



# GtoG Life11 ENV/BE/001039

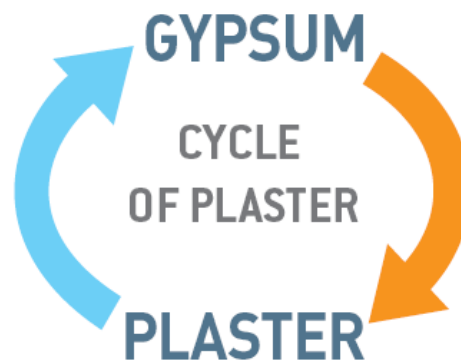
**Christine Marlet-Secretary general of Eurogypsum**

A circular economy for the European Gypsum Industry with the Demolition and Recycling Industry (January 2013-December 2015)



**GYPSUM TO GYPSUM**

- ▶ Gypsum as such is 100% and eternally recyclable.
- ▶ You can always reuse Gypsum because the chemical composition of the raw material in plasterboards and blocks always remains the same.

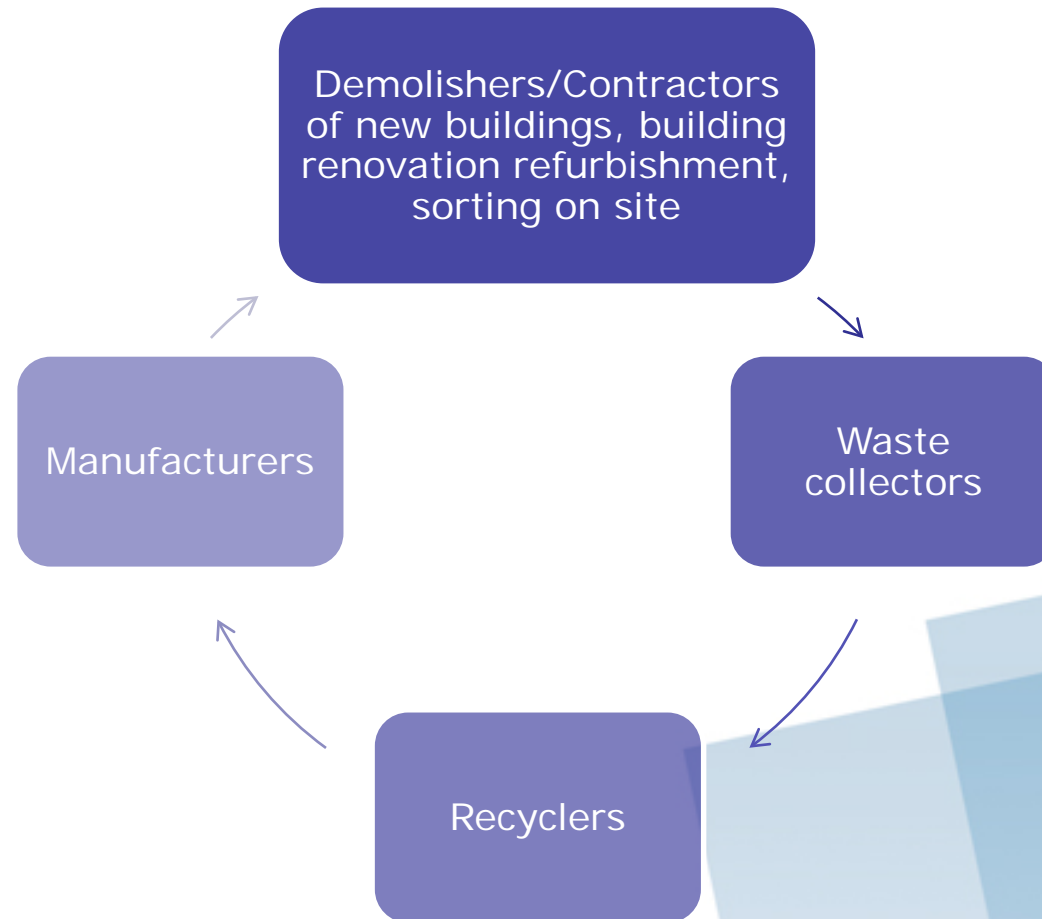


# A Cooperative Business Model

- ▶ The GtoG partners created a cooperative business model for **recycling C&D waste**, among other gypsum based waste

