Our contribution to LEED certification*

- **MX1** Optimise energy performance 1-19 points
- **MX2** Construction waste management 1-2 points
- **MX4** Recycled content 1-2 points
- **MX5** Regional materials 1-2 points
- **IEQ 4.6** Low-emitting materials (LEED for Schools) 1 point
- **IEQ 7.1** Thermal Comfort-Design 1 point
- **ID 01** Innovation in Design 1-4 points

Our contribution to BREEAM certification*

- **Hea 08** Indoor air quality 1 point
- **Hea 09** Volatile Organic Compounds (for ceiling tiles) 1 point
- **Hea 10** Thermal comfort 1-2 points
- **Hea 11** Acoustic performance 1 point
- **Env 01** Energy efficiency 1-15 points
- **Mat 01** Materials Specification (Major Building Elements) 1-4 points
- **Mat 05** Responsible sourcing of materials 1-3 points
- **Mat 07** Designing for robustness 1 point
- **Wst 01** Construction site waste management 1-3 points
- **Inn 01** Innovation 1-10 points

* "BREEAM Europe Construction 2009"

Providing Solutions for Sustainable Habitat
Environmental Brochure
Sustainable Habitat is our future. It starts now!

Buildings have a massive impact on the environment, with both their construction and use contributing significantly to the environmental issues we face today. For this reason, sustainable construction methods are becoming increasingly important. In Saint-Gobain Gypsum, we have developed a sustainable approach to our business which helps our partners in the construction industry (architects, contractors, installers to name but a few) deliver innovative solutions and services to their customers and clients.

Our commitment is to minimise the impact of our products and systems on the environment and we achieve this in a number of ways:

• We are located all over the world with manufacturing facilities as close as possible to the main construction hotspots, ensuring that our response is prompt, and that our materials are local to minimise transportation.
• Our products help provide comfort, security and health to the occupiers and users of buildings.
• After the construction of a building, we recycle construction site waste.
• The environmental impact of our products is monitored vigilantly during production and also over their whole life cycle. This requires transparency and the vigorous use of widely-accepted Life Cycle Assessment (LCA) techniques to produce meaningful data which our customers can compare to ensure an optimised approach is taken in line with the requirements of LEED or BREEAM.

Looking to the future, Saint-Gobain is introducing a strong “Eco-innovation” strategy to ensure that the environmental impact of a new product is considered right at the beginning of the innovation process. By using this mind-set and methodology, we will increasingly deliver product, system and service innovations to improve the environment and comfort of our installers and end-users. As you read this document, I hope you will appreciate the depth of our approach, and our total commitment to making it work in practice.
Gypsum is a natural resource, a mineral rock, embedded in the ground. It has been widely used in construction for over five thousand years and has proved to be not only durable but also easy and safe to use. Ancient Egyptians used gypsum to build the pyramid of Cheops and the material was also used as arabesque decoration-stucco in Alhambra.

Gypsum is an inherently sustainable material as it can be completely recycled an infinite number of times. Removing water from gypsum rocks through dehydration produces a plaster powder scientifically known as calcium sulphate. This process is totally reversible: adding water reproduces gypsum.

### Paper used for our plasterboards

Gypsum (either from a natural, synthetic or recycled source) is crushed and dehydrated at around 160°C to produce the plaster powder.

Paper used for our plasterboards is almost 100% recycled.

### The plaster powder is mixed mainly

The plaster powder is mixed mainly with water and starch to create a paste (slurry) which is introduced between two layers of paper. Glue is not necessary as starch is acting as a binder between both materials.

### After rapid setting

The board is dried at temperatures from 90 to 300°C to evaporate excess water and get strength.

Finally plasterboards are resized, stacked on pallets, warehoused and dispatched.

