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WASTE DOSSIER

Construction Products Europe has collected information from its members about waste flows management.

Click on the pictures to see the information and go back to this page using the index button.

Check also other documents related to waste and circular economy in our website.

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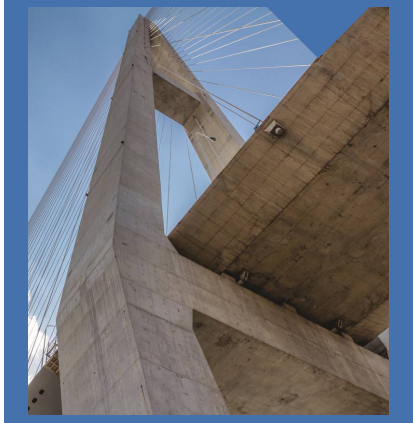
CALCIUM SILICATE UNITS



CEMENT

CERAMICS

CONCRETE

GYPSUM

PLASTICS

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CALCIUM SILICATE MASONRY

The European Calcium Silicate Producers Association (ECSPA) represents more than 80 % of manufacturers of calcium silicate masonry products in Europe coming up for more than 90 % of the annual production volume.

The main product constituents are lime, natural siliceous materials (sand, crushes or uncrushed siliceous gravel or rock or a mixture thereof) and water. These raw materials are abundantly available.

Calcium silicate by-products (e.g. faulty products and the remains of cutting) and/or construction and demolition waste are usually recycled.

Applications

Calcium silicate masonry products are used as construction material for inner and outer masonry walls, columns and partitions.

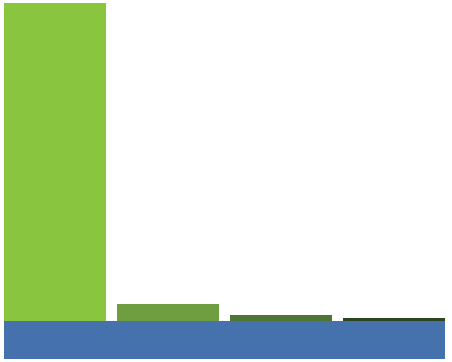
The total volume of calcium silicate masonry units in the European market is 7.000.000 m^3.

Statistics

The volume of calcium silicate by-products (i.e. faulty products and remains of sawing elements) in the production process represents less than 1% of the total volume and is completely recycled, mostly to become aggregates for the own calcium silicate production.

Calcium silicate masonry products are part of the mix of construction and demolition waste. At present the calcium silicate construction and demolition waste represents between 2 and 5% of the total amount of construction and demolition waste.

Calcium silicate construction and demolition waste is used as high quality aggregates for construction materials, for foundations (e.g. road base and houses), as substrates and for backfilling.



High quality aggregates	92%
Backfilling	5%
Calcium silicate products	2%
Landfilling	1%

ECSPA qualified estimate and
Institut für Angewandte Bauforschung, Weimar (Germany)
Pictures © Bundesverband Kalksandsteinindustrie e. V., Hannover (Germany)

Overall summary

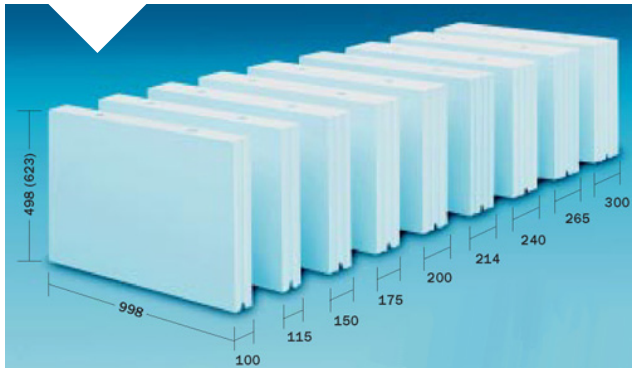
As an economic and environmental principle the calcium silicate masonry products industry strives to prevent and reduce waste generation during production, transport and installation of their products into construction works. The use of calcium silicate structures during their long reference service life does not generate waste. Research and practical experience have also demonstrated that calcium silicate products are fully recyclable in close-loop and open-loop recycling systems. Waste prevention, long reference service life and the full recyclability of calcium silicate masonry products reduce the demand for raw materials. They are therefore key elements of resource efficiency.

