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Version:	1.0		

Acronyms

BAT	Best Available Technique
COM	Communication
DEHP	Di (2-Ethylhexyl) Phthalate
EU	European Union
H2020	Horizon 2020
LCA	Life Cycle Assessment
LS	Legacy Substances
PVC	Polyvinyl Chloride
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SVHC	Substances of Very High Concern

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History of change

Version	Author	Date	Comments
0.1	Jorge A. Barona - SIE	29/04/2022	First draft
0.2	Camilo Borgogno - SIE	29/04/2022	Contribution
0.3	Roeland Juchtmans-OVAM	02/05/2022	Contribution
0.4	Tom Vercoutere - CTB	02/05/2022	Contribution
0.5	Vanessa Gutierrez Aragones - AIMPLAS	06/05/2022	Contribution
0.6	Mariana Fernández - SIE	18/05/2022	First Internal quality review
0.7	Andrei Holzer - FRAUNHOFER	20/05/2022	Contribution
0.8	Jorge A. Barona - SIE	23/05/2022	Second draft
0.9	Mariana Fernández - SIE	24/05/2022	Second Internal quality review
0.10	Jorge A. Barona - SIE	24/05/2022	Deliverable to be reviewed by partners
0.11	Roeland Juchtmans-OVAM	30/05/2022	Contribution
0.12	Zdenek Hruska – VinylPlus	07/06/2022	Contribution
0.13	Laurens Delva - CTB	10/06/2022	Contribution
0.14	Jorge A. Barona - SIE	15/06/2022	New version to be reviewed
0.15	Zdenek Hruska - VinylPlus	16/06/2022	Contribution
0.2	ENCO	01/07/2022	Addition of leaflet, for final check
1.0	Jorge A. Barona - SIE	06/07/2022	Final Version

Executive summary

REMADYL is an EU-funded project which aims at recycling of so-called "old PVC", i.e. PVC containing hazardous legacy substances such as low molecular weight phthalate plasticisers (mainly DEHP) and heavy metal-based stabilisers (mainly cadmium or lead). This 'old PVC' constitutes most of the current hard (e.g. window frames, tubes) and soft (e.g. flooring or cables) PVC post-consumer waste. The presence of legacy substances can present a barrier to PVC recycling as there are currently no economically viable solutions for their removal.[1] However, there can be also a valid REACH derogation for the use of PVC with some legacy substances (such as the one for example for Cadmium-based stabilisers, (EU) No 494/2011).

Throughout the project, processes are being developed in which different partners use their expertise to create strategies, technologies, or even new procedures that will provide various scenarios aiming to achieve the purpose of REMADYL. As an initial process, according to the REMADYL Grant Agreement, this project will develop a breakthrough process based on extractive extrusion technology in combination with novel solvents and melt filtration, which has the potential of rejuvenating "old PVC" into REACH compliant high purity PVC tuned towards the demands of various soft and hard PVC products at a market competitive cost. REMADYL's targets are fully aligned with the European Chemical Strategy for Sustainability, supporting the Commission's drive towards non-toxic material cycles as explained in (COM(2020) 667 final): "*ensure that authorisations and derogations from restrictions for recycled materials under REACH are exceptional and justified:"*, and also: "*support investments in sustainable innovations that can decontaminate waste streams"*. [2]

[1] REMADYL Grant Agreement No. 821136.

[2] Page 6 - https://ec.europa.eu/environment/pdf/chemicals/2020/10/Strategy.pdf

Introduction

REMADYL project is being developed by a 15 multidisciplinary partners consortium in which different companies and institutions are sharing their expertise and knowledge to not only comply with the EU standards and legislation but also to join efforts to develop advanced decontamination processes.

Within each partner's activities, tasks or processes, different scenarios are being presented with different legal implications. The Policy Brief is an important part of the REMADYL communication process explaining impact on current policies and recommending a way forward. This document gives some background on the actual 'Police Brief' which is attached at the end of the document.

1 Policy Challenges

At the beginning of the project, a deliverable 7.11 was drafted and submitted ("Overview of Relevant Standards and Legislation") in which we mentioned legal documents that have provided the basis of the current policy challenges. As part of the deliverable, an initial hypothesis was proposed: "*PVC has been at the centre of a controversial debate during much of the last two decades. Several diverging scientific, technical, and economic opinions have been expressed on the question of PVC and its effects on human health and the environment. Some Member States have recommended or adopted measures related to specific aspects of the PVC life cycle. However, these measures vary widely.*"

The decontamination of plastics containing hazardous substances and promotion of the recycling of materials derived from the REMADYL process is at the core of our project.