### Gypsum has many environmental qualities:

- Sustainable material
- Fire resistant
- Contains no hazardous substance i.e. non-toxic
- Infinitely recyclable

### Gypsum vs. conventional brick walls solutions

A comparison between plasterboard and conventional brick walls solutions clearly favours our gypsum solutions:

- **Lightweight**
- **Fewer natural resources per m²**
- **Low energy consumption in production**
- **Low CO₂ emissions over whole life cycle**
- **Time-saving during installation**
- **Performance ranges according to the application**
- **Flexible design**
- **Recyclable**

### Plaster, the most modern of old materials

Plaster is mixed mainly with water and starch to create a paste (slurry) which is introduced between two layers of paper. Glue is not necessary as starch is acting as a binder between both materials.

### Description of plasterboard manufacturing process steps

The board is dried at temperatures from 90 to 300°C to evaporate excess water and get strength.

Finally plasterboards are resized, stacked on pallets, warehoused and dispatched.
In Saint-Gobain Gypsum, we are very proud to contribute to a more sustainable habitat.

We have been working in the plaster and plasterboards fields for years and are committed to maintain a strong position thanks to our innovative and sustainable products and services. Sustainability is a core value for Saint-Gobain Gypsum and we follow this long-term vision to deliver benefits for people and their environment.

**Transparency can make the difference**

Our strategy is based on transparency and openness. By providing accurate data on environmental aspects of our products, we give our customers the information they need to make an informed choice. This information takes the form of externally validated Environmental Product Declarations and our Sustainable Development Report.

**Our goal: being exemplary in our actions**

Setting a good example is part of our role as market leader in gypsum products. We try to do the best in all our actions: increasing the recycled content of our solutions, continuously restoring our quarries, finding alternative means of transport to minimise our CO₂ emissions, proposing recycling services on jobsites...

**Eco-innovation is the future**

Eco-innovation refers to Saint-Gobain’s policy to develop innovative products and solutions that help reduce the environmental impact of buildings and infrastructure over their whole life cycle. Our eco-innovative products and solutions help reduce the operational use of resources (particularly energy and water) in buildings and infrastructure and/or have reduced environmental impacts over their own life cycle.

---

**Buildings have a huge impact on the environment**

- **12% of all water consumption**
- **40% of all energy use**
- **30% of greenhouse gas emissions**
- **40% of solid waste generation**

International data source: UNEP SBCI 2011

We believe that it is our responsibility to offer innovative products and solutions that will decrease these environmental impacts. By offering more environmentally-friendly products, we believe this can be achieved.

---

**12,000**

Our 12,000 employees worldwide are locally committed to building a more sustainable habitat.

**135**

We are an integrated business with 75 gypsum quarries and 135 manufacturing facilities.

**53**

Saint-Gobain Gypsum is present in 53 countries on all 5 continents.

---

We act as a global actor but also operate locally in almost each country where we are present.
In Saint-Gobain Gypsum we think that a life cycle approach is a key factor.

Not only do we want to offer products with high levels of performance in use but also products that respect the environment throughout their whole life cycle, from raw material extraction through to recycling.

**RAW MATERIALS** P.10
Gypsum, a sustainably extracted natural resource from quarries but also a by-product from power stations and a recycled waste from jobsites.

**MANUFACTURING** P.12
A manufacturing process at low temperatures, with low emissions and measured water consumptions.

**LOGISTICS** P.14
Local production in most countries we serve.

**RECYCLING** P.20
Gypsum is 100% recyclable, indefinitely.

**INSTALLATION** P.16
Flexible and lightweight solutions. Limited waste generation on jobsite.

**BUILDING LIFETIME** P.18
Comfortable, efficient and healthy buildings.

**END-OF-LIFE** P.20
Easy to dismantle and recycle solutions.
Here in Saint-Gobain Gypsum, we use either natural gypsum, synthetic gypsum (from desulphurising the flue gas of coal-fired power plants) or recovered gypsum from the waste-recycling chain.

- Extracting natural gypsum does not require much energy. In addition, quarries in use are continuously restored in order to preserve the natural site and its biodiversity.
- We also work on the effects of this exploitation on local communities and the environment. This includes the visual impact of operations, dust, noise and vibration, added road traffic and any repercussions on the natural surroundings.
- At the same time, the desulphurisation process represents an opportunity to tackle natural resource depletion and decrease sulphur dioxide emissions.
- Recycled gypsum is an opportunity to preserve natural resources.
- Almost 100% of the paper used to manufacture our plasterboards is recycled paper.

