6th European Gypsum Recyclers Forum
The latest figures on gypsum recycling in Europe

Xavier Meyer
EUROGYPSUM
2022 annual survey

Gypsum Volumes Processed in Europe
by the Plaster and Plasterboard Industry
2022

Processed raw materials

Virgin gypsum rock
16,903,176 tonnes

DSG/FGD gypsum*
6,530,255 tonnes

Recovered gypsum
(total volumes)
1,349,518 tonnes

Recycled gypsum from construction & demolition waste**
749,695 tonnes

Internally recovered material***
599,823 tonnes

*DSG/FGD gypsum: desulphogypsum / gypsum from flue gas desulphurisation of coal power plants
**Gypsum recycled from the construction, renovation or demolition phase, which is used by the gypsum industry
***Gypsum material which has been recovered internally during the production phase
2022 annual survey

Primary & secondary raw material gypsum
used by the European plaster and plasterboard industry

- Virgin gypsum rock: 68%
- DSG / FGD gypsum*: 2%
- Internally recovered material: 3%
- Recycled gypsum from CDW**: 26%
2022 annual survey

**Comments**

- Increasing trend of natural gypsum rock
- DSG decline set to accelerate in coming years
2022 annual survey

Kt of C/D gypsum waste recycled in the plasterboard industry

General comments

➔ Continuous progress over the last 4 years
➔ Still significant opportunities of progress
➔ Strong discrepancies between European MS, Nordic countries leading the way
Regulatory trends in the EU Member States

• **Extended Producer Responsibility** (French scheme “REP bâtiments” starting 2023 – waste collection & treatment schemes to be set up & funded by product manufacturers)

• **Landfill bans** (Austria 2026)

• **Green Public Procurement** (e.g. Italy’s Minimum Environmental Criteria (Criteri Ambientali Minimi) – min. 5% recycled content in public building construction/renovation

• **Waste Framework Directive**: By 31 December 2024, the Commission shall consider the setting of preparing for re-use and recycling targets for C&D waste and its material-specific Fractions (WFD)
Views from practitioners: Ambitions and challenges in gypsum recycling
Views from practitioners: Ambitions and challenges in gypsum recycling

Fernando Pardo
Saint-Gobain

Harald Schmitt
Knauf

Iryna Yermakova
Etex Group

Nicolas Clavelloux
SERFIM/Nantet

Ilaria Frealdo
Frealdo Asfalti srl

Maarten Hendriks
New West Gypsum

David Jörgens
REMONDIS/CASEA

Moderation: Annita Papa, Eurogypsum
Coffee Break

We will resume at 15:05
The latest on gypsum recycling in Europe
EU Regulatory Framework

Sustainable finance taxonomy, initiatives on construction and demolition waste

*Florian Flachenecker, European Commission DG Environment*
EU initiatives on construction & demolition waste and gypsum
Policy context
Circular Economy Action Plan

- Construction & buildings considered a key value chain due to circular and environmental potential
  - ~50% of all extracted materials
  - ~40% of the EU’s total waste generation
  - 5-12% of national GHG emissions, of which 80% could be saved through material efficiency

- Key initiatives
  - Considering setting preparing for re-use and recycling targets for CDW and its material-specific fractions
  - Integrate life cycle assessment of Level(s) in public procurement and the EU Taxonomy
  - Revising the Construction Product Regulation
  - Promoting measures to improve the durability and adaptability of built assets in line with the circular economy principles for buildings design and developing digital logbooks for buildings
  - Promoting initiatives to reduce soil sealing, rehabilitate abandoned or contaminated brownfields and increase the safe, sustainable and circular use of excavated soils
Waste Framework Directive

• Waste prevention: Requires Member States to “encourage the re-use of products and the setting up of systems promoting repair and re-use activities” and “reduce waste generation”

