Life REPOLYUSE

GOOD PRACTICES GUIDE

LIFE-Repolyuse. REcovery of POLYurethane
for reUSE in eco-efficient materials.
Project co-funded by the LIFE Programme
of the European Union (LIFE16 ENV/ES/000254)

Life REPOLYUSE

RECOVERY OF POLYURETHANE
FOR REUSE IN ECO-EFFICIENT MATERIALS

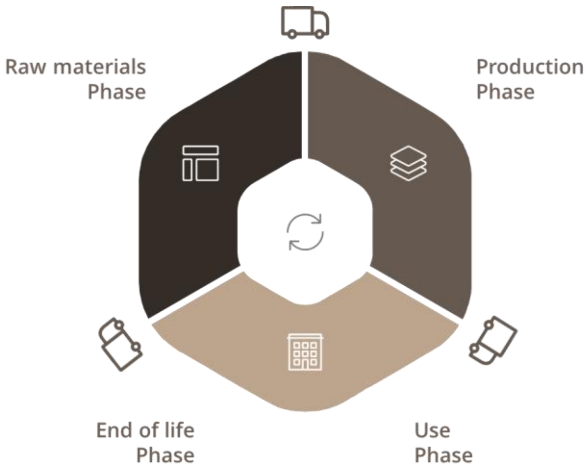
GOOD PRACTICES GUIDE

TABLE OF CONTENTS

1. INTRODUCTION

The **LIFE-Repolyuse project – REcovery of POLYurethane for reUSE in eco-efficient materials** tries to solve the environmental challenge of scarcity of resources and waste management in order to mitigate the effects of climate change.

Addressing the problem of **management of polyurethane plastic waste**, the goal is to increase the reuse of polyurethane waste that is currently managed as inert waste or is recovered through techniques that are not environmentally sustainable. By using a new technology, **polyurethane waste is integrated into new building materials, thus extending its lifecycle**. Life-Repolyuse technology aims to reduce the use of natural resources and ensure that more energy is embedded in the material.



Life-Repolysue Lifecycle

The project, with a high replicability impact, will design innovative materials, adapted to the needs of citizens and the building industry, and other stakeholders' groups who will benefit from it.

The best practices database is the cornerstone of the project. For this reason, one of the main outputs to be delivered is a Guide of Good Practices, organized in two dimensions. On the one hand, the **Product Lifecycle Stages**. And, on the other hand, the **Research and Development Project Phases**. The Guide aims to be an example and an inspiration for the industry, to **reduce the environmental impact, and to make a more rational use of the resources**. In order to have a more active role in the sustainable future.

Aims

- To maximise the reuse of PU waste
- To reduce the carbon footprint
- To transfer and replicate the technology in EU
- To promote sustainability

The guide compiles and makes available to the general public the best practices detected among the consortium and identified and characterized by every consortium partner. **These practices are intended to be incorporated into the Policy Learning Platforms as "success stories".**

This guide will ensure the necessary and appropriate steps to guarantee the technology installation and legal requirements. This includes the public entities that must be involved in any installation or construction license. The guide will also include details of the technology being used and the necessary components to put the system together.

Along the Life-Repolyuse project, the fruitful interchange of ideas has enlarged and improved this Guide.

2. LIFE-REPOLYUSE PROJECT

2.1 Polyurethane re-use

Polyurethane waste is currently managed as inert waste or it is recovered using techniques that are not environmentally sustainable. In fact, nowadays, about 3.5 Million tons of polyurethane are used in Europe each year. This generates around **675 thousand tons of polyurethane waste, and most of it (68%) become landfill waste**.

Currently, the **polymers have become a key material for society**, with very high levels of production and consumption compared to other materials. With presence in strategic sectors such as packaging, building and construction, automotive, electrical and electronic, home, leisure and sports, farming, medical applications, and so on.

The intensive use of polymers is **due to its properties and performance**, especially its plasticity, electrical, thermal and acoustic conductivity, and chemical, atmospheric mechanical strength, density, elasticity, hardness, melting temperature, variety, shape, color, texture and appearance, and production cost.

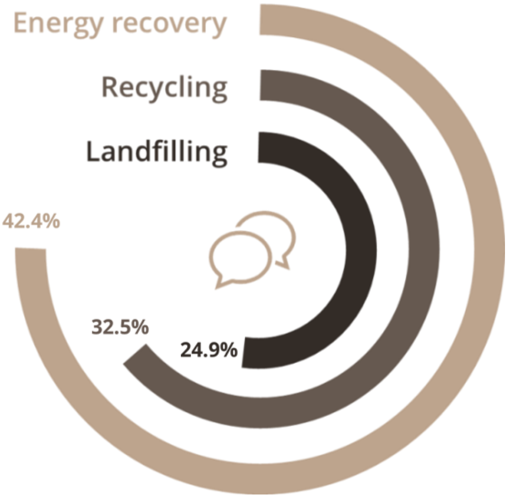
Despite the large size of the polymer industry and the concern about the environmental impact it generates, there is a **strong lack of global information on the destination of the polymers at the end of their useful life**.

Polyurethane foam

The end of the useful life of the polymers reveal the **"latent" environmental problem**, as they are not admissible by nature. Failure in the management of plastic waste leads to the environmental pollution on land, water and air, as well as a risk to the survival of species.

Since 1980, the EU has opted for the recycling of PU waste after its useful life in products or in the process of production, through policies that encourage recycling.

In 2018 there were collected 29.1 Mt of polymer waste for further treatment, with the following management average values: **Energy recovery (42.4%), recycling (32.5%) and landfilling (24.9%).**



Average waste management values[1]

---

[1] Plastics – the Facts 2019. An analysis of European plastics production, demand and waste data. Plasticseurope.org

Using this new technology, it will **integrate polyurethane waste into new building materials, thus extending its lifecycle.** Life-Repolyuse technology will allow a reduction in the use of natural resources and ensure that more energy is embedded in the material.

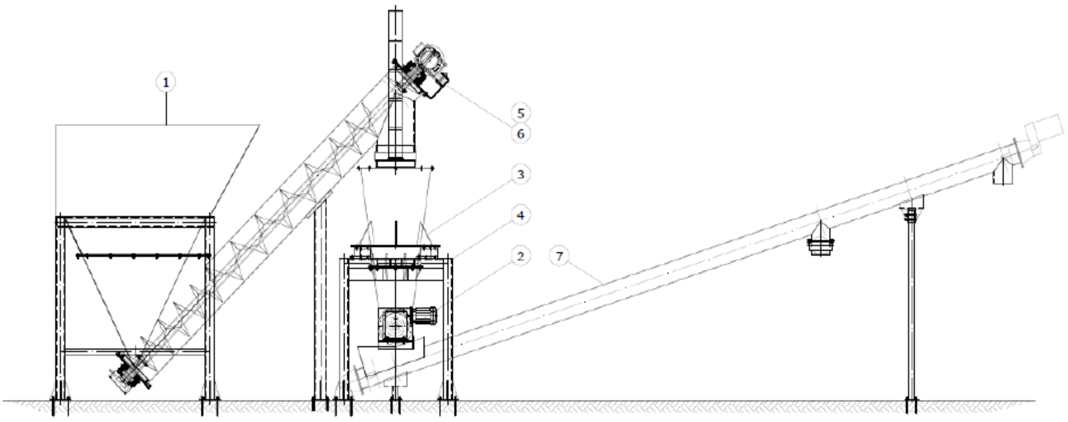
2.2 New technology based on polyurethane re-use

The new manufacturing technology is based on a traditional manufacturing line, with a slight additional process that has been added to **include polyurethane waste in the process as a raw material**.