The main policy challenge is balancing the requirements of the circular economy and that of the non-toxic environment. At present, there are no well-established decontamination processes to deal with end-of-life plastics containing legacy substances (for example SVHCs). Very often such wastes are disposed of by incineration or landfilled, leading to the loss of valuable materials for the European circular economy, and at the end the hazardous substances can be released into the environment.

High-quality products can be produced today with recyclates containing legacy additives if the relevant REACH derogations exist (such as three-layer PVC pipes where the layer containing LS is in the middle). The products containing legacy additives could have been produced 30 or 40 years ago and it is not easy to establish any accountability for such wastes. Additionally, we have to realize that the products manufactured such a long time ago respected all legal requirements concerning additives which were valid at that time.

REMADYL project seeks the removal of legacy substances from old PVC. It will be important to develop guidelines for the adaptation of the REMADYL process to other areas, so that the achieved technological advancements could be transposed to other plastics facing the same legacy issues.

2 Recommendations

- **IMPROVEMENT AND PROMOTION OF DECONTAMINATION AND RECYCLING PROCESSES TO REMOVE LEGACY SUBSTANCES.**

Many companies/entities are expecting the creation of incentives for the implementation of technologies which could include the removal of hazardous substances from wastes, such as for example the end-of-life PVC wastes. As a starting point, it is imperative to promote the development of legislative initiatives that could either create, modify, or strengthen the recycling processes that can remove the legacy additives.

The recommendations suggested in this document ought to be developed in parallel with campaigns increasing the public awareness; an excellent start has been set by the European Commission with the initiatives under FP7, Horizon 2020 and Horizon Europe programs, where many EU-funded projects target best available and most environmentally advantageous technologies for identification of legacy substances, decontamination, recycling, and reuse of recycled materials in new products.

We would like to stimulate more uniform collection schemes throughout Europe. This will simplify the exchange of waste between European countries and its use in appropriate scaled-up recycling facilities. This must be accompanied by independent research on BATs for recycling that considers the whole picture (for example, LCA studies with all available recycling technologies or cost-benefit studies on decontamination technologies) so that the most relevant technologies are applied for the benefits of the society.

- **REACH AND CIRCULAR ECONOMY**

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) is one of the most important regulations of the European Union[3], adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals while enhancing the competitiveness of the EU chemicals industry. In principle, REACH applies to all chemical substances and mixtures; not only those used in industrial processes but also in our day-to-day lives, therefore, the regulation has an impact on most companies across the EU. Product and chemical regulation from the past, as well as waste regulation, were developed with the idea of a linear economy in mind. These regulations need to be re-designed to match the transition from linear to circular economy, facilitating the use of appropriate decontamination technologies to reach non-toxic material cycles in future.

[3] "EU's REACH chemicals law begins life in Helsinki". EUobserver.com. 31 May 2007.

- ## REMADYL RESULTS FOR FURTHER SCENARIOS AND APPROACHES

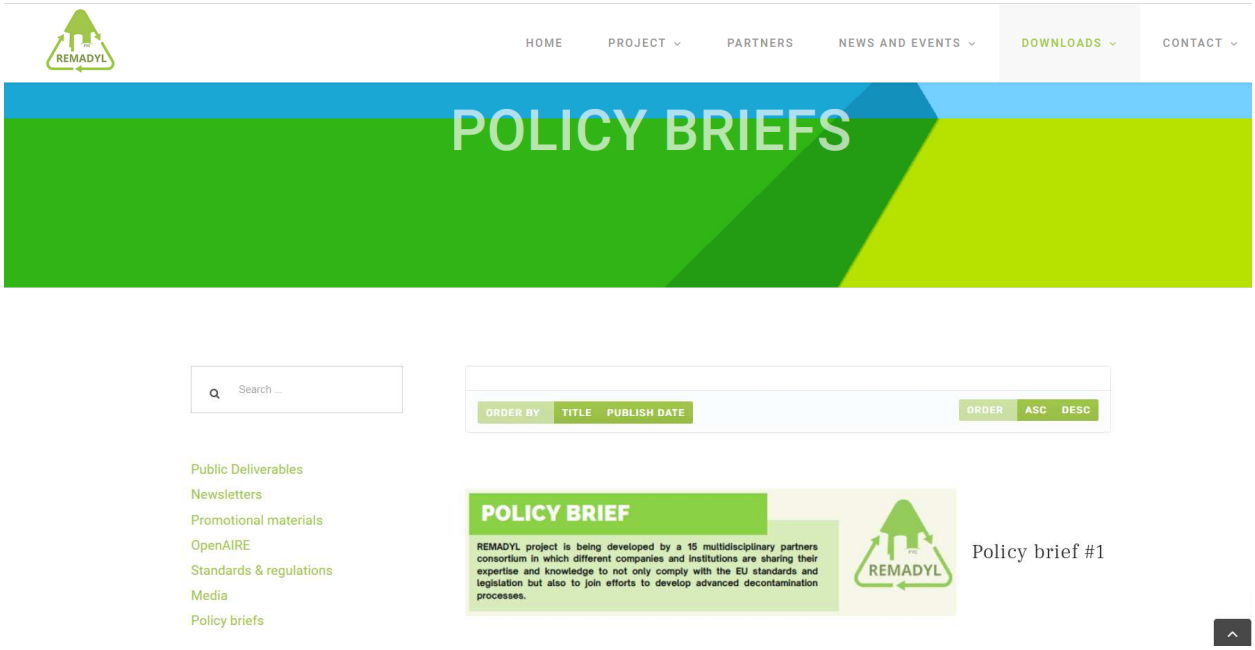
The advances of the project so far and the expectation that is created from the technical point of view provide elements for further discussion on the advancement of the legislative landscape. Our recommendation would be to carefully analyse, at the end of the project, the areas where the REMADYL process could serve as an example of responsible waste handling though the developed decontamination processes.

