



ENTREPRISES ET CLIMAT

*DIDIER ROUX - EMMANUEL NORMANT
DECEMBER, 5TH 2016*



AGENDA

- 1) An introduction to Saint-Gobain
- 2) Together towards more sustainable construction
- 3) Our solutions for your sustainable buildings
- 4) Our innovation



*AN
INTRODUCTION
TO SAINT-
GOBAIN*



KEY FIGURES

2015 net sales

€39.6 BN

More than **170,000** employees
and **98** nationalities
represented

Present in

66 countries

More than **80%** of sales
are made in the habitat markets:
construction, renovation,
infrastructures and civil
engineering

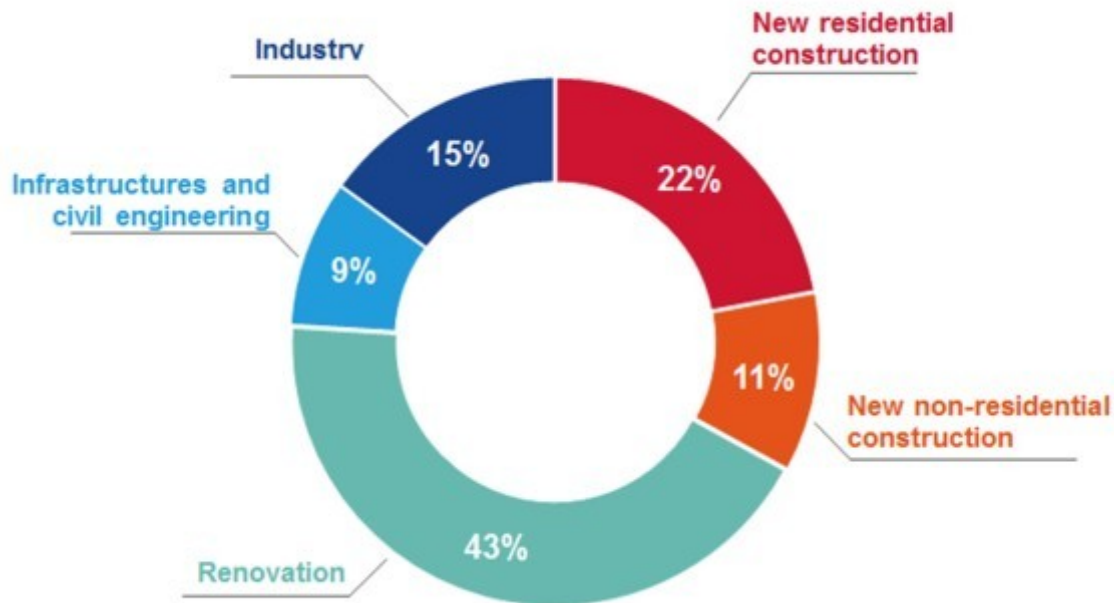


More than **4,000**
sales outlets

Created more than
350 years ago

One of the top **100** industrial
groups in the world with around
950 production sites

OUR REFERENCE MARKET: CONSTRUCTION



A GALAXY OF STRONG BRANDS FOR AN UNRIVALED PORTFOLIO OF SOLUTIONS



A LEADING PLAYER IN BUILDING DISTRIBUTION



WE HELP TO CREATE GREAT LIVING PLACES AND IMPROVE DAILY LIFE BY COMBINING

COMFORT



WHICH ANSWERS TODAY'S INDIVIDUAL NEEDS

(performance, safety, adaptability,
accessibility, beauty)

&

SUSTAINABILITY



WHICH ADDRESSES TOMORROW'S COLLECTIVE CHALLENGES

(sustainable building, better mobility,
resource efficiency, demographic
growth, climate change)

A CLEAR STATEMENT



“At Saint-Gobain, our materials and solutions are designed to help **increase the comfort of people today, wherever they live, work and travel.**

But we need to **do this sustainably, helping to safeguard the planet for future generations.**

For us, **these aspects of wellbeing are complementary, two sides of the same coin.”**



**TOGETHER, TOWARDS
MORE SUSTAINABLE
CONSTRUCTION**



A STRONG PARTNERSHIP WITH THE GREEN BUILDING COUNCILS (GBC) A GLOBAL COMMITMENT

AT SAINT-GOBAIN, WE ARE:

- ➔ ACTIVELY INVOLVED IN 35 GBCS AROUND THE WORLD
- ➔ PARTNER OF THE EUROPEAN NETWORK OF GBC
- ➔ MEMBER OF THE CORPORATE ADVISORY BOARD OF THE WORLD GBC



“Saint-Gobain is one of WorldGBC’s most important partners globally, regionally and locally.” Terri Wills, CEO of the WGBC



A STRONG PARTNERSHIP WITH THE GREEN BUILDING COUNCILS (GBC) A WIDE INVOLVEMENT IN PROJECTS

ADVANCING NET ZERO

A groundbreaking project aimed at ensuring that all buildings are “net zero” by 2050.



A collaborative project on building renovation across Europe.



A campaign promoting the benefits of green buildings in terms of health & wellbeing.

A FEW MORE PROJECTS WE ARE INVOLVED IN...



Global Alliance for Buildings
Business & Climate summit
(Following COP21 in Paris)



EU sustainable Building Framework
& Core Indicators



Mainstreaming LCA for
buildings and materials



OUR ACTIONS TO COMBAT CLIMATE CHANGE

OPTIMIZE OUR ENVIRONMENTAL PERFORMANCE

2010-2025 targets*

-15% energy consumption

-20% total CO₂ emissions

ANTICIPATE CLIMATE RISKS AND TEND TOWARDS A CARBON-FREE ECONOMY

Implementation of an **internal carbon price** for the industrial investments over €10M and the R&D technological breakthrough projects

REDUCE GREENHOUSE GAS EMISSIONS FROM OUR TERTIARY BUILDINGS

CARE:4 PROGRAM : -75% BY 2040



* at iso-production, baseline 2010



LEADING BY EXAMPLE REDUCING THE IMPACT OF OUR OWN BUILDINGS

WE COMIT TO reduce energy consumption and greenhouse gas emissions from our tertiary buildings with CARE: 4® program: **- 75% by 2040**



Innovation & training center in Italy, LEED Platinum, Primary energy need : 4,40 kWh/m²/anno



Halle de Pantin, undercover market, five times better than the requirements of the French RT 2012



Saint-Gobain's headquarter in the US, LEED Platinum

LEADING BY EXAMPLE

REDUCING THE IMPACT OF OUR OWN BUILDINGS

WE COMIT TO reduce energy consumption and greenhouse gas emissions from our tertiary buildings with CARE: 4® program: **- 75% by 2040**



COMING!

