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# Eurogypsum's Views and Recommendations on the Development of a Circular Economy and Resource Efficiency in the Building Sector

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## Summary

- The European Gypsum Industry is one of the frontrunners in the construction sector, striving for a circular economy for gypsum products;
- Current-day practices and pilot projects show that achieving this circular economy requires multi-stakeholder engagement, and a change of mind set on the supply side as well as the demand side.
- For the gypsum industry, we believe there is an opportunity to create a waste hierarchy system where recycling and recovery of gypsum are optimized, and landfilling is minimized.
- *Opportunities for optimising the use of construction products in buildings should focus on:*
  - Life Cycle thinking in building design, for which reduced environmental impacts should be illustrated using Environmental Product Declarations, based on European standardized LCA methodologies;
  - Holistic approach in building design, which should be supported by tools;
- The promotion of deconstruction to ensure that construction products are recycled at the end of life of the building whenever feasible.

## The European Gypsum Industry is willing to contribute to closing the loop in the Construction Sector

The European construction sector is responsible for 40% of EU's final energy consumption, 50% of all extracted materials, 30% of water consumption, and 33% of generated waste. Consequently, it stands as a key contributor to the general resource efficient objectives of the EU.

From an environmental point of view, reducing waste at the source (i.e. at the design stage) is obviously the preference. The main policy of the Gypsum Industry is therefore to prevent waste and thus save resources. This is in line with the Waste Hierarchy of the Waste Framework Directive (article 4).

However, Eurogypsum, the European Plaster and Plasterboard industry, also supports the vision of the Commission 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.

Gypsum is indefinitely recyclable. Gypsum based products and solutions are:

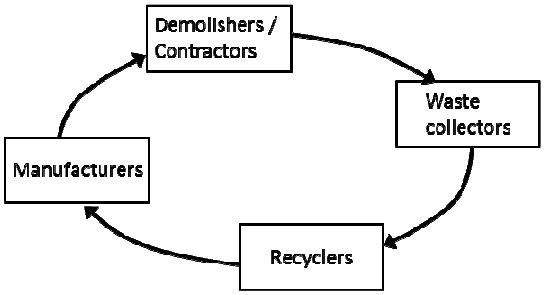
- contributing to thermal insulation if combined with insulation materials;
- fire protective;
- impact resistant;
- sound insulator;
- easy to install and dismantle;
- reducing waste as they may have bespoke dimensions;
- improving health & safety on the jobsite.

The circular economy does make sense for the European Gypsum Industry. As a matter of fact, the European Gypsum Industry has already 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" - http://gypsumtogypsum.org/.

## Challenges for a viable Circular Economy

### 1. Recycling requires collaboration between operators throughout the value chain

"Closing the loop" cannot be limited to a single operator responsibility. Construction and demolition companies, waste collectors, recyclers and manufacturers have to collaborate intensively in order to achieve this goal. The value chain should be market driven. Achieving a sustainable value chain does not happen overnight.




### 2. Ensuring a reliable supply of high-quality recycled material for manufacturers is key

To effectively close the loop, the recyclers need a constant flow of plasterboard waste that can be recycled into a volume of recycled gypsum, which meets the demands of the manufacturers. Quality variances in this material have to be limited in order to avoid that the manufacturing process has to be constantly adjusted.

- Today, only very small volumes of plasterboard waste are collected for recycling on construction, demolition or deconstruction sites;
- Today, incorporation of recycled gypsum from production waste, sometimes mixed with construction and demolition waste, is business-as-usual for most of the plasterboard manufacturers; however, rates of reincorporation vary depending on the type of product manufactured;
- Specifications for recycled gypsum are agreed between manufacturers and recyclers on a case-by-case basis. Technical and chemical parameters affecting the quality of the recycled gypsum should be reassessed in view of higher future reincorporation rates (deliverable of the GtoG project). Quality management systems (ISO standard 9000 series for example) are not yet widespread in the recycling value chain, but could contribute to higher quality standards in sector.

