



GTOG: From production to recycling: a circular economy
for the European gypsum Industry with the demolition
and recycling Industry



GYPSUM TO GYPSUM

Networking Report

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GYPSUM TO GYPSUM



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GYPSUM TO GYPSUM



Content

I.	Background.....	7
➤	Gypsum – an exceptional construction material	7
➤	The context.....	7
➤	Main types of gypsum	8
➤	Reasons for recycling plasterboard products.....	8
➤	GtoG, closing the loop effectively	9
II.	The GtoG project structure	10
III.	The GtoG networking strategy	11
IV.	The GtoG seminars	12
V.	Direct contacts with European associations and related results	13
VI.	Direct contacts with other European projects on C&D waste	15
➤	LIFE projects	15
➤	FP7/HORIZON 2020 projects	16
VII.	Participation to other European Commission’s activities	24
➤	The European Innovation Partnership on Raw Materials	24
➤	The Construction and Demolition waste Protocol	24
VIII.	Participation to events, conferences, seminars and fairs	25
IX.	17 partners for covering an integrated supply chain	30
X.	LIFE Programme	31



GYPSUM TO GYPSUM



GYPSUM TO GYPSUM

THE PERFECT LOOP

THE PATH TO A CIRCULAR ECONOMY: A EUROPEAN COLLABORATIVE PROJECT BETWEEN THE RECYCLING INDUSTRY, THE DEMOLITION SECTOR AND THE GYPSUM INDUSTRY





GYPSUM TO GYPSUM



I. Background

➤ **Gypsum – an exceptional construction material**

Gypsum is a rock-like mineral used in construction through different applications, mainly plasterboards, building plaster and gypsum blocks.

The GtoG project focuses on lightweight gypsum components, also known as plasterboards, which mainly consist of gypsum cores covered with paper in their surfaces and longitudinal edges. These products are used for partitions, lining walls and ceilings. Other generic terms used for these products are gypsum boards, drywalls and wallboards.

Their main properties are:

- Easy to handle and install
- Recyclable
- Very good fire performance
- High levels of robustness against impact
- Easily combined with insulation materials providing good thermal and acoustic properties to the system

➤ **The context**

The construction sector represents an important constituent of the European economy. However, this sector generates one of the heaviest and most voluminous waste streams in the European Union, the so-called Construction and Demolition (C&D) waste. This waste arises from activities such as the construction of buildings and civil infrastructure, or their total or partial demolition including renovation activities and maintenance. It accounts for approximately 30% of all waste generated in the EU¹ and consists of numerous materials, including concrete, bricks, wood, glass, metals, plastic, solvents, asbestos as well as excavated soil and of course gypsum, many of which can be recycled.

Despite the fact that gypsum is 100% recyclable, there is currently a large proportion of gypsum waste being landfilled and backfilled, while recycling systems in Europe are mostly operating in Benelux, Denmark, Finland, France, Norway, Sweden and the United Kingdom.

As a C&D waste fraction, gypsum based waste can be differentiated into three categories depending on their origin:

- Production waste, meaning the waste resulting from the manufacturing process.
- Construction waste, the waste resulting from new buildings construction sites.

¹ BioIS: Management of construction and demolition waste in the EU - requirements resulting from the Waste Framework Directive and assessment of the situation in the medium term (draft final report, 2010). Note: for some Member States, only data for 2004 were available



GYPSUM TO GYPSUM



- Demolition waste, the waste arising when refurbishing or removing existing buildings, thus including both demolition and renovation waste.

The GtoG project focused on eight EU target countries (Belgium, France, Germany, Greece, Poland, Spain, the Netherlands and the UK); estimating that around 1,150,000 tons of plasterboard waste was generated in 2012. In most of these European countries, a low recycling rate of gypsum waste was observed.

The aim of the GtoG project was to produce plasterboard with up to 30% content of recycled gypsum coming from both production and C&D waste.

➤ **Main types of gypsum**

Gypsum is an abundant mineral rock from which plaster is made and is commonly found in quarries. The European gypsum industry comprises 160 quarries and about 200 factories (plaster powder plants, plaster block plants and plasterboard plants), which directly employs 28,000 people and creates products for more than 850,000 users.

Until mid1980s most of the gypsum used in the European Union was natural gypsum extracted from quarries. Since then, flue gas desulfurization (FGD) gypsum, a by-product from coal-fired power plants, has become an alternate and important supply for the gypsum industry. This raw material is also known as synthetic gypsum and largely used in Belgium, Germany, the Netherlands and Nordic countries.

The origin of the main types of gypsum is summarized in Table 1.

Resource	Origin
Natural gypsum	Formed geologically
FGD gypsum	By-product from desulphurization of gases in coal-fired power stations
Recycled gypsum	From processing of gypsum waste in accordance with particular specifications

Table 1, origin of the main types of gypsum

➤ **Reasons for recycling plasterboard products**

1. **Gypsum is fully and eternally recyclable.** Gypsum products can be recycled because their chemical composition remains unchanged. Gypsum's chemical composition is calcium sulphate dehydrate which exist in nature in a rock-like shape. When heated (calcined), calcium sulphate hemihydrate is created, a substance that can be shaped and hardened by adding water (new gypsum products are made), whereby the material is turned into the original and naturally occurring gypsum state again. Therefore, gypsum products can be counted amongst the very few construction materials where "closed-loop" recycling is possible, i.e. where the waste is used to make the same product again.



GYPSUM TO GYPSUM



2. Article 4 of the Directive 2008/98/EC on Waste (also known as the Waste Framework Directive, hereinafter WFD) drafts the **waste hierarchy** that should be applied as a priority in all EU Member States. Waste prevention leads this hierarchy, followed by preparing for re-use and material recycling that should always be preferred to recovery and landfill disposal.
3. Article 11 of the WFD establishes that, by 2020, **the preparing for re-use, recycling and other material recovery of most of the categories defined in the European List of Waste (ELW) shall be increased to a minimum of 70% in terms of weight**. This target applies to non-hazardous C&D waste (where gypsum waste is included) and excluding soil and stones other than those containing dangerous substances.
4. If gypsum waste products are accepted at normal cells in non-hazardous landfills with biodegradable waste, its sulphate would break down, amongst other substances into **Hydrogen Sulphide (H₂S), a hazardous flammable gas with environmental and health effects when inhaled**, that even in very small concentrations creates odour problems and is dangerous. Council Decision 2003/33/EC, therefore, established that *“Non-hazardous gypsum-based material should be disposed of only in landfills for non-hazardous waste in cells where no biodegradable waste is accepted. The limit values for TOC and DOC given in section 2.3.1 and 2.3.2 shall apply to wastes landfilled together with gypsum based materials”*. When the gypsum waste is separated from organic matter, the risk of formation of hydrogen sulphide is limited.
5. Recycling plasterboard waste avoids **primary mineral resource depletion**.

