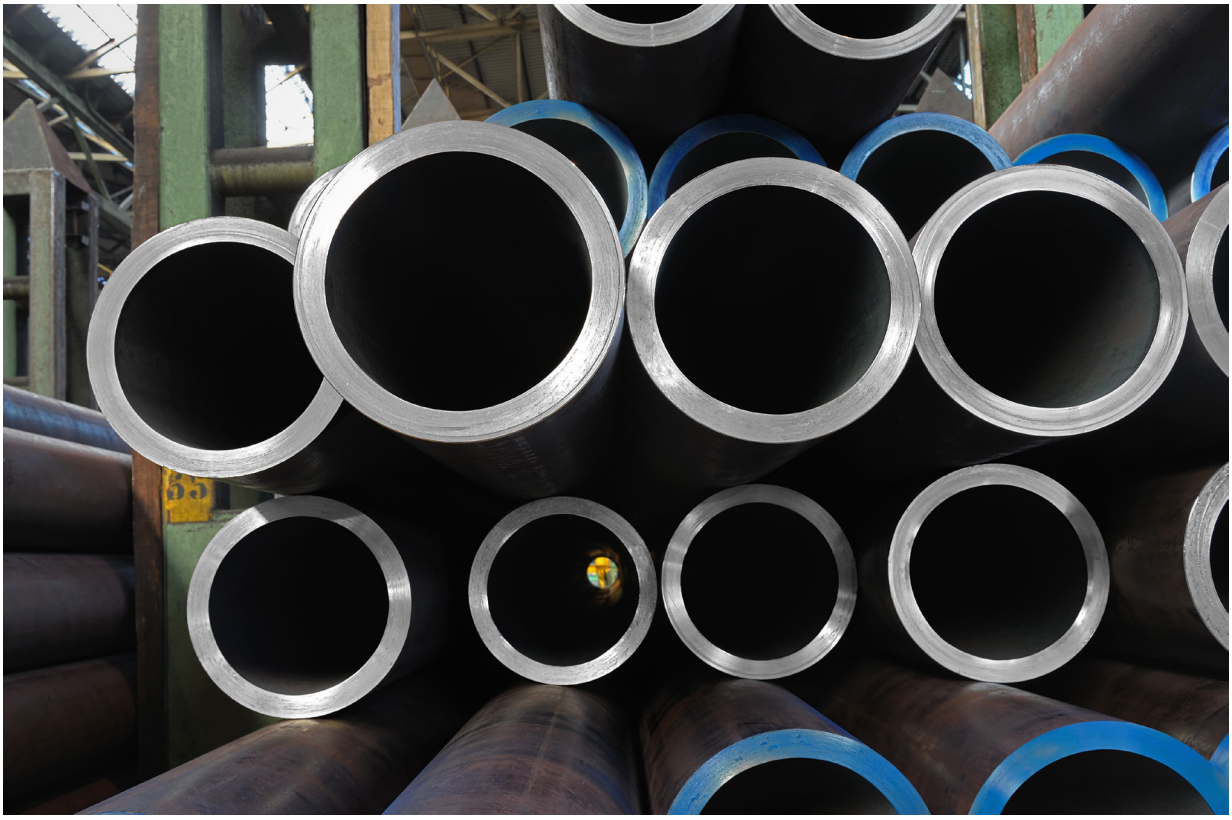


FOR THE ACHIEVEMENT OF THE OBJECTIVES OF SUSTAINABLE DEVELOPMENT SET OUT IN THE UN 2030 AGENDA, INCLUDING:

- building resilient infrastructure and sustainable cities
- promoting innovation
- ensuring sustainable consumption, production and industrialisation patterns
- reducing waste, CO_2 emissions and the release of hazardous substances
- adopting reliable policies based on the recycling of products

THE ITALIAN STEEL INDUSTRY HAS PROMOTED IMPORTANT MEASURES WITH A VIEW TO IMPLEMENTING AND ENHANCING THE GREEN STEEL INDUSTRY:





PERFORMANCE PRODUCTION ITALY

- Italy, second EU producer, eleventh world producer.
- Strongly export-oriented sector: 34% of turnover.
- More than 35% of investments in the sector are aimed at improving environmental performance and occupational health and safety.
- With 85%, Italy records the highest annual quantity of recycled steel within the European Union.
- A CO_2 saving of 1,4 tCO_2 is obtained for each ton of recycled steel.
- The specific direct emissions of CO_2 from the Italian steel industry decreased by about 60% from 1999 to 2020.
- 33% reduction in total energy consumption per ton of steel from 2000 to today.
- Italy energy efficiency + 38% compared to the European average.
- From 2010 to 2020 reduction of approximately 2.7 m^3 of water withdrawn per ton of steel produced.
- High percentage of cooling water recirculation with average values of 77% and peaks of up to 98%.
- Waste production per t of steel - 22% since 2012 -9% since 2017.
- 72% of the waste produced in the steel industry is sent for recovery.
- More than 90% of the national steelworks have an ISO 14001 certified Environmental Management System.

