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RECYCLING OF WASTE ACRYLIC TEXTILES

D7.3: Mid Term Policy Report

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Abstract	The mid-term policy report includes initial recommendations on research and innovation; policy for the engagement of the European industries, SMEs, Research centres and end-users; environmental legislation and policy.
Keywords	Recommendations, Exploitation, Stakeholders, Project Results

Document Revision History

Version	Date	Description of change	List of contributor(s)
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Disclaimer

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Nature of the deliverable *:	Report	
Dissemination Level		
PU	Public, fully open, e.g. web	✓
CI	Classified, information as referred to in Commission Decision 2001/844/EC	
CO	Confidential to REACT project and Commission Services	

** REPORT: Document, report (excluding the periodic and final reports)*

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

OTHER: Software, technical diagram, etc

EXECUTIVE SUMMARY

The REACT Work Package 7, WP7, is dedicated to "Dissemination, Communication and Exploitation" and aims at defining, maintaining and coordinating the appropriate mechanisms and tools ensuring broad visibility and impact of the project's work and results. The main objective is to promote the developed project's concepts and technologies.

This deliverable describes how REACT is identifying stakeholders that can be interested in project results, recognizing some early findings and some recommendations or needs to be met and coming from REACT experience.

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ABBREVIATIONS

EU	European Union
PC	Project Coordinator
PMB	Project Management Board
SB	Scientific Board
WP	Work Package

1 INTRODUCTION

One of the main critical aspects in the transition from a prevailing organizational and business system (i.e. linear economy) to a more desirable one (circular economy) is the involvement of all stakeholders. In particular, referring to the triple helix model, the participation of the three fundamental actors of the innovative processes is important: universities and research centres, the government and companies.

This deliverable describes the actions taken to define the reference stakeholders for the REACT project according to the results and the related potential impacts expected.

Furthermore, on the basis of the results already achieved in the first period (M1 – M18), some emerging discussion points / recommendations on research and innovation are sketched.

This policy brief sets out how to identify and involve stakeholders in order to offer policy recommendations to policy makers, businesses and also researchers and innovators. The policy brief, at the end of the project, based on the results obtained, will populate actions and recommendations that can be considered to integrate future policies at national and European level.

2 REACT SOCIAL IMPACT

2.1 REACT project's objectives

Recycle is a common word used always more and more but continues to be low in the EU, while landfill and
incineration rates remain high. One of the major problems is to have secondary raw material similar to virgin one. This is because of contamination, treatments, and so on, that lower product performance.

The REACT proposal addresses the management of waste acrylic textiles coming from outdoor awnings and furnishing. A clue issue is the analysis and removal of finishing substances (fluorocarbons, melamine and acrylic resins, anti-mould agents) that affect the secondary raw material purity and their management. Removing these substances, then a mechanical recycling process could be implemented to obtain second life fibres and fabrics, which performance must be tested for best application.

A full environment friendly process to remove hazardous materials on finishing of waste acrylic textiles is investigated and developed to enhance their recycling, improve sustainability and reduce environmental and health risk. The removing of finishing products via chemical reaction involves the combination of many factors and has never been studied in this sector.

Final goal is a fully compatible recycled acrylic textile for reuse and guidelines for hazardous chemicals removing from finished textile with innovative investigation techniques.

The main objectives of this proposal, 36 months long, are therefore to:

- remove those substances up to 93%;
- re-use the acrylic textiles as raw material for other production cycles, also in combination with virgin fibres to reach 3,300 tons total of waste prevented from disposal;
- reduce the amount of landfill and incineration of acrylic textiles of at least 30% for the outdoor sector (awnings and furnishing).

At the end of the project, the REACT partnership aims to set recommendations on the design and manufacturing of materials for recyclability and on the recycling process for the standardization of the whole process, that would be applied on other sectors.