Almost 100% of the paper used to manufacture our plasterboards is recycled paper.

Key assets

Here in Saint-Gobain Gypsum, we use either natural gypsum, synthetic gypsum (from desulphurising the flue gas of coal-fired power plants) or recovered gypsum from the waste-recycling chain.

- Extracting natural gypsum does not require much energy. In addition, quarries in use are continuously restored in order to preserve the natural site and its biodiversity.
- We also work on the effects of this exploitation on local communities and the environment. This includes the visual impact of operations, dust, noise and vibration, added road traffic and any repercussions on the natural surroundings.
- At the same time, the desulphurisation process represents an opportunity to tackle natural resource depletion and decrease sulphur dioxide emissions.
- Recycled gypsum is an opportunity to preserve natural resources.
- Almost 100% of the paper used to manufacture our plasterboards is recycled paper.

Through on-going work with our paper suppliers, in Europe we are able to provide plasterboard with 97.4% to 100% of recycled paper. In cases where the paper is not from a recycled source, we ensure that it comes from sustainably managed forests in Europe. One way to guarantee that commitment is the FSC label.

Paper sourcing

Through on-going work with our paper suppliers, in Europe we are able to provide plasterboard with 97.4% to 100% of recycled paper. In cases where the paper is not from a recycled source, we ensure that it comes from sustainably managed forests in Europe. One way to guarantee that commitment is the FSC label.

Natural gypsum has an industrial alternative: FGD gypsum comes from the flue gas desulphurisation (FGD/DSG) process of the coal-fired power stations.

Biodiversity preservation

The Vaujours quarry (France) is continuously restored in order to preserve biodiversity. We liaise with Ecosphère and its ecology specialists to restore the site throughout its exploitation.

Over 200 hectares have already been restored around the industrial site with more than 130,000 trees replanted and a variety of ecosystems set up.

Local actions

Our environmental actions are not just limited to our processes and products. We also try to minimise our impact on the local biodiversity and work with the local population. For example, in Tuyango Piedras Blancas (Argentina) we are working on a project to recover an old unrestored quarry and turn it into a refuge for wildlife (birds, mammals, alligators, butterflies, insects...). This is a community project involving primary and secondary school students, who, with our assistance, have already sown native seeds in the quarry area and are now working on building a vivarium with native species that they will transplant in this area.

“We work closely with the neighbourhood around our quarries, throughout their operational life, taking care to avoid any acoustic and visual pollution.”
Our environmental targets for 2013* are:

• Zero environmental accidents,
• Reduce CO2 emissions by 6%,
• Reduce water withdrawal by 6%,
• Reduce landfill waste by 6%,
• Obtain ISO 14001 certification for more than 90% of our sites.

Circular economy
Collaboration between CertainTeed’s L’Anse facility (US) and Warden Electric is producing a perfect demonstration of sustainable resources management. Warden Electric bought a power plant and converted it from coal, oil and natural gas to biomass. Excess steam generated at the power plant is channelled to the CertainTeed facility for use in its production, replacing the natural gas previously used to run the product dryers. In addition, CertainTeed provides scrap, from wood pallets, generated in its production process to the power plant to be burned for additional green biomass input.

Rain water harvesting
Water is one of our major items of consumption and emission during the manufacturing process. To improve its usage, we have implemented systems to recover the water from our emissions (during dehydration and drying) and from rainwater. For example, in Gyproc Wada (India) rainwater is harvested (especially during the rainy season) and used to combat water scarcity in the plant.

Avoid waste energy
During the plasterboard manufacturing process, we use energy to calcinate gypsum. In Rigips Melnik (Czech Republic) we installed a system to reuse the heat lost to heat up the plant and adjacent offices (including hot water supply) instead of using a separate gas boiler. This allowed an annual saving of about 1,100,000 kWh.