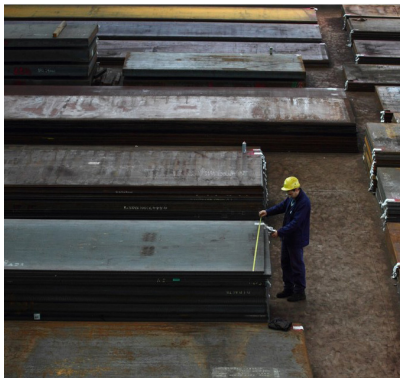
Source: Federacciai – Sustainability Report 2021

which are the steel products for construction?

DESIGNERS HAVE A VERY WIDE RANGE OF PRODUCTS AT THEIR DISPOSAL

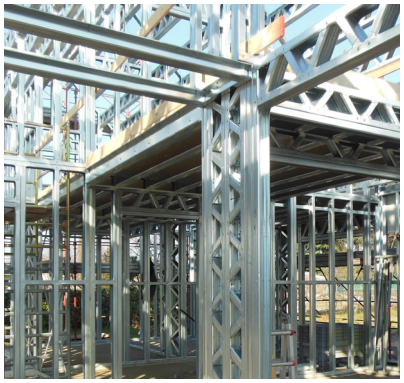


BEAMS - HOLLOW SECTIONS - MERCHANT BARS



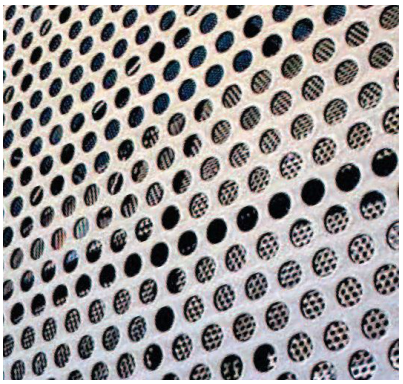
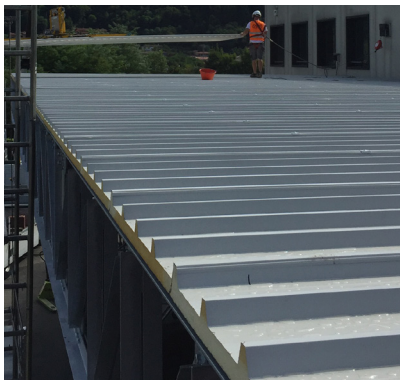
HEAVY PLATES - WELDED BEAMS MADE FROM HEAVY OR QUARTO PLATES - IFB, SFB, ASB BEAMS INTEGRATED IN THE FLOOR





CELLULAR BEAMS - COILS - COLD FORMED SECTIONS

THAT CAN PROVIDE FOR AN INFINITE NUMBER OF SOLUTIONS FOR STRUCTURES, THE SHELL, INTERNAL PARTITIONS AND ALSO FOR RETAINING AND FOUNDATION WORKS.

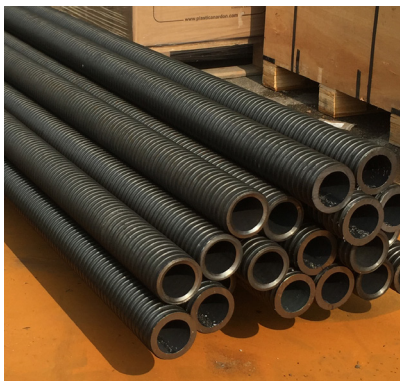




CORRUGATED SHEETS - SHEETS FOR CLADDING - PANELS



STRUCTURAL FRAMEWORK AND PLASTERBOARD

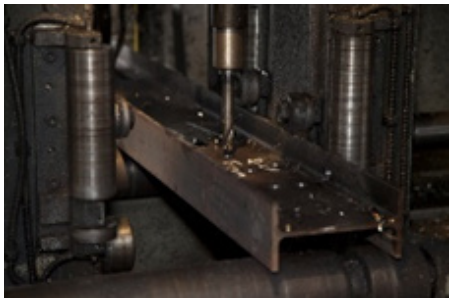
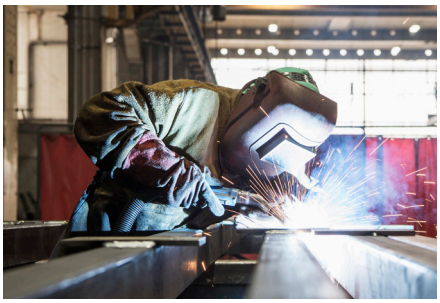