It is necessary to **transform the polyurethane waste into a powder material** to integrate it into the production line.

Once crushed, the polyurethane waste is stored in drums or big bags waiting to enter in the production line of the ceiling tiles.

The manufacturing process involves the **dry mixing of the waste with gypsum**. For this purpose, an industrial scale mixer has been defined and built, as shown below.



Industrial mixer

To dry mix both raw materials, the mixer has a dosing that works continuously and that provides the right mix.

The rest of the manufacturing process is the same as the normal production process of gypsum ceiling tiles.

To mix both products homogeneously, it has been used a **worm gear**. After several designs and some modifications, it has been able to give a suitable mix for the industrial propose.

The in-line mix of the dry material **(gypsum + polyurethane) blends in line with the water, fibers and additive**, and continues the normal manufacturing process.

The new tiles are stored for drying under the same conditions as standard tiles.

After the drying phase, the tiles are prepared for the transport in the following way:

8 units/box - 48 boxes/pallet

2.88 m^2/box - 138.24 m^2/pallet

3. PRODUCT ANALYSIS RESULT

The new Life-Repolyuse product has been assessed in order to evaluate the **environmental and economic impact** for the society.

3.1 Lifecycle analysis

The main purpose of this study was to compare, under contemporary production infrastructure and logistics conditions, the **environmental implications** of choosing traditional gypsum tiles or the new Life-Repolyuse tiles based on an equivalent gypsum ceiling tiles to cover a surface of 1 m^2. The results are valid for tiles produced in Spain and help in the **identification of key parameters and hotspots in both systems**.

The conclusions of the Lifecycle Analysis are summarized in the following chart. This includes the assessment in each impact category, presenting the percentage of difference between both tiles, using the standard gypsum tile as a reference.

Impact category (unit)	Model of tile	Total	% Difference
Global warming (kg CO2 eq/m^2)	Standard	6.488	-13.98%
	PU-gypsum	5.581	
Soil and water acidification (Kg SO2 eq/m^2)	Standard	1.68 x 10-3	-9.52%
	PU-gypsum	1.53 x10-3	
Eutrophication (Kg (PO4)3- eq/m^2)	Standard	3.12x10-4	-8.65%
	PU-gypsum	2.85x10-4	
Photochemical ozone formation (Kg C2H2 eq/m^2)	Standard	1.05x10-5	+19.05%
	PU-gypsum	1.25x10-5	
Abiotic resource depletion (ADP-elements) (Kg Sb eq/m^2)	Standard	0.48737	-11.79%
	PU-gypsum	0.42989	
Abiotic resource depletion (ADP-fossil fuels) (MJ/m^2)	Standard	94.0797	-13.83%
	PU-gypsum	81.0671	
Use of renewable primary energy excluding resources used as raw material (MJ/m^2)	Standard	0	-
	PU-gypsum	0	
Non-renewable primary energy use excluding resources used as raw material (MJ/m^2)	Standard	94.0797	-13.83%
	PU-gypsum	81.0671	
Net use of fresh water (L/m^2)	Standard	8.328	-25.22%
	PU-gypsum	6.228	
Disposed / discharged hazardous waste (Kg/m^2)	Standard	0	-
	PU-gypsum	0	
Non-hazardous waste disposed / discharged (Kg/m^2)	Standard	10.1452	-31.18%
	PU-gypsum	6.9816	
Materials for recycling (Kg/m^2)	Standard	0.220212	+1.08%
	PU-gypsum	0.222600	
Exported energy (MJ/m^2)	Standard	30.458	-21.75%
	PU-gypsum	23.832	

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

Based on the results of the present study, it can be affirmed that important differences have been found in the behavior of the two gypsum ceiling tiles models studied in terms of **quantification of the impact categories**.

Moreover, to these data, we must also add the results of the comparative tests for both tiles in terms of use, which are shown below:

Test	Result
Thermal conductivity	Test based on the UNE-EN 12667 standard. The PU-gypsum ceiling tile improves the results of the standard gypsum tile by 26.7%
Reaction to fire and resistance to fire	Result: A1. The classification of the PU-gypsum tile does not differ compared to the standard gypsum tile
Acoustic absorption coefficient	Similar results for both tiles: • αm (average absorption coefficient) = 0.08 • NRC (noice reduction coeficient) = 0.12 • αW (weighted sound absorption coefficient) = 0.10

After analyzing the results of all the impact categories studied, as a final conclusion of the Lifecycle Analysis study, it can be established that the **environmental behavior of the PU-gypsum ceiling tile is more favorable than the standard gypsum tile**, since the PU-gypsum tile presents improvements in most of the impact categories, some of them substantial and significant, such as global warming, depletion of abiotic resources, (ADP-elements and ADP-fossil fuels), net use of fresh water and non-hazardous waste eliminated / dumped).

3.2 Lifecycle cost

The Lifecycle costing (LCC) evaluates and compares the “traditional” standard gypsum model and the “new” polyurethane-gypsum model, the **total cost performance of the tiles over time, including acquisition, operation, maintenance and disposal costs**.

The LCC analysis concludes that the **PU-gypsum tile performs better in the cost perspective**.

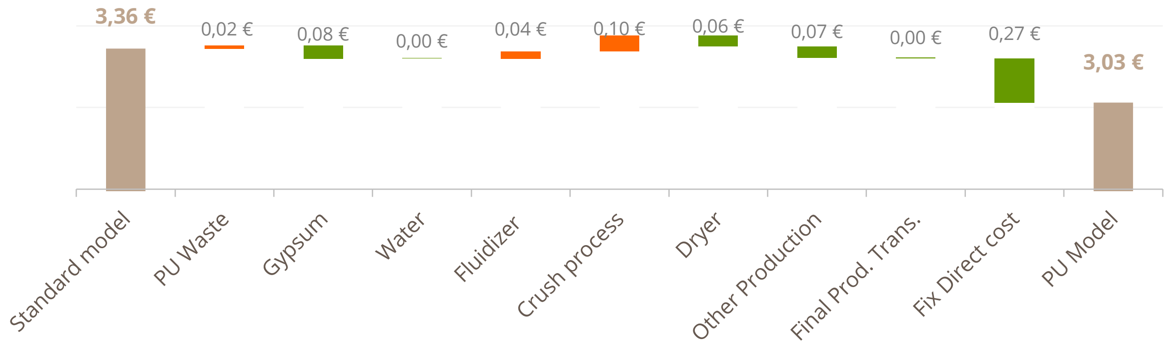
	Standard model	PU model	Diff.	% Diff.
Product LCC	**3.46€**	**3.13€**	**0.33€**	**-9.51%**
Production unit costs	3.36€	3.03€	0.33€	-9.79%
Variable direct costs	1.84€	1.78E	-0.06€	-3.26€
Raw materials	*0.41€*	*0.40€*	*-0.02€*	*-4.00%*
Manufacturing	*1.43€*	*1.38€*	*-0.04€*	*-3.04%*
Fixed direct costs	1.52€	1.25€	0.27€	-18%
Use	N/A	N/A	N/A	N/A
Waste / Recycling process	0.10€	0.10€	0.00€	-0.23%