With the aim of ensuring the sustainability of the results once the project is over in correlation with the individual exploitation intentions of each partner, the partnership has:

- defined relevant stakeholders for participation in the project's ecosystem and the adoption of the REACT results offered for the acrylic fibres industry and manufactures;
- provided broad visibility of REACT results by disseminating and communicating them to all relevant stakeholders, including researchers, industry, European projects and policy makers;
- looked at liaisons and close coordination with related projects and initiatives both within EU and wider internationally;
- defined a sustainable framework to ensure the future evolution of the project results and, at the same time, generate business opportunities for the partners and the industry at large.

2.2 Stakeholders

Categories of identified stakeholders are:

1. European public authorities
2. National public authorities

3. Regional and Local public authorities
4. Sectoral and Environmental regional agencies
5. Infrastructure and (public) service providers (e.g. utility companies: sewage and waste collection)
6. Research and Academia and Higher education and research institutions
7. Large enterprises and SMEs (including collectors and recyclers)
8. Business support organizations (e.g. Chambers of commerce, Business associations, Clusters)
9. Certification and accreditation systems
10. Technology providers
11. Social companies (e.g. charities).

2.3 Results for stakeholders

For each result obtained or still to be achieved within the project, each partner is identifying its own interest in correlation with the interest that its reference stakeholders may have for the result in question.

For each category of stakeholder, each partner therefore defines a priority scale (3: very important, 2: important, 1: interested), thus identifying the specific interests and methods of involvement (see below Figure 1 Partners' & Stakeholders' Interest).

The goal of this process is to identify the stakeholders to involve set up a Policy and to facilitate the results of the project.

Which Stakeholders are the recipients to involve to set up a Policy and to facilitate the results of the project?							
Results	**Deliverable**	**Available to date**	**Partner's Priority**	**Which stakeholders?**	**What is the specific interest of the stakeholder?**	**How to involve it?**	**When to involve it?**
Plan design of waste storage and classification system	D1.1, D1.2	Yes					
Acrylic textile waste characterization	D1.3	Yes					
Chemical removal	D2.2, D2.4						
Predictive model of NIR analysis	D2.6						
Industrial level chemical removal (scale-up)	D2.7						
Lab-scale wastewater treatment	D3.1						
Yarn made of recycled fibres	D4.1, D4.2	Partially					
Mechanical recycling of acrylic fibre	D4.3						
Fabrics made of recycled fibres	D5.2						
New and environmental friendly finishing	D5.1, D5.4						
Prototypes and demonstrators	D5.6						
LCA of acrylic fibres	D6.1, D6.5	Partially					
Recommendation on production chain and backlogistic	D6.2	Yes					
Recommendation for technology transfer	D6.3						
Recommendation on eco-design	D6.4						
Policy report	D7.3, D7.6	Partially					
Roadmap for exploitation after REACT	D7.5						

Table 1: Partners' & Stakeholders' Interest (template)

2.4 Earlier results

The involvement process is in progress, the following tables show the first elaborations of some partners.