➤ **GtoG, closing the loop effectively**

Closed loop recycling involves a close collaboration among all the stakeholders throughout the entire value chain: from the dismantling and collection of plasterboard waste in buildings, via the recycling of this waste and culminating with the reincorporation of the recycled gypsum by the plasterboard manufacturing plants, in order to create a highly efficient reverse logistics.

The GtoG project will serve to boost the closed-loop recycling route whenever possible.

➤ **Deconstruction: dismantling of plasterboard on the demolition site**

Deconstruction enables the quantity and quality optimization of valuable materials, thereby increasing the potential for their future recycling. It results in different waste fractions with minimal damage, due to the time and care taken for separating the waste, in order to achieve the minimal negative effect of its generation.

➤ **The reprocessing of the recyclable plasterboard waste**

Once plasterboard waste from construction and demolition waste is separated on site, it can be collected by a third party and transported to a gypsum recycler for processing.



GYPSUM TO GYPSUM



➤ **The reincorporation of the recycled gypsum in the manufacturing process**

Once the plasterboard waste has been processed, the gypsum recycler provides the manufacturer with the recycled gypsum that will be reincorporated in the production process.

II. The GtoG project structure

The GtoG project has put in place an integrated approach to C&D waste by holistic management, starting from the major refurbishment/demolition sites to the reincorporation of the recycled gypsum in the manufacturing process via the processing of gypsum waste as a secondary raw material.

The project structure has been conceived to be simple and comprehensive at the same time. Indeed, the project has developed all its technical activities through three actions:

- **Action A** analyzed and evaluated the **current practices** in deconstruction/demolition, C&D waste characterization, processing the gypsum waste for the production of recycled gypsum and its reincorporation into the manufacturing process. This action represented a sort of introduction to GtoG, where a technical, economic, environmental and legislative analysis was carried out for the different stages of the value chain. This analysis has been performed by UPM (Universidad Politécnica de Madrid, Spain) with the collaboration of all the partners, who provided astute information about deconstruction, recycling and re-incorporation of recycled gypsum into the production process. The result has been an **Inventory of best practices**.
- **Action B**, the project implementation actions, where **five pilot projects** implementing the deconstruction techniques, the decontamination and the waste qualification, reprocessing and reincorporation in gypsum manufacturing plants have been carried out in **Belgium, France (2), Germany and UK**. This action has been developed through the following sub-actions:
 - **The 5 deconstruction projects.** Recovering, a French consulting company, led this action. This activity has been implemented by the five demolishers in the project (Recass for Belgium, KSE for Germany, Occamat and Pinault & Gapaix for France and Cantillon for the United Kingdom), who selected commercial buildings, where gypsum products and systems have been audited and deconstructed, using various techniques and practices.
 - **The 5 recycling projects.** Gypsum Recycling International A/S (GRI) led this action, and counted on the participation of the other recycler for the project, New West Gypsum Recycling (NWGR). In this sub-action, the plasterboard waste supplied by the deconstruction project have been processed and then transferred as recycled gypsum powder to the five manufacturer's plants to be re-incorporated in the production process.



GYPSUM TO GYPSUM



- **The 5 reincorporation projects.** The National Technical University of Athens (NTUA) led this action, and coordinated the five gypsum manufactures of the project (Saint Gobain Gyproc for Belgium, Placoplâtre and Siniat SA for France, Knauf Gips KG for Germany, and Siniat Ltd for the United Kingdom). Within the sub-action, the recycled powder supplied by the recyclers has been re-incorporated into the production process. The recycled gypsum powder used during the re-incorporation phase has also been tested by the laboratory LOEMCO (Fundación Gomez Pardo, Spain).
- **Action C**, which monitored the impact of the project actions. The end result has been a **report on best practice indicators**, the responsibility of the Polytechnic University of Madrid. In addition, other outcomes of this action have been the **carbon footprint of gypsum: landfilling versus landfilling route**, developed by UPM, and **the roadmap for implementing a gypsum sustainable value chain**, a document created by Eurogypsum, where an outline plan has been determined in order to achieve a more widespread implementation of gypsum C&D waste recycling.

III. The GtoG networking strategy

The GtoG networking strategy had been conceived by Eurogypsum, the project coordinator, and implemented by all the GtoG partners. It covered the knowledge, dissemination, training and educational activities aiming to maximize the technological and social impact of the project results. The main purpose of this strategy has been to ensure a fast and effective promotion of the results of the project towards all stakeholders in the value chain (demolition, recycling companies, gypsum product producers, architects, contractors and builders of large construction projects, public and private bodies, etc.).

Built on good practices that have been implemented and documented during the course of the project, this strategy intended at spreading the knowledge in order to improve C&D waste recycling in Europe, and therefore to significantly reduce the quantity of gypsum waste landfilled.

The dissemination of the project deliverables at national and European level aimed at raising awareness and demonstrating the effectiveness of the results in improving the value chain of lightweight C&D waste management via deconstruction/recycling instead of demolition/landfill. In addition, networking activities fostered exchange with other related organisations and projects and explored potentials for current and future synergies.

Information on the project has been disseminated throughout Europe among key target groups and on different levels, e.g. EU institutions, EU associations, energy agencies, centres of environmental expertise, educational institutions, etc. The project's results have also been disseminated via international trade fairs and scientific conferences.

The partners included several key international players in the lightweight C&D waste industry who have well established dissemination channels that have been made available for the needs of the project throughout the entire project's duration.



GYPSUM TO GYPSUM



This strategy is expected to have a significant impact on current European practices regarding deconstruction and recycling of waste originating from lightweight demolition and renovation. Indeed, the main goal of the dissemination strategy is to create the appropriate framework that will drive all involved stakeholders to adopt the practices developed in the frame of the project. A second objective of the dissemination strategy is to create appropriate material that will drive the municipal governances to create easy to access and cost-effective C&D waste facilities open to public disposal of lightweight construction cut-offs emanating from lightweight construction renovation. The last and third main goal is to prepare and disseminate material for actions that could improve recycling in the deconstruction field.

From a practical point of view, the networking strategy has implemented the following activities:

1. Organisation of the national GtoG seminars, implemented in cooperation with national Gypsum Association and/or GtoG partners where the GtoG project has been presented.
2. Establishment of personal contacts with European associations and stakeholders active in the fields of environmental and sustainable construction, waste management and circular economy.
3. Establishment of personal contacts with other projects on waste policies and management, including information exchange activities and the creation of an exhaustive mapping exercise of the main EU-funded projects in this field.
4. Direct participation to international events, fairs, conferences, seminars in the fields of environmental and sustainable construction, waste management and circular economy, including the presence and delivery of dissemination materials (like stand display, posters, video, brochures and leaflets).