LCC Analysis

The main differences in the production costs are mainly due to the fact that PU-gypsum production is more cost efficient as less drying time is required.

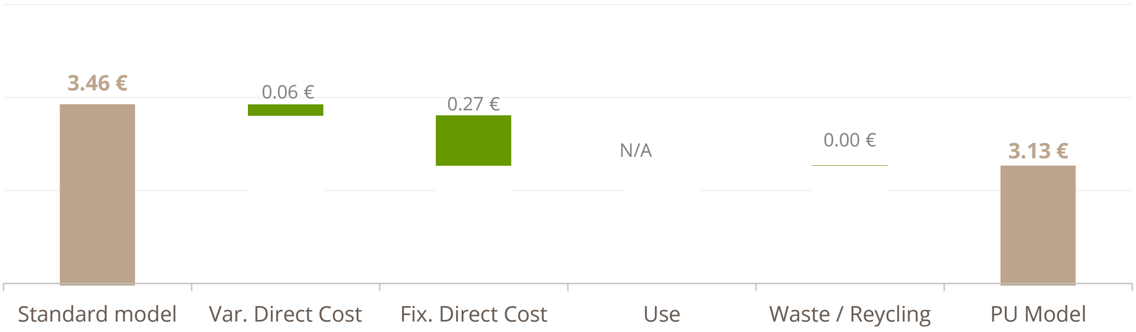
The bridge analysis of the following chart allows identifying the differences in unit cost.

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)



Bridge analysis between the production costs of the standard gypsum model and PU-gypsum model showing the increases in green and the decreases in orange

The following chart shows the overall bridge analysis for both models with the different costs.



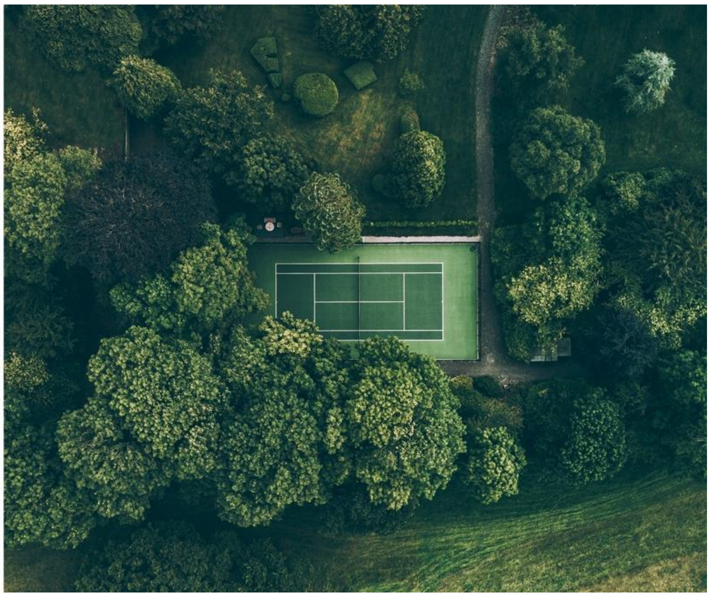
Overall bridge analysis between standard model and PU model

The PU-gypsum model is **0.33 €/m^2 (-9.51%) less costly** than the standard gypsum model.

The LCC analysis concludes that PU-gypsum tile performs better in all perspectives. On the one hand, the **PU-gypsum model performs better in the cost perspective**. On the other hand, the PU-gypsum model performs better in the installation and use perspective, due to the **lower weight and better conductivity isolation and acoustic absorption.**

The PU-gypsum tile model reduces the overall weight of the suspended ceiling, and thus, the cost of the structure. Furthermore, the lighter tiles increase the speed of installation and reduce the costs of transportation.

Moreover, the better PU-gypsum tile model conductibility isolation improves the energy efficiency of the building, and thus, the energy costs.



4. METHODOLOGY

The project defines “Good Practices” as an initiative (e.g. activity project, process, technique) undertaken in the program’s priority which has proved to be successful in the project, and which is of potential interest to other related projects or other stakeholders in the industry. Proved successful means that the good practice has already provided **tangible and measurable results in achieving a specific target**. Although it is primarily referring to good practices, valuable learning also derives from bad practices, in which learned lessons can be taken into account in the process of exchanging experience.

The Good Practices Guide includes practices organized in two classification dimensions:

- On the one hand, the **Life-Repolyuse product lifecycle stage**, in which the practice focuses.
- On the other hand, the **stage of the project in which the practices take place better**.

Classification impact

		Product lifecycle stage			
		Raw Material	Manufacturing	Use	Waste / Recycling
Project stage	Research				
	Laboratory				
	Pilot				
	Market				

Furthermore, each practice is structured according to the following information in order to have an exhaustive analysis of each practice:

- **Description.** Brief description of the practice, the reason why it is important, and the main impacts.
- **Key success factors.** Identification and description of the main activities, tasks, resources and processes in order to deliver the practice successfully.
- **Risks.** Identification and description of the main risks in order to deliver the practice successfully.
- **Classification.** Identification and description of the product lifecycle stage and project stage in which the practice focuses and has impacts.
- **Impact / effort matrix framework.** Position of the practice in terms of impact and effort to deploy it.
    - **Impact.** Identification of the impact of the practice in a low / medium / high scale.
    - **Effort.** Identification of the the effort of the practice in a low / medium / high scale.
- **Replicability.** Description of the main drivers to replicate the action and measurement of its replicability in a low / medium / high scale.
- **Stakeholders.** Identification of the main stakeholders involved and impacted by the practice.
- **KPIs.** Identification of the main KPIs (environmental / economic / social) impacted by the practice.

