TOTAL
COMMITTED TO BETTER ENERGY

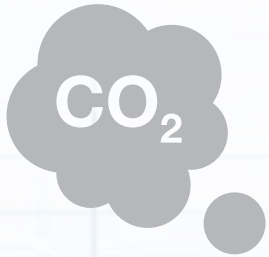
Excell-R®

For better insulation

REFINING & CHEMICALS

Contents

Ambitious objectives such as reducing greenhouse gas emissions, increasing the share of energy consumption produced from renewables and improving energy efficiency overall are targets to be met by 2020 in Europe. Total offers particular solutions, such as Excell-R® to help address these specific objectives.



-40%

+27%

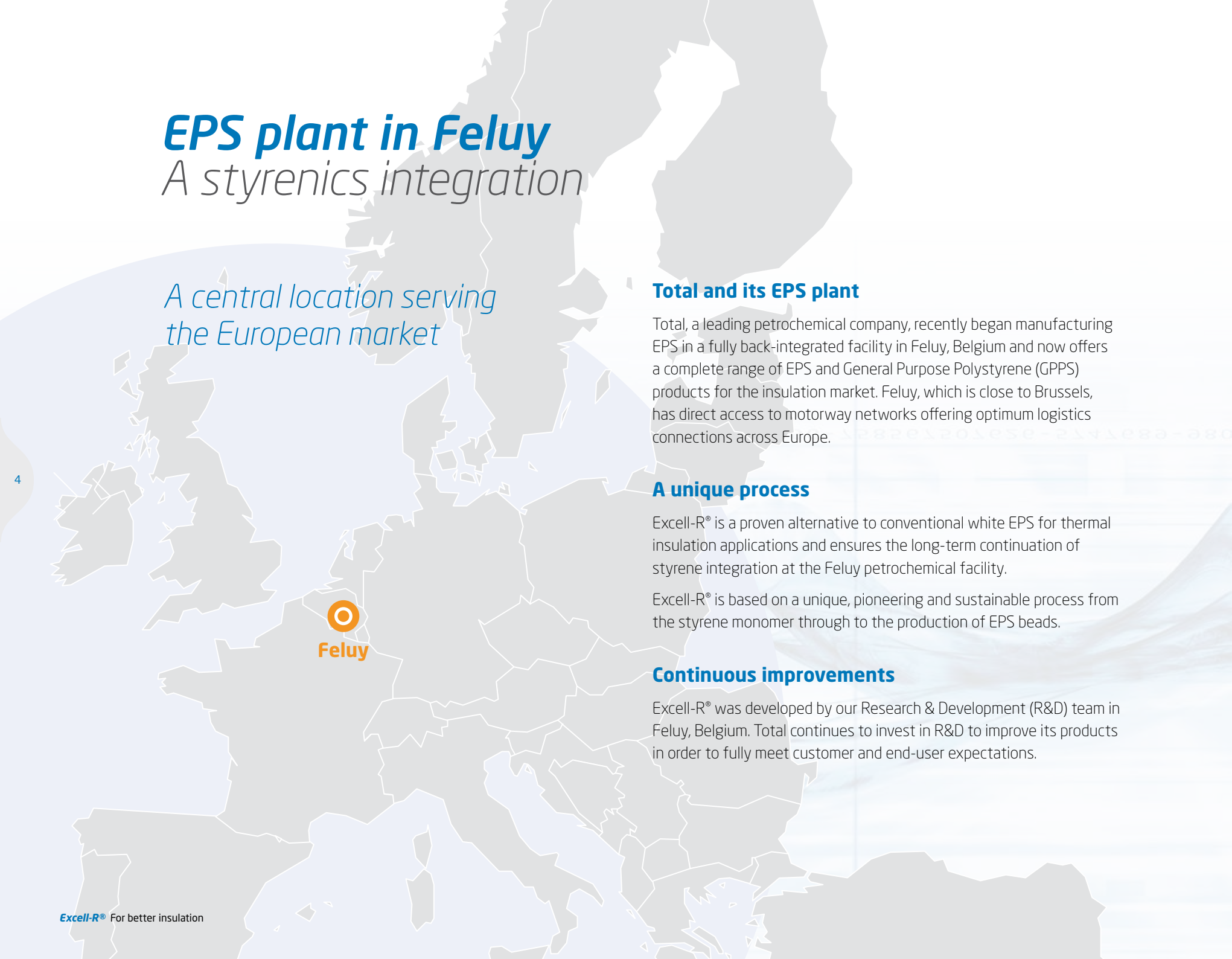
-30%

Not only active in conventional energy sources, Total has been investing strongly for several years in renewables such as solar power highlighted by its subsidiary with SunPower. Buildings are responsible for 40 percent of energy consumption. Therefore the insulation of buildings has a major impact on the optimization of energy savings. Made up of 98 percent air, Expanded Polystyrene (EPS) insulation is an environmentally sound option.

In Europe, EPS is the most appropriate choice for thermal insulation as its performance is impressive. Besides contributing to the reduction of CO_2 emissions, in line with Total's commitment to better energy efficiency, **Excell-R® is a solution that saves both energy and money.**

EPS plant in Feluy
A styrenics integration

A central location serving the European market



Total and its EPS plant