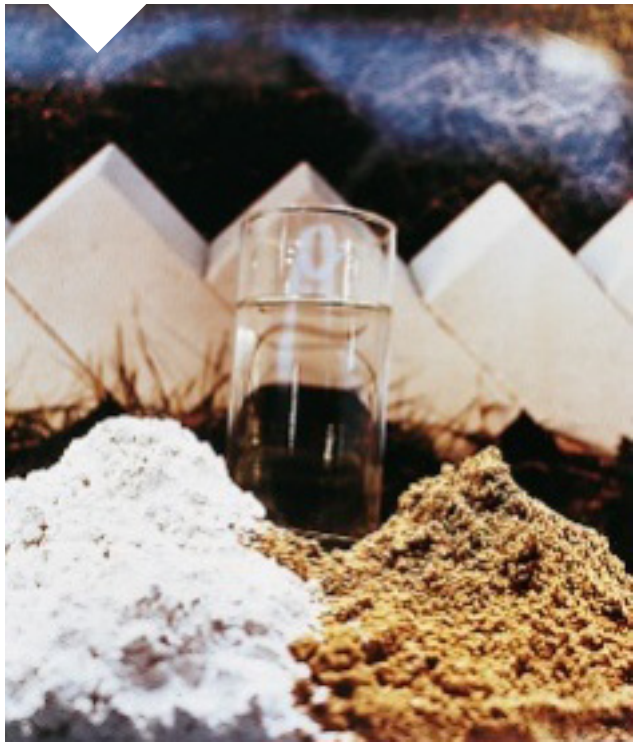
Calcium silicate by-products and calcium silicate construction and demolition waste common uses after being processed:

Best practices

The Calcium silicate masonry products industry is striving to reach a zero waste production, not only regarding internal processes but also in terms of reducing, reusing and recycling packaging materials.

In case of CS-Elements, the products and quantities are customised at the factory prior to delivery to site. This reduces the environmental impact of transportation, as well as the amounts of take-backs and remains from cutting on site at best down to zero.





Over the past the density and dimensions of the products have been adapted to meet exactly the technical requirements of the building thereby saving raw materials.

The calcium silicate masonry products industry has demonstrated in numerous projects that its products are fully recyclable to be used as aggregates for producing new products. It is also possible to substitute a substantial amount of virgin aggregates by recycled mineral aggregates, provided these meet specific quality requirements.

However, despite a high recycling quota for construction and demolition waste in the Member States where calcium silicate masonry units are produced, the demand for raw materials (aggregates) surmounts by far the availability of recycled aggregates. This low availability and the principle of the circular economy to use virgin raw materials at the highest utility, account for the limited use of recycled aggregates at present.

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CEMENT

CEMBUREAU, the European cement association, is the representative organisation of the cement industry in Europe. The Association acts as spokesperson for the cement industry before the European Union institutions and other public authorities, and communicates the industry's views on all issues and policy developments with regard to technical, environmental, energy and promotional issues.

CEMBUREAU plays a significant role in the world-wide promotion of cement and the ready-mix and precast concrete industries in co-operation with Member Associations and oth er relevant organisations.

Overall summary

The cement industry has a proven track record in the simultaneous recovery and recycling of waste materials in an operation called 'co-processing'. For over 30 years cement plants in Europe have been co-processing waste in kilns where the industry has adapted its processing and technologies to offer the best environmental and economic solutions whilst maintaining a high quality product.

Applications

CEMBUREAU Member countries produced 235.5 million tonnes of cement in 2014. The European Union produced 159.4 million tonnes the same year.

In 2013, the residential subsector accounted for 26.9% of cement consumption in the CEMBUREAU region, non-residential for 27.6%, civil engineering for 32.9% and repair and maintenance for 12.6%.