• Preparing for re-use & recycling: “Member States shall take measures to promote selective demolition […], and to ensure the establishment of sorting systems for construction and demolition waste at least for wood, mineral fractions (concrete, bricks, tiles and ceramics, stones), metal, glass, plastic and plaster”

• 2020 target: At least 70% by weight of non-hazardous construction & demolition waste (CDW) is prepared for re-use, recycling and other material recovery, including backfilling operations

Upcoming and ongoing initiatives on CDW

• Review clause – Article 11(6) WFD: “The Commission shall consider the setting of preparing for re-use and recycling targets for CDW and its material-specific fractions”
  • JRC report I: Overview of current situation by Member State and subset of material fractions (covering data gaps), 2050 projections, existing waste management technologies, life cycle analysis and costing (https://data.europa.eu/doi/10.2760/772724)
  • JRC report II: Forthcoming JRC work on remaining material fractions, but not on proposing targets

• Ongoing background analysis on EU-wide end-of-waste criteria for CDW

• Ongoing update of guidance documents: EU Construction & Demolition Waste Management Protocol and Guidelines for the waste audits before demolition and renovation works of buildings
Around 1.4% of CDW is gypsum waste, of which ~10% is recycled and ~90% landfilled.

Following conventional demolition, gypsum is generally landfilled, but plasterboards could be recycled into new plasterboards (up to 30% recycled content considered technically feasible), or used in cement production or as a soil improver (open loop).

Selective demolition facilitates recycling to produce new plasterboard, but is labour-intensive and limited due to economic barriers including the relatively low market value of the secondary material.

The (preparing for) re-use potential of gypsum is currently very limited.
Life cycle analysis & costing | gypsum

LCA climate impacts

Notes: REC-GYP: recycling of gypsum; LAN: landfilling
Source: JRC (forthcoming). Techno-economic and environmental assessment of construction and demolition waste management in the EU
EU Taxonomy
Logic and objectives

- **Make a substantial contribution** to at least one of the six environmental objectives

- **Do no significant harm** to any of the other environmental objectives

- **Meet minimum safeguards** comply with international minimum safeguards
## Defining environmental sustainability

<table>
<thead>
<tr>
<th>What it is</th>
<th>A classification system</th>
<th>A measurement tool</th>
<th>A transition tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides clarity on what is an environmentally sustainable activity and under which circumstances.</td>
<td>Measures the degree of sustainability of an investment and the degree of green activities of companies.</td>
<td>Helps investors and companies to plan and report on the transition. It sets the objectives and the direction of travel for different economic activities.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What it is not</th>
<th>Not a mandatory list to invest in</th>
<th>Not a rating of the ‘greenness’ of companies</th>
<th>It does not make any judgement on the financial performance of an investment</th>
<th>What’s not green is not necessarily brown</th>
</tr>
</thead>
</table>

Ultimately, it helps raise the needed investments to build a net zero, resilient and environmentally sustainable economy.
70% of non-hazardous CDW prepared for re-use or recycled

1. Treating CDW in accordance with waste legislation and the full checklist of the EU CDW Management Protocol

2. Excludes backfilling and naturally occurring materials in category 17 05 04

3. Reporting using Level(s) indicator 2.2 and Level 2 reporting format
Selected criteria | renovation of buildings

The waste hierarchy favours prevention (e.g. re-use), preparing for re-use and recycling.

Focus on primary raw materials raises awareness and incentivises re-use, preparing for re-use and recycling.