STRUCTURAL FASTENERS - SHEET PILING - MICROPILES

processing and distribution

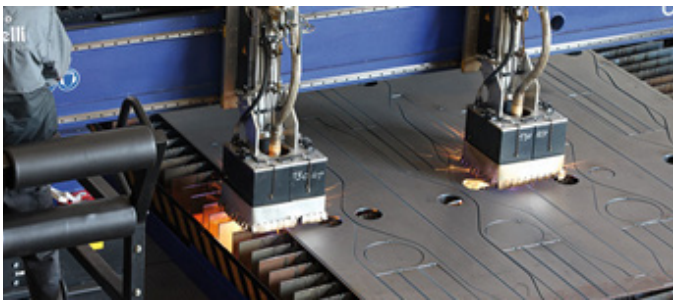
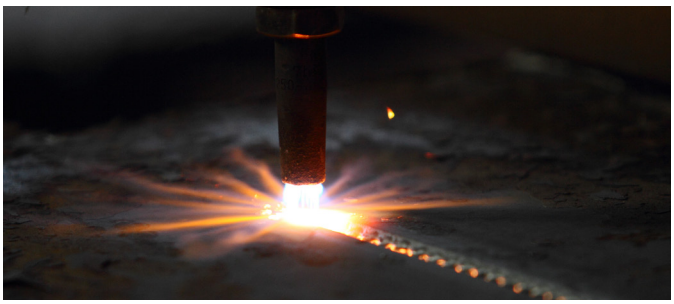
THE MAIN PROCESSES ON STEEL PRODUCTS IN THE SERVICE CENTRES

CUTTING TO LENGTH - DRILLING - WELDING



SECTION BENDING - BENDING - LASER CUTTING

PLASMA CUTTING - OXYCUTTING

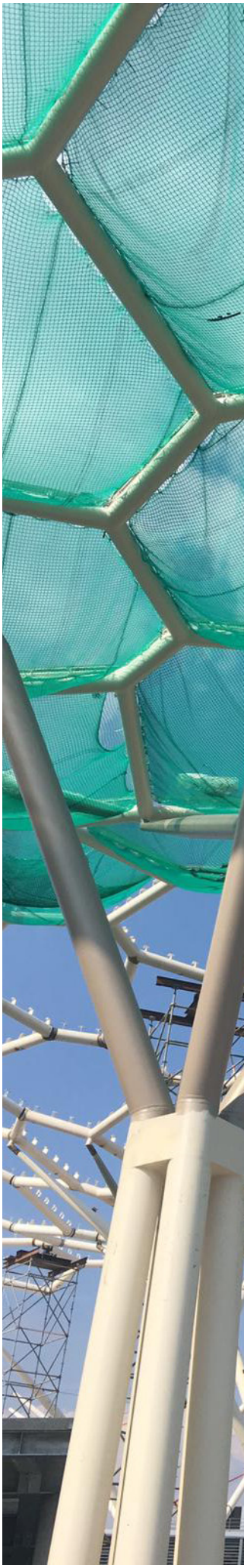
Due to its chemical, physical and mechanical properties,
steel is a material that can be easily processed.
Steel products are therefore suitable for a wide range of machining operations
in service centres and structural metal factories.
Site operations and production times are significantly reduced in favour of safety.

Structural steel products are available already pre-processed
using advanced cut-to-length and laser cutting techniques,
drilling, welding and stud welding, at distribution and service centres.

STEEL IS A SAFE MATERIAL AS PRODUCT TRACEABILITY IS GUARANTEED THROUGHOUT THE SUPPLY CHAIN, FROM THE PRODUCER TO THE END USER, BY USING CE MARKING.

prefabrication and installation

THE STRUCTURAL METAL FACTORIES
PLAY A KEY ROLE IN STEEL CONSTRUCTION:
THEY PROCESS ANY TYPE OF SECTION
ACCORDING TO THE HIGHEST QUALITY STANDARDS,
GIVING RISE
TO NEW STRUCTURAL COMPONENTS
THAT ARE PRE-ASSEMBLED IN THE FACTORY
AND READY FOR EASY INSTALLATION.