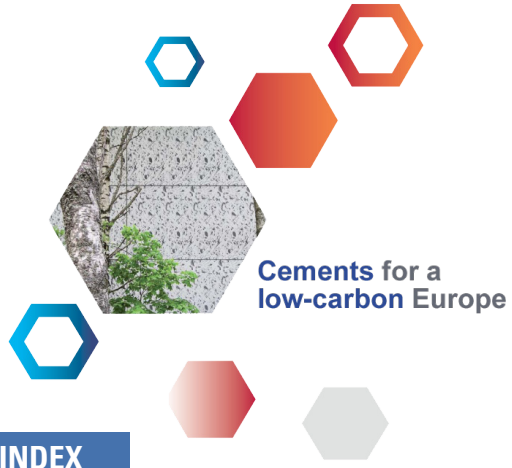
CEMBUREAU activity report 2014

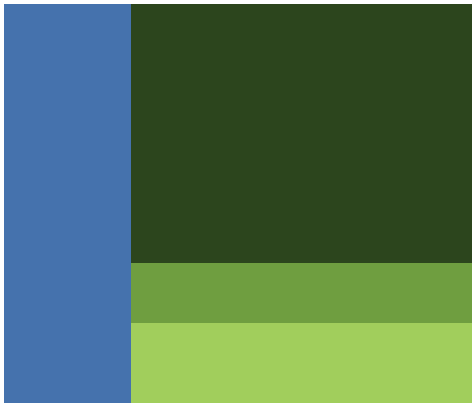
Statistics

Thanks to co-processing in the cement industry, in 2013:

- 7 million tonnes of raw material was saved
- 7 million tonnes of coal were saved
- CO2 emissions were reduced by 16 million tonnes
- 8.1 million tonnes of alternative fuels where used
- 2 million tonnes of biomass where used

Getting the Numbers Right (GNR)





Concrete composition	
Water	15-20%
Cement	10-15%
Aggregates	60-65%

The co-processing solution provided by our sector is somewhat unique in that both material recycling and energy recovery take place at the same time. The mineral content of waste serves as a raw material for the production of clinker (recycling), while the energy content provides part of the energy needed for clinker production (energy recovery). As a result, close to 100% of the material input is recovered/recycled in the production process without the production of additional waste from the process.

Cement in Europe must be manufactured according to the harmonised standard EN 197-1 which clearly indicates the 27 common cements according to their main constituent.

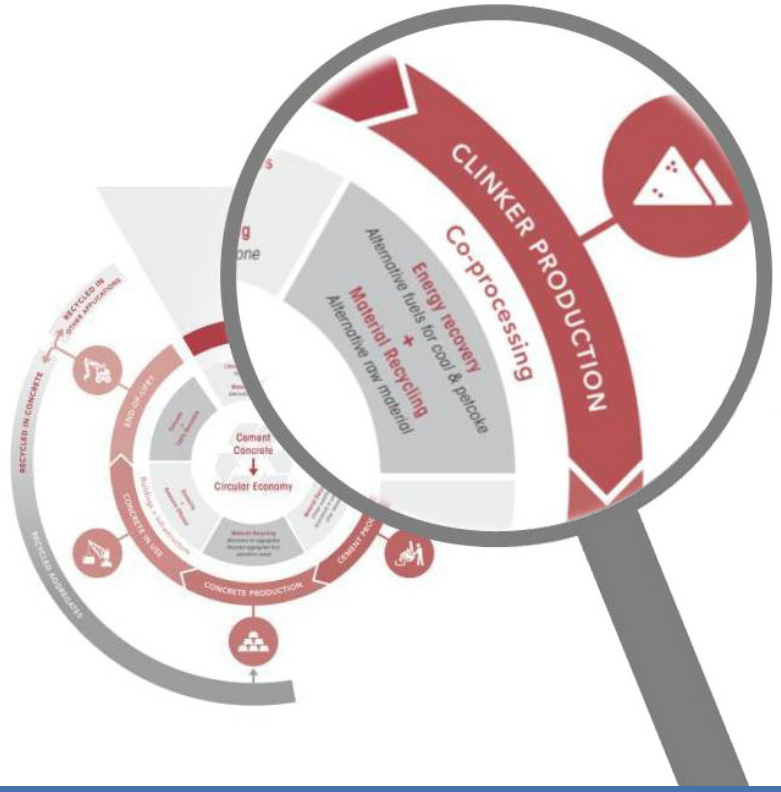
As mentioned, the main component of cement is clinker. Depending on availability, part of the clinker can be replaced with alternative constituents. Two major examples are granulated blast furnace slag, a by-product of the iron manufacturing process, and fly ashes, one of the residues generated from the combustion of coal.

