



ArcelorMittal

Our Steel Solutions for your Green Building

transforming
tomorrow



Steel Solutions for Green Building

As society makes determined moves towards sustainability, construction has a very important role to play within this agenda, not only because of its economic and social contribution, but also because of its impact on the quality of our lives. While the building industry provides 5% to 10% of worldwide employment and generates 5% to 15% of the GDP, the built environment accounts for 40% of energy consumption, 40% of CO₂ emissions, 30% of the consumption of natural resources, 30% of waste generation and 20% of water consumption.

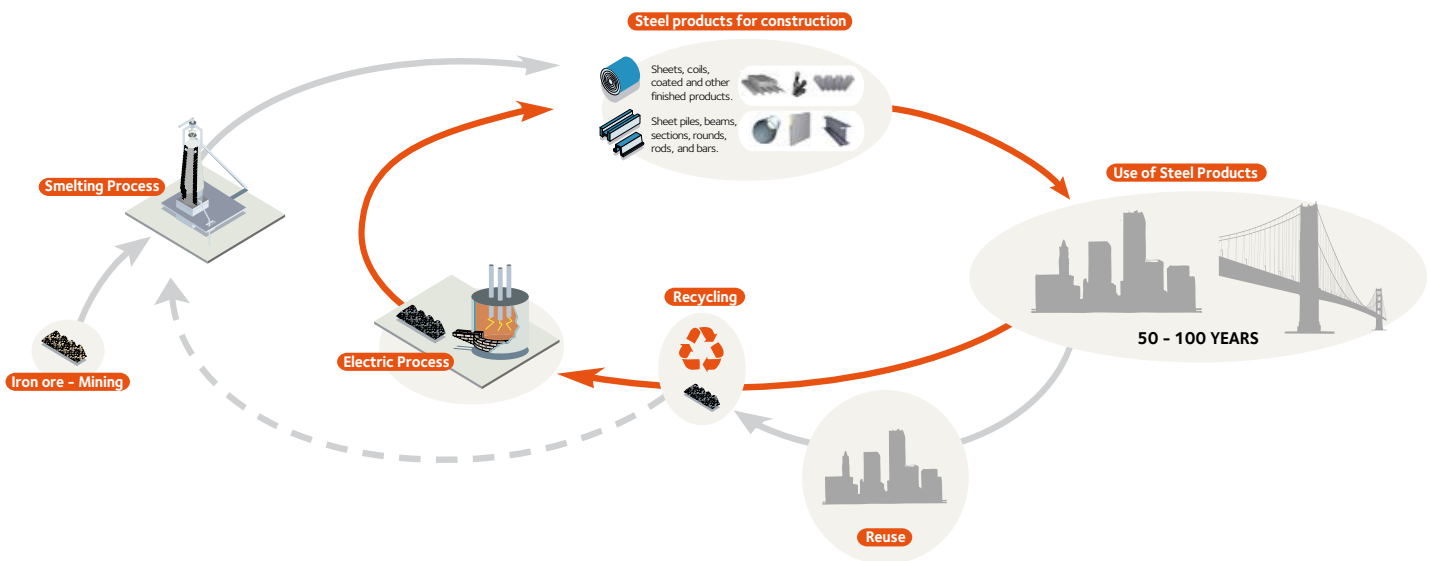
The future global challenge for the construction industry is clearly to meet the world's growing needs while at the same time limiting the impact of its burdens by drastic improvement of its activities.

In construction, steel has developed as a material of choice and offers a wide range of solutions that can make buildings more energy efficient, less costly to operate and more comfortable.

We in ArcelorMittal believe strongly in steel's values for Green Building and are committed to helping deliver the benefits that our solutions bring to our customers, their buildings and their owners.

Steel Solutions for lower environmental impact

The Steel Recycling Loop



1.2 tonnes of steel recycled by ArcelorMittal each second

Steel: the most recycled material in the world

Steel is 100% and indefinitely recyclable, without any quality loss. When recovered, it is 100% recycled.

Its recycling rate (i.e. the percentage of materials being taken out of service, recovered and reused) is high but varies from product to product.

In construction, it reaches particularly high levels: 98% for beams, 65–70% for reinforcement bars.

Recycled steel represents 40% of the steel industry ferrous resource in the world. With almost 40 million tonnes used in 2007, ArcelorMittal is the world's largest scrap recycler.

A huge decrease in environmental impact in the manufacturing process

A lot of progress has been made by ArcelorMittal over time.

Waste generation, water use and air emissions are continually decreasing, as are energy consumption and greenhouse gas emissions.

In Europe, CO₂ emissions and energy consumption per tonne have been reduced by 20% over the 20 last years. By year end 2007, 80% of ArcelorMittal production sites had attained ISO 14001 certification, the international standard for environmental management systems.