COMPLETE PREFABRICATION IN THE FACTORY ALLOWS HIGH CONSTRUCTION SPEED ON SITE AND A CONSIDERABLE REDUCTION IN CONSTRUCTION TIME AND CONSEQUENTLY, OF THE ASSOCIATED COSTS.

Metalwork factories usually buy products
from distribution or service centres
as well as directly from the manufacturers when the orders are large.

Steel is a safe material because, all processes
are regulated by specific product and technical standards,
at all stages of the supply chain,
from production in the steelworks to processing in the service centres,
to the prefabrication of structures in the metalwork factories and assembly on site.

Assembly in the factory (where absolutely reliable controls,
testing and quality standards are guaranteed)
also reduces the risks due to environmental factors and conditions
typical of wet construction.
The ease of assembly on site, even by simple bolting,
reduces construction time and the impact of various activities:
construction sites are cleaner due to prefabrication in the factory
and, above all, safer due to the limited need for machinery and equipment.

Lifting and installation equipment
is generally much lighter and the possibility of working in problematic areas
due to existing buildings, infrastructures or the lie of the land
is considerably higher than on a traditional building site.

The lightness of steelwork structures
limits land-use,
by requiring less foundation work,
thus significantly reducing the volumes of excavation, concrete and backfill,
which are other important elements to consider
when assessing construction costs.

durability and protective treatment

HOT-DIP GALVANISING
AND THE COMBINED GALVANISING AND COATING CYCLES
RESULT IN STEEL STRUCTURES HAVING
UNRIVALLED DURABILITY:
DEPENDING ON THE EXPOSURE ENVIRONMENT
AND THE THICKNESS OF THE PROTECTIVE COATING
50 YEARS CAN EASILY BE EXCEEDED,
IN SOME CASES EVEN A CENTURY,
WITHOUT THE NEED FOR MAINTENANCE,
SIGNIFICANTLY REDUCING THE OPERATING COSTS
OF BUILDINGS AND INFRASTRUCTURE.

A fundamental aspect that makes the difference
in quantifying the sustainability of a structure is its durability,
meaning the preservation of the physical and mechanical properties
of the materials that it is made of, over time.

Steel is by far the most durable of all construction materials:
it is possible to avoid the corrosion of steel when exposed to air and weather,
immersed in water or placed underground
and hence the degradation of a component or an entire construction
by choosing a suitable protection system.

The main corrosion protection systems
are active cathodic protection by hot-dip galvanising
and passive protection by coating.
Steels with improved resistance to atmospheric corrosion,
also known as weathering steels, can also be used.

The useful life of steel structures
can easily exceed 50 years,
in some cases even a century,
avoiding the use of repeated and costly maintenance cycles, which in turn,
avoids the unnecessary waste of economic and environmental resources.

The conscious choice of these measures, already at the design stage,
for buildings and infrastructures results in safety,
reduced maintenance and operating costs
and sustainable use of natural resources.

economic competitiveness and profitability

STEEL IS ECONOMICALLY COMPETITIVE
FOR VARIOUS REASONS:
SMALLER FOUNDATIONS,
SAVINGS ON MATERIAL,
CONSTRUCTION SPEED,
RAPID RETURN ON INVESTMENT,
REDUCED MAINTENANCE COSTS.

EASY ASSEMBLY ON SITE REDUCES CONSTRUCTION TIME AND THE IMPACTS OF VARIOUS ACTIVITIES.