Total, a leading petrochemical company, recently began manufacturing EPS in a fully back-integrated facility in Feluy, Belgium and now offers a complete range of EPS and General Purpose Polystyrene (GPPS) products for the insulation market. Feluy, which is close to Brussels, has direct access to motorway networks offering optimum logistics connections across Europe.

A unique process

Excell-R® is a proven alternative to conventional white EPS for thermal insulation applications and ensures the long-term continuation of styrene integration at the Feluy petrochemical facility.

Excell-R® is based on a unique, pioneering and sustainable process from the styrene monomer through to the production of EPS beads.

Continuous improvements

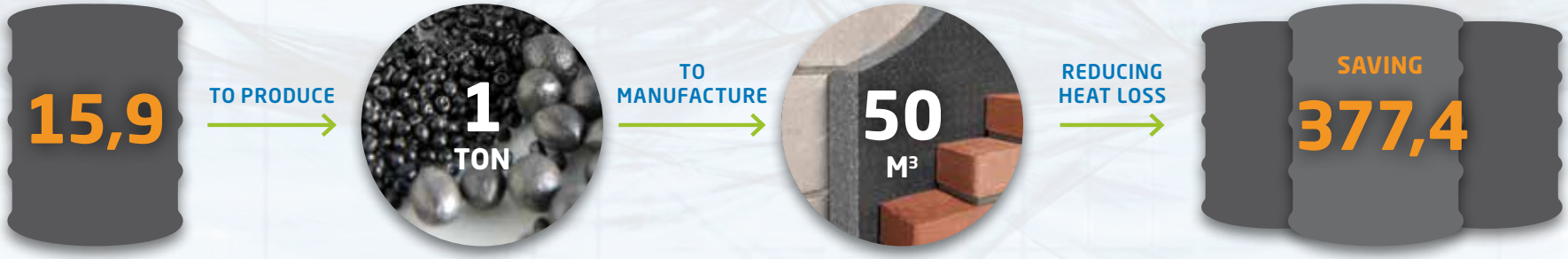
Excell-R® was developed by our Research & Development (R&D) team in Feluy, Belgium. Total continues to invest in R&D to improve its products in order to fully meet customer and end-user expectations.

Excell-R®

are small beads of grey expandable polystyrene (EPS) containing a blowing agent which makes it expandable. Excell-R® presents thermal insulation properties significantly improved compared to traditional white EPS – it allows you to use 20% less product for the same thermal performance. The Excell-R® self-extinguishing grade contains the most advanced flame retardant technology, making it a safe choice for foam insulating applications.

How sustainable is the EPS industry?