### 3. Deconstruction should become main stream and facilitated by practices in building design

In order to promote recycling, recyclable material needs to be collected separately as early as possible in the value chain, preferably on the construction or deconstruction site. Mixed waste involves cross-contamination impacting the technical and chemicals parameters of the recycled gypsum, thus jeopardizing the recyclability of waste or the use of the recycled gypsum as raw material. If buildings are crushed (demolished) rather than being deconstructed, plasterboard waste is not separated at the source and ends up in a landfill.

- Today, demolition is common practices in the EU Member States rather than deconstruction. The development of a successful circular economy will also imply an evolution towards widespread (or even mandatory) deconstruction (dismantling) practices. Furthermore, mandatory audits of the buildings, prior to demolition, can

help assess what is recyclable and recoverable in the building and in which amount. Recording of these audits and penalties in case of non-compliance appear necessary for an effective implementation.

- Today, when calculating the cost of demolition versus deconstruction, it is clear that the recycling route is economically feasible and favored by demolishers only if
  - the material has a high commodity value (e.g. metals);
  - the overall landfill costs are higher than the demolition cost and recycling gate fee.
- Future deconstruction costs can be minimized by applying certain building design principles (see annex I). So-called "design for disassembly" can be applied at different scales in a building, and should be promoted in sustainable construction practices.

**4. There is a need for detailed and reliable statistics on materials available in "the urban mine"**

The volume of plasterboard waste stemming from renovation activities is unknown but could offer potential. Current-day statistics on plasterboard waste generation are inexistent or too approximate due to the lack of data. Eurogypsum is convinced that renovation will be of great importance for the creation of a sustainable built environment. Building materials -like plasterboard- which are until now stored into building structures, will be released from this "urban mine" in the coming decades. In order to develop a business case for the circular economy of the future, reliable estimates regarding construction and demolition waste generation are necessary (Eurostat).

**5. Today's recycling market is underdeveloped**

The recycling market is far from being perfect, for several reasons:

- Lack of financial interest for main actors: Clients' lack of visibility on waste management, especially on construction projects (no dedicated contractor). Lack of financial interest for construction / demolition companies.
- Transaction costs in secondary material markets: Arises from the diffuse and irregular nature of waste generation. May also arise from the heterogeneous nature of secondary materials.
- Information failures related to waste quality: Arises from producer with a quality of the recycled gypsum less than the required by internal specifications.
- Consumption externalities and risk aversion: Perceived production costs associated with the quality of the final products derived from secondary materials. Discontinuity in the volume of raw material received and discontinuity in the quality of the recycled material received
- Technological externalities related to products: Innovations costs of the recycling technologies to process currently non-recyclable gypsum waste.
- Market power in primary and secondary markets: Substitution between primary and recyclable materials may be restricted due to imperfect competition and strategic behavior on the part of the firms.

For the Deconstruction side, we face in summary the following picture:

- Existing buildings have not been designed for dismantling;
- Building components have not been designed for disassembly;
- Disposal costs for demolition waste are frequently low;
- Dismantling of buildings requires additional time;
- Deconstruction workers should be better trained;
- Building codes often do not address the reuse of building components; and
- The economic and environmental benefits are not well-established.

Eurogypsum here also wants to point out that the inclusion of reuse does not make sense for Gypsum Products. Gypsum Products are strictly regulated by the Construction Product Regulation (CPR) with essential requirements and standardized product characteristics. At the moment it is not possible for the entity involved in dismantling to take over the responsibilities regarding CE marking and testing in the same way like a construction material producer to keep the product in the market for the purpose of reuse and under full legal compliance.

## The European Gypsum Industry Views and Recommendations on the Environmental Performance of Buildings in view of closing the Loop

The Gypsum Industry is a global industry but produces and consumes locally. Its activities cover the whole value chain (from the extraction of gypsum to the recycling of products). Therefore, the Gypsum Industry is a good example of a holistic industrial approach for clean and smart manufacturing of construction products and building solutions.