A high degree of prefabrication for fast, reliable and predictable construction

The advantages of the dry steel construction system

Use of prefabricated elements provides a large range of benefits that contribute to reduce the risks during the construction phase: using steel construction techniques reduces environmental impacts and neighbourhood nuisance on the construction site.

Water use, waste generation, dust emission, traffic and noise are considerably lower than in traditional construction. Work site management is largely facilitated. All these advantages are especially appreciable in congested urban areas.

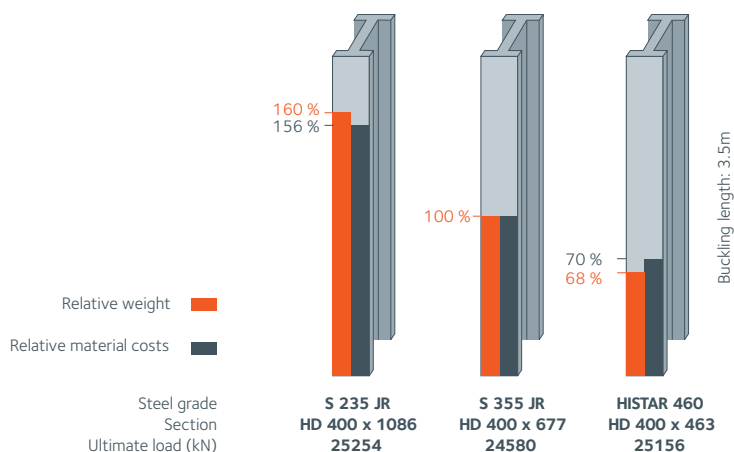


Velodrome, Berlin – Architect: Dominique Perrault

Steel's high strength to weight ratio for conservation of natural resources

Thanks to steel's high strength to weight ratio, steel construction requires less material than traditional construction technologies and contributes to reducing a building's environmental impact.

Resultant conservation of natural resources could be from 30% up to 70%. It is possible to achieve further savings by using high strength steels in place of merchant steels.



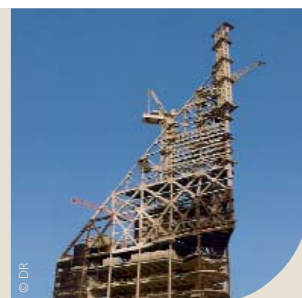
HISTAR® performance compared with other steel grades – Use in heavy columns

High strength steels

ArcelorMittal new high-strength steels (HSS) developed for the construction market are contributing to a major reduction in greenhouse gases by making it possible to use lighter structures.

Substituting HISTAR® for merchant steel achieves weight reductions of 32% in steel columns and 19% in beams.

The 50,000 tons of HISTAR® produced in 2007 by ArcelorMittal represents a saving of 14,000 tonnes of CO₂, which roughly equates to the annual emissions of 4,000 vehicles.



One example of extensive use of HISTAR® steels: The Emirates Tower in Dubai.

Up to 30% reduction of CO₂ emissions during construction.

Steel Solutions for energy-efficient buildings

In order to address global warming issues as well as economic considerations, the management of rising energy consumption is an operational imperative: steel solutions can help achieve this and even have a key role to play in the move towards zero energy buildings.

More than 80% of the energy consumed during the use phase

In a building, the operational energy consumption (due to heating, air conditioning, but also lighting etc...) largely outweighs its embodied energy (the energy used to build it). By proposing technical solutions to reduce the energy consumed during the whole life of a building, ArcelorMittal is contributing positively to the reduction of its environmental impact.

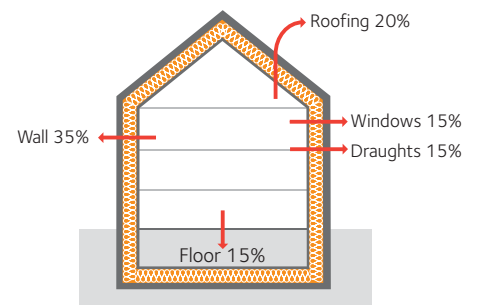
Thermally efficient buildings

A high proportion of energy use is devoted to heat control, by artificially heating or cooling the building: good steel-based design or use of appropriate steel products can achieve a major reduction in this energy consumption.

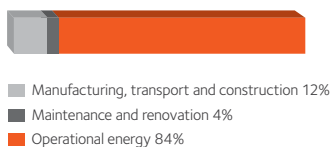
- The combination of steel structure with effective external insulation drastically reduces a building's losses.
- Double skin systems and/or sandwich panels provide a thermally efficient envelope, matching latest energy standards.
- No thermal bridges due to approved design.
- Airtightness of steel cladding or roofing systems eliminates air leakage that contributes to energy waste.

- Intelligent use of the thermal mass effect of steel products or components enables energy savings.
- The large range of colours or finishes of organic, metallic or even radiative coatings is suited to all existing climate models.