Long-lasting thermal insulation properties offer cost savings

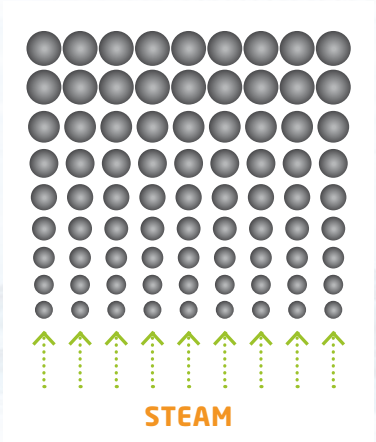


The lifespan of EPS insulation panels is more than 50 years. Thanks to its higher thermal insulation properties, EPS panels made from Excell-R® are thinner than conventional white EPS panels yet provide the same thermal characteristics thereby saving valuable resources during the manufacturing process.

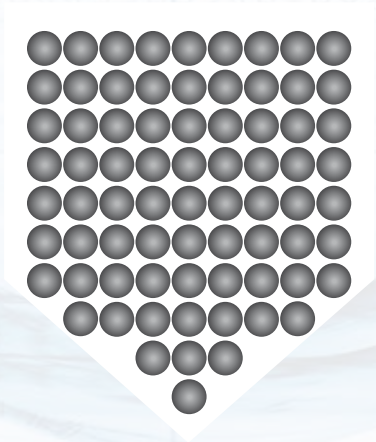
Source: Plastic Europe

The conversion of EPS
From raw material to final product

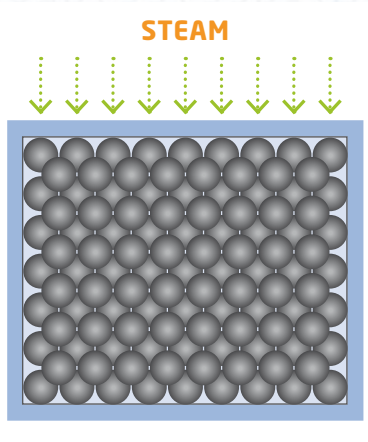
Once expanded, EPS is made of 98% air.
The transformation occurs in ***4 steps*** *without adding any new component.*



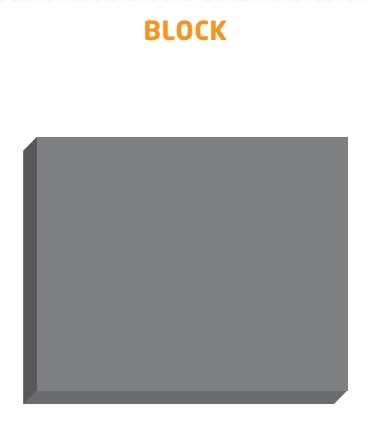
❶ PRE-EXPANSION | The beads, containing a foaming agent, are steam-heated in a pre-expander which causes them to swell in size. During this stage the beads expand between 40 and 50 times their original volume.



❷ MATURATION | The expanded beads decant for several hours in a silo in order to reach an equilibrium between temperature and pressure.



❸ MOLDING | The beads are transferred into a mold and reheated with vapor. As a result the beads expand further, stick together and take the shape of the mold. The most common form is a block (up to 12 meters in size) or any other geometrical shape (customized mold). At this stage the EPS contains 98% air.



❹ MACHINING | The blocks can be hot-wire cut into boards of different thicknesses and surface edges can be further machined, if necessary.

How do we improve insulating performance?

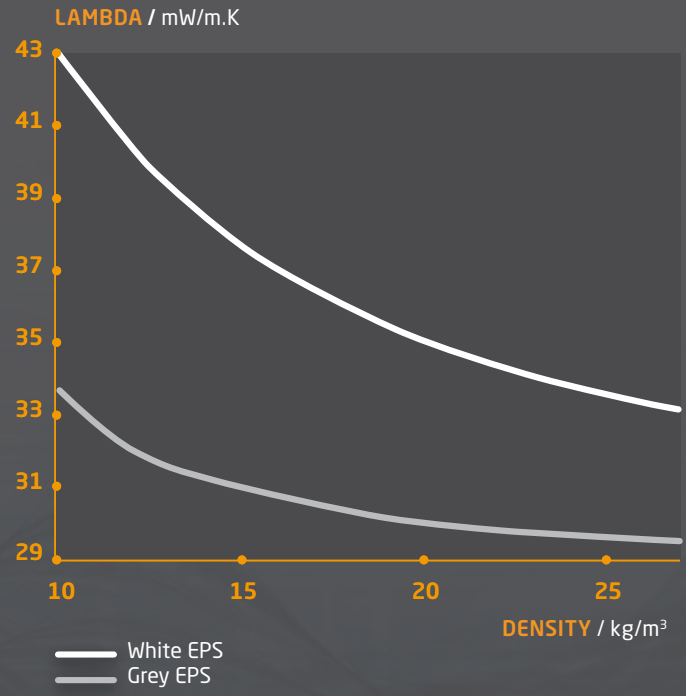
The lower the thermal conductivity (lambda value), the better the insulating performance. The lambda value is influenced by the material choice, the foam structure and its density.