New
headquarter
in
La Défense

LEADING BY EXAMPLE MULTI-COMFORT PROGRAM

SAINT-GOBAIN'S VALUE PROPOSITION TO HELP OUR CUSTOMERS DELIVER ENVIRONMENT-FRIENDLY, HEALTHY AND COMFORTABLE HOMES AND WORKING ENVIRONMENTS



OUR SOLUTIONS FOR SUSTAINABLE BUILDINGS




SAINT-GOBAIN

OUR KEY PRINCIPLES TO INNOVATE SUSTAINABLY



■ **Life-Cycle Thinking**: From raw material extraction to end-of-life, the full lifecycle of your product you will consider



■ **Multi-Criteria approach**: People, Planet & Prosperity are key, the three pillars you will take into consideration

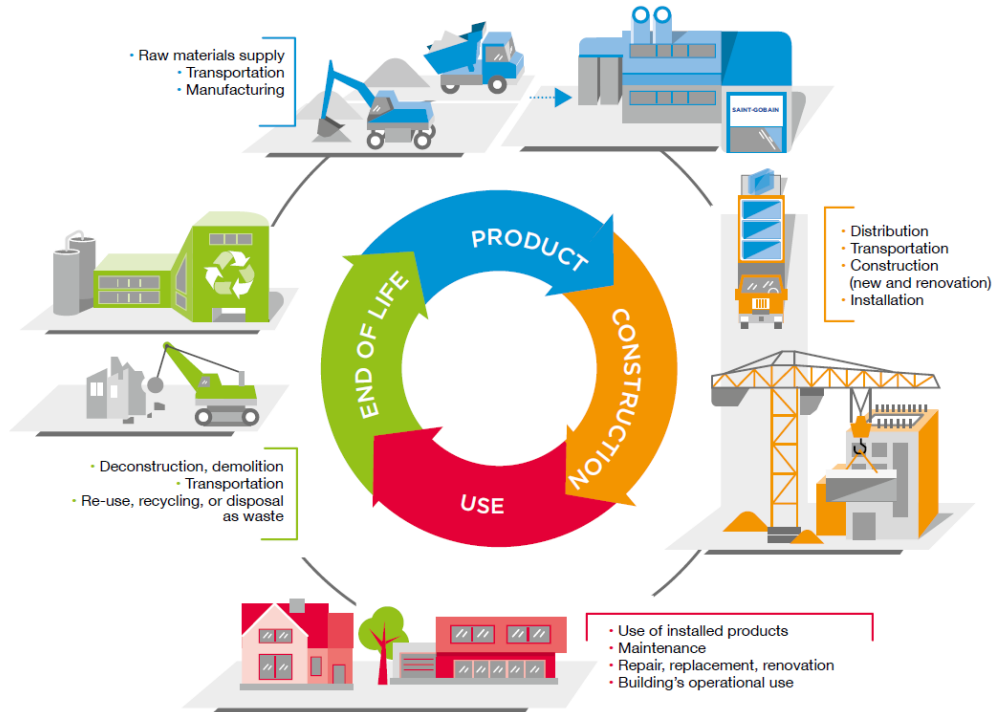


■ **Systemic Approach**: Not alone is your product, the system around it you will investigate

OUR KEY PRINCIPLES TO INNOVATE SUSTAINABLY



Life-Cycle Thinking:



WE COMIT TO

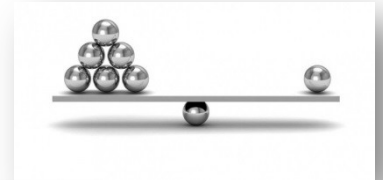
- Promote the preservation and availability of natural resources.
- Reduce the amount of non recovered waste and natural resources consumption.
- 50% of non-recovered waste by 2025*
- Reduce water withdrawal and in the long term, water discharge in liquid form.
- 80% of water discharge by 2025*
- Reduce energy consumption of the Company activities.
- 15% of energy consumption by 2025*
- Reduce the CO2 emissions from industrial activities, transportation, infrastructure, products and services of the Company.
- 20% of total CO2 emissions by 2025*



OUR KEY PRINCIPLES TO INNOVATE SUSTAINABLY



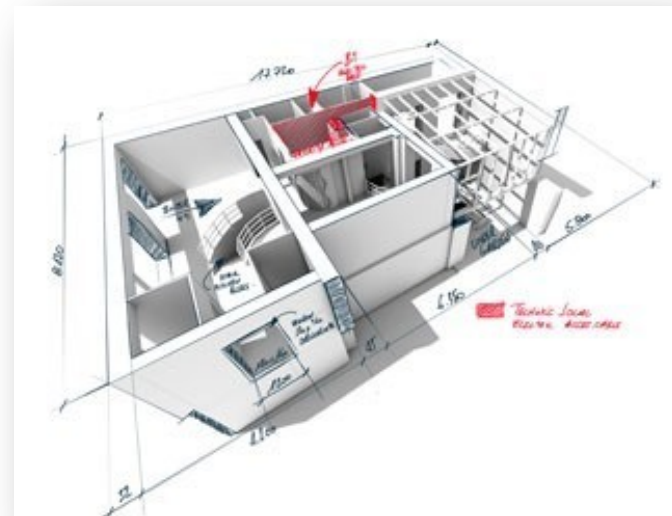
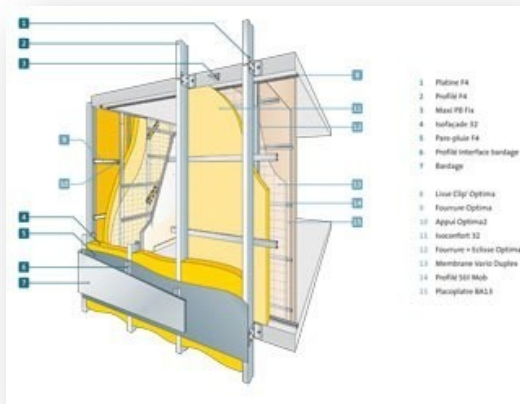
Multi-Criteria approach :



OUR KEY PRINCIPLES TO INNOVATE SUSTAINABLY



Systemic approach:



SOME EXAMPLES FROM OUR PORTFOLIO OF SOLUTIONS

BLUTOP PIPE & ECOPOSE (PAM)

BENEFITS OF **blutop**



SUSTAINABLE DEVELOPMENT

The BLUTOP® solution was developed in keeping with the principles of sustainable development and delivers outstanding environmental performance.