The general milestone of all these activities have been the dissemination of the project as much as possible, by communicating about the GtoG project structure, methodology, aims and objectives. This meant in practice:

- Delivery of presentations of the GtoG project.
- Forwarding of the GtoG project dissemination materials.
- Any other collaboration not strictly linked to the dissemination of the GtoG project, like reports, sources and contacts exchange, delivery of questionnaires and surveys on waste management, understanding and learning from other possible best practices, looking for possible synergies and exploring possibility for further cooperation, etc.

IV. The GtoG seminars

The summary of all GtoG seminars is presented in the table below.

Country	Location	Organisation	Partners	Date
Belgium	Kallo	SG Gyproc and ABLG (Belgian Gypsum Association)	SG Gyproc, NWGR, Eurogypsum	15/10/2014



GYPSUM TO GYPSUM



France	Paris	SNIP (French Gypsum Association)	Siniat France, SG Placoplatre, Recovering, Occamat, Eurogypsum	23/06/2015
Germany	Berlin	BV Gips (German Gypsum Association)	Knauf, Eurogypsum	07/10/2014
Greece	Athens	NTUA	NTUA, Eurogypsum	14/05/2015
Spain	Madrid	ATEDY (Spanish Gypsum Association)	UPM, Loemco, Eurogypsum	17/04/2015
UK	London	GPDA (UK Gypsum Association)	Siniat UK, Cantillon, Eurogypsum	14/01/2014

Table 2: the GtoG seminars

V. Direct contacts with European associations and related results

All direct meetings held for presenting the GtoG project are listed in the table below.

Organisation	Contact person	Date	Result/Action
Architects Council of Europe (ACE)	Veronika Schropfer	3/11/2014	Questionnaire on recycled materials' usage sent to their members, collection of responses, invitation to present the GtoG project to one of their event (Wicked Workshop, Delft, Netherlands, 23/4/2015), and Eurogypsum invitation to be a speaker during the GtoG Final Conference
Association of cities and regions for recycling and sustainable resource use management (ACR+)	Françoise Bonnet	4/11/2014	Invitation to the ACR+ Working Group on Circular Economy, and Eurogypsum invitation to be a speaker during the GtoG Final Conference
Covenant Circular Economy 2022	Peter Koegler	12/2/2015	Information session and exchange of opinions
European Builders' Confederation (EBC)	Riccardo Viaggi		Information session and exchange of opinions
European DIY Association (EDRA)	Alisdair Gray	10/2/2015	Information session and exchange of opinions
European Environmental Bureau (EEB)	Piotr Barczak	30/10/2014	Invitation to present the GtoG project to their waste Working Group, and Eurogypsum invitation to be a speaker during the GtoG Final Conference



GYPSUM TO GYPSUM



European Panel Federation (EPF)	Kris Wijnendale	3/11/2014	Information session and exchange of opinions
European Quality Association for Recycling (EQAR)	Dirk Behling	8/5/2015	Information session and invitation to join their Congress
European Manufacturers of Expanded Polystyrene (EUMEPS)	Edmar Meuwissen	2/10/2014	Information session and exchange of opinions
European Federation of Waste Management and Environmental Services (FEAD)	Nadine De Greef	12/1/2015	Information session and distribution of GtoG dissemination materials to their members through their newsletter
European Insulation Manufacturers Association (EURIMA)	Jan te Bos	19/9/2014	Information session and exchange of opinions, further meeting about the GtoG deconstruction activities with Recovering (project partner and deconstruction coordinator)
Metals for Europe	Christian Leroy	30/9/2014	Information session and exchange of opinions
Municipal Waste Europe (MWE)	Vanya Veras	20/11/2014	Information session and exchange of opinions
PV Cycle	Jan Clynce	13/11/2014	Information session and exchange of opinions
Recovynyl	Eric Criel	17/12/2014	Information session and exchange of opinions
SITA Belgium	Yves Decelle	6/1/2015	Information session and exchange of opinions
European Association of National Builders' Merchants Associations and Manufacturers (UFEMAT)	Marnix Van Hoe	5/11/2014	Invitation to present the GtoG project to the UFEMAT Congress (Dubrovnik, Croatia, 16/10/2015)
United Nations Industrial Development Organisation (UNIDO)	Christophe Yvetot	16/4/2015	Information session, presentation of the GtoG project to one of their event (ITCCO Workshop, Antwerp, Belgium, 16/4/2015), and Eurogypsum invitation to be a speaker during the GtoG Final Conference
WWF	Andreas Baumueller	2/3/2015	Information session and exchange of opinions
Zero Waste Europe	Joan Marc Simon	4/3/2015	Information session and



(ZWE)			exchange of opinions
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Table 3: summary of meetings held with European associations

VI. Direct contacts with other European projects on C&D waste

➤ LIFE projects

- Project Name: **Gy.Eco (Gyproc Eco-friendly), LIFE10 ENV/IT/000356**
- Project website: <http://www.gyeco.it/ing/progetto.html>
- Coordinator: Saint Gobain PPC Italia S.p.A. (SG PPC), Italy
- Project duration: from 1/9/2011 to 30/11/2015, ongoing project
- Project explanation: The Gy.Eco project aims to develop a system for managing and processing waste plasterboard and plaster from construction activities. This process could allow the recovery of gypsum for reuse as an additive in cement production. The specific objectives of the project are:
 - To reduce the amount of waste gypsum disposed of in landfill;
 - To reduce the potential for the illegal disposal of gypsum waste by offering, for the first time, a national recycling service;
 - To define criteria for the development of new recycling markets and the promotion of waste recycling in the construction sector;
 - To reduce the extraction of natural gypsum;
 - To produce a secondary raw material with a low environmental impact and to identify a certification procedure;
 - To promote a more sustainable management of mechanical treatment and disposal facilities through the transfer of materials recovery technologies from other sectors;
 - To reduce the potential recovery of gypsum waste in non-tested activities and/or the production of non-certified secondary materials.

- Project Name: **CDW-recycling (Innovative solution for the separation of construction and demolition waste), LIFE11 ENV/FR/000752**
- Project website: <http://www.cdw-recycling.eu/>
- Coordinator: Sud-Est Assainissement (SEA), France
- Project duration: from 3/9/2012 to 2/10/2015, ongoing project
- Project explanation: The 'CDW-recycling' project aims to use innovative technologies to find solutions to the problems currently limiting the recycling and reuse of C&D waste materials. It will establish a pilot plant that should be capable of sorting C&D waste pieces of 8-30 mm and of 30-80 mm at industrial scale.