EPS Foam Cellular Structure

The heat flow significantly loses its intensity thanks to heat absorbing or infrared reflecting additives present in the Excell-R® product.

Enhanced thermal insulation coefficient

Grey EPS is a major breakthrough in an otherwise mature market.

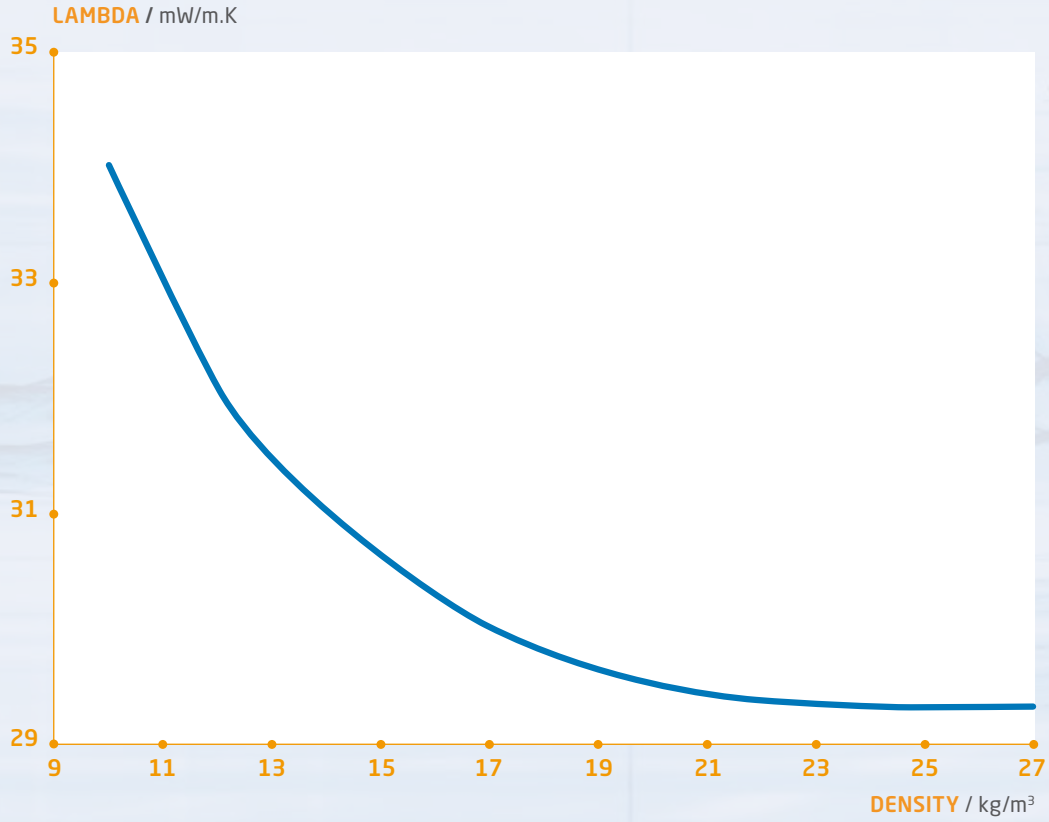


The grey EPS is an improved type of EPS thanks to its enhanced capacity of both reflecting and absorbing heat. Its insulating properties are superior to standard white EPS. An improvement of up to 20% in thermal insulation for the same thickness can be achieved.