5. GOOD PRACTICES

1. Initial “sanity check” to identify agents that may damage the product
2. Analysis of the regulatory framework in order to find the strengths of the new product / technology
3. Design and installation of sensors in DEMOSITES
4. Ensuring that the laboratory test done applies to the market reality
5. Development of innovative awareness activities to communicate the project values
6. Strategy of continuous communication and dissemination activities to engage the community
7. Definition of a technical outcomes presentation calendar for the project
8. Involvement of an industry leader in the project
9. DEMOSITE selection process and property approval
10. Transportation and storage of the product before placement in DEMOSITES
11. Ensuring enough raw material nearby the production site

12. Carrying out the processes in the most efficient location, regardless of the owner
13. Definition of a detailed protocol for the waste management and traceability
14. Analysis of the whole product lifecycle impacts “from cradle to grave”
15. Development of a clear new process production diagram
16. New workplace safety assessment
17. Focusing on large markets with high and increasing demand
18. Innovation in materials that also have better manufacturing results
19. Obtaining the CE product mark
20. Elaboration of the technical data sheet of the finished product
21. Identification of additional opportunities for the new product / technology
22. Establishment of communication channels at product marketing level
23. Transportation with more efficient vehicles
24. Environmental certification of the product to compete with other products
25. Maximization of the use of renewable electricity

INITIAL “SANITY CHECK” TO IDENTIFY AGENTS THAT MAY DAMAGE THE PRODUCT

1

During the initial phases of the research, it is important **to do a characterization check of the new material** in order **to identify agents that may damage the final product** (i.e. metallic particles). This identification **allows to discard the idea of using the waste material as raw** material in initial stages, in case there is any incompatibility and, **therefore, to avoid investing additional efforts**.

Key Success Factors

- Including “sanity checks” and previous assessment processes to **identify “deal breakers” as soon as possible** in the research process
- Gathering **real final product and market information** to know the product and market “deal breakers”
- Having **human and technological resources** to perform the checks and tests

Risks

- **Misunderstanding the product and market “deal breakers”** and identifying false negatives or false positives that drive into wrong decisions

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research	■			
Laboratory				
Pilot				
Market				

Stakeholders

- Project leader
- Researcher

KPIs

- They apply to all the **performance indicators** since these ones are not even defined if the project is discarded

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			
Medium			■
High			

Replicability

- Including a **sanity check** in early stages is replicable
- Although the parameters and ”deal breakers” are **different for each product or market**

High

[✓ Medium]

Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

2

ANALYSIS OF THE REGULATORY FRAMEWORK IN ORDER TO FIND THE STRENGTHS OF THE NEW PRODUCT / TECHNOLOGY

In order to guarantee the new technology outcomes, it is key **to analyze the regulatory framework to identify the strengths** . Furthermore, this analysis will also **highlight weak points as soon as possible.** Therefore, if there is an opportunity, the project may, in early stages, **persuade the regulatory entities to change the regulation**.
In this case, polyurethane is considered "subproduct", so there is not any regulatory barrier to be used as a raw material.

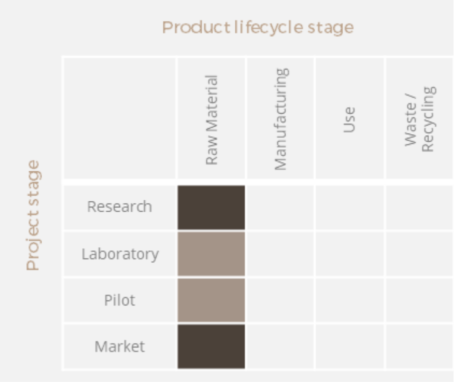
Key Success Factors

- Having a **detailed knowledge of the regulatory framework** regarding the technology used in the project
- If the regulatory framework raises a strong point regarding the new technology, **communicating it to the market and to the regulatory entities**
- If the regulatory framework raises a weak point, if it makes sense to change the regulation, developing a **communication strategy** to persuade the regulatory entity to change the regulation

Risks

- Changing the regulatory framework may take **too much time and resources**

Classification impact

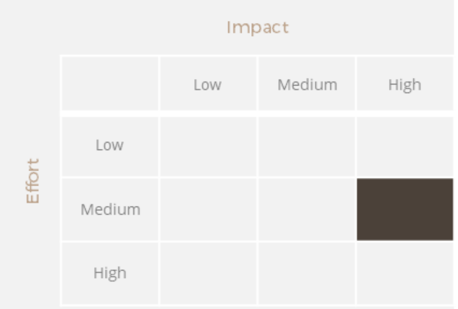


Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research	■			
Laboratory	▨			
Pilot	▨			
Market	■			

Effort / Impact Matrix



Impact

Effort

	Low	Medium	High
Low			
Medium			■
High			

Stakeholders

- Research team
- Waste producers
- Manufacturer

KPIs

- All **environmental, economic and social KPIs** related to the use of the product are impacted by this practice

Replicability

- The regulatory framework analysis is quite straightforward for the technological expert
- To make changes to the regulation may be **more challenging**

High

[Medium]

Low

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

3

DESIGN AND INSTALLATION OF SENSORS IN DEMOSITES

For the data analysis of the DEMOSITES, it is very important, not only to deploy sensors in the building, but also to deploy a strategy of placement of them, both in **geographical and time frame analysis** for gathering the best data possible.

Key Success Factors

- Acquiring data simultaneously allows **better data comparison** and the consideration of the same boundaries
- **Validating the product** compared to similar technologies in the same timeframe and place
- **Acquiring external data** allows to develop the energy model more in detail

Risks

- The possibility of a DEMOSITE to **allow the installation of different ceilings** and its instrumentation could be difficult
- Delays in the **simultaneous instrumentation of DEMOSITES** could lead to lack of data for analysis

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research			■	
Laboratory				
Pilot			■	
Market				

Stakeholders

- Project leader
- Researcher
- Installer
- Instrumentation planner

KPIs

- All **environmental, social and economic KPIs** related to the use of the product

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			
Medium			■
High			

Replicability

- Each DEMOSITE is different. However, with a good planning, it could be easy to design good **instrumentation plans for data analysis**

[✓ High]

Medium

Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

4

ENSURING THAT THE LABORATORY TEST DONE APPLIES TO THE MARKET REALITY

In the laboratory phase, it is required to **work close to the industry, to ensure that the tests are aligned with the market reality** and, therefore, to **optimize the tests design.**
In this case, we required the optimal dosage that complies with the regulation, and we had to use similar materials (fibers / lime / additive) as used in the factory, so that the process analyzed in the laboratory is aligned with the market.

Key Success Factors

- **Working close to the industry** during the research phase is required
- **The industry must be encouraged** to work and invest resources in these early product stages
- The laboratory **must ask the right questions to the industry**, and the industry must understand the research process

Risks

- The **industry may not be encouraged** to invest resources in this early product stage
- The research institution and the industry **may not talk the same language.** Therefore, it may be misunderstandings among the different players

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory	■	■	■	■
Pilot				
Market				

Stakeholders

- Project leader
- Researcher
- Manufacturer

KPIs

- The **impacts on the KPIs** are mainly based on wrong definition at the beginning of the project or delays in the accomplishment

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium		■	
High			

Replicability

- The involvement of the industry partners **differs** from one to another

High
[✓ Medium]
Low

Life REPOLYUSE
Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

5

DEVELOPMENT OF INNOVATIVE AWARENESS ACTIVITIES TO COMMUNICATE THE PROJECT VALUES

Define, develop and deliver innovative awareness activities to communicate the project values and objectives. In this case, the main objective is improving the environmental sustainability of the building materials. This innovative activities will broaden the message and the audience of the project.
For example, the project has done several workshop with students, based on the environmentally friendly building materials.