EXTENDED SERVICE LIFE

As investment in renewing water supply infrastructure is declining in relative terms, water network managers are demanding longer service lives. Ductile iron components are not prone to ageing. Their mechanical properties remain constant over time.



LEAKTIGHTNESS

Reducing the amount of water lost in leaks from pipe systems is a major issue. BLUTOP® delivers a two-pronged solution, as ductile iron components (including pipes, fittings, valves and accessories) have an excellent reputation for both leaktightness and pressure resistance.



LESS ENERGY REQUIRED FOR PUMPING

Improving leaktightness reduces head losses, which in turn saves energy.



INSTALLATION

BLUTOP® revolutionises pipe installation and use. Pipe-laying operations are quicker because pipes and fittings can be transported by hand and inserted using a crowbar.



OPERATION

The BLUTOP® pipe range is compatible with existing plastic pipe networks and their related connection and maintenance accessories.

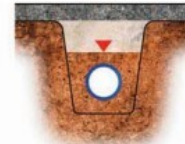


WATER QUALITY

In accordance with the major European regulatory requirements, drinking water Certificates have been obtained for all materials used in the BLUTOP® range (DUCTAN® coating, epoxy, elastomers, lubricating paste and repair products).

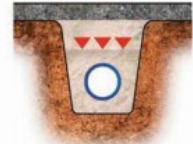


BLUTOP® pipes



Re-use of
extracted materials
85% compression (SPO*)

Conventional laying technique



Use of
filler materials
95% compression (SPO*)

SOME EXAMPLES FROM OUR PORTFOLIO OF SOLUTIONS

FACADE F4 (ISOVER, PLACO)

La dénomination F4 Induit des performances de tout premier ordre dans 4 domaines essentiels :



Thermique



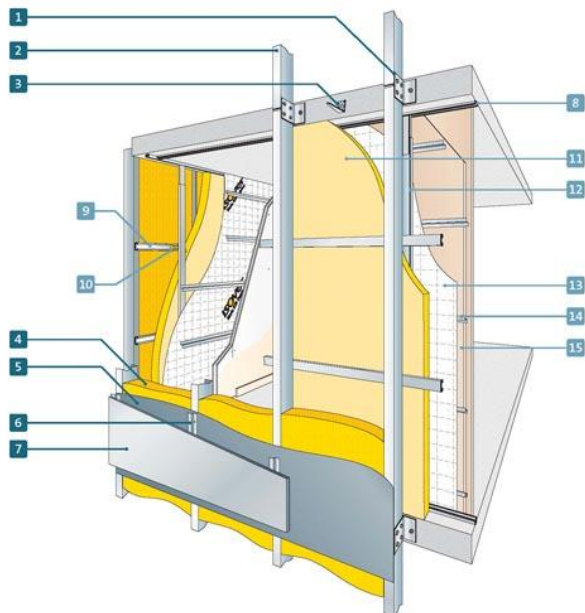
Acoustique



Environnemental



Economique



- 1 Platine F4
- 2 Profilé F4
- 3 Maxi PB Fix
- 4 Isofaçade 32
- 5 Pare-pluie F4
- 6 Profilé Interface bardage
- 7 Bardage
- 8 Lisse Clip' Optima
- 9 Fournure Optima
- 10 Appui Optima2
- 11 Isoconfort 32
- 12 Fournure + Eclisse Optima
- 13 Membrane Vario Duplex
- 14 Profilé Stil Mob
- 15 Placoplatre BA13

Performances environnementales



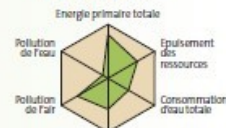
- Le montage en filière sèche améliore considérablement le bilan de l'analyse de cycle de vie de la **Façade F4** au regard des solutions traditionnelles de mur de façade : la consommation d'eau et les émissions de CO₂ sont divisées par 2 pour un ouvrage de performance thermique identique.
- La **compression des isolants**, qui permet de minimiser les volumes de transports, contribue aussi à améliorer les performances environnementales.
- Les produits utilisés dans la façade sont majoritairement issus de **matières**

premières recyclées et recyclables (acier, laine minérale, gypse, ...).

- En fin de vie, la façade est **déconstruite rapidement** et ses différents composants peuvent aisément être séparés pour être valorisés dans leurs différentes filières.

La **Façade F4** a fait l'objet d'une étude environnementale sur l'ensemble de son cycle de vie (www.facadef4.fr). A cette occasion, deux autres systèmes constructifs ont été étudiés : voile béton + ITE sous enduit et voile béton + isolation intérieure.

Extrait de l'analyse environnementale



Changement climatique

- Façade traditionnelle (base 100)
- Façade F4

Étude réalisée par TRIBU Énergie à l'aide du logiciel Eiodie développé par le CSTB.

AND THERE ARE MUCH MORE...



Minska CO₂ utsläppen med hållbara golv från Weber

Weber lanserar ett nytt golvsortiment under devisen Weber Hållbara Golv. Ledorden vid framtagning av de nya produkterna har varit bättre produktprestanda, enklare applicering, mindre miljöbelastning och bättre inomhusmiljö.

Låga koldioxidutsläpp

De nya golvavjämningprodukterna har genomgått livscykelanalys. De nya produkterna genererar upp till 20% lägre koldioxidutsläpp än Webers äldre produkter. För en yta på 1000 m² med 20 mm skikt tjocklek sparar man cirka 1000 kg CO₂ vid användning av de nya produkterna jämfört med produkter ur det befintliga sortimentet.

Inomhusmiljö

Webers nya avjämningssmassor är lågalkaliska och har väldigt låga egenemissioner vilket är bra för inomhusmiljön.