Which Stakeholders are the recipients to involve to set up a Policy and to facilitate the results of the project?							
Results	**Deliverable**	**Available to date**	**Partner's Priority**	**Which stakeholders?**	**What is the specific interest of the stakeholder?**	**How to involve it?**	**When to involve it?**
Plan design of waste storage and classification system	D1.1, D1.2	Yes					
Acrylic textile waste characterization	D1.3	Yes	***	Stakeholder n.9 (Accredia)	New types of laboratory tests	with a certification method can be validated.	After an in-depth analysis on the NIR method, a certification method can be validated.
Chemical removal	D2.2, D2.4		***	Stakeholder n.9 (Accredia)	New types of laboratory tests	Studying a procedure to certify is non-destructive capable of verifying the presence or absence of chemical agents on a fabric	After an in-depth analysis on the chemical removal method, a certification method can be validated.
Predictive model of NIR analysis	D2.6		***	Stakeholder n.9 (Accredia) and Stakeholder n.6 (Bicocca)	Create databases for NIR analysis	collaborate and interact with NIR experts	Deepen the NIR method with research centers and universities. After a thorough analysis of the NIR method, it is possible to validate a certification method.
Industrial level chemical removal (scale-up)	D2.7		**	Stakeholder n.9 (Accredia) + Stakeholder n.3 (Regione Lombarida) + Stakeholder n.4 (ARPA and ISPRA)	Be sure about the possibility of recycling acrylic fabrics	Mainly, check the waste flows with the public administrations in order to verify the current legislation on how to manage and handle waste to be recycled.	Check current regulations. After a thorough analysis of an industrial chemical removal model, a certification method can be validated.
Lab-scale wastewater treatment	D3.1			?			
Yarn made of recycled fibres	D4.1, D4.2	Partially	***	Stakeholder n.9 (Accredia)	New types of laboratory tests	increase laboratory analysis experiences to distinguish recycled materials from virgin ones	After an in-depth analysis on the chemical removal method, a certification method can be validated.
Mechanical recycling of acrylic fibre	D4.3		**	Stakeholder n.7 (MC2)	Purpose to encourage companies to consider the recycling method	report the state of the art of technologies	After having certified the yarn and fabric and verified the product life cycle through LCA analysis.
Fabrics made of recycled fibres	D5.2		***	Stakeholder n.9 (Accredia)	New types of laboratory tests	increase laboratory analysis experiences to distinguish recycled materials from virgin ones	After an in-depth analysis on the chemical removal method, a certification method can be validated.
New and environmental friendly finishing	D5.1, D5.4						
Prototypes and demonstrators	D5.6						
LCA of acrylic fibres	D6.1, D6.5	Partially	***	Stakeholder n.9 (Accredia) and Stakeholder n.6 (Bicocca)	New types of laboratory tests	Create an environmental passport for products containing recycled fibers. collaborate and interact with LCA experts	After a thorough analysis of the chemical removal method and trimming methods of recycled acrylic fibers, it will be possible to validate certification method.
Recommendation on production chain and backlogistic	D6.2	Yes	**	SHs n.7	Waste traceability	Define contents to teach	At the end of WP1
Recommendation for technology transfer	D6.3		**	SHs n.7	Training, know-how	Define contents to teach	At the end of WP5
Recommendation on eco-design	D6.4		**	SHs n.6, 7	Training, know-how	Define contents to teach	At the end of WP5
Policy report	D7.3, D7.6	Partially	***	SHs n.1-5, 8	Best practices, Innovation	Workshop and guidelines	Last project semester
Roadmap for exploitation after REACT	D7.5		***	SHs n.1-11	Best practices, Innovation	Workshop and guidelines	Last project semester

Table 2: Centrocot's & Stakeholders' Interest

Which Stakeholders are the recipients to involve to set up a Policy and to facilitate the results of the project?							
Results	**Deliverable**	**Available to date**	**Partner's Priority**	**Which stakeholders?**	**What is the specific interest of the stakeholder?**	**How to involve it?**	**When to involve it?**
Plan design of waste storage and classification system	D1.1, D1.2	Yes	***	Stakeholder n° 7 (Fil Man Made , Filatura di Lenna, Tessitura Corti , Gibus, Ombrellificio Magnani) and n°5 (Magitteri)	the stakeholders concerned are all the players in the supply chain, i.e spinning mills, weaving mills, manufacturing industries and distributors	we will study a plan to create a platform for the collection of waste from the different sources identified	once we have obtained encouraging results regarding the fabric made with recycled waste
Acrylic textile waste characterization	D1.3						
Chemical removal	D2.2, D2.4						
Predictive model of NIR analysis	D2.6						
Industrial level chemical removal (scale-up)	D2.7						
Lab-scale wastewater treatment	D3.1						
Yarn made of recycled fibres	D4.1, D4.2	Partially					
Mechanical recycling of acrylic fibre	D4.3		***	Stakeholder n.7 : spinning mills Filatura di Lenna , Fil Man made	transfer knowledge to the subjects of the PARA 'supply chain	report the state of the art of technologies	After having certified the yarn and fabric, verified the life cycle of the product through LCA analysis and carried out an economic evaluation.
Fabrics made of recycled fibres	D5.2						
New and environmental friendly finishing	D5.1, D5.4						
Prototypes and demonstrators	D5.6						
LCA of acrylic fibres	D6.1, D6.5	Partially					
Recommendation on production chain and backlogistic	D6.2	Yes					
Recommendation for technology transfer	D6.3						
Recommendation on eco-design	D6.4						
Policy report	D7.3, D7.6	Partially					
Roadmap for exploitation after REACT	D7.5						