The 8 countries  
of the project

- France
- Germany
- UK
- Greece
- Belgium
- Spain
- Holland
- Poland

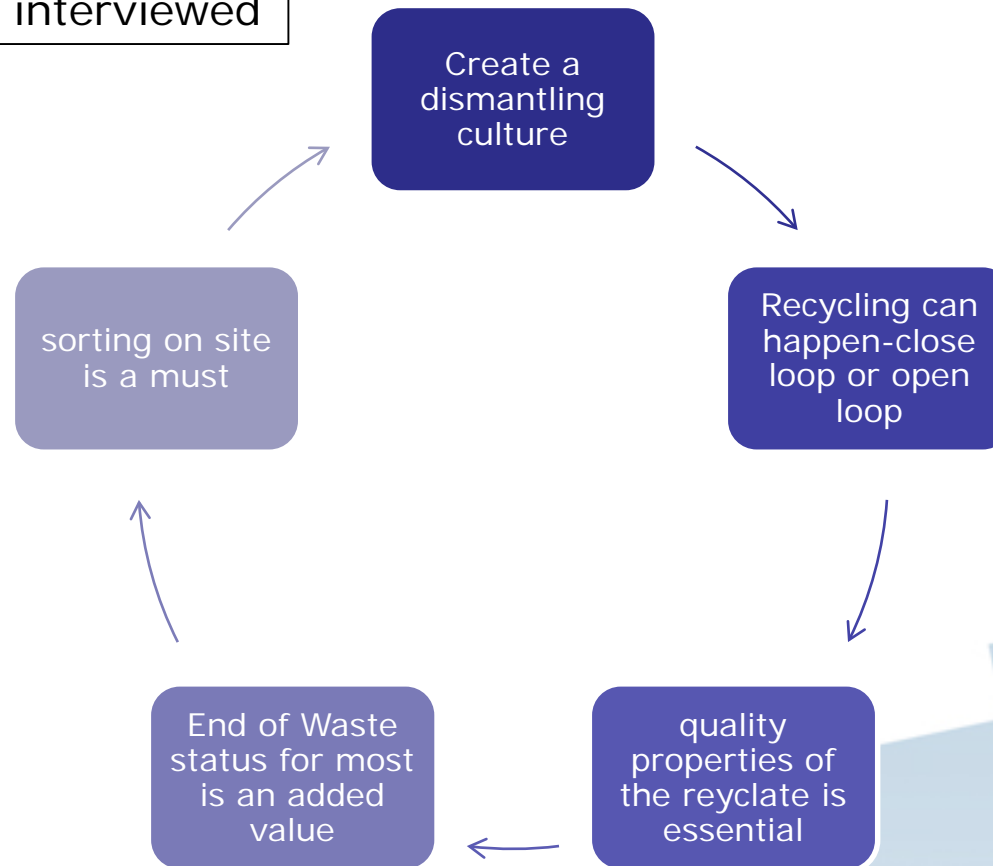


# A Cooperative Business Model

## ► Main issues for C&D sectors

C&D waste sectors interviewed

- Glass
- Wood
- Metal
- PVC
- Mineral wool
- Photovoltaic
- Expanded polystyrene



# A Cooperative Business Model

- ▶ For gypsum based waste, this model is mature in:

- ▶ **France;**
- ▶ **UK;**
- ▶ **Scandinavia;**
- ▶ **Belgium;**
- ▶ **The Netherlands.**



- ▶ The model is being implemented in Germany
- ▶ The model is being assessed in Spain
  - ▶ **Knauf Spain is partner to the HISER project\***
  - ▶ **Eurogypsum is an external advisory partner to HISER**

\*Holistic Innovative Solutions for an Efficient Recycling and Recovery of Valuable Raw Materials from Complex Construction and Demolition Waste (HISER)

# Business options

- ▶ Gypsum industry **motivation** to recycle is
  - ▶ **Difficulty to access primary raw material;**
  - ▶ **FGD Gypsum decreases (closing of the coal combustion plants).**

- ▶ **More recycling needed to ensure security of supply of the raw material**

**What are the challenges to use recycled gypsum 100% as we do now we FGD Gypsum?**



# Recycling Gypsum Challenges



Causes of market inefficiency	Explanation
Price costs in secondary material markets	<p>Arises from different reasons among which:</p> <ul style="list-style-type: none"> <li>• the diffuse and irregular nature of waste generation;</li> <li>• the heterogeneous nature of secondary materials;</li> <li>• the lack of a recycling culture in certain countries</li> <li>• absence of a restrictive national regulation or non-compliance with an existing one</li> </ul> <p>the unfair competition of landfill whose tax is not sufficient to divert tonnages to recycling routes</p>
Information failures related to waste quality	This is the case of recycled gypsum that does not respect the quality specifications set up by a given manufacturer
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.