Best practices

The raw materials used to produce cement and concrete, primarily limestone and aggregates, are abundantly available.

When manufacturing clinker, the cement industry is able to use waste as a fuel instead of coal and petcoke. At the same time, the mineral content of waste is recycled as a raw material. We, in the cement industry, refer to this combination of energy recovery and material recycling as 'co-processing'

Material recycling also occurs when making cement. Here, we replace part of the clinker with by-products from other industries. One example is fly ash from coal combustion.



CEMBUREAU firmly believes that policies relating to resource efficiency and C&D waste should:

— Foster the use of waste to achieve the EU targets set for waste recycling and resource efficiency.

— Count material recycling from waste and fuel ashes towards recycling targets compliance for Member States.

— Leave open to Member States the range of waste treatment options for their assessment of the best technical feasibility, economic viability and environmental protection for waste streams.

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CERAMICS

Cerame-Unie is the Brussels-based trade association that represents the European ceramic industry. Our members include national associations and companies from 9 ceramic sectors and 30 European countries, including 26 EU members.

Applications

Ceramic constructions products are used mainly for buildings. However, vitrified clay pipes are used for sewage systems and clay pavers are commonly used for walkways.

Our products stand out with their high durability thanks to a lifespan of over a century and require little or no maintenance/replacement. Service life extension of the first use of products gives an important contribution to the circular economy.

Studies show that a brick house has an average life span of more than 150 years. Clay pipes have a similar durability (150 years), tiles for flooring and walls have a life span of 50 years and sanitaryware products 40 years.

Best practices

After a building is demolished, ceramic construction products (e.g. ceramic masonry products, roof tiles, ceramic tiles for flooring and walls and ceramic sanitaryware) can be crushed and then used as secondary raw materials for different applications, including road construction (sub-layer), cement clinker production, agriculture, embankments, tennis courts, substrate for green roofs and concrete aggregates. Crushed ceramic masonry units coming from the demolition of the building can also be used to replace primary raw materials in the manufacturing of an equivalent ceramic masonry unit.

Roof tiles have a long life span and require little or no maintenance. Thus, they can be easily reused. After the end-of-life stage of a building, roof tiles can be removed, transported to a storage site and then reused in a new building.

Examples

In Belgium, a manufacturer of ceramic roof tiles uses granite powder as secondary raw material. By doing this, the mechanical

Ceramic construction product	Production quantity	Unit
Ceramic tiles for floors and walls	1.127.341.580	m^2
Clay building bricks	48.864.593	m^3
Clay roof tiles	2.892.778.750	p/st
Vitrified clay pipes	291.268.123	kg
Non-refractory clay constructional products	136.923.715	kg
Ceramic sanitaryware	36.983.678	p/st

Prodcom Eurostat and Eurostat 2013

Ceramic product	Reuse	Recycle
Clay bricks & blocks	Clay bricks may be reused	Clay bricks and blocks can be recycled and then used for the same application or for other applications
Clay roof tiles	Clay roof tiles can be very easily reused	Clay roof tiles can be recycled and then used for the same application or for other applications
Ceramic tiles for floor and walls	N/A	Ceramic tiles can be recycled and then used for other applications
Ceramic sanitaryware	N/A	Ceramic sanitaryware can be recycled and then used for other applications
Vitrified clay pipes	Clay pipes can be reused	Clay pipes can be recycled and then used for the production of pipes or other applications

strength improves and tiles can be thinner. This reduces the use of primary clay, sand, and energy consumption in production, transport and packaging.

In Europe, some manufacturers are resizing their products to an optimised slimmer format recuing the use of primary raw materials. thinner facing bricks allow to increase the thickness of insulation.