In a first stage, the project aims to design and set up sorting processes for the two fractions – 8-30 mm and 30-80 mm – of C&D waste. To achieve this, the project partner Pellenc Selective Technologies will adapt its optical and blowing technologies for industrial use. Pilot testing should enable definition and validation of the optimal specifications. In the second stage, the pilot projects will be integrated into industrial-



GYPSUM TO GYPSUM



scale waste sorting processes at the beneficiary's site at Nice-Saint Isidore. Further modification and optimisation should then take place and, if necessary, equipment – such as a conveyor belt - added to the prototype. The new process should effectively demonstrate that it is possible to recover large quantities of C&D waste and with less of an environmental impact than using traditional C&D waste management techniques.

- Project Name: **VAL-C&DW (Recovery of construction and demolition waste in Buzau County), LIFE10 ENV/RO/000727**
- Project website: <http://life-dcd.ro/en/>
- Coordinator: Buzau County Council, Romania
- Project duration: from 1/9/2011 to 30/6/2014, closed project
- Project explanation: The VAL-C&DV project aims to develop a functional and effective demolition waste management system through detailed knowledge of the current situation in terms of generation, collection, recovery and disposal of construction and demolition waste at the level of Buzau County. The project will first analyse the quantity and composition of all categories of waste that are within the scope of the project (i.e. categories pertaining to class 17 of the European Waste List, generated at the level of Buzau County) in order to be able to carry out a correct assessment of the possibility of recovery. A detailed analysis (Lifecycle Assessment) of the impact on the environment of secondary raw materials generated from treated construction and demolition waste will be carried out. The project will also ensure the development of a code of best practices concerning the separate collection at source of construction and demolition waste. The demonstration value of the project will be highlighted by the implementation of a pilot project in Buzau County. The pilot will carry out the following activities:
 - Commissioning of a mechanical waste treatment facility for C&D waste;
 - Collection and transport of C&D waste to the new treatment facility;
 - Development of a methodology for reuse of secondary raw materials generated treated C&D waste; and
 - Development of a proposal for a technical norm which would include the minimum technical criteria and standards for the recovery of products resulting from the treatment of construction and demolition waste.

Finally, the project will aim to develop a coherent decision-making system by classifying the responsibilities of all the factors involved at county level in the construction and demolition waste management system. It will fulfil all legal objectives in terms of C&D waste recovery in Buzau County, including the recovery of the type of waste that is disposed of in a non-compliant manner.

➤ **FP7/HORIZON 2020 projects**

- Project Name: **FC-DISTRICT (New μ -CHP network technologies for energy efficient and sustainable districts)**
- Project website: <http://www.fc-district.eu/>



GYPSUM TO GYPSUM



- Coordinator: Mostotal Warszawa S.A., Poland
- Project duration: from 1/9/2010 to 31/8/2014, closed project
- Project explanation: The overall objective of the FC-DISTRICT project is to optimize and implement an innovative energy production and distribution concept for sustainable and energy efficient refurbished or new "energy autonomous" districts, exploiting decentralized co-generation coupled with optimized building and district heat storage and distribution network.

The concept is based on dynamic heat exchange between the buildings (fitted with Solid Oxide Fuel Cells) for energy production collaborating with improved thermal storage and insulation building systems, the distribution system (optimized piping and district heating with or without a heat buffer) and the consumer (new business and service models), aiming to achieve energy balance at district level.

A technology in scope of the project is a high temperature solid oxide fuel cell (SOFC) with versatile fuel processor for gas reforming and optimized peripheries making possible successful integration with district networks. FC-DISTRICT integrates a proven innovative SOFC technology with heat management at building and district level (building thermal storage coupled with intelligent distribution networks) to serve the consumer needs for economy-ecology-sustainability. It introduces a new paradigm in energy efficiency by developing materials, technologies, methodologies and systems specifically intended for integration at district level.

- Project Name: **ELISSA (Energy Efficient Lightweight-Sustainable-SAFE-Steel Construction)**
- Project website: <http://elissaproject.eu/>
- Coordinator: National Technical university of Athens (NTUA), Greece
- Project duration: from 1/9/2013 to 31/8/2016, ongoing project
- Project explanation: ELISSA targets the development and demonstration of nano-enhanced prefabricated lightweight steel skeleton/dry wall systems with improved thermal, vibration/seismic and fire performance, resulting from the inherent thermal, damping and fire spread prevention properties of carefully preselected inorganic nanomaterials (aerogels, VIPs, MMTs, CNT) and NEMS as well as the development of industrially friendly methods for their application. New computational and design tools for energy efficient, safe and sustainable anti-seismic steel frame lightweight buildings, exploiting nanomaterials and fulfilling relevant EU building codes, will be developed. The new ELISSA prefabricated lightweight elements will reach the highest achievable degree of energy efficiency, safety - will be structurally tested and optimized as load bearing elements - and sustainability for steel lightweight buildings through:
 - Ensuring efficiency and structural integrity under thermal, dynamic and fire loads (due to nanomaterial properties, NEMS and design concept).
 - Saving materials, energy and time during construction due to construction concept (pre-fabricated elements -resilient construction that doesn't need repair in case of lower seismic action).



GYPSUM TO GYPSUM



- Saving energy during building operation due to materials (multi-functional elements with suitable insulation).
- Being economic (recycled, re-usable materials, flexibility in architectural design, optimized production-logistics-construction-use chain).

The industry driven consortium comprises two major industries, one consortium of industries and four high tech SMEs, specializing in lightweight modular construction, nanomaterials and structural design, complemented by four research partners providing expertise on property assessment, testing and modeling aiming to develop, optimize and validate the ELISSA elements and systems that will enhance structural excellence, human comfort and safety in new and existing buildings."

- Project Name: **FISSAC (Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the Extended Construction Value Chain)**

- Project website: http://cordis.europa.eu/project/rcn/196821_en.html

- Coordinator: Acciona, Spain

- Project duration: from 1/9/2015 to 1/3/2020, ongoing project

- Project explanation: The overall objective of FISSAC project is to develop and demonstrate a new paradigm built on an innovative industrial symbiosis model towards a zero waste approach in the resource intensive industries of the construction value chain, tackling harmonized technological and non-technological requirements, leading to material closed-loop processes and moving to a circular economy.

A methodology and a software platform will be developed in order to implement the innovative industrial symbiosis model in a feasible scenario of industrial symbiosis synergies between industries (steel, aluminium, natural stone, chemical and demolition and construction sectors) and stakeholders in the extended construction value chain. It will guide how to overcome technical barriers and non technical barriers, as well as standardisation concerns to implement and replicate industrial symbiosis in a local/regional dimension. The ambition of the model will be to be replicated in other regions and other value chains symbiosis scenarios. The model will be applied based on the three sustainability pillars.