Fukt

Produkterna har väldigt bra utorkningsegenskaper och när de läggs i tunna skikt får de korta torktider. Den relativa fuktigheten i avjämningssmassan kan bedömas med Webers fuktkräktningsprogram och verifieras i fält med fuktensorm weber.floor screedry.

Arbetsmiljö

De är lättflytande och pumpbara vilket underlättar appliceringen och de har genomgått laktest och har låga egenemissioner vilket också bidrar till en bra

arbetsmiljö. Produkterna levereras i säckar om 20 kg vilket är 5 kg lättare än de befintliga produkternas förpackningsvikt. Detta minskar de tunga lyften på arbetsplatsen.

Nya produkter

weber.floor 110 Fine
weber.floor 120 Reno DR
weber.floor 130 Core
weber.floor 140 Nova

För mer information

Läs mer om Weber Hållbara Golv på weber.se.

Kontakt

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weber.se - 2024024



BEYOND REDUCTION...OUR POSITIVE CONTRIBUTION

INSULATING SOLUTIONS BY SAINT-GOBAIN

3

MONTHS ON AVERAGE

The usage time it takes for our solutions to offset the emissions attributable to their production.



WHERE TO FIND INFO. ON THE SUSTAINABILITY OF OUR SOLUTIONS?

Information about the environmental impact of our solutions can be found in our **EPDs (Environmental Product Declarations)**. We have EPDs available for our major ranges in international and local databases!



SAINT-GOBAIN BECOMES GROUP WITH MOST EPDS REGISTERED IN THE INTERNATIONAL EPD® SYSTEM

Jan 28, 2016



<http://www.envirodec.com>

<http://www.inies.fr>

...



WHERE TO FIND INFO. ON THE SUSTAINABILITY OF OUR SOLUTIONS?

Beyond EPDs, information is available about **the contribution of our solutions to your LEED, BREEAM, HQE, etc. projects** (for our major brands and in countries).



A wooden boardwalk with a railing winds through a dense bamboo forest. The path is made of light-colored wooden planks and is bordered by a dark brown wooden railing. The bamboo stalks are tall and thin, with green leaves. The lighting is bright, suggesting a sunny day.

OUR INNOVATION

The Saint-Gobain logo, featuring a stylized building icon with a red and blue color scheme, positioned in the bottom right corner.

SAINT-GOBAIN

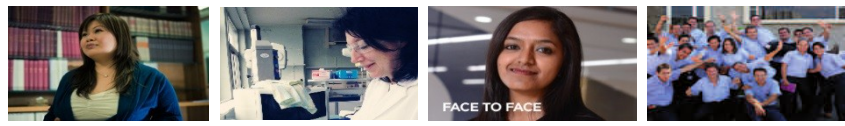
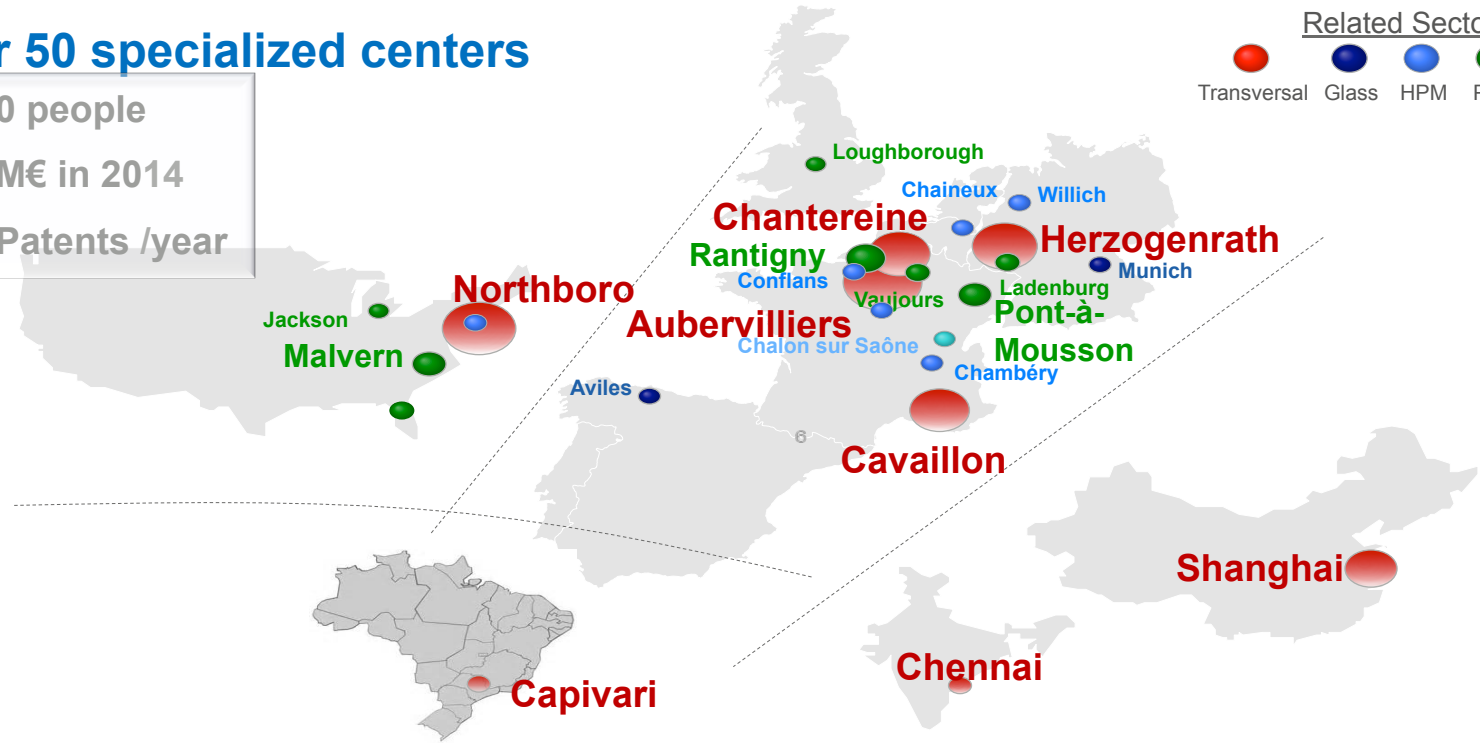