Inspired by nature, a manufacturer of vitrified clay pipes has introduced a cradle-to-cradle approach in the production of clay pipes. There is no material loss in the production stage, i.e. 100% of broken pipes are crushed and reinserted into the production process. The vitrified clay pipe is composed of 30-40% secondary raw material, including broken clay pipes and floor and wall tiles. Last but not least, after the end-of-life stage, clay pipes can be removed from the soil and recycled for the production of new clay pipes or for a different application (e.g. construction of new roads).

A clay pipe manufacturer in the UK has recently used the restored land at one of their clay quarries to provide hives for 3 million bees. The honey is sold in the local community.

Most ceramic products can be recycled after the end of life stage, but it is important to have a good system for collection, sorting and separation of waste. By doing this, the quality of materials available for recycling will improve. Recycling is a relevant process for resource efficiency and thus should be properly addressed. However, due to the long lifespan of ceramic products and the fact that in some sectors over a third of the production is exported outside the EU, the quantity of secondary material available after the end of life is often insufficient. As a result, virgin material remains a requirement within the supply chain. For circular economy, it is important to consider both open and closed loop recycling and avoid one size fit all approach.

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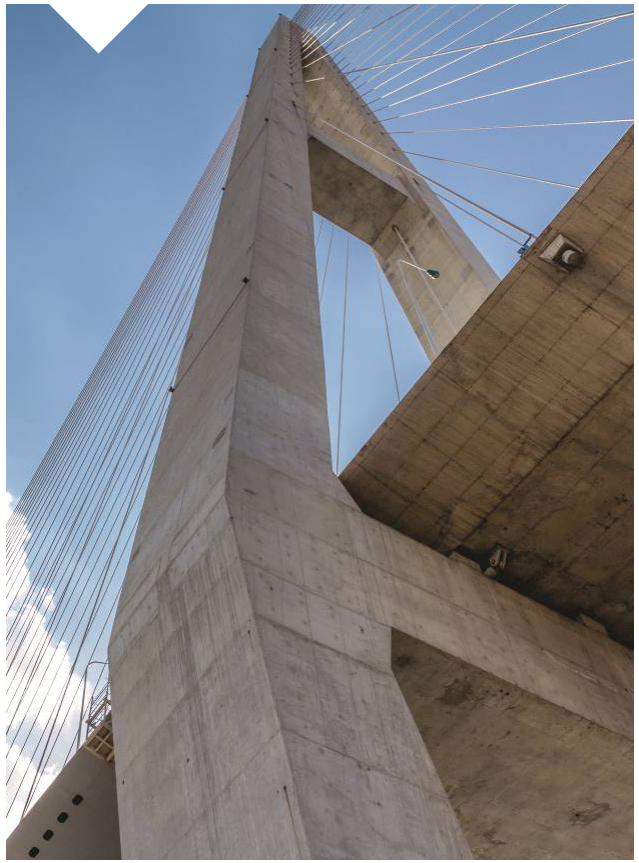
CONCRETE

The European Concrete Platform (ECP) is a European Association which gathers together European branch associations representing the concrete industry and its constituents. The aim of the ECP is to study and promote all aspects of concrete as the material of choice for sustainable construction. In this regard, the ECP covers a wide range of topics, ranging from thermal mass and energy efficiency to Eurocodes and fire safety.



Applications

The following list includes key facts about concrete:

- 70% of the world's population live in concrete structures
- The value of concrete production in Europe is €74 billion
- The energy consumption of conventional buildings is typically 150-200kWh/m^2/year – Existing concrete technology enables buildings that use 50kWh/m^2/year
- The concrete used in the Channel Tunnel is contractually guaranteed to last for 120 years
- Every Km of concrete road can reduce the CO^2 emissions of vehicles by 1000-4000 tonnes over a 30 year period

The concrete initiative - Key facts

Statistics

The situation of construction and demolition (C&D) waste, in particular concrete, in Europe can be summarised in the following points.