- Project Name: **BAMB (Buildings as Material Banks: Integrating Materials Passports with Reversible Building Design to Optimise Circular Industrial Value Chains)**

- Project website: http://cordis.europa.eu/project/rcn/196829_en.html

- Coordinator: Institut Bruxellois pour le Gestion de l'Environnement, Belgium

- Project duration: from 1/9/2015 to 1/9/2018, ongoing project

- Project explanation: The aims of BAMB (Buildings as Material Banks) are the prevention of construction and demolition waste, the reduction of virgin resource consumption and the development towards a circular economy through industrial symbiosis, addressing the challenges mentioned in the Work Programme on Climate action, environment, resource efficiency and raw materials. The focus of the project is on building construction and process industries (from architects to raw material suppliers).



GYPSUM TO GYPSUM



The BAMB-project implements the principles of the waste hierarchy: the prevention of waste, its reuse and recycling. Key is to improve the value of materials used in buildings for recovery. This is achieved by developing and integrating two complementary value adding frameworks, (1) materials passports and (2) reversible building design. These frameworks will be able to change conventional (cradle-to-grave) building design, so that buildings can be transformed to new functions (extending their life span) or disassembled to building components or material feedstock that can be upcycled in new constructions (using materials passports). This way, continuous loops of materials are created while large amounts of waste will be prevented.

- Project Name: **HISER (Holistic Innovative Solutions for an Efficient Recycling and Recovery of Valuable Raw Materials from Complex Construction and Demolition Waste)**
- Project website: <http://www.hiserproject.eu/>
- Coordinator: Tecnalía, Spain
- Project duration: from 1/2/2015 to 1/2/2019, ongoing project
- Project explanation: EU28 currently generates 461 million tons per year of ever more complex C&D waste with average recycling rates of around 46%. There is still a significant loss of potential valuable minerals, metals and organic materials all over Europe.

The main goal of HISER project is to develop and demonstrate novel cost-effective technological and non-technological holistic solutions for a higher recovery of raw materials from ever more complex C&D waste, by considering circular economy approaches throughout the building value chain (from the End-of-Life Buildings to new Buildings). The following solutions are proposed:

- Harmonized procedures complemented with an intelligent tool and a supply chain tracking system, for highly-efficient sorting at source in demolition and refurbishment works.
- Advanced sorting and recycling technologies for the production and automated quality assessment of high-purity raw materials from complex C&D waste.
- Development of optimized building products (low embodied energy cements, green concretes, bricks, plasterboards and gypsum plasters, extruded composites) through the partial replacement of virgin raw materials by higher amounts of secondary high-purity raw materials recovered from complex C&D waste.

These solutions will be demonstrated in demolition projects and 5 case studies across Europe. Moreover, the economic and environmental impact of the HISER solutions will be quantified, from a life cycle perspective (LCA/LCC), and policy and standards recommendations encouraging the implementation of the best solutions will be drafted.



GYPSUM TO GYPSUM



HISER will contribute to higher levels of recovered materials from C&D waste from 212 Mt in 2014, to 359 Mt in 2020 and 491 Mt by ca. 2030, on the basis of the increase in the recovery of aggregates, from 40% (169 Mt) to more than 80% (394 t) and wood, from 31% (2.4 Mt) to 55% (5 Mt). Similarly, unlocking valuable raw materials currently not exploited is foreseen, namely some metals and emerging flows.

- Project Name: **ProSUM (Prospecting Secondary raw materials from the Urban Mine and Mining waste)**
- Project website: <http://www.prosumproject.eu/>
- Coordinator: WEEE Forum, Belgium
- Project duration: from 1/1/2015 to 31/12/2017, ongoing project
- Project explanation: The ProSUM project will establish a European network of expertise on secondary sources of critical raw materials (CRMs), vital to today's high-tech society. ProSUM directly supports the European Innovation Partnership (EIP) on Raw Materials and its Strategic Implementation Plan calling for the creation of a European raw materials knowledge base. Data on primary and secondary raw materials are available in Europe, but scattered amongst a variety of institutions including government agencies, universities, NGOs and industry. By establishing a EU Information Network (EUIN), the project will coordinate efforts to collect secondary CRM data and collate maps of stocks and flows for materials and products of the "urban mine". The scope is the particularly relevant sources for secondary CRMs: Electrical and electronic equipment, vehicles, batteries and mining tailings. The project will construct a comprehensive inventory identifying, quantifying and mapping CRM stocks and flows at national and regional levels across Europe. Via a user-friendly, open-access Urban Mine Knowledge Data Platform (EU-UMKDP), it will communicate the results online and combine them with primary raw materials data from the ongoing Minerals4EU project. To maintain and expand the EU-UMKDP in the future, it will provide update protocols, standards and recommendations for additional statistics and improved reporting on CRM's in waste flows required.

- Project Name: **SMARTGROUND (SMART data collection and inteGRation platform to enhance availability and accessibility of data and infOrmation in the EU territory on SecoNDary Raw Materials)**
- Project website: <http://www.smart-ground.eu/index.php>
- Coordinator: ENCO Engineering & Consulting, Italy
- Project duration: from 1/1/2015 to 31/3/2018, ongoing project
- Project explanation: EU is dependent on the import of Raw Materials, if we consider that in Europe there are between 150K to 500K highly variable landfills, it is easy to understand that the SRM potential of various landfills is significant. Valuable Raw Materials disposed in landfills are mostly lost due to inefficient waste management practices. Existing knowledge, reporting standards and inventory on SRM seems to be inefficient. In this context, the SMART GROUND project intends to foster resource recovery in landfills by improving the availability and accessibility of data and



GYPSUM TO GYPSUM



information on Secondary Raw Materials (SRM) in the EU, while creating synergies among the different stakeholders involved in the SRM value chain. SMART GROUND involves the 3 main players of the process: End-users (waste management companies), RTD institutions (Research centres, Universities, SMEs), and Technology Transfer providers (Networking, training organizations and public authorities). Thus, the consortium will integrate all the data from existing databases and new information retrieved in a single EU databank. SMART GROUND will respond to the needs of coordination, networking and cooperation between stakeholders, through the creation of a databank enabling the exchange of information among them. It will improve data gathering on SRM from different types of waste, by defining new and better data acquisition methods and standards; it will cooperate with other EU ongoing activities and support the implementation of the EIP on RM. The project also aims at improving the SRM economic and employment potential, by i) providing training on the assessment of landfill sites material recovery targeting end-users, ii) forming a dedicated network of academic, industrial and other stakeholders and regulators committed to cost-effective research, technology transfer and training; iii) developing and implementing a dissemination and exploitation plan to maximise the impacts and benefits of the SMART GROUND action.