- TRANSVERSAL PROGRAMS
- INTERNAL PRICE FOR CO₂
- RECYCLING
- ECO INNOVATION

A WORLDWIDE NETWORK OF R&D CENTERS

Over 50 specialized centers

3,700 people
420 M€ in 2014
400 Patents /year



MULTI CONFORT BUILDINGS: TO SERVE THE FINAL CUSTOMER



- ✓ Aesthetics
- ✓ Thermal comfort
- ✓ Visual comfort
- ✓ Indoor air quality
- ✓ Acoustic comfort
- ✓ User comfort

→ *in the context of an energy efficient and sustainable Habitat*

Multi-Confort program
=
Show house in each
country



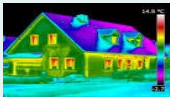
Materials



- Physical chemistry of inorganic binders
- Green chemistry
- **Recycling**
- Organic and inorganic foams
- **CO2**

Building science

- Physics
- Design et user experience
- Comfort, wellness and health
- Virtual reality and digital



- Acoustics
- Air quality
- Energy efficiency, thermal and visual comfort
- Fire performance

- Internal price for CO2
 - Two different prices
 - Short terms (Capex)
 - Long terms (R&D)

LOW CO2 PRODUCTS

► OUR PROCESS

- Less energy -> less CO2 :
 - Furnaces : conception, renewable energy source
 - New processes of shaping (cold fiberization)
 - Breakthrough processes: diluted combustion, immersed burners



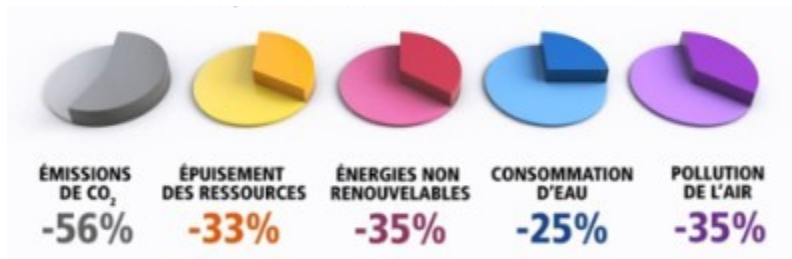
► OUR PRODUCTS

- Lighter products for the same function
 - glasswool, cast iron pipes, plasterboards, thinner glass
- Less CO2 in the raw materials we use
 - Green mortars (replacing cement by **slag**: a binding agent CO2 free)