**Waste hierarchy**

- **PREVENTION**
- **PREPARING FOR RE-USE**
- **RECYCLING**
- **RECOVERY**
- **DISPOSAL**

**GOAL**

- **Primary raw materials**
- **Secondary raw materials**
- **Re-used products**
Selected criteria | renovation of buildings

<table>
<thead>
<tr>
<th>Material categories</th>
<th>Maximum primary raw materials content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete, natural or agglomerated stone</td>
<td>85%</td>
</tr>
<tr>
<td>Brick, tile, ceramic</td>
<td>85%</td>
</tr>
<tr>
<td>Bio-based materials</td>
<td>90%</td>
</tr>
<tr>
<td>Glass, mineral insulation</td>
<td>85%</td>
</tr>
<tr>
<td>Non-biobased plastic</td>
<td>75%</td>
</tr>
<tr>
<td>Metals</td>
<td>65%</td>
</tr>
<tr>
<td>Gypsum</td>
<td>83%</td>
</tr>
</tbody>
</table>

Thresholds are lower for the construction of new buildings, i.e. fewer primary raw materials are allowed.

Source: European Environment Agency (2022), Modelling the Renovation of Buildings in Europe from a Circular Economy and Climate Perspective
Extended producer responsibility: The French example

Rami Jabbour, Valobat
Eurogypsum’s Quality Criteria for Recycled Gypsum. Towards End of Waste Status?

Xavier Meyer
EUROGYPSUM
Why an EoW status?

• Stop regulating the material as a waste
• Reduce administrative burden (transport, business license to store and handle the material, etc.)
• Change the image of the material from a waste to a valuable resource
• Accelerate circular practices

Purpose of the Quality Parameters

Recommended by Eurogypsum as to ensure the end-of-waste status to reprocessed gypsum from waste plasterboard and other plaster products in order for it to be processed into new plasterboard or other gypsum-based products.

The document provides a specification that can be adopted by reprocessors for producing defined grades of reprocessed gypsum, to ensure they are procuring a material of consistent and verifiable quality.
Health, Safety and Environmental parameters

Determined on the basis of a comprehensive human health assessment carried out within the framework of the EU chemicals legislation REACH, and the good practices collected using the “Specification for the production of reprocessed gypsum from waste plasterboard” in the United Kingdom.

Assessment methods and minimum sampling are fixed in individual contracts signed with recyclers.

<table>
<thead>
<tr>
<th>HSE* Parameter</th>
<th>Quality Criteria</th>
<th>Method used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace elements</td>
<td>Non-toxic</td>
<td>According to national legal requirements or by internal assessment</td>
</tr>
<tr>
<td>Radioactivity Index I</td>
<td>&lt; 0,5</td>
<td>- Directive 2013/59/Euratom</td>
</tr>
<tr>
<td>Asbestos</td>
<td>None</td>
<td>ISO method (ISO 22262-2 (2014)) and/or adequate national method required</td>
</tr>
<tr>
<td>Sulphur (primary)</td>
<td>Odourless/neutral</td>
<td>VGB, part 1, 8.9</td>
</tr>
<tr>
<td>Man Made Mineral Fibres (WHO dimension, excluding gypsum fibres)</td>
<td>0.1 w/w %</td>
<td>ISO method (ISO 22262-2 (2014)) and/or adequate national method required</td>
</tr>
</tbody>
</table>
Each company or production site remains free to set up different quality requirements in light of the necessities of their respective production processes.

1This value is purely indicative, as strong differences can be encountered in natural gypsum depending on the local gypsum rock purity, contrary to the level of purity achievable via flue gas desulphurisation.

ITALY:
Assogesso suggesting alternative parameters to Italian Ministry for the Environment’s law proposal (purity ≥70%)