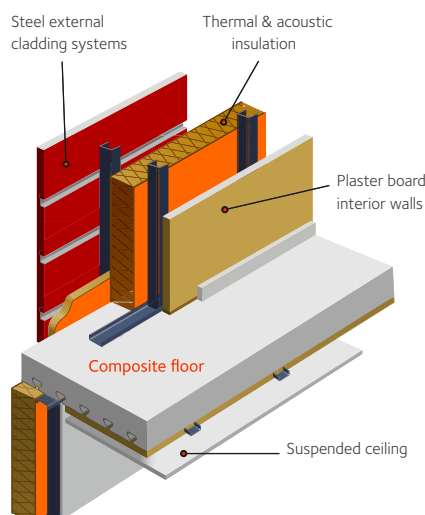
Energy losses in a building



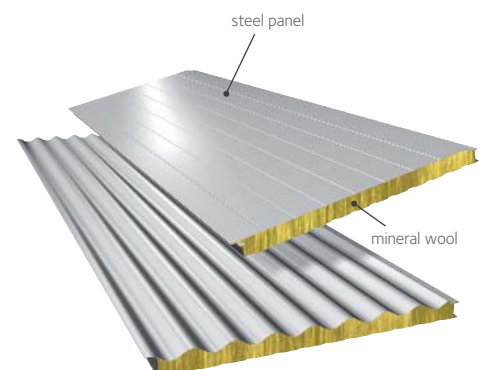
Life Cycle Energy Use in a Building (source EEB)

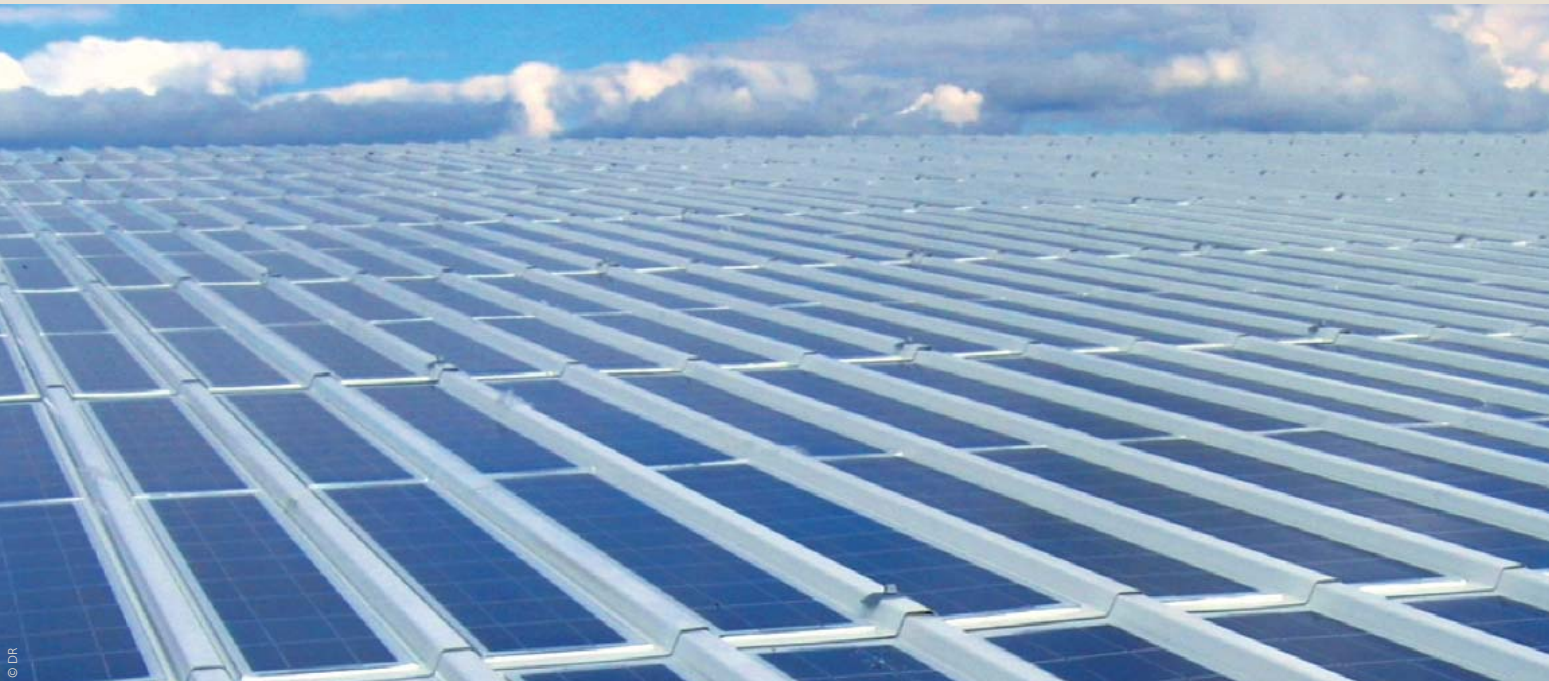


Thermally efficient steel system



High insulation panels (mineral wool)





Arsolar® Photovoltaic System

Sunscreen and green roof systems

Efficient use of steel sunbreakers protects from the sun and helps to reduce solar heat entering a building. It allows substantial energy savings by limiting or even eliminating the requirement for air conditioning.