# Policy Challenges

## ► Landfill cost versus recycling fee

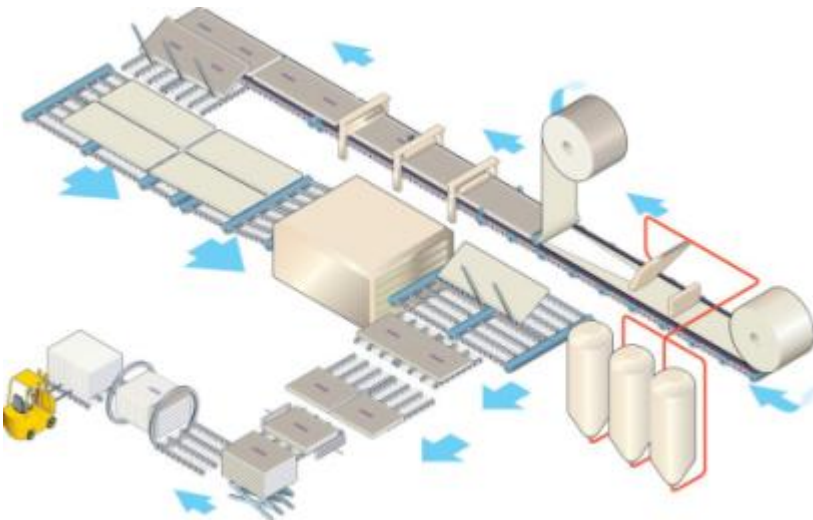
Country/Cost for non-hazardous landfilling	Standard* cost per ton (2013)	Gate fee per ton (2013)	Landfill tax per ton
France	80 €	40 to 95 €	17 to 30€
The UK	110 €	13-50 €	85€ (72£)
Germany	20-150 €	20-150 €	0€
Belgium	105€ (wal)	50 €	67,46€ 46,29€ (Fl)
The Netherlands	90 €	90 €	0 € as per 1/1/2013
Spain	80 €	50 - 110 €	3 € (inert)
Poland	N/A	20 to 35 €	65€
Greece	25 to 31 €	10-72 €	35 €/tons as of 1/01/2014 + 5€/year up to 60€

if the recycling gate fee (average 55 Euro/tons) is lower than the landfill costs, (gate fee + landfill tax), then the recycling route is likely to be chosen



# Policy Challenges

- ▶ Statistical data:
  - ▶ **very limited data available on plasterboard waste generation**
    - ▶ Waste volume-constancy
    - ▶ Recycled gypsum quality-constancy
- ▶ This means that producers are reluctant to invest in the production process if waste generation is uncertain



# Policy Challenges

## Estimation of gypsum based waste generation

**ESTIMATION OF TOTAL GYPSUM BASED WASTE GENERATED IN 2012 (IN TONNES)-A1 report**

Country	Sold volume of gypsum based products (m <sup>2</sup> )	Population	Consumption of gypsum based products* (square meter per capita)	Consumption of gypsum based products* (square meter)	Consumption of gypsum based products (tons)	New construction waste (tons)	Demolition and renovation waste (tons)	Total gypsum based waste generated (tons)
						10% of total consumption	50% of new construction waste	
Belgium	Confidential	11,094,850	2.54	28,201,500	239,727	23,973	11,986	35,959
Germany	264,956,532	81,843,743	2.33	190,769,490	1,621,638	162,164	81,082	243,246
Greece	Confidential	11,290,067	1.08	12,182,500	103,557	10,356	5,178	15,534
Spain	100,504,000	46,196,276	1.44	66,551,649	565,723	56,572	28,286	84,858
France	292,711,321	63,409,191	4.49	284,636,700	2,419,557	241,956	120,978	362,934
The Netherlands	Confidential	16,730,348	2.14	35,871,000	304,922	30,492	15,246	45,738
Poland	105,272,000	38,538,447	1.71	66,020,816	561,211	56,121	28,061	84,182
The UK	221,100,410	63,256,141	3.46	218,639,790	1,858,550	185,855	92,927	278,782
<b>TOTAL</b>	<b>984,544,263</b>	<b>-</b>	<b>-</b>	<b>902,873,444</b>	<b>7,674,885</b>	<b>767,488</b>	<b>383,744</b>	<b>1,151,233</b>