Disclaimer: Average value curve of the measurement values according to EN 13163; mean temperature 10° C.

Technical performance

With Excell-R®, a lambda of 31 mW/mK is obtained at a density of 15 kg/m³.



Beads processing

Processing of Excell-R® beads is straightforward and feasible on existing industrial equipment.

Flame retardancy

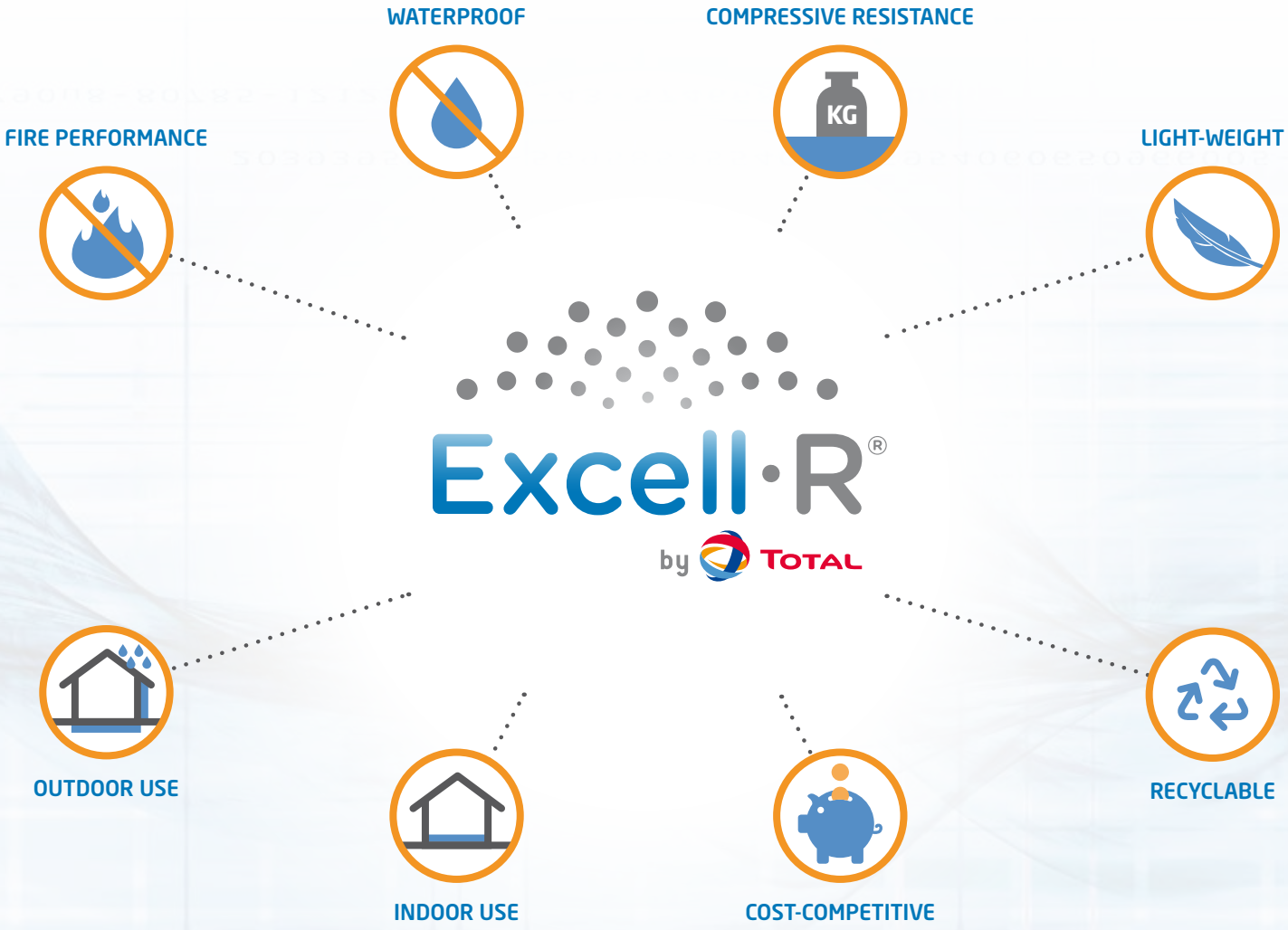
The latest generation of flame retardant is used in the self-extinguishing grade.