Key Success Factors

- **Identifying innovative awareness activities**
- **Partnering with entities with influence** on the target population
- Delivering the activities in a professional manner
- After the activities, broadly **communicating the initiatives done**

Risks

- Defining and executing innovative initiatives that require resources but **with low impact**

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot	■			
Market				

Stakeholders

- Project leader
- Researcher
- Manufacturer

KPIs

- In the short run, the main impacts are in KPIs related to **communication**
- In the long run, the KPIs related to **production levels** will be impacted, due to the increase in the use of the PU-gypsum tiles

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low		■	
Medium			
High			

Replicability

- The **continuous communication strategy** can be replicated to any project

[✓ High]
Medium
Low

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

6

STRATEGY OF CONTINUOUS COMMUNICATION AND DISSEMINATION ACTIVITIES TO ENGAGE THE COMMUNITY

In order to engage the industry community, it is **key to develop a continuous communication and dissemination strategy** (monthly, every two weeks…) in the different channels available (web, public relations, news…).
This will engage the stakeholders and lead to a better technology awareness and acceptance.

Key Success Factors

- **Identifying the main message** to communicate
- **Identifying the stakeholder communication target** (manufacturers, waste producers, clients, research community…)
- **Identifying the main communication channels** depending on the stakeholder target
- **Being consistent** in the communication periodicity
- **Involving the stakeholders** in the communication process

Risks

- Not being able to maintain the **communication periodicity** due to the resources needed, or because there is not enough content to communicate

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot	■	■	■	■
Market				

Stakeholders

- Project leader
- Researcher
- Manufacturer
- Waste producer
- Clients / users

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low		■	
Medium			
High			

KPIs

- In the short run, the main impacts are in KPIs related to **communication**
- In the long run, the KPIs related to **production levels** will be impacted, due to the increase in the use of the PU-gypsum tiles

Replicability

- The **continuous communication strategy** can be replicated to any project

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

7

DEFINITION OF A TECHNICAL OUTCOMES PRESENTATION CALENDAR FOR THE PROJECT

In order to communicate the technology results to the community, the project **must have a clear results presentation calendar** in congresses and events to communicate the technological outcomes, so that it can maximize the technology acceptance in the industry.

Key Success Factors

- **Identifying the main outcomes to communicate** to the target audience
- **Identifying and joining the main congresses and events to communicate** the project outcomes depending on the target stakeholder

Risks

- Taking part in all **conferences and events** may be very time and resources consuming

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory	▨	▨	▨	▨
Pilot	■	■	■	■
Market				

Stakeholders

- Project leader
- Researcher
- Manufacturer
- Waste producer
- Clients / users

KPIs

- In the short run, the main impacts are in KPIs related to **communication**
- In the long run, the KPIs related to **production levels** will be impacted, due to the increase in the use of the PU-gypsum tiles

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low		■	
Medium			
High			

Replicability

- The **continuous communication strategy** can be replicated to any project

[✓ High]

Medium

Low

8

INVOLVEMENT OF AN INDUSTRY LEADER IN THE PROJECT

In order to better guarantee the long-term success and replicability of the project, it is important to involve an industry leader in the project, who will do the **"fact check" with the market and will have the resources to implement and scale the product / technology.**

Key Success Factors

- Conducting the research to find the right industry leader
- **Aligning the project objectives with the industry leader objectives and incentives**
- **Defining a clear collaboration model** and future technology agreement
- Understanding the competitive dynamics in order to involve or not other stakeholders in the project

Risks

- The industry leader may **change its goal or incentives**
- If the project does not match the **"core business" or the current revenue stream** for the company, it may not be a priority

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot		■		
Market		■	▨	

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			■
High			

Stakeholders

- Project leader
- Companies / manufactures
- Clients / users

KPIs

- All environmental and social KPIs related to PU-gypsum production levels will be impacted due to the **increasing production levels**

Replicability

- The industry leaders are a few, and these few may be focused in other R&D projects
- Nevertheless, if there is a **long-term economic output**, the industry leader will be encouraged

High

[✓ Medium]

Low

9

DEMOSITE SELECTION PROCESS AND PROPERTY APPROVAL

The DEMOSITE´s selection and approval from the property or owner is one of the critical activities of the project. The scheduled planning to match the installation with the construction stages, as well as the approval of the product by the owner, are very important.

Key Success Factors

- **Correcting and specifying scheduled planning in order** to adjust the R&D project stages with the construction ones
- **Analyzing the construction project portfolio** in order to determine alternative DEMOSITES
- Making product **certifications, tests results and samples available in advance** in order to manage the approval of the property or owner of the DEMOSITE

Risks

- **Failure in the approval** from the property or owner could lead to the early finish of the project without achieving the goals
- **Delays in the construction schedule** can affect the project schedule
- A product **without certification or test results may lead to the non-approval** of the product for its use in the DEMOSITE

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot			■	
Market				

Stakeholders

- Project leader
- Researcher

KPIs

- All environmental and social KPIs related to the **use of the product**

Replicability

- Correct planning, availability of alternatives from the **construction project portfolio and product certification**

High

[✓ Medium]

Low

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			
High			■

10

TRANSPORTATION AND STORAGE OF THE PRODUCT BEFORE PLACEMENT IN DEMOSITES

The transportation and storage conditions before installation of the product in the DEMOSITES **should be properly indicated, communicating the procedures to all the partners** involved in the transportation, storage and manipulation of the product.

Key Success Factors

- Preparing **a transportation, storage and manipulation manual** for stakeholders
- **Ensuring a correct use of the product** during the construction stage
- Allowing any stakeholder during the installation process to **know how to deal with the product in different stages**

Risks

- **Possibility of a loss of material** due to an incorrect use of it
- **Delays due to that loss** could lead to scheduling problems with DEMOSITES
- Failures in the product and packaging may lead to a **misuse of the product** if the instructions are not clear

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot			■	
Market			■	

Stakeholders

- Project leader
- Researcher
- Manufacturer
- Hauler
- Installer

KPIs

- All **environmental and social KPIs** related to the use of the product

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			■
Medium			
High			

Replicability

- A **guide of use of the product**, including the stages of transportation, storage and manipulation should be prepared before use

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

11

ENSURING ENOUGH RAW MATERIAL NEARBY THE PRODUCTION SITE

In projects of new raw materials, it **is important** not only the benefits of them, but also **the availability of enough amount of the new raw materials in an economical distance** from the production site.
The project must optimize the waste transportation.