Key assets
• Manufacturing plasterboard is a very low energy-consuming process as the calcination, transformation of gypsum into plaster, and drying stages only require low temperatures, 160°C and 100°C respectively.
• The other main plasterboard production input in the process is water. We strive to increase the percentage of reused water in our process (rainwater or steam).
• Even if on the whole this is a low consumption and emission process, we have a threefold target to reduce our energy consumption, CO2 emissions and waste generation by 6%. We support Saint-Gobain’s policy to purchase green electricity wherever possible and cost effective to do so.
• We have also introduced a “zero landfill waste” policy to avoid sending production waste to landfill and, at the same time, consume fewer primary raw materials by directly recycling scrap.
• In line with the Saint-Gobain objectives, we aim to increase the percentage of our ISO 14001 certified sites to more than 90% by the end of 2013.

*Based on 2010 values.
Locating manufacturing facilities close to quarries minimises the transportation of gypsum for processing, just as working with our local distribution partners helps shorten the distance when shipping finished products to installers and building sites.

Many projects are already implemented to optimize our logistics and decrease transport-related carbon emissions:

• We optimize truck loading to avoid vehicles leaving our plants less than full.
• We arrange different transport means for our raw materials and finished products wherever possible. For example, boat transportation leaves less environmental impact than road freight. Quarry to plant electric strip conveyors enable us to take a large number of trucks off the road every year!
• We rely on our local manufacturing facilities to ensure that materials are produced as close as possible to the end-user.
• In our logistics centres, we work with haulage companies to develop better transportation practices (eco drive training courses, natural gas…).

Minimising CO₂ emissions during transport

Key assets

Many projects are already implemented to optimize our logistics and decrease transport-related carbon emissions:

• We optimize truck loading to avoid vehicles leaving our plants less than full.
• We arrange different transport means for our raw materials and finished products wherever possible. For example, boat transportation leaves less environmental impact than road freight. Quarry to plant electric strip conveyors enable us to take a large number of trucks off the road every year!
• We rely on our local manufacturing facilities to ensure that materials are produced as close as possible to the end-user.
• In our logistics centres, we work with haulage companies to develop better transportation practices (eco drive training courses, natural gas…).

“Locating manufacturing facilities close to quarries minimises the transportation of gypsum for processing, just as working with our local distribution partners helps shorten the distance when shipping finished products to installers and building sites.”

24,000 truck movements removed annually thanks to the installation of an electric strip conveyor between the quarry and the Vaujours plant (France)!

Transport by ropeway

In Rigips Austria, gypsum is not put on trucks to cover the 8.4 km from the quarry to the plant… It is loaded into cable cars which saves 23,000 trucks which means a reduction of 235 tons of carbon emissions a year.

Transport by boat

Orders from Cyproc Netherlands supplied by our Belgium plant in Kallo were shipped to Amsterdam (Netherlands) by boat! In December 2012, the delivery of 90,000 m² of plasterboards replaced 35 truckloads, yielding a 35% reduction in carbon emissions when compared with truck transportation.
The building market is evolving very quickly when it comes to environmental issues. Saint-Gobain Gypsum provides training to its customers, enabling them to keep their skills up-to-date with the latest regulations and technologies.

**Facilitating installation and reducing waste**

Key assets

- Saint-Gobain Gypsum works directly with installers to train them and ensure that our solutions are installed in the best conditions. Globally, there is a need for trained workers skilled in sustainable products and technologies. We can fulfil these training needs around the world.

- Gypsum solutions generally offer a number of key benefits over traditional brick, block, sand and cement solutions.
  - As a dry solution there is less mess on the jobsite and their lightweight (10 times lighter in the case of plasterboard partitions vs. traditional partitions) reduces transportation, crane activity and even the depth and material involved in foundation design.
  - This huge weight saving also translated into less manual handling by installers and less material weight in the building when it is eventually deconstructed.

- Construction waste to landfill is reduced by bespoke board sizes to minimise cut-offs, jobsite collection and recycling of cut-offs.

The building market is evolving very quickly when it comes to environmental issues. Saint-Gobain Gypsum provides training to its customers, enabling them to keep their skills up-to-date with the latest regulations and technologies.