<table>
<thead>
<tr>
<th>Technical Parameter</th>
<th>Expressed as</th>
<th>Quality Criteria</th>
<th>Method used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size</td>
<td>≤ 50 mm</td>
<td>VGB, part 2, A7</td>
<td></td>
</tr>
<tr>
<td>Free moisture</td>
<td>≤ 10 %</td>
<td>VGB, part 1, chapter 1</td>
<td></td>
</tr>
<tr>
<td>Purity of gypsum¹</td>
<td>CaSO₄· 2 H₂O</td>
<td>≥ 80%</td>
<td>VGB, part 1, chapter 2</td>
</tr>
<tr>
<td>Total organic content (TOC)</td>
<td>≤ 2.0 %</td>
<td>VGB, part 1, chapter 8.10 / EN 15936:2022</td>
<td></td>
</tr>
<tr>
<td>Magnesium salts, water soluble</td>
<td>MgO</td>
<td>&lt; 0.1 %</td>
<td>VGB, part 1, chapter 8.1</td>
</tr>
<tr>
<td>Sodium salts, water soluble</td>
<td>Na₂O</td>
<td>&lt; 0.04 %</td>
<td>VGB, part 1, chapter 8.2</td>
</tr>
<tr>
<td>Potassium salts, water soluble</td>
<td>K₂O</td>
<td>&lt; 0.06 %</td>
<td>VGB, part 1, chapter 8.3</td>
</tr>
<tr>
<td>Chloride</td>
<td>Cl</td>
<td>&lt; 0.01 %</td>
<td>VGB, part 1, chapter 8.8</td>
</tr>
<tr>
<td>pH</td>
<td>5 – 9</td>
<td>DIN EN ISO 787-9: 2019-06</td>
<td></td>
</tr>
<tr>
<td>Visible physical contaminants: Total glass, metal, plastic and any other non-stone fragments (excluding paper)</td>
<td>None</td>
<td>BSI, Annex E</td>
<td></td>
</tr>
</tbody>
</table>
Ongoing developments in EU Member States

**AT:**
- Ministry working on the EoW quality criteria (publication expected for 12/2023)
- Anyone who wants to buy gypsum waste will be able to, but only the gypsum industry would receive the EOW status for the waste
- Asbestos detection limit 0.008%

**NL:**
- Since 2020, recycled gypsum considered as a product instead of a waste when used for agriculture (fertiliser)!

**IT:**
- Ministry working on the EoW quality criteria, use of the Eurogypsum proposed Quality Criteria.
- Control every 200t of recycled gypsum processed (reprocessing companies). All criteria should be respected to maintain the license to operate

**DK:**
- Danish Environmental Protection Agency statement regarding hierarchy:
  1. Gypsum waste must primarily be reused.
  2. If not possible, the gypsum waste should be recycled, e.g. for the production of new gypsum boards or in cement production.
  3. If not possible, it can instead be handled by someone else recovery, e.g. in compost.
  4. In relation to use in compost, this must be done in accordance with a specific section 19 permit.
Reactions from the audience

Moderation:
Annita Papa
Eurogypsum
Outlook: Gypsum recycling in North America

Stephen Meima
Gypsum Association
Gypsum Association Member Companies

Regular Members

- American Gypsum
- CertainTeed Saint-Gobain Gypsum
- Georgia-Pacific Gypsum
- PABCO Gypsum
- National Gypsum
- USG CGC

Associate Member

- Cabot Gypsum Company
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Gypsum Association Focus Areas

• Technical information and assistance A/E/C value chain
• Standards development
• Building code activities
• Promotion: Industry, products, resources
• Education: Practical, continuing education credit
• Industry issues: Regulatory, legislative, market
• Safety & Health: Safety statistical program
• Government affairs
• Industry statistics
Gypsum Recycling in North America

• Status

• Challenges

• Opportunities
Gypsum Recycling – Panel discussion

• Share views on similarities and differences in gypsum recycling between Europe and North America.
• Discuss respective levels of support from local policy makers.
• Discuss potential for replication of each others’ initiatives in their respective markets.

Can Europe and North America advance together?
• If so, how?
• If not, why?
Debate: How can Europe and North America advance together?
Debate: How can Europe and North America advance together?

Maarten Hendriks, New West Gypsum

Jean-Luc Marchand, Eurogypsum

Stephen Meima, Gypsum Association

Tim Mulso, Beneficial Reuse Management

Moderation: Tristan Suffys, Eurogypsum
Closing words

Jörg Ertle
President, EUROGYPSUM