Key Success Factors

- **Performing analysis of distance between waste generators** and final product manufacturers
- **Creating alliances among waste producers** and final product manufacturers
- Optimizing the **transportation process and resources**

Risks

- The manufacturers and the waste generators need very **different waste location requirements**. Therefore, it is not “natural” that they are both located in proximity
- Mainly during the early market stages, **the production levels are not high enough** to make any change of location feasible

Classification impact

Product lifecycle stage / Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market	■			

Stakeholders

- PU / raw material supplier
- Manufacturer

KPIs

- Environmental KPI
- Economic KPI

Effort / Impact Matrix

Impact / Effort

	Low	Medium	High
Low			
Medium			
High			■

Replicability

- It is very **difficult to change industries location**, mainly in early product stages

High
Medium
[✓ Low]

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

CARRYING OUT THE PROCESSES IN THE MOST EFFICIENT LOCATION, REGARDLESS OF THE OWNER

12

When preparing the new raw material, it is important to **involve the waste industry in order to do onsite the most processes as possible**. This may lead into a reduction of the transportation costs, as well as the required processes.

Key Success Factors

- **Involving the waste industry in the process**
- Identifying and communicating the new processes for the benefit of the waste industry
- **Analyzing all the overall lifecycle processes in order to identify the most efficient location** for each process, regardless the location owner

Risks

- The **waste industry may not be encouraged** to add additional processes to the waste management
- The waste management **requirements may not be the same among the manufacturers.** Therefore, each one may need their own preparatory processes

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market	■			

Stakeholders

- PU supplier
- Manufacturer

KPIs

- Environmental KPI
- Economic KPI

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			
High		■	

Replicability

- The **methodology** may be added to all the project
- But **the application differs** for each project

High
[✓ Medium]
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

13

DEFINITION OF A DETAILED PROTOCOL FOR THE WASTE MANAGEMENT AND TRACEABILITY

Define a detailed protocol for collecting, storing, packing and shipping waste in waste generators. The waste collection process must be documented to be easily replicable. Therefore, the waste producers will have enough tools to manage the waste destined to be reused. In addition, the compliance with this protocol means ensuring trust in the origin of the waste for the producers of the prefabricated.

Key Success Factors

- **Creating a detailed protocol** including:
    - Type of waste managed
    - Waste treatment factory
    - Waste collection scheme
    - Waste logistics
- **Involving the waste generators** in the development of the protocol

Risks

- The waste treatment protocols **may not be economically affordable** for the waste generator
- The **waste type may be so different** that it may be difficult to manage all the alternatives in only one protocol

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market	■			

Stakeholders

- Waste generator
- Manufacturer

KPIs

- All KPIs related to the use of the **waste**

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			■
High			

Replicability

- The **waste management protocol** may be defined for any waste product and waste use case

High

☑ Medium

Low

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

14

ANALYSIS OF THE WHOLE PRODUCT LIFECYCLE IMPACTS “FROM CRADLE TO GRAVE”

Analyzing the product lifecycle “from cradle to grave” allows the manufacturer and the client to have a clear assessment of the product performance. For example, in the case of the polyurethane-gypsum tiles, at the end of the product lifecycle, the polyurethane waste can be separated and used again.

Key Success Factors

- **Performing an exhaustive lifecycle analysis** involving all the stakeholders in the process
- Gathering all the information required for the analysis
- **Being able to compare the analysis with similar products** or substitute products

Risks

- Not being able to **collect all the data needed**
- Identifying **unexpected outputs** that may put at risk the performance of the product

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot	▨	▨	▨	▨
Market	■	■	■	■

Stakeholders

- Project leader
- Researcher
- Manufacturer
- Clients / users

KPIs

- The **lifecycle analysis** is the tool to calculate the main environmental and cost indicators

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			
Medium			■
High			

Replicability

- The **LCA** is a wide used methodology and that fits in any product type

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

15

DEVELOPMENT OF A CLEAR NEW PROCESS PRODUCTION DIAGRAM

The manufacturer must **develop a clear production diagram for the new production process**. This includes elaborating a digital dashboard for each process involved (dosage, crush...). The yearly audit must inspect the work instruction order to follow the ISO-9001 standard.

Key Success Factors

- **Assessing and analyzing the new production processes**
- Elaborating the tools and diagrams in order to **illustrate the production** process (i.e. work instruction)
- **Periodically assessing** the processes

Risks

Replicability

- The **processes diagrams and work instruction reports** are standard requirements to represent and analyze the production processes

[✓ High]
Medium
Low

Classification impact

Project stage	Product lifecycle stage			
	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■		

Effort / Impact Matrix

Effort	Impact		
	Low	Medium	High
Low		■	
Medium			
High			

Stakeholders

- Manufacturer
- Clients / users

KPIs

- The process analysis and representation is a **requirement of the ISO-9001**. Therefore, this impacts on the product selling and, consequently, in all the KPIs based on absolute volume, and the related environmental and social KPIs

Life REPOLYUSE
Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

16

NEW WORKPLACE SAFETY ASSESSMENT

Any **new workplace requirement from the new technology must be assessed**. The occupational hazards department, or the provider, must assess the risks related to the new workplace and define the personal protective equipment (i.e. protection glasses and mask) or factory requirements, such as ventilation, in order to ensure the air quality.

Key Success Factors

- **Identifying all the new workplace requirements** due to the new technology
- **Assessing the occupational hazards** related to the new workplace defined
- **Identifying the safety requirements** and equipment needed

Risks

- A **wrong safety assessment** may drive to work accidents
- The safety requirement may put at risk the **economic feasibility**

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■		

Stakeholders

- Manufacturer
- Clients / users

KPIs

- The **workplace safety assessment** is a requirement for running the production. Therefore, this impacts on the product selling and, consequently, in all the KPI based on absolute volume

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low		■	
Medium			
High			

Replicability

- The **workplace safety assessment** is a basic requirement for any production process

[✓ High]

Medium

Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

FOCUSING ON LARGE MARKETS WITH HIGH AND INCREASING DEMAND

17

It is key to introduce the product / technology in a market with demand, so that more waste may be recycled. It is also important to look for similar markets that may also use the technology.
In this case, although we are currently focusing on the 3.5M m^2 gypsum ceiling tiles European market, an additional market could be reached if the technology was also used in the gypsum plasterboard one.

Key Success Factors

- **Focusing on big markets and / or markets with high growth**
- **Looking for adjacent markets** that may also use the new product / technology
- **Including industry experts** on the market, so that they can help with the identification of the key drivers for the improvement of the market

Risks

- Usually, **big markets are already very efficient**. Therefore, additional improvements are difficult to achieve

Replicability

- To find **improvements in large markets** is very difficult to achieve and, therefore, to replicate

High
Medium
[✓ Low]

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market	■	■	■	

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			
High			■

Stakeholders

- PU producers
- Manufacturer
- Clients / users

KPIs

- All the indicators based on production **in absolute volume** will be affected

18

INNOVATION IN MATERIALS THAT ALSO HAVE BETTER MANUFACTURING RESULTS

The outcome of the use of polyurethane, does not only has impact in the reuse of the material, but in an **improvement of the manufacturing process.** In this case by reducing the drying time needed, and consequently, reducing the amount of energy needed in the process.