**Minimising waste by design**

During the design stage, Saint-Gobain Gypsum’s specification team works with architects and consultants on the building design to minimise waste. Together, they review the location of doors, windows, etc. to define solutions with the right dimensions to fit the building layout. Thanks to this collaborative phase, off-cuts and waste are limited.
During buildings’ lifetimes, our solutions contribute to the comfort, safety and health of people living there.

- **The occupants’ comfort** is associated with several benefits, which can be provided by our solutions:
  - **Acoustic comfort**: better sound insulation between spaces and enhanced sound absorption within a room;
  - **Thermal comfort**: insulation complex and high level of air-tightness;
  - **Hygrometric comfort**;
  - **Flexibility**: easy to install, to fit different heights and thicknesses and to be removed during lifetime;
  - **Easy maintenance**.
- **Visual comfort**: aesthetic ceilings solutions and smooth walls finishing.
- **Fire safety** is embedded in our products and we offer solutions with high fire resistance performance.
- Finally not only will our products not deteriorate the building’s indoor air quality but, thanks to Activ’Air technology, our plasterboards can actually improve this indoor air environment by capturing and eliminating VOCs* (Volatile Organic Compounds) present in the air.

Knowing that people spend 90% of their time indoors, we think that our solutions should not only guarantee occupants a healthy environment but also contribute to improving indoor air quality, thanks to Activ’Air technology.

**Key assets**

- **Indoor air quality**: Our products contain a very low quantity of VOCs and our Activ’Air system durably removes 70% of VOCs* in the air.
- **Acoustic insulation**: A 100mm-thick drywall system can achieve up to Rw 50dB sound insulation, while a half-brick wall (plastered both sides) provides an average sound insulation of Rw 40dB.
- **Speech intelligibility**: Our solutions can also be specified to improve sound absorption properties within a given space to improve speech intelligibility.

**Benefits from our solutions**

- **Stability**: Our solutions can be specified for use in conditions exposed to mechanical stress in the building. They provide stiffness to statically loaded walls and are suitable for flooring elements.
- **Impact resistance**: Our solutions can be specified to offer the highest level of impact protection in high traffic areas such as hospitals and schools. They will provide resistance against damage to walls over the building lifetime.
- **Fire resistance**: Lightweight partition and ceiling systems using a range of different gypsum boards can be specified to provide excellent fire performance for up to 4 hours within all building types.
- **Energy efficient**: Our solutions can help meet regulations regarding air tightness, the thermal performance of the building structure and help reduce the energy consumed.
- **Easy maintenance**: Whether damage to the plasterboard system is minor or more extensive, the system can be easily repaired using gypsum products... and it always delivers an excellent finish.
- **Moisture resistance**: Our systems can provide complete moisture resistance for the lifetime of the building and can be dedicated to wet areas (bathrooms, swimming pools...).
Avoiding landfilling and giving a new life to gypsum-based waste

Key assets

- To avoid gypsum waste landfiling, either from construction or deconstruction jobsites, we propose recycling services to our contractors.
- Recycling services depend on the country and the project itself and basically follow the steps below:
  - First, big-bags or skips are made available on site either directly by us or through partners;
  - When filled with waste, the collection is organized and the scraps are sorted to meet recycling specifications;
  - Next, plasterboard scraps are sent to recycling units to obtain a recycled gypsum powder;
  - Finally, this powder is re-introduced into our process as raw material to manufacture new plasterboards.
- Thanks to these services, our contractors can comply with their local regulations, which are becoming more and more stringent, and also fulfil building eco-label requirements.

End-of-life and recycling

Recycling from small sites
Rigips Switzerland offers a recycling service for small volumes thanks to a big bag collection system. This service is mainly designed for craftsmen. End-users have the possibility to buy 1 m$^3$ big bags from Rigips, which are delivered to the customer by mailbox. Once full with waste, Rigips’ partners (waste management companies) collect the big bags from the site, check the purity and massify the waste before sending to Rigips’ recycling unit in Granges (Switzerland).