- According to the Eurpeam Commission, construction & demolition waste accounts for a third of the EU's total waste production per year, amounting to some 450-500 million tonnes, with concrete accounting for at least one third of this waste
- Concrete can be 100% recycled after demolition. Recycled aggregates from demolition concrete are traditionally used in unbound applications such as for road base, & they are also used as aggregates for new concrete.
- If all concrete C&D waste in Europe were recycled, this could supply 10% of the total demand for aggregates for all applications. This means that there is still a need for virgin aggregates.
- If all concrete C&D waste were recycled to supply aggregates just for use in new concrete, this would fulfil 32% of the total demand

European Concrete Platform

Overall summary

The most sustainable waste is that which you don't create. Recycling is usually considered as the solution to waste; however, following the principles of the Waste Hierarchy, "prevention" and "minimisation" of waste are the first choices.

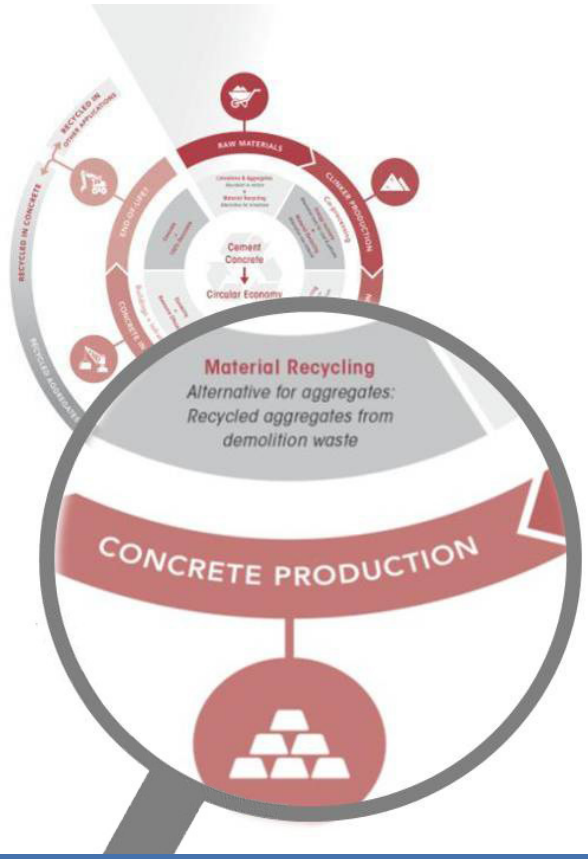
The concrete sector applies the principles of the waste hierarchy throughout its value chain: It is manufactured using natural materials which are generally abundant and locally available. It can be recycled 100% at the end of its life.

Recycling can be both closed-loop (re-use in the same application) and open-loop (re-use in another application). Both open-loop and closed-loop recycling have benefits in terms of resource efficiency: one is not necessarily better than the other as they both prevent the extraction of virgin raw materials.

Best practices

In concrete production, part of the clinker/ cement can be substituted with by-products from other industries. One example is fly ash from coal combustion.

Not only is concrete a durable construction material, it is also 100% recyclable. At the end of its life, concrete can be recycled either back into concrete as a recycled aggregate or into other applications (as a road base, for example)



The European Concrete Platform firmly believes that policies relating to resource efficiency and C&D waste should:

— Assess the impact of C&D waste from a whole life cycle perspective from the social, economic and environmental points of view

— Prioritise the collection and treatment of C&D waste by material importance (i.e. whether it is a scarce and/or a hazardous resource), rather than by mass

— Assess resource efficiency taking into account indicators of both quantity and scarcity, such as the indicator developed by the University of Dundee.

GYPSUM

Eurogypsum is the European federation of national associations of gypsum products manufacturers. The European gypsum industry operates 160 quarries and some 200 factories (plaster, gypsum block, fibreboard, and plasterboard plants), which directly employs 28.000 people and creates products for more than 850.000 users.

Until mid-1980s most of the gypsum used in the European Union was natural gypsum extracted from quarries. Since then, FGD gypsum (Flue Gas Desulphurisation gypsum, a by-product from the coal fired power plants) became an important supply for the Gypsum Industry. This raw material is also known as synthetic gypsum and it is largely used in Belgium, Germany, the Netherlands and Nordic and Eastern European Countries. Gypsum can be recycled because the chemical composition can be kept

Applications

Gypsum is an abundant mineral rock commonly found in the earth crust and quarried worldwide. It is used mainly in the manufacturing of non-load-bearing building elements such as partition walls and ceiling systems.