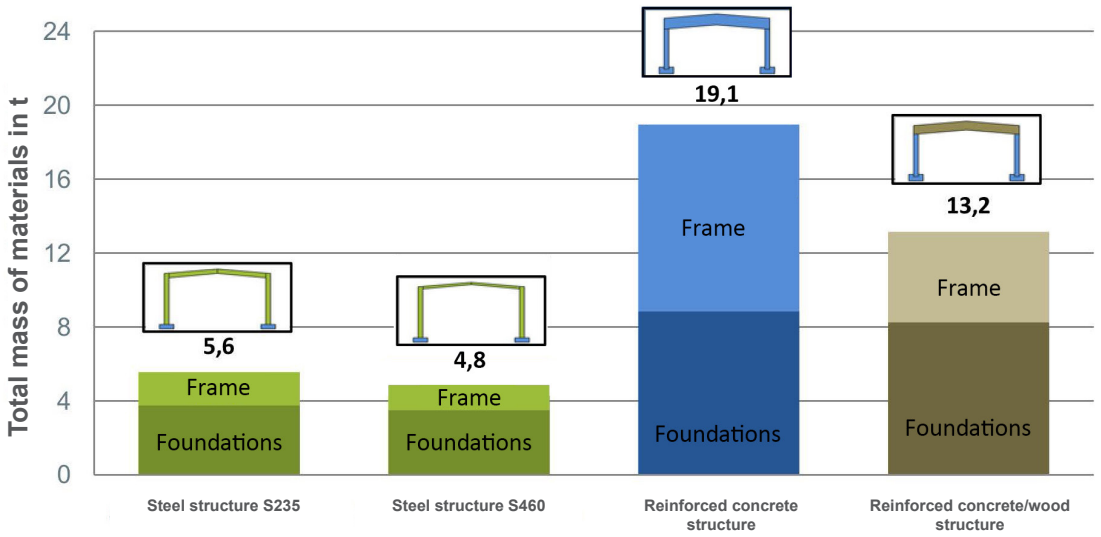
The standardisation of steel solutions
is an important consideration when evaluating the final cost,
also in terms of the reduced labour requirements:
a quick return on investment can be achieved by lowering financial costs
and shortening the time after which the completed work starts to pay off.

Dry construction technology facilitates the assembly
of the structural components of the steelwork structures
with the cladding and roofing elements
and makes it possible to quickly build finished turnkey solutions
in a much shorter time compared to traditional systems.

The dry construction system made of steel is considered one of the most fire resistant.
Due to the combination of steel with the properties of other building components,
steel structures are able to achieve some of the highest performances
in terms of fire resistance for different uses.

Shorter construction time, longer service life:
the life cycle of steel constructions is considerably longer than that of traditional constructions.

The possibility of covering large spans
with very large interior spaces and without intermediate supporting structures
is undoubtedly one of steel's greatest assets.
The reduced size of the metal structures (reduced number and size of columns and floor beams)
allows maximum use of the covered area and volumes,
an advantage that is difficult to achieve with other materials:
this translates into higher profitability for industrial, logistics, commercial, exhibition and sports complexes,



TYPICAL QUANTITIES OF MATERIAL, EXPRESSED IN TONNES,
FOR THE CONSTRUCTION OF STRUCTURES AND FOUNDATIONS
OF A FACTORY FOR THE MAIN CONSTRUCTION TECHNOLOGIES.
Source: Fondazione Promozione Acciaio - Analisi comparativa del ciclo di vita di un tipico edificio monopiano