Durable thermal performance

The thermal insulation properties of Excell-R® remain constant during the entire lifespan of a building. Its vapor transmission is the same as for traditional building materials but with hardly any water absorption.

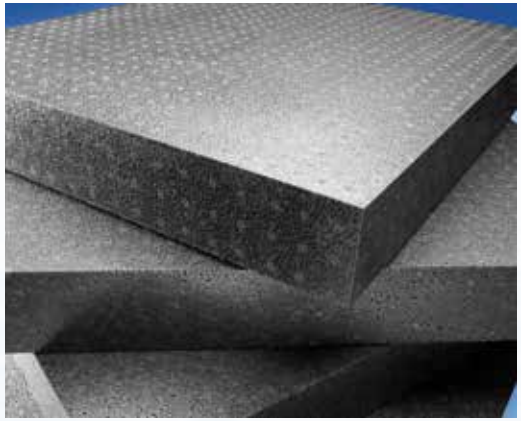
Disclaimer: Average value curve of the measurement values according to EN 13163; mean temperature 10° C.

A versatile material



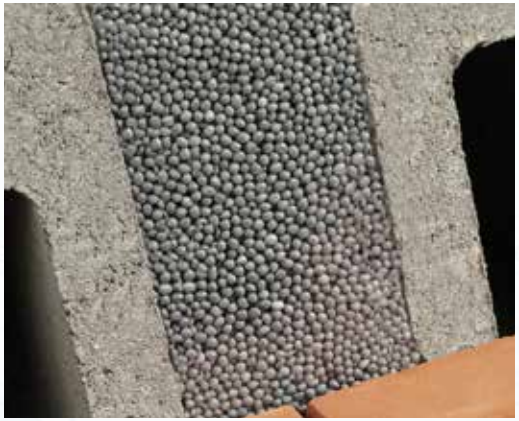
Application examples

An Excell-R® EPS solution for every insulation need



PANELS

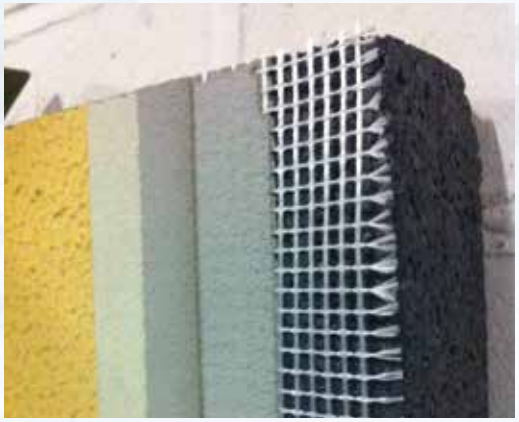
CAVITY WALLS



LOOSE FILL

ICF: Insulating Concrete Form

SIP: Structural Insulating Panel



ETICS: External Thermal Insulation Composite System

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Energy drives progress where it is readily available. In building a responsible energy future, we must ensure that each individual has access to energy and that energy is used in the most efficient way possible.
This is the environment in which we conduct our business. With operations in more than 130 countries, we are a leading international oil and gas company. We produce, refine and market oil, manufacture petrochemicals. We are also a major player in natural gas and rank second in solar energy through our affiliate SunPower. We are committed to better energy: this is our mission. Our 100,000 employees help supply our customers around the world with safer, cleaner, more efficient and more innovative products that are accessible to as many people as possible. We work alongside our stakeholders to ensure that our operations consistently deliver economic, social and environmental benefits.

TOTAL

Total Petrochemicals & Refining SA/NV
Refining & Chemicals Division
Global Polymers
Insulation
Rue de l'Industrie, 52 Nijverheidsstraat
B-1040 Brussels - Belgium
Phone: +32 (0)2 288 33 48
Fax: +32 (0)2 288 94 14
insulation@total.com
www.totalrefiningchemicals.com

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