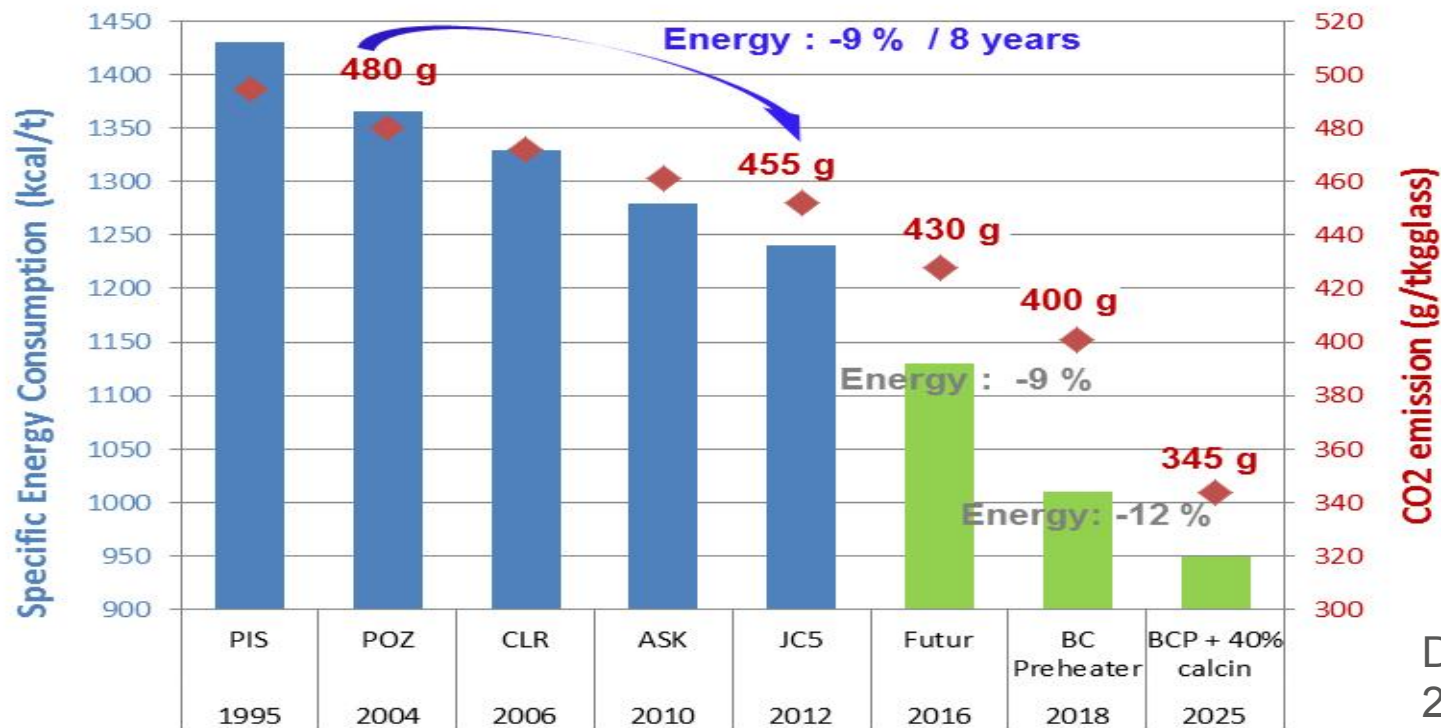


SOME EXAMPLE FROM OUR PORTFOLIO OF SOLUTIONS

WEBER.COL.FLEX ECO



SG-Glass : Design Evolution / Energy savings / CO2 Emissions



Data calculated with 20% cullet

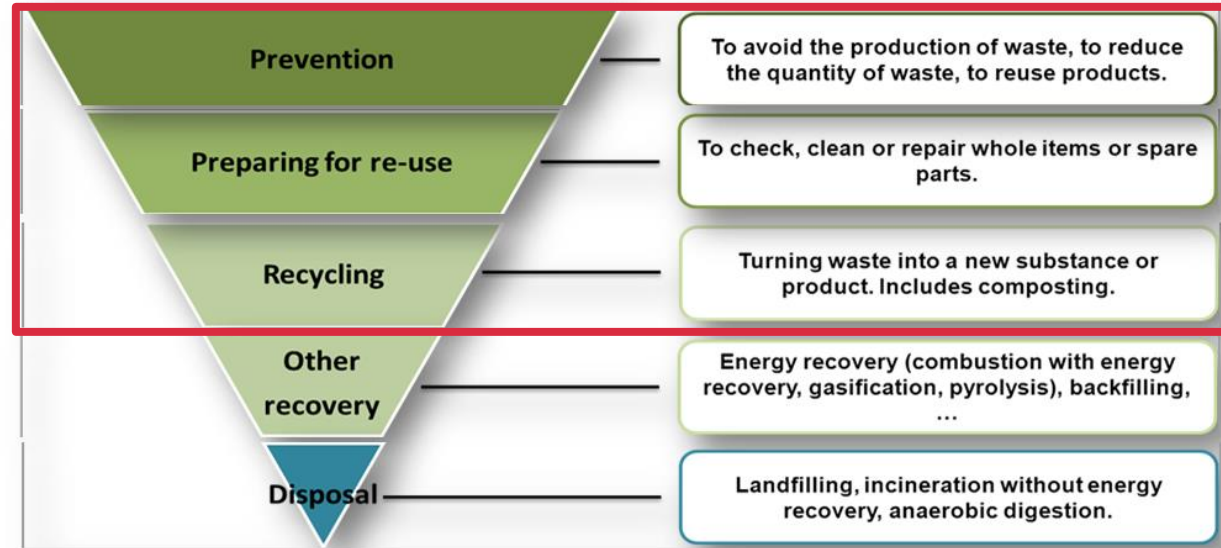
- Floats best design evolution: transformation of global park possibly within 17 years (1.5 rep/year)
- Average float current operational values : ~ 500-550 g/kg

SCOPE OF THE TRANSVERSAL PROGRAM RECYCLING

Find technical solutions for recycling production and end-of-life wastes.
Closed loop or open loop

Increase the amount of recycled materials into our products

Develop internal awareness on new products and systems easy to install, to dismantle, to recycle, in order to prevent scraps (using the eco-innovation tools and design thinking)



EXISTING INITIATIVES

RECYCLING OUR WASTES FROM OUR PLANTS

- Objectives 2025 vs 2010 : -50% less wastes

RECYCLING WASTE FROM SUPPLIERS OR CUSTOMERS

- Pipe
- Glass
- Gypsum
- Insulation

RECYCLING WASTE FROM CONSTRUCTION SITES

- Gypsum to Gypsum
- Many local initiatives

RECYCLING DECONSTRUCTION JOB SITES

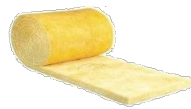


Gypse



- **Collecte en croissance du gypse** (chutes de construction et déconstruction)– la tendance va se poursuivre
- **Augmentation du tri** : à la source et dans des déchetteries publiques

Laines minérales



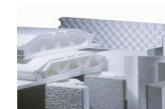
- **Mal quantifié**
- Elimination en **ISDND**
- Plusieurs WMP intéressés par le recyclage
- Réflexion sur la mise en place de presses chez les collecteurs pour optimiser la logistique

Verre bâtiment



- Les fenêtres sont collectés par la plupart des WMP
- **Tri effectué en général** – pour récupérer les cadres (plutôt PVC que bois)
- Verre termine souvent en **ISDI, ISDND, rarement recyclé**
- **Isover** intéressé par le recyclage du verre bâtiment

EPS



- **Quantité faible d'EPS bâtiment** (vs. EPS pour emballage)
- Collecte EPS : n'est pas une priorité pour les WMP
- **Matériaux très léger**
- **Pas de plan d'investissement** pour une presse chez les collecteurs

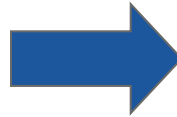
ECO INNOVATION : ENABLES TO REDUCE THE ENVIRONMENTAL FOOTPRINT OF OUR SOLUTIONS

'healthy' buildings'

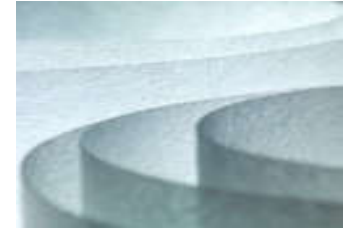
➔ DEVELOP RECYCLABLE SOLUTIONS OR USING SUSTAINABLE RAW MATERIALS

➔ SAINT-GOBAIN SOLUTIONS

- Eco packaging
- Supported by a Life Cycle-Analysis



Formaldehyde free (sugar based) binders

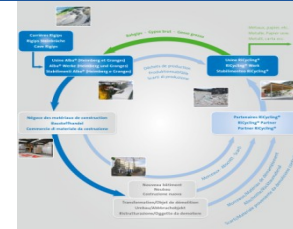


Eco packaging

Ce sac est compostable en déchetterie avec les déchets verts
Ensemble, un sac 100% recyclé !
Ce sac est certifié



Life Cycle Analysis



A CONTINUUM OF INNOVATIVE SOLUTIONS

Incremental innovation

Radical innovation

1 Advances on traditional materials

Weber. Col flex éco



- -56% of CO2 emissions
- -25% of water consumption
- -33% exhaustion of resources

BluTop water pipes

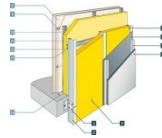


- Coke and cast iron divided by 2
- Natural backfill
- Organic coating
- Very long lifespan

20-50% raw material savings

2 New materials combinations

Facade F4 Isover



- -16% thickness
- -50% of water consumption and CO2 emissions during the assembling process