There are two possibilities to recycle gypsum-based waste:

- Closed loop recycling into new gypsum products. Closed loop recycling should be the end goal of the recycling industry in order to save primary raw material, maximize the usefulness of virgin materials, and minimize landfilling.
- Open loop recycling: using the recycled gypsum as a material in other products and applications. For example as a soil amendment for agricultural purposes, or as a retarder for cement.

Gypsum waste can be disposed off in landfills for non-inert non-hazardous waste according to the European Landfill Directive. If organic waste is co-disposed separate cells for gypsum waste are recommended.

Residential	New	23%
	Renovation	36%
Non residential	New	22%
	Renovation	19%

Eurogypsum

Statistics

The actual total volume of gypsum-based waste in the EU is estimated at more than 1,5 million tonnes. Two thirds of this volume is installation off-cuts from new construction sites, whereas the other third comes from demolition or deconstruction waste.

Today, plasterboards in general typically have a recycled content of more than 20%.

Overall summary

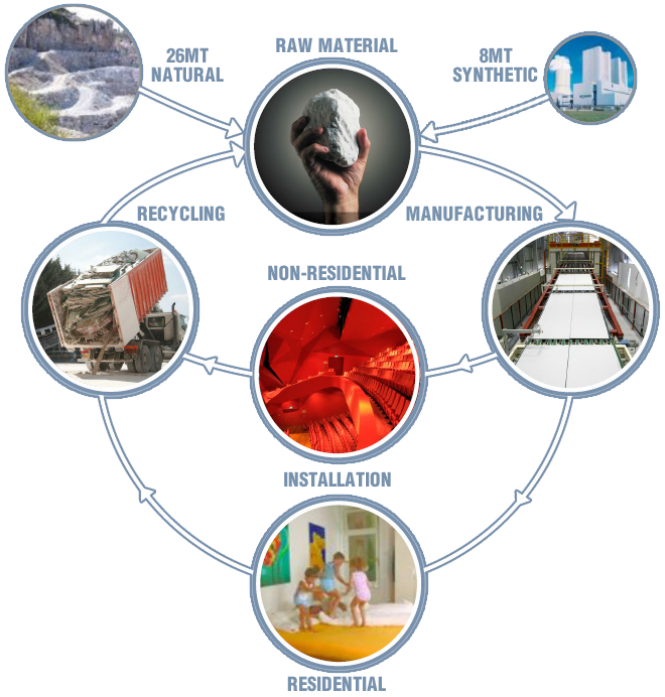
Gypsum products such as plasterboards and plaster blocks are some of the few construction materials where "closed-loop" recycling is possible. Gypsum as such is 100% and eternally recyclable thanks to its chemical composition. Closed loop recycling for gypsum will however only happen if:

- Best deconstruction techniques are applied systematically to the project. Demolition leads to insufficient purity of gypsum waste to be recycled;
- Sorting of waste is done, preferably at the source, since avoiding contamination is key;
- Upstream and downstream processing is carried out according to clear standards;
- Process in manufacturing focusses on the increase of the recycled content.

Best practices

The European Gypsum Industry has taken concrete steps to increase the recycling of construction and demolition waste through the Life+ co-financed GtoG-project: "From Gypsum to Gypsum: the path towards a circular Economy for the European Gypsum Industry with the demolition and recycling sector".

The project innovation lies in considering the supply chain (demolishers, recyclers, manufacturers) to create a recycling and resource efficient economy. Indeed, the aim of the project is to close the loop effectively and transform the plasterboard waste market to achieve higher recycling rates.



The main policy of the Gypsum Industry is to prevent waste and thus save resources. Eurogypsum also supports the vision of the EC to move away from today's linear "take-produce-dispose" resource consumption patterns towards a circular economy aiming at the reuse, recovery and recycling of waste and the minimization of landfilling. But the following steps need to be taken for the circular economy to be viable and finally succeed:

1. Recycling requires collaboration between operators throughout the value chain;
2. Ensuring a reliable supply of high-quality recycled material for manufacturers is key;
3. Deconstruction should become main stream and facilitated by practices in building design;
4. There is a need for detailed and reliable statistics on materials available in "urban mines";
5. There is a need to develop the gypsum recycling market.