- Project Name: **New Innonet (The Near-zero European Waste Innovation Network)**
- Project website: <http://www.newinnonet.eu/>
- Coordinator: PNO CONSULTANTS, Netherlands
- Project duration: from 1/2/2015 to 1/8/2017, ongoing project
- Project explanation: Europe generates around 3 billion tonnes of waste yearly, which is expected to grow further. Despite the introduction of innovative waste and recycling technologies, market uptake varies drastically amongst the 27 Member States. New-InnoNet is the new stakeholder platform initiative by 12 European consortium members active as entrepreneurs, researchers and policy makers. These recognise that in order to reach a European near zero waste economy, all value chain stakeholders must cooperate, exchange generated knowledge, insights and hands-on experience and enforce changes to the value chain structure together. Previous initiatives were unable to achieve actual, large scale results towards a sustainable growth of the European economy. The reason is that they either focussed on a specific waste area or they lacked the involvement of the competent industries. This project includes various waste value chains which enable exchange of information and technology transfer from one chain to another. In addition, the consortium's network includes over 2000 relevant industrial stakeholders and several already expressed their interest in this new stakeholder platform, its goals and actions. During the project, key stakeholders will be mobilised to participate in the platform and road mapping workshops, as only an active involvement of industrial organisations will lead to the desired changes in the structure of the value chain.
The many letters of support show the consortium's strength in mobilising stakeholders. NEW_InnoNet's main objective is to mobilise stakeholders towards



GYPSUM TO GYPSUM



building a circular economy by developing and reinforcing solid foundations for building the European Near-Zero Waste Platform through: 1. Set-up and maintain near zero waste stakeholder platform 2. Analyse selected waste streams and develop innovation roadmaps per waste stream 3. Develop an integrated near zero waste strategic research and innovation agenda 4. Stakeholder mobilisation and interaction.

- Project Name: **PPI4Waste (Promotion of Public Procurement of Innovation for Resource Efficiency and Waste Treatment)**
- Project website: <http://www.ppi4waste.eu/>
- Coordinator: Instituto Andaluz de Tecnologia (IAT), Spain
- Project duration: from 1/1/2015 to 1/7/2017, ongoing project
- Project explanation: Effective waste management is heavily dependent on the development of innovative solutions for waste collection and treatment. This is where public procurement comes in: it can act as a key instrument to galvanise the market in order to preserve and recycle material resources. Public procurement of innovation (PPI), particularly, is a way to encourage the development of new, more efficient solutions.

Public procurement of innovation (PPI) can be hampered by a lack of cross-border coordination, limited access to best practice cases, and limited or no knowledge of close-to-market innovative solutions.

The PPI4Waste project explores mechanisms to overcome barriers to public procurement of innovation in the waste sector.

- Project Name: **IRCOW (Innovative strategies for high-grade material recovery from construction and demolition waste)**
- Project website: <http://www.ircow.eu/>
- Coordinator: Tecnalía, Spain
- Project duration: from 17/1/2011 to 17/1/2014, closed project
- Project explanation: The main goal of the IRCOW project is to develop and validate upgraded technological solutions to achieve an efficient material recovery from C&D waste by considering a life cycle perspective.

The innovation beyond the state-of-the-art will focus on:

- Developing new approaches and models aimed at raising the rate of reuse components.
- Developing and adapting recycling technology with the overall purpose of improving the quality of C&D recycled materials: recycled aggregates, wood, plastics, granular gypsum from mixed streams and emerging waste materials.
- Developing high grade construction products by using C&D recycled materials; not only those related to the stony fraction, but also the other fractions where there is currently a strong knowledge gap.
- Demonstrating results under real conditions with the aim of providing potential stakeholders with information on the global performance.



GYPSUM TO GYPSUM



- Setting the basis for specific European policies on C&D waste aiming at fostering a high and efficient level of material recovery.

- Project Name: **ZEROWIN (Towards zero waste in industrial networks)**
- Project website: <http://www.zerowin.eu/>
- Coordinator: Austrian Society for Systems Engineering and Automation (SAT), Austria
- Project duration: from 4/5/2009 to 4/5/2014, closed project
- Project explanation: The main idea of ZeroWIN is that waste prevention has to be seen from a holistic perspective to make it work efficiently and effectively. The plan to move society in the direction of sustainability must be based on an understanding of the constitutional principles of the functioning of the system usually referred to as the eco-sphere (e.g. thermodynamics; the biogeochemical cycles; the ecological interdependencies of species; the societal exchange with, and dependency on, the ecosphere). Operational approaches towards e.g. dematerializations and substitutions need to comply with the complementary, non-overlapping, conditions for social and ecological sustainability. Resulting actions should be fostered through a set of strategic principles defining a future “landing place” on a systems level first, otherwise reaching sustainability is an unlikely outcome of any effort. Each investment should bring practices closer to the overall aim of complying with the system conditions. This requires back-casting methodology, which means that the starting point of the planning process is an envisioned successful future outcome of the planning. Based on this outcome, the strategic paths are designed. This systematic approach involves close cooperation with other strategic approaches towards sustainability, the utilization of tools such as Life Cycle Assessment in order to evaluate the present situation of material flows, and the implications of various technologies, industrial designs and policy options at a micro, meso and macro-level.

- Project Name: **CANDY (CompAct highly mobile Next generation construction, Demolition and excavation waste recoveryY system)**
- Project website: http://cordis.europa.eu/project/rcn/108921_en.html
- Coordinator: CDE Global, UK
- Project duration: from 14/9/2012 to 13/12/2014, closed project
- Project explanation: The enclosed project focuses on the Sustainable building products and the Materials recycling priority of the 2011 CIP ECO-INNOVATION call and is focused on the development and validation of an advanced Aggregate washing system for the construction and recycling sector.

At present the CD&E waste recycling sector is dominated by contractors employing traditional crushing and dry screening methods. This results in poor quality aggregate, highly variable product quality standards and lost commercial opportunity for the EU construction and demolition sector. Aggregate washing enables effective recycling, creates commercial product with added value and diverts material away from landfill.

The CANDY project will focus on the development of the next generation of washing plant for the recycling of Construction, Demolition & Excavation (CD&E) waste. The



GYPSUM TO GYPSUM



project will see the implementation of advanced liquid / solid separating technology and the creation of a genuine mobile road transportable washing system. A key element of the project will be to replicate the high level of aggregate recycling that takes place in the UK (in 2009 23% of aggregates were from recycled sources) into a wider European context where aggregate recycling ranges from 0-19%. If we achieve this level of replication we would prevent the extraction of 560m tonnes of virgin aggregate per year.