Warm edge spacer bar Swisspacer



- Heat transfer reduction up to 3x

Additional 20-50% raw materials saving

3 Breakthrough materials

Ecovative's Myco Foam



- Natural mushroom-based products

4 Comprehensive solutions

Multi-comfort program



- Optimize synergies between products

Building Information Model

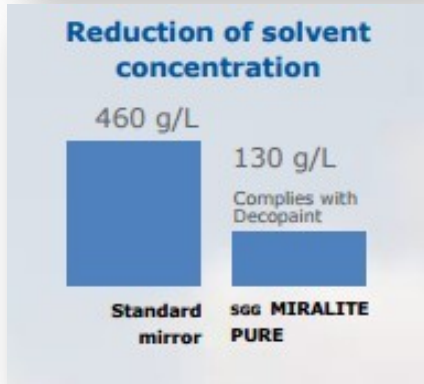


- Use as few materials as necessary and in the most efficient way

Toward zero environmental impact

SOME EXAMPLES FROM OUR PORTFOLIO OF SOLUTIONS

MIRALITE: FROM EVOLUTION, TO REVOLUTION, TO PURE (GLASS)

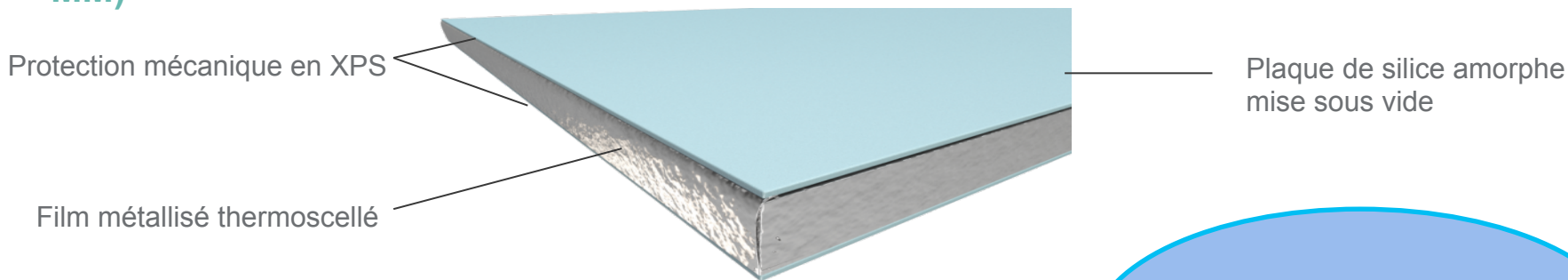


SGG MIRALITE® PURE

A mirror with real conference for health and the environment.



CŒUR DE PANNEAU: POUDRE DE SILICE AMORPHE PRESSÉE, MISE SOUS VIDE
ENVELOPPE : FILM EN POLYESTER MÉTALLISÉ THERMOSCELLÉ
SURFAÇAGE : PROTECTION MÉCANIQUE DES 2 FACES PAR COLLAGE EN XPS (3 MM)



- **Épaisseurs** de cœur de panneau de 30 et 50 mm + 2 x 3 mm pour l'épaisseur produit (protection XPS)
- **Deux formats de panneaux**
 - 600 mm x 300 mm
 - 600 mm x 1000 mm

$\lambda = 5.2 \text{ mW}/(\text{m.K})$
Certifié ACERMI

OPTIMAVIP : POUR LES FORTES CONTRAINTES D'EMPRISE AU SOL

ISOLATION DES MURS PAR L'INTÉRIEUR (TOUS TYPES DE MURS, Y COMPRIS MOB)

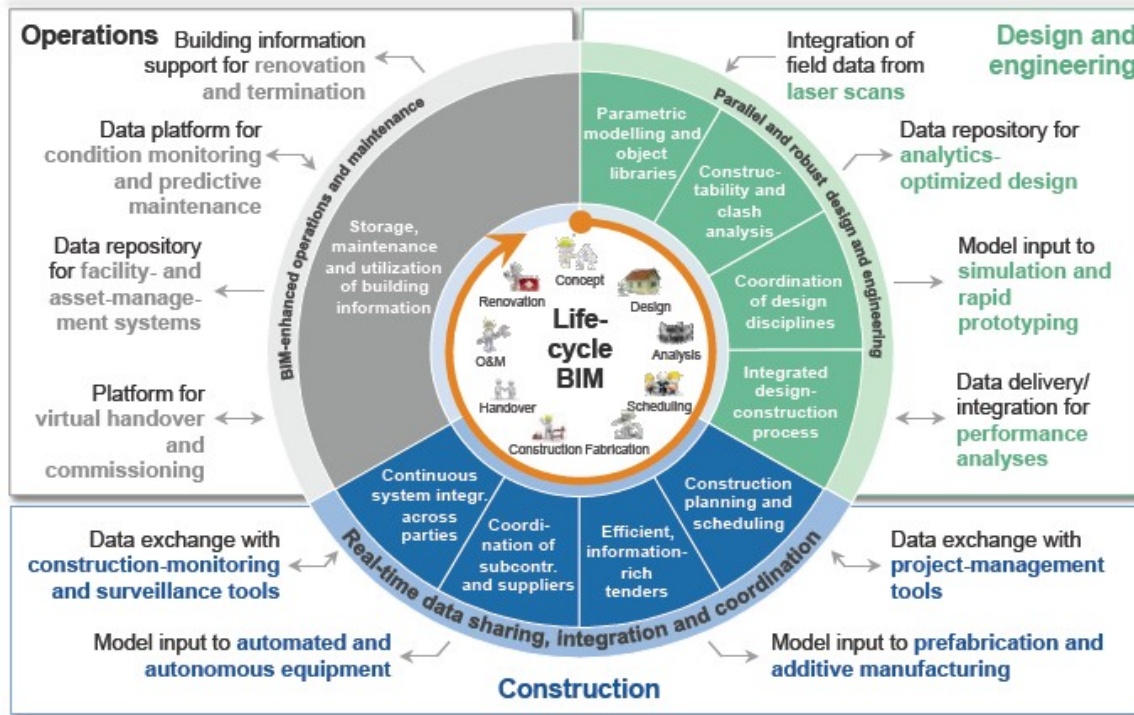
POUR LES APPARTEMENTS ET MAISONS, NOTAMMENT :

- POUR LES RÉNOVATIONS ÉNERGÉTIQUES, Y COMPRIS EN MILIEU OCCUPÉ
 - POUR LES CONSTRUCTIONS NEUVES DANS LES CENTRES URBAINS
 - POUR LES PROJETS DE RÉAFFECTATION DE BUREAUX EN LOGEMENTS PRIVÉS
-
- POUR CERTAINES PIÈCES AFIN DE NE PAS EMPIÉTER SUR LA SURFACE HABITABLE ET LES CAPACITÉS D'AMÉNAGEMENT