Future legislative initiatives shall prevent the need for decontamination processes of wastes. Therefore, the continuous stimulation of design for recycling from the chemical perspective considering end-of-life scenarios is important and shall be taken into consideration. Funding of academic research on new alternative additives to replace harmful substances in plastics shall also be within the EU Commission's scope, as well as the support for creating EU-wide standards on analysing wastes, with the aim of identifying the presence of classified substances.

It is in the interest of the European Circular Economy that we decontaminate and recycle all materials. REMADYL contributes undoubtedly to a healthier European environment, with clear economic benefits for the society.

3 Policy Brief – Leaflet format

See next pages for the public Policy Brief (2-pager) which was already published on the REMADYL website as shown on the screenshot below.



POLICY BRIEF

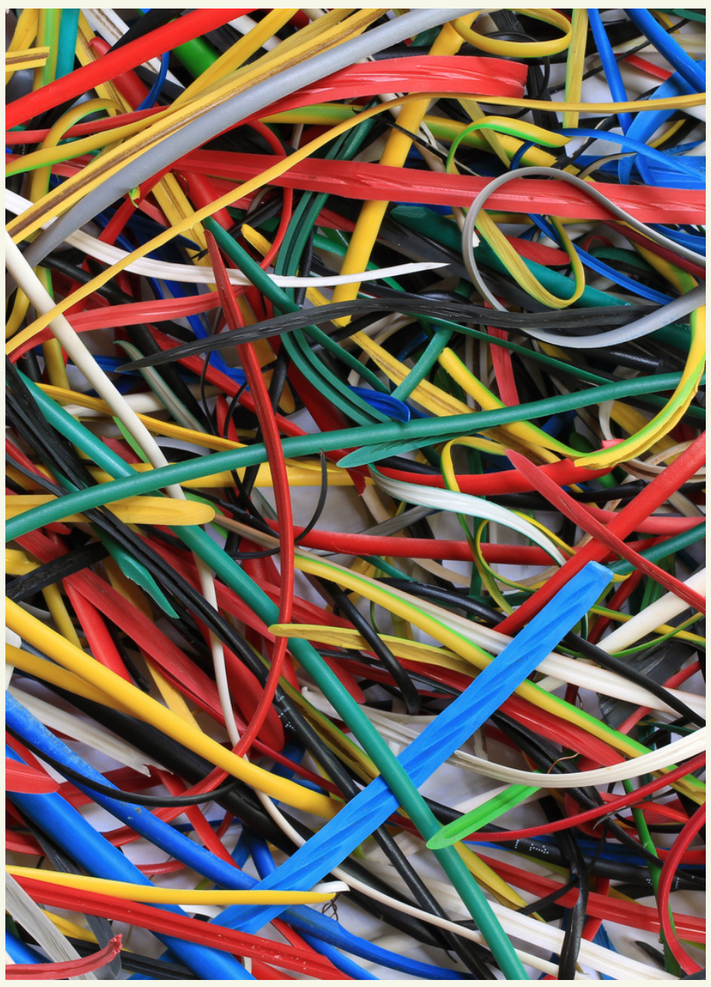
REMADYL project is being developed by a 15 multidisciplinary partners consortium in which different companies and institutions are sharing their expertise and knowledge to not only comply with the EU standards and legislation but also to join efforts to develop advanced decontamination processes.

POLICY CHALLENGES

- The **decontamination of plastics** containing hazardous substances and promotion of the recycling of materials derived from the REMADYL process is at the core of our project.
- The main policy challenge is **balancing the requirements of the circular economy** and that of the **non-toxic environment.** Very often such wastes are disposed of by incineration or landfilled, leading to the loss of valuable materials for the European circular economy, and at the end the **hazardous substances** can be released into the environment.