VII. Participation to other European Commission's activities

➤ **The European Innovation Partnership on Raw Materials**

European Innovation Partnerships (EIPs) are a new approach to EU research and innovation. EIPs are challenge-driven, focusing on societal benefits and a rapid modernisation of the associated sectors and markets. EIPs act across the whole research and innovation chain, bringing together all relevant actors at EU, national and regional levels in order to: (i) step up research and development efforts; (ii) coordinate investments in demonstration and pilots; (iii) anticipate and fast-track any necessary regulation and standards; and (iv) mobilise 'demand' in particular through better coordinated public procurement to ensure that any breakthroughs are quickly brought to market. Rather than taking the above steps independently, as is currently the case, the aim of the EIPs is to design and implement them in parallel to cut lead times.

The EIPs are launched in 5 different areas and the most important for the C&D sector is the European Innovation Partnership on Raw Materials, a stakeholder platform that brings together representatives from industry, public services, academia and NGOs. Its mission is to provide high-level guidance to the European Commission, Member States and private actors on innovative approaches to the challenges related to raw materials.

The EIP on Raw Materials' aim is to help raise industry's contribution to the EU GDP to around 20% by 2020. It will also play an important role in meeting the objectives of the European Commission flagship initiatives 'Innovation Union' and 'Resource Efficient Europe'. It will do this by ensuring the sustainable supply of raw materials to the European economy whilst increasing benefits for society as a whole.

The GtoG project has been awarded the status of official commitment by the EIP on Raw Materials. More precisely, the GtoG project has been included in the non-technology pillar of the EIP on Raw Materials, in the priority area II.B and action area II.5 (Improving Europe's waste management framework conditions and excellence, Optimised waste flows for increased recycling).

➤ **The Construction and Demolition waste Protocol**

This project constitutes a new initiative within the framework of the Construction 2020 Governance Structure – TG 3. It will develop a concrete deliverable in a true tripartite work structure, where industry and national governments are expected to concretely contribute to the development of the final deliverable.



- Why? Sound recycling and treatment of C&D waste can have major benefits in terms of sustainability, compared to disposal. EU and national policy makers have already put in place a strong policy framework, but more can be done to increase recycling and the uptake of processed C&D waste as inputs (secondary resources or materials). One of the largest hurdles is that the perceived quality of processed C&D waste is low. The lack of confidence in the performance of recycled products limits demand for these and slows the development of a secondary C&D waste market. Practices in collecting, sorting and processing C&D waste are not homogeneous in the EU and therefore professionals could be reluctant to re-use C&D waste derived recycled products. Quality and confidence are key for C&D waste recycling market.
- What? EC – DG GROW proposes to tackle the (mis)perception on the perceived quality of processed C&D waste by developing a Common EU C&D Waste Management Protocol in order to increase transparency and confidence in the market. The Protocol should develop a common set of technical, environmental and managerial principles, which are applicable in the entire EU and based on the highest common standards in each stage of the waste management chain that would be recognised in all Member States. A standardised Protocol will provide common language for industry and policy makers in the EU and facilitate the adoption of sound C&D waste management across the EU. After finalisation, the Protocol will function as ‘soft legislation’: a reference document for industry professionals and policy makers who can refer to it when developing new policies.
- How? As C&D waste management protocols are not new in the industry local, regional authorities, national governments and industry have already developed similar waste management plans - this project should uncover existing knowledge at national and industry level and synthesise it at EU-level based on the highest common denominators in terms of quality, environment and efficiency. In this project managed by DG GROW, two Task Forces will be formed by industry professionals, public officials and other stakeholders, which will be tasked with the development of the actual Protocol text.
- Who? The Protocol will be developed based on the collaboration between industry professionals, their EU level representations, national governments and the EC. Industry, their associations and national policy makers are expected to lead the development of the Protocol. The project will be managed by DG GROW with the assistance of Ecorys.
- When? The project has officially started on 26 June 2015 (kick-off meeting). Two to five meetings will be organised until the summer of 2016, when the Protocol should be finished.

As GtoG project coordinator, Eurogypsum has been invited to be part of this project by providing expertise in the field of C&D waste.

VIII. Participation to events, conferences, seminars and fairs

All the events where the GtoG project was present are listed in the table below.



GYPSUM TO GYPSUM



Event	Date	Location	Partner
Workshop with ATEDY (Gypsum Spanish Association) members	17/1/2013	Madrid, Spain	Eurogypsum
Batibouw 2013 (fair for construction and renovation field's professionals)	21-22/2/2013	Brussels, Belgium	SG Gyproc
Demolition Waste Conference	7/3/2013	Istanbul, Turkey	Eurogypsum
Materials Week organized by the CEI Campus Moncloa, in the FECYMAT Forum on Science and Technology of Materials	26-30/4/2013	Madrid, Spain	UPM
2013 Annual Conference on demolition and dismantling	15-16/3/2013	Berlin, Germany	Knauf
9 th Panhellenic Congress on Chemical Engineering	23-25/5/2013	Athens, Greece	NTUA
SNED (Demolition French Association) annual meeting	31/5-1/6/2013	Versailles, France	Occamat
European Demolition Association annual convention	20-22/6/2013	Milan, Italy	Recovering
Sustainable building and refurbishment for next generations	26-28/6/2013	Prague, Czech Republic	UPM
2013 Demolition Expo	28-29/6/2013	Solihull, UK	Cantillon
Deconstruction Forum	27/9/2013	Madrid, Spain	UPM
High level forum on the competitiveness of the construction sector - Thematic WG3: the sustainable use of natural resources	4/10/2013	Brussels, Belgium	Eurogypsum
European Forum, Megatrends in Construction - The three R's: Renovation, Resource, Recycling	16/10/2013	Brussels, Belgium	Recovering
Seminarios Internacionales de Fronteras de la Ciencia de Materiales	11/11/2013	Madrid, Spain	UPM
The Athens Programme - COURSE91 given by giSCI-UPM: Construction and Demolition Waste (C&DW) Management in Europe. Current and Best Practices	18-22/11/2013	Madrid, Spain	UPM
The plasterboard Sustainability Partnership	14/1/2014	London, UK	Eurogypsum