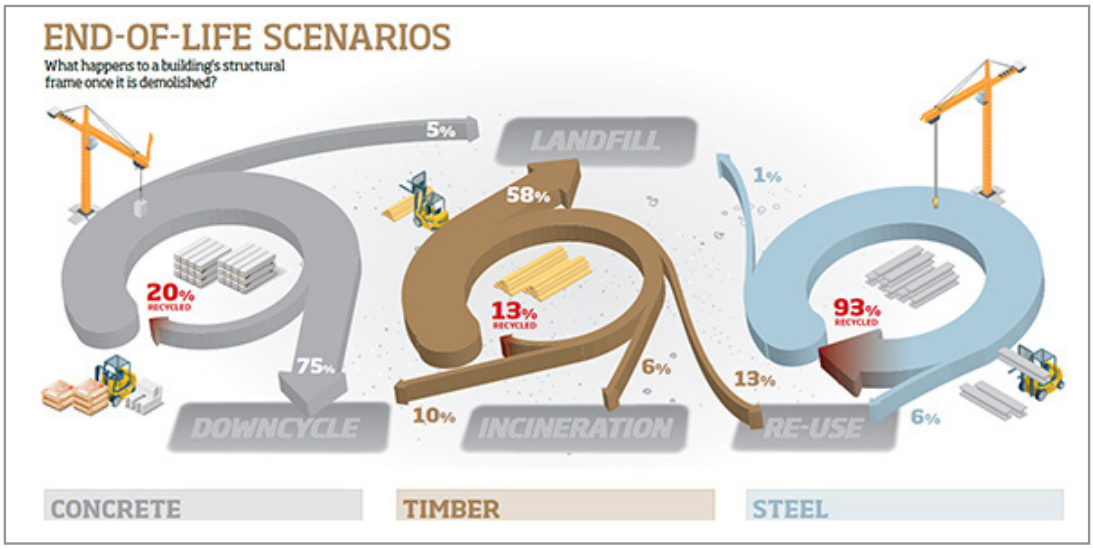
between reuse and recycling

THE COMPLETE CAPABILITY OF INTEGRATING
WITH DRY CONSTRUCTION TECHNIQUES
IS CERTAINLY ANOTHER ADVANTAGE
WHICH MAKES STEEL STRUCTURES REVERSIBLE,
EASY TO DISASSEMBLE
AND PERFECTLY SUITABLE FOR REUSE.

When a steel frame building reaches the end of its life,
a considerable part of the steelwork components can be reused directly.
Being flexible and adaptable
the functional life of these parts can be extended.

Due to their magnetic properties
steel elements from discarded products
(buildings, machinery, vehicles, etc.)
are easily collected and sorted.

After dismantling a building,
steel can be directly reused or recycled,
allowing it to be used again as a construction material
due to its special “cradle to cradle” property.

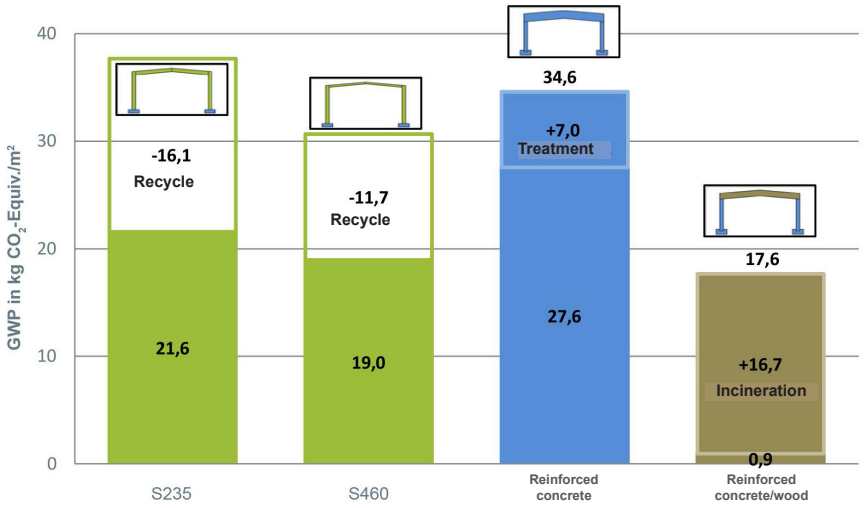


END-OF-LIFE SCENARIOS FOR THE STRUCTURAL ELEMENTS OF A BUILDING
Source: British Constructional Steelwork Association

TODAY MORE THAN 95% OF METAL PRODUCTS USED IN BUILDINGS ARE COLLECTED AT THE END OF THEIR LIVES

Small and medium-sized enterprises play a key role
in the collection and processing of steel products,
on their way to recycling plants.
The high economic value is the main driving force behind systematic collection and recycling.
Recycling steel also offers far greater energy savings
than primary production, creating a win-win situation for both the environment and the economy.
In this way steel is never consumed,
but continuously transformed through recycling processes.
This positive property perfectly describes the concept of PERMANENT MATERIAL.

The complete recyclability and durability of steel therefore allows less
consumption of raw materials and consequently
a more sustainable
development and economic management of buildings and infrastructures
than with other construction materials.



GLOBAL WARMING POTENTIAL FOR THE PRODUCT STAGE ADDED TO THE COSTS AND BENEFITS FROM RECYCLING (STEEL), INCINERATION (WOOD) OR RUBBLE TREATMENT (CONCRETE), FOR A FRAME STRUCTURED BUILDING WITH FOUNDATIONS, MEASURED IN KG OF CO2 EQUIVALENTS PER m² OF FLOOR AREA.
Source: Fondazione Promozione Acciaio - Analisi comparativa del ciclo di vita di un tipico edificio monopiano

KNOWLEDGE OF THE ADVANTAGES OFFERED BY STEEL CONSTRUCTIONS ENABLES INFORMED INVESTMENTS IN CONSTRUCTION NOT ONLY IN THEIR CONSTRUCTION BUT ALSO AND ABOVE ALL IN THEIR MANAGEMENT.

BUILD
VALUE

BUILD
SUSTAINABLY

BUILD
IN STEEL

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