REMADYL OBJECTIVE

- REMADYL project seeks the **removal of legacy substances from old PVC**. It will be important to develop guidelines for the adaptation of the REMADYL process to other areas, so that the achieved technological advancements could be transposed to other plastics facing the same legacy issues.



IMPROVEMENT AND PROMOTION OF DECONTAMINATION AND RECYCLING PROCESSES TO REMOVE LEGACY SUBSTANCES

- It is imperative to **promote the development of legislative initiatives** that could either create, modify, or strengthen the recycling processes that can remove the legacy additives.
- The recommendations shall be implemented in parallel with campaigns **increasing the public awareness**; where many EU-funded projects target best available and most environmentally advantageous technologies for identification of legacy substances, decontamination, recycling, and reuse of recycled materials in new products.

- We would like to stimulate **more uniform collection schemes** throughout Europe. This will simplify the exchange of waste between European countries and its use in appropriate scaled-up recycling facilities. This must be accompanied by independent research on BATs for recycling that considers the whole picture so that the most relevant technologies are applied for the benefits of the society.

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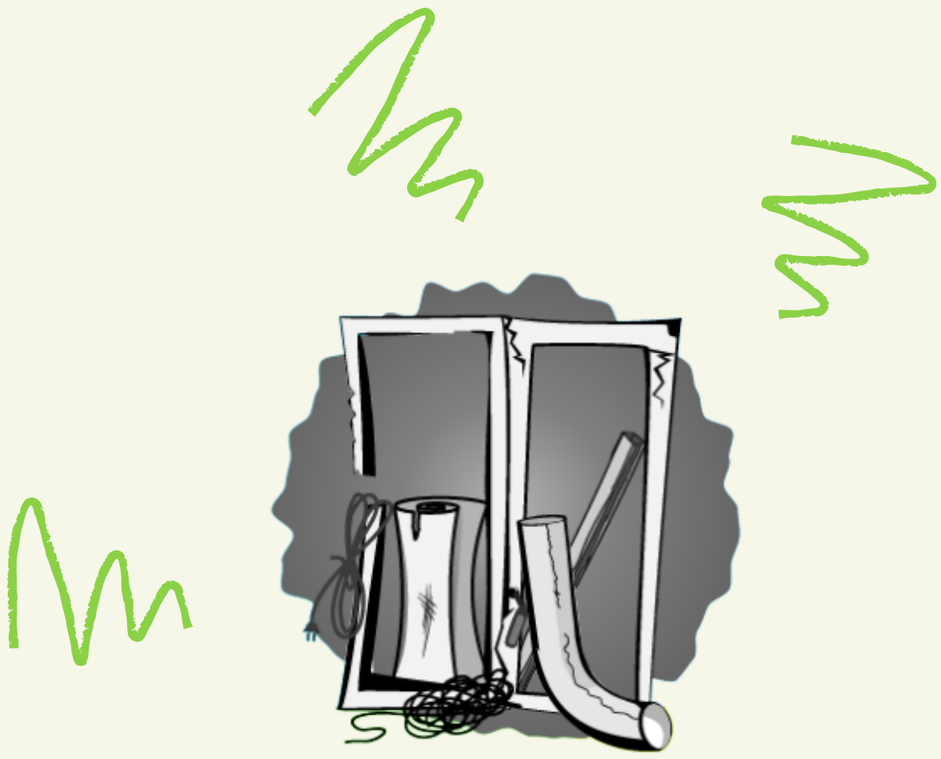

REACH AND CIRCULAR ECONOMY

- REACH applies to all chemical substances and mixtures, therefore, the regulation has an impact on most companies across the European Union. In the past, the chemical product and waste regulations had been developed with the idea of a **linear economy in mind**.

- These **regulations need to be re-designed** to match the transition from linear to circular economy, facilitating the use of appropriate decontamination technologies to reach non-toxic material cycles in future.

REMADYL RESULTS FOR FURTHER SCENARIOS AND APPROACHES

The advances of the project so far and the expectation that is created from the technical point of view provide elements for further discussion on the **advancement of the legislative landscape.**

Our recommendation would be to **carefully analyse**, at the end of the project, the areas where the REMADYL process could serve as an **example of responsible waste handling** though the developed decontamination processes.

Future legislative initiatives shall **prevent the need for decontamination processes of wastes**. Therefore, the continuous stimulation of **design for recycling** from the chemical perspective considering end-of-life scenarios is important and shall be taken into consideration.

Funding of academic research on **new alternative additives** to replace harmful substances in plastics shall also be within the EU Commission's scope, as well as the support for creating EU-wide standards on analysing wastes, with the aim of identifying the presence of classified substances.

It is in the interest of the European Circular Economy that we decontaminate and recycle all materials. **REMADYL contributes undoubtedly to a healthier European environment,** with clear economic benefits for the society.

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