Table 3: Parà's & Stakeholders' Interest

Which Stakeholders are the recipients to involve to set up a Policy and to facilitate the results of the project?							
Results	**Deliverable**	**Available to date**	**Partner's Priority**	**Which stakeholders?**	**What is the specific interest of the stakeholder?**	**How to involve it?**	**When to involve it?**
Plan design of waste storage and classification system	D1.1, D1.2	Yes		Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	once we have obtained encouraging results regarding the fabric made with recycled waste
Acrylic textile waste characterization	D1.3	Yes		Stakeholder n.9 Certification systems for Accredited laboratory tests + Stakeholder n.6 Research and Academia and Higher education and research institutions	transfer knowledge	Related news to be posted on the REACT website and channeled through social media and newsletter. Communication through channels dedicated to certification bodies, presentation at scientific conferences. Scientific publications	once we have obtained encouraging results regarding the fabric made with recycled waste
Chemical removal	D2.2, D2.4			Stakeholder n.9 Certification systems for Accredited laboratory tests	transfer knowledge	news on the REACT website and channeled through social media and newsletter. Communication through channels dedicated to certification bodies, presentation at scientific conferences. Scientific publications	After an in-depth analysis on the chemical removal method.
Predictive model of NIR analysis	D2.6			Stakeholder n.6 Research and Academia and Higher education and research institutions	transfer knowledge	news on the REACT website and channeled through social media and newsletter. Communication through channels dedicated to certification bodies, presentation at scientific conferences. Scientific publications	After an in-depth analysis on the chemical removal method.
Industrial level chemical removal (scale-up)	D2.7			Stakeholder n.1 European public authorities + Stakeholder n.4 Sectoral and Environmental regional agencies + Stakeholder n6 Research and Academia and Higher education and research institutions	transfer knowledge	News channeled through specialized press. Presentation at chemical industry / association events	After having certified the yarn and fabric, verified the life cycle of the product through LCA analysis and carried out an economic evaluation.
Lab-scale wastewater treatment	D3.1			Stakeholder n.1 European public authorities + Stakeholder n.4 Sectoral and Environmental regional agencies + Stakeholder n6 Research and Academia and Higher education and research institutions	transfer knowledge	News channeled through specialized press. Presentation at chemical industry / association events	After having certified the yarn and fabric, verified the life cycle of the product through LCA analysis and carried out an economic evaluation.
Yarn made of recycled fibres	D4.1, D4.2	Partially		Stakeholder n.7 Large enterprises and SMEs (including collectors and recyclers) + Stakeholder n.8 Business support organisations (e.g. Chambers of commerce, Business associations, Clusters)	transfer knowledge	News channeled through specialized press. Presentation at chemical industry / association events	once we have obtained encouraging results regarding the fabric made with recycled waste
Mechanical recycling of acrylic fibre	D4.3			Stakeholder n.7 Large enterprises and SMEs (including collectors and recyclers) + Stakeholder n.8 Business support organisations (e.g. Chambers of commerce, Business associations, Clusters)	transfer knowledge	News channeled through specialized press. Presentation at chemical industry / association events	once we have obtained encouraging results regarding the fabric made with recycled waste
Fabrics made of recycled fibres	D5.2			Stakeholder n.7 Large enterprises and SMEs (including collectors and recyclers) + Stakeholder n.8 Business support organisations (e.g. Chambers of commerce, Business associations, Clusters)	transfer knowledge	News channeled through specialized press. Presentation at chemical industry / association events	once we have obtained encouraging results regarding the fabric made with recycled waste
New and environmental friendly finishing	D5.1, D5.4			Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	After having certified the yarn and fabric, verified the life cycle of the product through LCA analysis
Prototypes and demonstrators	D5.6			Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	After having certified the yarn and fabric, verified the life cycle of the product through LCA analysis
LCA of acrylic fibres	D6.1, D6.5	Partially		Stakeholder n.1 European public authorities + Stakeholder n.2 National	transfer knowledge	Presentation at regional/EC green/circular economy policy events	After having certified the yarn and fabric, verified the life cycle of the
Recommendation on production chain and backlogistic	D6.2	Yes		Stakeholder n.7 Large enterprises and SMEs (including collectors and recyclers) + Stakeholder n.8 Business support organisations (e.g. Chambers of commerce, Business associations, Clusters)	transfer knowledge	Presentation at regional/EC green/circular economy policy events	at the end of the project
Recommendation for technology transfer	D6.3			Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	at the end of the project
Recommendation on eco-design	D6.4			Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	at the end of the project
Policy report	D7.3, D7.6	Partially		Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	at the end of the project
Roadmap for exploitation after REACT	D7.5			Stakeholder n.1 European public authorities + Stakeholder n.2 National public authorities + Stakeholder n.3 Regional and Local public authorities	transfer knowledge	Presentation at regional/EC green/circular economy policy events	at the end of the project