Based on our practical knowledge and experience of industrial symbiosis, the following principles should be taken into account for effective EU wide policies on resource efficiency in view of the future Circular Economy:

**Construction Products Supply side**:

Strengthen in practice the life cycle thinking when shaping new policies. Indeed, when thinking of environmental impact reduction, the whole value chain of a product should be duly and effectively considered.

1. **LCA and EPDs = basis for clear and harmonized communication**
   Consider that environmental impact assessment for a construction product should be based on LCA (Life Cycle Assessment) data (from cradle to grave). For construction products, LCA methodologies have already largely been harmonized on the EU level, and a communication format has been established: the Environmental Product Declaration. Communication on the environmental profile of construction products should therefore be based on this EPD, following the European standard EN 15804 (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products). This standardised approach should avoid non-transparent information and erroneous conclusions.

2. **Core Indicators**
   The development of core indicators foreseen in the Communication[1] to be commonly used on a voluntary basis by the builders should be done cautiously:
   - Core Indicators should preferably be based on, or in accordance to, existing Life Cycle Assessment methodologies, which have already been standardized by CEN;
   - Core Indicators should be part of a policy, clearly defining the agreed objective between the supply side and demand-side: what do we want to communicate? For which purpose? How do we want to communicate? Taking into account the views of the Demand-side (see below), which also needs to evolve, is essential.

3. **Recycling and minimisation of landfill**
   Objectives related to recycling and landfilling should be considered with caution and should be linked to a feasible pathway for the value chain to adopt. It should be acknowledged that today's recycling market is not perfect, and will need some time to develop. More in particular, terms like recyclable C&D waste, backfilling, recovery, recycled C&D waste, recyclable gypsum waste, recycled gypsum, recycled content,

[1] Communication on resources efficiency opportunities in the building sector (COM) 2014445 final, page 6 and 7

demolition, deconstruction, selective demolition, renovation should be clearly and legally defined before a regulatory decision is taken banning any type of landfilling.

**Construction Products Demand-side**:

Consumption patterns need to change fundamentally and thus also the construction methods and practices.

1. **Promote the Life Cycle View on Sustainable Construction**
   The shift of the construction industry towards a path parallel to the overarching sustainable development movement is what we call sustainable construction. Also this effort addresses the entire life cycle of buildings: their planning, design, construction, operation, modifications, renovation, retrofitting, and end-of-life waste management.

   According to the Conseil International du bâtiment, sustainable construction could be defined as: "the creation and operation of a healthy built environment based on resource efficiency and ecological principles".

   Again, the principles of Sustainable Construction result from a holistic approach, and include:
   - reduce, reuse, and recycle resources;
   - protect nature in all activities;
   - eliminate toxic substances from construction;
   - apply life cycle economics (life cycle costs) in decision making;
   - and create a quality built environment (aesthetics, durability, maintainability, to name a few quality aspects).

   For each life cycle stage, a sustainable *modus operandi* will have to be developed. Some examples are already emerging today:

| Life Cycle stage | Conventional Built | Sustainable construction |
|---|---|---|
| Planning | Urban Design | New urbanism<br>Biourbanism |
| Design | Conventional architecture<br>Conventional Interior Design<br>Conventional engineering | Eco-design |
| Construction | Building construction | "green" building construction |
| Operation | Facilities Management | "Green" Facilities Management |
| Renovation/retrofit | Conventional design | Eco-design |
| Disposal | Demolition | Deconstruction |

2. **Develop tools for design calculation and simulation**
   LCA data at the product level are necessary as a basis, but in order to be meaningful, sustainability as such should be assessed at the building level. It should be considered that a holistic approach requires good tools for design calculation and simulation, allowing decision makers in the design phase to optimise the factors that affect building sustainability. The Gypsum Industry therefore welcomes the emergence of tools such as software for the assessment of building environmental performance or Building Information Modelling (BIM).

# ANNEX I-Gypsum Waste Hierarchy Model