Green roof provides various benefits, such as longer roof membrane life, acoustic insulation, but it also increases energy efficiency. In the summer, green roof planting shades the building from solar radiation and reduces if not

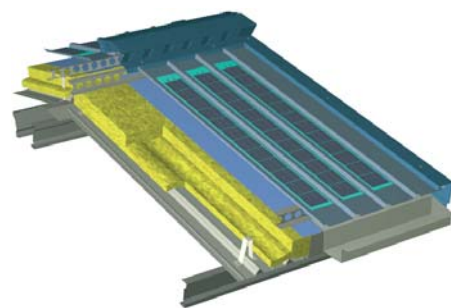
eliminates any heat gain. In the winter, the additional insulation helps to decrease the amount of energy required to heat the building.

Renewable energy generation systems

Besides providing thermally efficient solutions, ArcelorMittal has developed a complete range of products capable of producing energy, such as solar absorbers for hot water production, or photovoltaic cell systems for electricity generation.

Arsolar® Photovoltaic System

30 – 35 m² of roofing
produce 4,000 kWh per year



Helice: from ArcelorMittal's Sunstyl range of solutions for summer comfort



GlobalRoof Hacierco:
the green roof solution



Steel Solutions for high building values

Steel's inherent mechanical properties (particularly its high strength-to-weight ratio) enable the creation of lightweight load-bearing structures, thus gaining additional usable and efficient space, and bringing higher economic and social value to the building.



Increasing and optimising spaces

Long-spans and column-free areas

The use of long-span sections for the building's structure creates large, open and flexible spaces. Using steel columns instead of concrete ones could deliver around 40 square metres of additional floor area on 1000 square metre office floor plates. Thin floor systems allow appreciable gains in vertical space.

Angelina™ beam

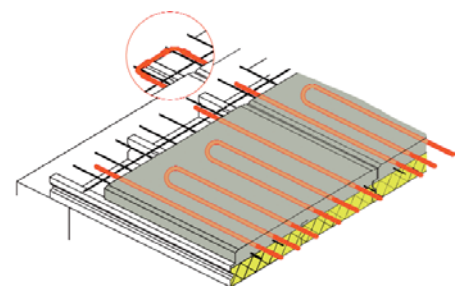


Sleek, open, transparent and flexible, the Angelina™ beam offers a new architectural dimension within an environmentally friendly approach.

Integration of technical components

The shape and design of steel components makes it possible to integrate a building's technical services into ceilings, flooring or partitioning. It enables reduction of the storey height and consequent savings in weight and material, or increasing the lettable area by adding extra floors.

Integrated heated floor





Kranspoor: reutilisation of a old concrete craneway for a new innovative steel framed office building – MIPIM green building Award

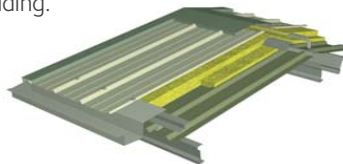
Sustainability also means the ability to accommodate changed requirements and to take up the challenge of time. A steel building characterized by the absence of load bearing wall is intrinsically more versatile and flexible than other structures.

Fast and easy renovation

By providing prefabricated, lightweight and fast to erect components, steel construction is well placed to facilitate rehabilitation and to update buildings to evolving construction standards. Overcladding and over-roofing are particularly efficient solutions to give a second life to a building by improving thermal performance as well as envelope aesthetics.

Hairenov

A innovative renovation process which allows complete renovation of a roof without interfering with the activity taking place in the building.



Enlarging the National Art Museum Reina Sofia, by addition of a steel building that complements the classic traditional style original museum



Flexible internal spaces

A column and beam structure creates more efficient and usable spaces, which can be reconfigured to adapt to user's requirements over time. It makes it easy to redesign volumes by using relocatable steel partitions.

Extension

Often associated with envelope retrofitting, building extensions provide new habitable spaces and new facilities. Steel construction enables horizontal extension (balcony, terrace) and is fast becoming the only viable solution for vertical extension, thanks to the lightness of steel.

Dusseldorf: rooftop extension of a historical brick building



Efficient Steel Solutions at each stage of a building's life

When evaluating the sustainability of a building, the life cycle approach is required, taking into account all phases of a building's life, including materials production, transportation to the construction site, the construction operation itself, operational use of the building, demolition or deconstruction, and end of life.





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