Table 4: Martel's & Stakeholders' Interest

3 METHODS OF ENGAGEMENT AND DEVELOPMENT OF RECOMMENDATIONS

3.1 Management structure

The management structure of REACT is based on three levels, ensuring an efficient and success-oriented project management.

The **decision making level**: This level consists of the REACT Project Management Board which is the highest authority and the central body for strategic discussions within the project consortium, being responsible for the overall performance, the compliance with the Grant Agreement and its Annexes as well as with the Consortium Agreement.

The **management level**: This level is shared by the Project Coordinator with his Management Support Team for operational management and the Scientific Board for strategic management.

The **executive level**: The WP leaders and Task Leaders within this level are responsible for carrying out all activities and tasks as described in the individual work packages, keeping close contact with the partners involved in specific tasks and WPs.

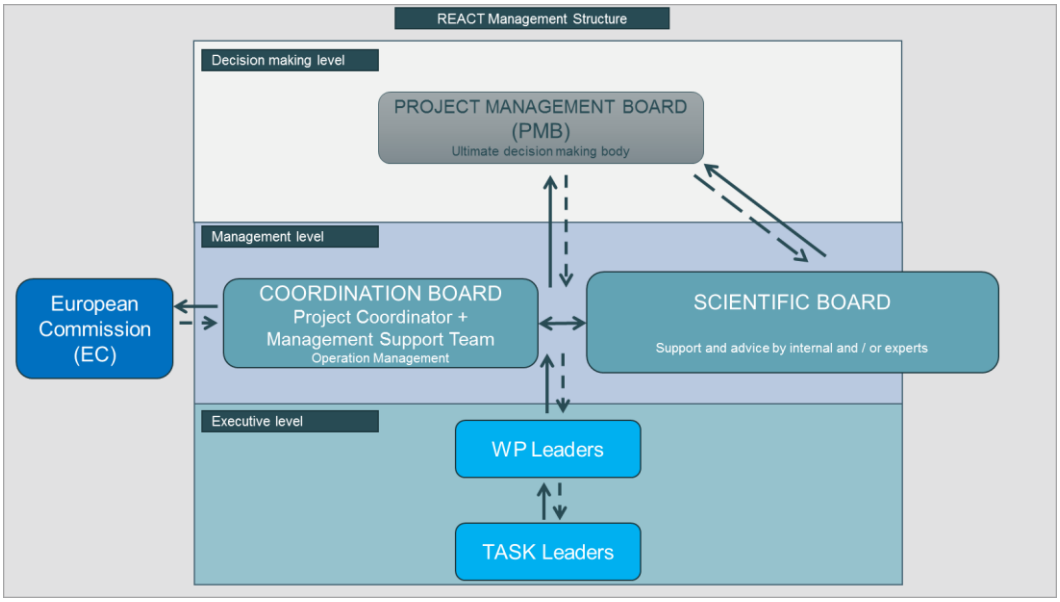

Figure 1: REACT Management Structure

In addition to the Consortium bodies described above, REACT is being supported by the **Scientific Board** (SB).