Key Success Factors

- In the material research process, **focusing not only on the material itself, but also on other processes that may be impacted** by the new product / technology result
- **Validating the new product / technology** in all the product lifecycle

Risks

- In the research stage, it may be **difficult to anticipate all the manufacturing implications** of the new material

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot		▨		
Market		■		

Stakeholders

- Project leader
- Researcher
- Manufacturer

KPIs

- All **environmental and economic KPI** related to manufacturing process

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium		■	
High			

Replicability

- Each material and manufacturing process is different. Therefore, it is **difficult to replicate** the previous analysis

High

Medium

[✓ Low]

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

19

OBTAINING THE CE PRODUCT MARK

CE Mark proves that the product has been assessed and meets EU safety, health and environmental protection requirements. It is valid for products manufactured both inside and outside the EEA, that are then marketed inside the EEA.

Key Success Factors

- **Putting together a technical dossier proving** that this product fulfils all the EU-wide requirements
- **Assessing the EU health protection requirements**
    - Reaction to fire
    - Flexural strength
    - Others…
- Assessing the **EU environmental requirements**
- **Applying for the CE mark**

Risks

- Not obtaining the **CE Mark**

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■	■	

Stakeholders

- Manufacturer
- Clients / users

KPIs

- The CE certification is a requirement to launch the product to the market, thus affecting the **product selling**. Therefore, it impacts on all the KPI based on absolute volume

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			■
Medium			
High			

Replicability

- The **CE Product mark** is one of the most common certifications for any EU product

[✓ High]

Medium

Low

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

20

ELABORATION OF THE TECHNICAL DATA SHEET OF THE FINISHED PRODUCT

The technical data sheet of the new finished product demonstrates the technical features of the product. This data sheet is a mandatory document for most corporate clients in order to incorporate the new product to their projects.
This data sheet includes the safety, health and environmental protection requirements.

Key Success Factors

- **Creating a technical dossier** by putting together all the technical information
- **Performing the tests indicated by the regulations** of the sector in order to certify the technical viability
  - Flexural resistance
  - Thermal conductivity
  - Superficial hardness
  - Reaction to fire
  - Gross heat of combustion
  - Moisture content
  - Acoustic absorption test
- **Publishing and sharing the information** with clients and users

Risks

- The product **indicators may not be as good** as the ones of competing products

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■	■	

Stakeholders

- Manufacturer
- Clients / users

KPIs

- The technical data sheet is a **basic documentation in order to sell de product**, that affects the product selling. Therefore, it has an impact on all the KPI based on absolute volume

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			■
Medium			
High			

Replicability

- The **technical data sheet** of finished products is a basic information that the clients and users will require

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

IDENTIFICATION OF ADDITIONAL OPPORTUNITIES FOR THE NEW PRODUCT / TECHNOLOGY

21

Although it may not be the core the project "use case", it is a good practice to **identify other "use cases" that fit with the new technology / product.** In this case, the new material can be used as an insulation panel for walls and ceilings, to improve the building energy efficiency performance.

Key Success Factors

- Having a clear understanding of the new product / technology **value proposition**
- **Assessing adjacent** markets in order to identify new opportunities for the new value proposition

Risks

- **Misaligning the team** and the resources regarding the core project activities
- Investing time and resources in **researches with no return**

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market			■	

Stakeholders

- Project leader
- Researcher
- Manufacturer

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low			
Medium			
High			■

KPIs

- All the **indicators based on production** in absolute volume will be affected

Replicability

- It is very complicated to **identify additional opportunities** for the new technology / product

High

Medium

[✓ Low]

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

ESTABLISHMENT OF COMMUNICATION CHANNELS AT PRODUCT MARKETING LEVEL

22

In order to achieve an increasing acceptance of the technology, **communication channels must be established at the product marketing level.** For example, by sending to all stakeholders / potential stakeholders via email (newsletter, brochures...) the dissemination material published.

Key Success Factors

- **Identifying the stakeholder communication target** (manufacturers, waste producers, clients, research community...)
- Being consistent in the **communication periodicity**

Risks

- Not being able to maintain the **communication periodicity** due to the resources needed or in case there is not enough content

Classification impact

Product lifecycle stage

Project stage

	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot	▨	▨	▨	▨
Market	■	■	■	■

Stakeholders

- Project leader
- Researcher
- Manufacturer
- Waste producer
- Clients / users

Effort / Impact Matrix

Impact

Effort

	Low	Medium	High
Low		■	
Medium			
High			

KPIs

- In the short run, the main impacts are in the KPIs related to **communication**
- In the long run, the KPIs related to **production levels** will be impacted, due to the increasing use of the PU-gypsum tiles

Replicability

- The **continuous communication strategy** can be replicated to any project

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

23

TRANSPORTATION WITH MORE EFFICIENT VEHICLES

Greenhouse gases associated with the use of a given transport are related to the vehicle efficiency and their corresponding fuel consumption. Using cargo vehicles with lower emissions of polluting gases (nitrogen oxides, hydrocarbons, carbon monoxide and particles) will reduce the carbon footprint related to the product.

Key Success Factors

- **Using vehicles that comply with the European regulations** on emissions (Euro 5 and later)
- Taking into account **raw material** transport operations **and final product transportation**

Risks

- The **cost of using this kind of vehicles** may not be economically feasible

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market	■	■	■	■

Stakeholders

- Waste producer
- Manufacturer
- Client / users

KPIs

- All KPIs related to **environmental impact and product cost**

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium		■	
High			

Replicability

- The replicability may be complex if there is **not transport providers** with this kind of vehicles

High
[✓ Medium]
Low

Life REPOLYUSE
Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

24

ENVIRONMENTAL CERTIFICATION OF THE PRODUCT TO COMPETE WITH OTHER PRODUCTS

In order to communicate the added value of the product due to the new technology, it is **important to apply for environmental certifications**. These certifications support the buying processes of the clients (building companies, architects…) in order to add environmental attributions to the product.