USE DIGITAL TO FURTHER IMPROVE MATERIALS EFFICIENCY

BIM technology allows an integrated view of a building during all stages of its life cycle



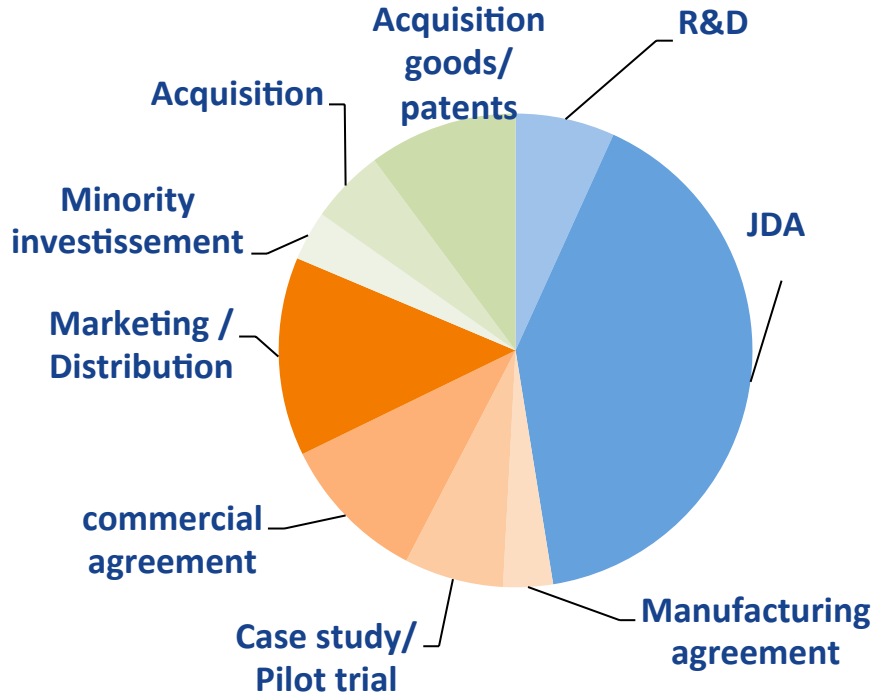
○ Full-scale digitalization in non-residential construction would, within 10 years generate savings of:

- **13-21%** of costs in the Engineering & Construction phases
- **10-17%** of costs in the Operations phase

Source : World Economic Forum

NOVA TO INTERACT WITH START UPS

NOVA PARTNESHIP TYPOLOGY 2006-2014



Concrete Canvas



CORSOMAGENTA



Brochier technologies



Types of partnership:

- Commercial
- Financial
- Technical



COLLABORATIONS WITH UNIVERSITIES (ONGOING CONTRACTS)

Canada (NRDC)

Univ. of Laval
McGill University
Univ. of British Columbia

Germany (SGR & HRDC)

Fraunhofer Institutes (IBP)
RWTH Aachen Univ

2,5 % Budget

Russia

MSU (SGR)
MGSU (Weber)

UK (SGR & CREE) *

Univ. Saint Andrews
Leeds Metropol. Univ.
Salford Univ.

China (SGRS)

Tsinghua Univ, Beijing
Fudan Univ., Shanghai
Tongji Univ., Beijing
Zhejiang Univ.

USA NRDC

Rensselaer PI
MIT
UMASS-Amherst
CWRU
Penn State University
UPenn

Norpro

Kent State University

MIC

Kansas Polymer Institute

France (SGR, CREE, CRIR & PAM)

3 Chaires
2 CNRS UMR
CNRS and schools labs

India (SGRI)

IIT Madras
IIT Delhi
IIT Kanpur
IIT Bombay
IIT Hyderabad

SG-CNRS UMI @

NIMS
Tsukuba, Japan

Singapore (SGRS)

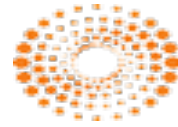
National Univ of Singapore

Others:

CRIR: Tallin University of Technol., Univ Santa Catarina (Brazil)

Weber: EMPA (Switzerland), Lund Univ. (Sweden *)

THOMSON REUTERS
TOP 100
GLOBAL INNOVATORS



THOMSON REUTERS



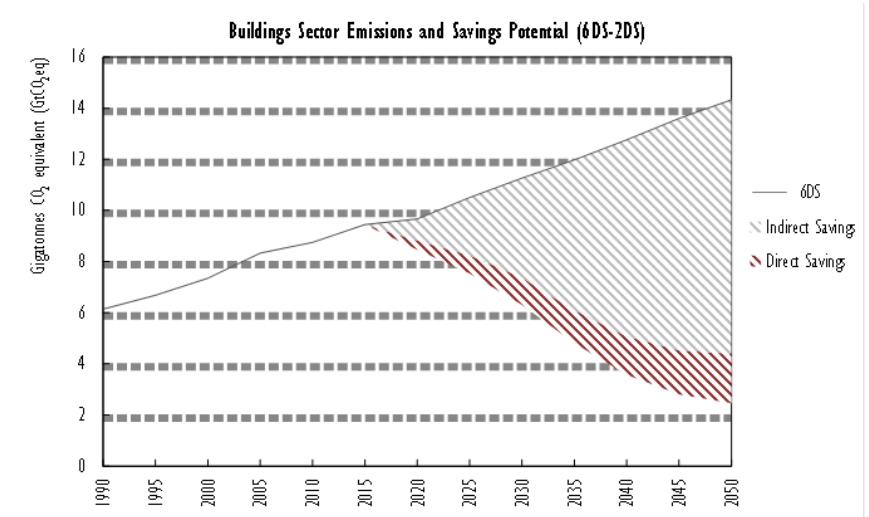
5 times winner

2011, 2012, 2013, 2014 and 2015



AS A CONCLUSION...

Through collaboration across the value chain, we believe we can meet the commitment made the WGBC for our sector:
reduce CO₂ emissions from the buildings sector by 84 gigatonnes by 2050,



THANKS FOR YOUR
ATTENTION!