# Policy Challenges

- ▶ Create a culture of deconstruction
- ▶ Deconstruction vs demolition
  - ▶ **Buildings currently demolished and not dismantled**
  - ▶ **Unsegregated waste goes to landfill**
  - ▶ **No possibility to recover valuable recyclable materials**
- ▶ Deconstruction requires
  - ▶ **Separation and selection in situ**
  - ▶ **No mixed waste**
- ▶ Regulation for deconstruction in Europe
  - ▶ **No regulatory requirement agreed in the 8 target countries of the project**
  - ▶ **Regulatory audit of the materials prior to demolition in France**



# Deconstruct





# Industry Challenges

- Recycling network to be extended in Eastern and Southern Europe

Company	Contact
GRI	Henrik Lund-Nielsen
NWGR	Maarten Hendricks
<b>France</b>	
Ritleng valorisation	jean-Luc Ritleng
Nantet Locabennes	Giles Nantet
<b>UK</b>	
GRAUKI-Gypsum reprocessors association	Mark Hatfield
Roy Hatfield	Mark Hatfield
Countrystyle	Country style recycling
<b>NL</b>	
Gipsnet	
<b>Germany</b>	
MUEG GmbH	Jörg-Michael Bunzel
HEILIT Umwelttechnik GmbH	Hermann Hahn
ARGE Gipsrecycling	Dr. Steffen Stubenrauch
GFR mbH	Dr. Erwin Gerstner
<b>Ireland</b>	
EGRS	Martin Eves

# Industry Challenges

---

- ▶ **Recycling process**
  - ▶ **Striving for certification of the recycling process of the recyclers (quality management system);**
  - ▶ **Achieve high quality of recycled gypsum;**
  - ▶ **Obtain the end-of-waste status (EOW) at national, federal or local level;**
  - ▶ **Definition of the recycled gypsum;**
  - ▶ **Definition of the recyclable gypsum;**
  - ▶ **Establishment of Waste acceptance criteria for countries not covered by the project.**

**Recycled  
material**



- ▶ Innovation in the recycling process
  - ▶ **Two issues:**
    - ▶ The recyclability of the plasterboard waste at the entrance of the recycling plant
    - ▶ The recyclability of the plasterboard itself due to additives.

This means collaborative technological innovation between recyclers and producers

# Growth and job

---

- ▶ Innovative recycling company (France)
  - ▶ **Activities started in 2011 with 3 persons**
  - ▶ **Today: 16 employees (qualified and non qualified)**
  - ▶ **Network of waste collectors (indirect employment)**
  - ▶ **Acceptance of polystyrene for an innovative polystyrene recyclers (3persons)**
  - ▶ **Future:**
    - ▶ One plant in Paris (early 2017) – around 10 employees
    - ▶ One plant in Bordeaux
- ▶ Issues
  - ▶ **Huge difficulties for access to finance**
  - ▶ **Undue administrative burden**