Key Success Factors

- Identifying the **main environmental features** of the new product / technology
- Carrying out the **certification process**

Risks

- The firsts assumptions regarding the **environmental features** may not be accomplished right after the deployment
- If other competing products also have the **environmental certification,** this certification is not a competitive advantage**,** but just a necessary requirement to compete in the market

Classification impact

Product lifecycle stage

Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■	■	

Stakeholders

- Manufacturer
- Clients

Effort / Impact Matrix

Impact

Effort	Low	Medium	High
Low			
Medium			■
High			

KPIs

- The **certification** may have impact on increasing the product selling. Therefore, it impacts all the KPIs based on absolute volume

Replicability

- Once the new product / technology is **more environmentally friendly**, the certification process is very replicable

[✓ High]
Medium
Low

Life REPOLYUSE

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

25

MAXIMIZATION OF THE USE OF RENEWABLE ELECTRICITY

In the cases in which taking electricity from the grid is feasible, **contracting it with marketers with a high renewable generation energy mix will reduce the carbon footprint** of the work.

Key Success Factors

- Choosing manufacturer locations with **energy grid available**
- Identifying **clean energy trading companies**
- Contracting electricity with **renewable energy companies** to reduce the carbon footprint

Risks

- The investment needed to **connect the manufacturer to the grid** may be high and thus, the project may not be feasible

Classification impact

	Product lifecycle stage			
Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market		■		

Stakeholders

- Manufacturer

KPIs

- All KPIs related to the **environmental impact and product cost**

Effort / Impact Matrix

	Impact		
Effort	Low	Medium	High
Low			
Medium			
High			■

Replicability

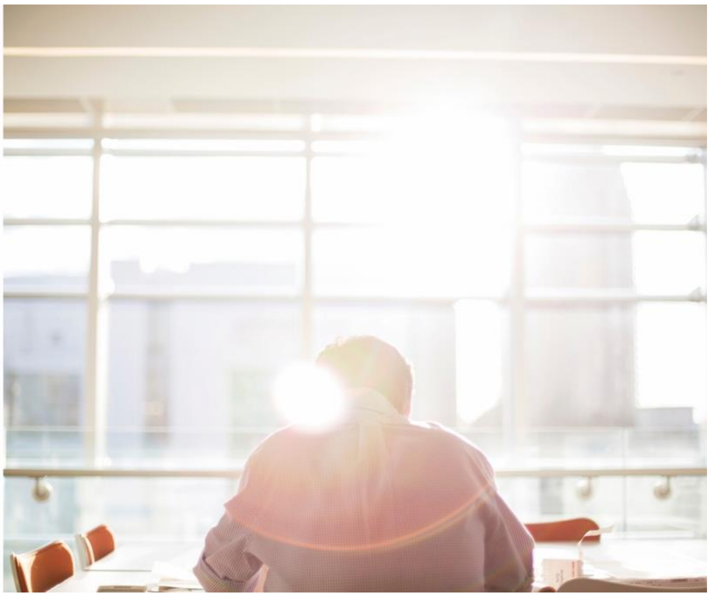
- The **right manufacturing location** in terms of raw material, water, land cost, clients and, of course, access to the energy grid it is difficult

High

Medium

[✓ Low]

Project co-funded by the
LIFE Programme of the European Union
(LIFE16 ENV/ES/000254)

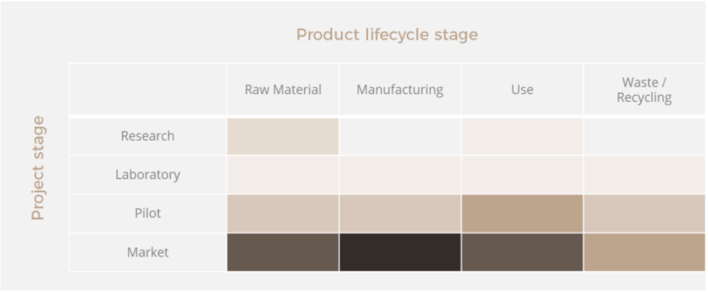


6. CONCLUSIONS

This Good Practices Guide is a great opportunity to wrap up the main activities of the project. In this case, it has been observed that these **good practices take place during all the phases and during all the product lifecycle**.

The following matrix shows the allocation of the impact of the good practices in the different project phases and product lifecycle stages.

Classification impact



	Product lifecycle stage			
Project stage	Raw Material	Manufacturing	Use	Waste / Recycling
Research				
Laboratory				
Pilot				
Market				

The darkest areas mean the highest impact, whereas the lightest areas mean the least impact

Due to the current project stage, and the nature of the new material, most of the good practices are allocated in the **market stage** and with an additional focus on **raw material and manufacturing**. This drives to define practices very close to the real market, therefore **very close to be a real option**.

Furthermore, in order to be as efficient as possible, we must also analyze the good practices based on the Impact and effort matrix, in order to **focus on the "quick wins": the good practices with more impact that, at the same time, require less effort**.

Effort / Impact Matrix

		Impact		
		Low	Medium	High
Effort	Low		15 5 6 16 7 22	19 10 20
	Medium		18 4 23	13 2 1 14 8 3 24
	High		12	21 11 9 25 17

Due to the fact that we are obviously focused on good practices, it is worth to mention, that all practices have **high or medium impact**.

High impact / Low effort

Based on the matrix, the "quick wins" are the following practices, positioned in high impact and low effort:

- Obtaining the **product CE mark**.
- Elaborating the **technical data sheet** of finished product.
- Properly **transporting and stocking** the product before its placement in DEMOSITES.

These “quick wins” are mainly the basic product certification, tests and technical information required in order to launch the new building product to the market. They are quite standard, but also a must, in order to launch the product.

High impact / Medium effort

Positioned as high impact practices, but requiring some more effort, the following practices have been identified:

- **Initial “sanity check”** to identify agents that may damage the product.
- Analysis of the **regulatory framework** in order to find strengths of the new product / technology.
- Design and installation of **sensors** in DEMOSITES.
- **Involvement of an industry leader** in the project.
- Definition of a detailed protocol for **waste management and traceability**.
- Analysis of the the whole product lifecycle **“from cradle to grave” impacts**.
- **Environmental certification** of the product to compete with other products.

This is a more sophisticated analysis and project/product interventions that allow the new product to have and demonstrate an additional value proposition compared to other competing products.

High impact / High effort

Positioned as high impact, but requiring high effort, the following practices have been identified:

- DEMOSITE selection process and **property approval**.
- Ensurement of **enough raw material nearby** the production site.
- Focus on **large markets with high and increasing demand**.
- Identification of **additional opportunities** for the new technology / product.
- Maximization of the use of **renewable electricity**.

These are mainly the good practices that impact in the main profitability and sales drivers. However, they are very restrained by the manufacturing/location requirements and the market and industry dynamics. Therefore, it is very difficult to change or interfere with one producer or with the project stakeholders.

These are the **25 main good practices drawn by the project**.

We expect that they are useful for the industry and the research community.

Start October 1, 2017
Project duration 39 months
Total budget 1,289,434 €
EU Contribution 773,660 €

You can find us on
Life-Repolyuse.com
@LifeRepolyuse

Partners

Stakeholders

LIFE-Repolyuse. REcovery of POLYurethane for reUSE in eco-efficient materials.
Project co-funded by the LIFE Programme of the European Union (LIFE16 ENV/ES/000254).