Recycling on big projects
Collection of gypsum-based waste can also be organized with skips, for larger volumes. Gyproc Malaysia offers such a recycling service providing skips to its contractors. The size can be adapted to projects but requires a minimum of 1,000 tons load. Once again, skips are delivered to customers and then collected when requested by Gyproc’s partners.

Up to 25% of recycled content
To preserve natural resources, we are working to improve the recycled content of our products. First, our plasterboards use almost 100% recycled paper (see p.10). Then the proportion of recycled gypsum depends on a variety of local parameters and ranges from 10 to 25%.
To increase this proportion, the recycling sector for construction products needs to be developed locally, hence the reason why we are proposing more and more recycling services.

“Depending on the project size, we offer different kind of recycling solutions. We provide bags, bins or skips to answer the specific needs of our contractors.”

Our recycling services close to local needs
A recycling service is available in Austria, Belgium, the Czech Republic, Denmark, Finland, France, Italy, Malaysia, the Netherlands, North America, Sweden, Switzerland, the UK, Poland (pilot phase) and the UAE (pilot phase).
Why eco-innovate?

Thanks to LCA results we can identify opportunities of improvement at each stage of our products’ life cycle. Next step is to decrease and minimise as possible these environmental impacts.

In order to help this process, we have launched our “Eco-Innovation” policy which will help us to develop innovative products and solutions that:

- Help reduce the operational use of resources in buildings and infrastructures and/or,
- Have lower environmental impacts over their own life cycle.

Our approach is to be transversal, involving all of the relevant company functions.

A rigorous tool for assessing the environmental impacts of our products

Understanding the environmental performances of construction products is a growing expectation for professionals in the building chain.

In Saint-Gobain, we strongly believe that Life Cycle Assessment is the most reliable tool available to assess the green credentials of construction products and enables companies to communicate credible, fact-based information about their products to consumers. It is also a powerful tool for enhancing the environmental features of our products.

Consequently, Saint-Gobain Gypsum has decided to promote the use of LCAs in the building industry and to communicate actively on the LCA results of its products.

Our “EPD verified” policy

When an Environmental Product Declaration has been checked by an independent third party, it is said to be “verified”. This process ensures the quality and reliability of the results and that is why, here in Saint-Gobain Gypsum, we are committed to have verified EPDs. These EPDs can be easily identified thanks to our “EPD Verified” pictogram.

What is a Life Cycle Assessment (LCA)?

LCA is a comprehensive methodology to evaluate the environmental impacts of a product over its whole life cycle according to specific ISO or EN standards (ISO 25930 and EN 15804).

- Multi-criteria tool: consumption of natural resources, air, ground and water emissions, waste generation, global warming potential…
- Multi-step tool: “from cradle to grave”, meaning from the extraction of raw materials to the product’s end-of-life.

The results of a LCA are presented in the form of an Environmental Product Declaration (EPD), which is published.

Transparency

We currently have around 120 EPDs available on our products.
Our contribution to sustainable buildings

Our contribution to LEED certification*

- MK1 Optimise energy performance: 1-19 points
- MK2 Construction waste management: 1-2 points
- MK4 Recycled content: 1-2 points
- MK5 Regional materials: 1-2 points
- IEQ 4.6 Low-emitting materials (LEED for Schools): 1 point
- IEQ 7.1 Thermal Comfort-Design: 1 point
- ID 01 Innovation in Design: 1-4 points

** "LEED 2009 for New Construction and Major Renovations"**

BREEAM

Our contribution to BREEAM certification*

- Hea 08 Indoor air quality: 1 point
- Hea 09 Volatile Organic Compounds (for ceiling tiles): 1 point
- Hea 10 Thermal comfort: 1-2 points
- Hea 11 Acoustic performance: 1 point
- Ene 01 Energy efficiency: 1-15 points
- Mat 01 Materials Specication: 1-4 points
- Mat 05 Responsible sourcing of materials: 1-3 points
- Mat 07 Designing for robustness: 1 point
- Inn 01 Innovation: 1-10 points

** "BREEAM Europe Construction 2009"**

Providing Solutions for Sustainable Habitat
Environmental Brochure