GYPSUM TO GYPSUM



SNIP (French Gypsum Association) marketing meeting	24/2/2014	Paris, France	Eurogypsum
The Athens Programme - COURSE91 given by giSCI-UPM: Introduction to Construction and Demolition (C&D) Waste Management. In-depth analysis of plasterboard waste management: international experiences	17-21/3/2014	Madrid, Spain	UPM
The Gypsum Weimar conference	26-27/3/2014	Weimar, Germany	Eurogypsum
DG Research Conference - Renaturing Cities: How to address Environmental Challenges and the Financial Crisis Through Nature-Based Solutions	13/5/2014	Brussels, Belgium	Eurogypsum
Lesson to "Isaac Newton" Secondary School	27/5/2014	Madrid, Spain	UPM
Green week 2014 - Circular economy: saving resources, creating jobs	4/6/2014	Brussels, Belgium	Eurogypsum
Athens 2014 2 nd International Conference on Sustainable Solid Waste Management, organized by the Athens BIOWASTE PROJECT - LIFE 10 ENV/GR/000605	12-14/6/2014	Athens, Greece	UPM
European Demolition annual conference	13/6/2014	Madrid, Spain	Cantillon
Conference Mineral By-Products and Waste - Ashes, Slags, Dusts and Demolition Waste	30/6-1/7/2014	Berlin, Germany	Knauf
BEST Course - Session given by giSCI-UPM about sustainable construction	17-23/7/2014	Madrid, Spain	UPM
Participation to the Greek Researchers' Night	9/2014	Athens, Greece	NTUA
Global Gypsum Conference	29/9/2014	Berlin, Germany	Eurogypsum
GtoG Workshop with the University of Tamaulipas (Mexico)	29/9/2014	Madrid, Spain	UPM
Recycling Day (BVgips)	7/10/2014	Berlin, Germany	Eurogypsum
European Innovation	10/11/2014	Brussels, Belgium	Eurogypsum



GYPSUM TO GYPSUM



Partnership on Raw material - Meeting of the operational group			
The Athens Programme - COURSE91 given by giSCI- UPM: Introduction to Sustainable Construction	17-21/11/2014	Madrid, Spain	UPM
Pollutec Fair	2-5/12/2014	Lyon, France	Eurogypsum
GtoG Workshop University of Goteborg + University of Sevilla	3/12/2014	Madrid, Spain	UPM
Knauf Fair (Knauf Werktage)	14-15/1/2015	Mainz, Germany	Knauf
11 th International Conference on Environmental, Cultural, Economic and Social Sustainability	21-23/1/2015	Copenhagen, Denmark	UPM
Knauf Fair (Knauf Werktage)	28-29/1/2015	Magdeburg, Germany	Knauf
Knauf Fair (Knauf Werktage)	4-5/2/2015	Stuttgart, Germany	Knauf and Eurogypsum
Knauf Fair (Knauf Werktage)	25-26/2/2015	Hamburg, Germany	Knauf
BatiBouw 2015	26/2-8/3/2015	Brussels, Belgium	SG Gyproc and Eurogypsum
PR Workshop on the European Minerals Day	3/3/2015	Brussels, Belgium	Eurogypsum
Knauf Fair (Knauf Werktage)	3-4/3/2015	Nurnberg, Germany	Knauf
Knauf Fair (Knauf Werktage)	11-12/3/2015	Dusseldorf, Germany	Knauf and Eurogypsum
Jornada sobre Innovación en el Sector del Yeso	14/3/2015	Madrid, Spain	UPM
The Athens Programme – COURSE 103 given by giSCI- UPM: Introduction to Sustainable Construction	16-20/3/2015	Madrid, Spain	UPM
Training on Waste Circular Economy	26/3/2015	Paris, France	Recovering
1 st Wicked Workshop on Architectural and Urban Sustainability, Faculty of Architecture and the Built Environment	23/4/2015	Delft, Netherlands	Eurogypsum
1 st International furniture recycling congress (FURNIREC)	8-9/6/2015	Deauville, France	Recovering
15 th International Multidisciplinary Scientific GeoConference SGEM	16-25/6/2015	Albena, Bulgaria	UPM
National Federation of Demolition Contractors Day	26/6/2015	London, UK	Eurogypsum



GYPSUM TO GYPSUM



3 rd International Conference on Sustainable Solid Waste Management (ISWM 2015)	2-4/6/2015	Tinos, Greece	UPM
The European Conference on Sustainability, Energy & the Environment (ECSEE 2015)	9-12/7/2015	Brighton, UK	UPM
World Congress and Expo on Recycling	20-22/7/2015	Barcelona, Spain	UPM
Webinar organised by IEMA (Institute of Environmental Management & Assessment)	2/9/2015	Online	Eurogypsum
14th International Conference on Environmental Science and Technology (CEST 2015)	3-5/9/2015	Rhodes, Greece	NTUA
Ibausil	16-18/9/2015	Weimar, Germany	Knauf
European Minerals Day Launch Event	25/9/2015	Luxembourg	Eurogypsum
HISER project advisory board meeting	29/9/2015	Brussels, Belgium	Eurogypsum
UFEMAT Congress	15/10/2015	Dubrovnik, Croatia	Eurogypsum
Global Cleaner Production & Sustainable Consumption Conference (GCPC2015) Accelerating the Transition to Equitable Post Fossil-Carbon Societies	1-4/11/2015	Sitges, Spain	UPM
Kick-off & Networking meeting - Boosting synergies on EU WASTE Research and Innovation projects	8/12/2015	Brussels, Belgium	Eurogypsum
III International Congress on construction and building research (COINVEDI)	14-16/12/2015	Madrid, Spain	Eurogypsum UPM

Table 4: the summary of all the events where the GtoG project was present



GYPSUM TO GYPSUM



IX. 17 partners for covering an integrated supply chain

The GtoG is a [LIFE](#) project co-financed by the European Commission. It covered the duration of three years, from January 2013 to December 2015.

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A working team of 17 Partners

Coordinator

- Eurogypsum, the European association of plasterboard manufacturers, Belgium

Universities

- The National Technical University of Athens, Greece
- Universidad Politécnica de Madrid, Spain

Laboratory

- Fundación Gomez Pardo (LOEMCO), Spain

Consulting agency

- Recovering SARL, France

Demolition companies

- Occamat, France
- Cantillon Ltd, UK
- Recycling assistance BVBA, Belgium
- Pinault & Gapaix, France
- KS Engineering, Germany

Recycling companies

- New West Gypsum Recycling Benelux BVBA, Belgium
- Gips Recycling Dan mark A/S, Denmark

Gypsum manufacturing companies

- Placoplâtre SA (Saint Gobain group), France
- Siniat SA, France
- Siniat Ltd, United Kingdom
- Knauf Gips KG, Germany
- NV Saint Gobain Construction Products Belgium SA (Gyproc), Belgium



GYPSUM TO GYPSUM



X. LIFE Programme

The [LIFE programme](#) is the EU funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value.

LIFE began in 1992 and to date there have been four complete phases of the programme (LIFE I: 1992-1995, LIFE II: 1996-1999, LIFE III: 2000-2006 and LIFE+: 2007-2013). During this period, LIFE has co-financed some 4 171 projects, contributing approximately €3.4 billion euros to the protection of the environment and climate.