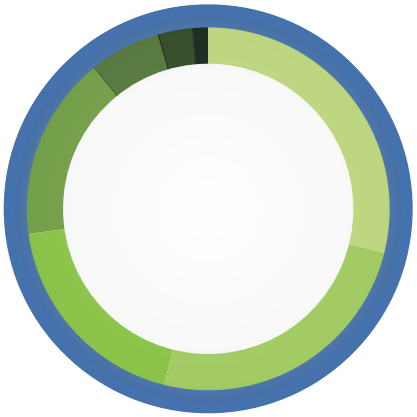
PLASTICS

PlasticsEurope is one of the leading European trade associations with centres in Brussels, Frankfurt, London, Madrid, Milan and Paris. We are networking with European and national plastics associations and have more than 100 member companies, producing over 90% of all polymers across the EU28 member states plus Norway, Switzerland and Turkey

Applications

Application	Market/year
Pipes and ducts (essentially PVC and polyolefins)	2.3 Mt
Thermal insulation products (essentially PS and PU)	2 Mt
Profiles (essentially PVC)	1.5 Mt
Insulation and sheathing of electrical cables (essentially PE and PVC)	1.3 Mt
Resilient flooring products (essentially PVC)	0.5 Mt
Linings and waterproofing (various polymers)	0.2 – 0.3 Mt
Wall paper, coated fabrics (awnings)	0.1 Mt

PLASTICS EUROPE



Demand for plastics raw materials used to produce construction products was 9.4 million tonnes in 2013. The production of plastic for buildings and construction products in the EU was therefore around 10 million tonnes in 2013.

Statistics

Consultants estimated that in 2013 about 1400 kt of plastic waste from buildings and construction applications was available for recovery. PVC is the largest component (about 45 %), followed by polystyrene and polyurethane. About 770 kt is estimated to be recycled (280 kt, almost exclusively PVC) or incinerated with energy recovery. The remainder is landfilled.

Using waste as a resource is one key element to becoming more resource efficient. PlasticsEurope considers that landfilling of recyclable and other recoverable post-consumer waste should be stopped by 2025. Using plastics, which cannot be recycled sustainably, as a secondary source of energy, thereby saving fossil fuels, expands the diversity of the EU's energy supply, improves energy security, and helps mitigate climate change. Using such waste as a resource should have a role to play in the EU's energy and resource efficiency strategies.

Product	Waste/year	End of life
Pipes and ducts	300 kt	PVC pipes are mechanically recycled. Polyolefin pipes are mechanically recycled or incinerated with energy recovery
Thermal insulation	300 kt	mainly incinerated with energy recovery
Profiles	250 kt	mechanically recycled
PVC Electrical cables insulation and sheathing	At least 100 kt	mechanically recycled
Electrical cables insulation and sheathing	unknown	landfilling
Polyolefin cables insulation and sheathing	unknown	energy recovery and landfilling
Flooring	At least 200 kt	Some (PVC) flooring is mechanically recycled, but most is incinerated with energy recovery or landfilled
Linings	About 120 kt	Some is mechanically recycled (PVC), remainder incinerated with energy recovery or landfilled

Consultic Marketing und Industrieberatung GmbH, Alzenau (Germany)

In order to further increase the potential for plastic recycling, innovation in recycling technologies is needed. One goal amongst others is to make feedstock recycling viable for plastics, turning them back into their basic chemical building blocks through gasification, pyrolysis or depolymerisation processes

When considering how to make a product more in line with resource efficiency aspirations, the impact over the whole life cycle of the said product should be taken into account in order to have a true understanding of the actual impact on the environment. It would be counterproductive to focus on improving one impact point, e.g. the end-of-life, if doing so were detrimental to the benefits a product offers during the use phase, and if this combination were to result in the product being less environmentally friendly when considering its whole life cycle.