The members of the SB have been appointed by the Project Management Board (PMB). The chair of the SB is appointed by the Project Coordinator (PC).

The SB includes experts on project topics from the partnership and, if needed, international experts following a decision from the PMB.

Its role is to give recommendations and support to the strategic steering of the project in close collaboration with the PC and the PMB:

- providing independent advice to the PC and the PMB to support strategic decisions;
- critically reviewing project progress (e.g. deliverables) to ensure their relevance and excellence and to provide important feedback to the REACT consortium;
- facilitating the relationship of the project with other new and existing projects and strategic forums and initiatives related to the improvement of acrylic textile materials re-use and of chemical products dissolved in wastewater.

Meetings of the SB are taking place adjacent to the PMB meetings to give the SB members the opportunity to follow project progress more closely and to be directly involved in the discussions leading to strategic decisions. The PMB and PC are seeking the advice of the SB whenever it is necessary for the project course. They can call for extraordinary SB meetings or consult the SB members by video- or teleconferences and electronic communication.

3.2 Overall approach of engagement

Development of the guidelines and recommendations for policy audience uses the transdisciplinary approach of the REACT project, bringing together actors from politics, industry, academic society and research.

Each partner is obviously free to contact and organize activities to involve its own stakeholders, at local, national and European level.

The PMB, on the other hand, evaluates the need to share or organize wider-ranging activities at the European level, in particular by organizing a consultation panel or workshop with a policy audience.

The partners will have to choose members among significant stakeholders, public officers, experts, opinion leaders, in the field of circular economy.

They should draw up analysis and studies on the strategic and methodological issues that the authorities will face, beginning from start of their activity.

4 INNOVATION ITEMS AND IMPLICATIONS

During the first project period and in relation to the results already achieved, some food for thought emerged, the table below summarizes the main findings.

The main elements of innovation are identified in correspondence with the results.

These can consist of inventions (such as "Innovative analytical methods for identification of chemicals"), or of new technological processes developed (such as "Chemicals and finishing removal"), or of new greener approaches (such as "Investigation for new solutions never approached").

These results and innovations must be generalized, if possible, to generate a greater environmental, economic and social impact, facing risks or barriers to be overcome. The third column of the table summarizes some recommendations or needs to be met and coming from REACT experience.

<table>
<tr><th>RESULTS</th><th>INNOVATION</th><th>RECOMMENDATIONS
(or needs to be satisfied)</th></tr>
<tr><td rowspan="2">Chemical removal</td><td>No solution for addressed waste</td><td rowspan="2">Data to understand "EoL market" and trends</td></tr>
<tr><td>Chemicals and finishing removal has never been studied in this sector</td></tr>
<tr><td>Predictive model of NIR analysis</td><td>Innovative analytical methods for identification of chemicals</td><td rowspan="3">More knowledge to reduce skills gap</td></tr>
<tr><td rowspan="2">Environmental friendly finishing</td><td>Green approaches</td></tr>
<tr><td>Sludge evaluation treatment</td></tr>
<tr><td>Waste classification and management (disassembly platform+M3P) system</td><td rowspan="3">Treatment of industrial and post-consumer waste</td><td rowspan="3">Infrastructures / rules to common "trade" waste / recycled materials</td></tr>
<tr><td>Prototypes from recycled fibres</td></tr>
<tr><td>Report on mechanical recycling of acrylic fibre</td></tr>
</table>

Table 5: Innovation items and implications