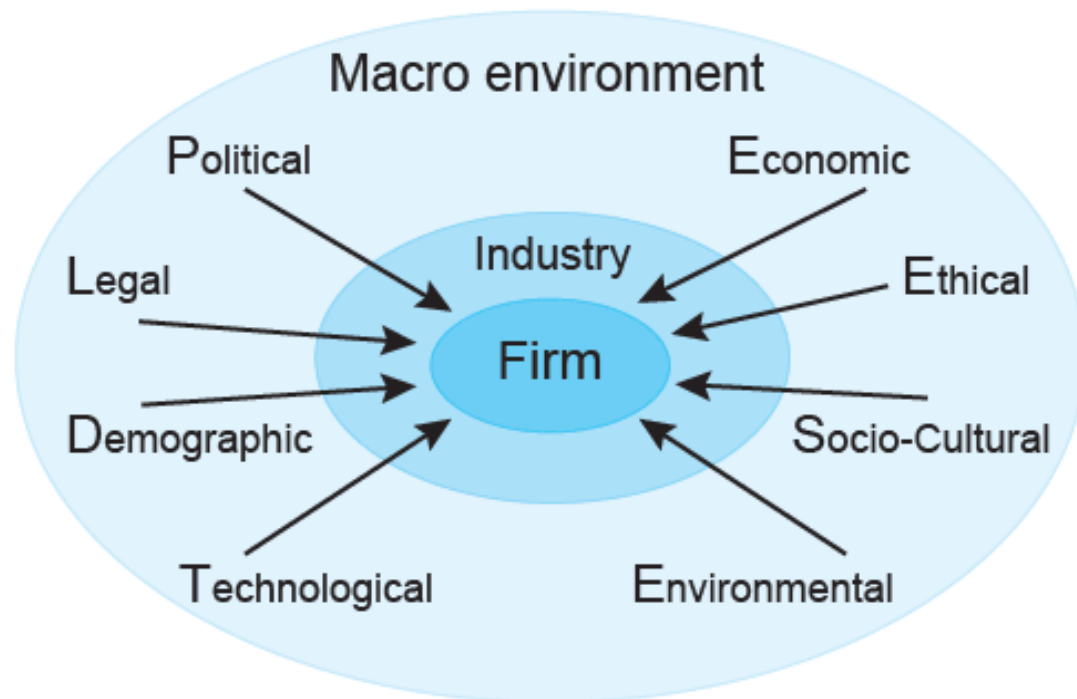
# Results of the Project

---

- ▶ Showed that deconstruction is key to reach constant volume and rely on a secure deposit of gypsum based waste;
- ▶ Showed that constant quality of the recycled gypsum is necessary for widespread use of the recycled material;
- ▶ Proved that **re-incorporation (up to 30%) of recycled gypsum in Type A plasterboard manufacturing is feasible in practice** even under the adverse conditions of non-permanent process adjustments;
- ▶ Proved that the reincorporation of recycled gypsum up to 30% does not noticeably affect the basic **performance characteristics of Type A plasterboards**;
- ▶ Highlighted **potential production bottlenecks in terms of recipe modifications** (e.g. in additives) **and production process equipment** (e.g. storage, feeding conveyors, recycled gypsum pre-processing etc) that may arise when the increased percentage becomes standard practice in the plasterboard manufacturing;
- ▶ Showed that **the end-of-waste status** is appealing but in practice is today challenging to achieve at EU level for the recycled gypsum;
- ▶ Showed that **the GHG emissions** between natural and recycled gypsum are minor;
- ▶ Demonstrated in practice **the full engagement of plasterboard manufacturers** to develop recycling practices that will permit higher re-incorporation percentages in the future.

# Way forward

- ▶ The recycling of production, construction and demolition waste highly depends on the macro-environment dominating in each country.
- ▶ Recyclable solutions should be thus taken at country level on the basis of the below diagram



# Recommendations

---

## EU Authorities

- ▶ Waste Framework directive
  - ▶ **Aim: three targets**
    - ▶ Recycling
    - ▶ Reuse
    - ▶ Backfilling
- ▶ Improve EU C&D waste Statistics
- ▶ Design for deconstruction
- ▶ Improve waste prevention
- ▶ Mandatory audit of buildings prior to demolition
- ▶ Financial support for technology deployment and development

# Recommendations

---

- ▶ Gypsum Industry
  - ▶ **Design for recycling**
  - ▶ **Selective demolition of plasterboard systems**
  - ▶ **Active cooperation between recyclers and producers (specifications, technologies)**
  - ▶ **R&D in recycling techniques**





THE VOICE OF THE EUROPEAN GYPSUM INDUSTRY

Rue de la presse, 4  
B-1000 Brussels, Belgium

Tel: (32) 2 227 11 30  
Fax: (32) 2 218 31 41

[info@eurogypsum.org](mailto:info@eurogypsum.org)  
[www.eurogypsum.org](http://www.eurogypsum.org)

