



**Removal of Legacy Substances from polyvinylchloride (PVC) via a continuous and sustainable extrusion process**

**Grant Agreement No 821136**

**12M online meeting  
Minutes**

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Version:	V2
Date of preparation:	22/06/2020
Dissemination Level:	Confidential



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## 1. Agenda

Date May 26<sup>th</sup> – 27<sup>th</sup> 2020

Venue Online – Teams Meeting

**Agenda – Day 1: May 26<sup>th</sup>, 2020 - [Join Microsoft Teams Meeting](#)**

TIME	SUBJECT	Presenter
13:30-13:45	Introduction	CENTEXBEL
<b><u>Technical Working session I</u></b>		
WP progress, main results, deliverable status and plans for the next period		
Discussions on open issues and plans for next period		
13:45-14:30	<b><u>WP1 - Recyclate characterisation and sorting</u></b>	IRIS
	<p>Task leaders makes a 10 min. presentation per task + 2 min. short discussion</p> <p>Technical working session:</p> <ul style="list-style-type: none"> <li>• In depth evaluation of model samples</li> <li>• Characterization of the PVC waste stream</li> <li>• Evaluation of detection techniques</li> <li>• Development of a monitoring system for detecting Pb- and phthalates-based LS in EoL PVC</li> </ul>	<p>IRIS, CTB, AIMPLAS, Fr-ICT, DECEUNINCK, DANOSA, PROMOLDING , Bulk.ID, AZOR, OVAM, Vinylplus</p>
14:30-14:45	<i>Break</i>	
14:45-16:00	<b><u>WP2 - Batch extraction of PVC containing LS</u></b>	CENTEXBEL

TIME	SUBJECT	Presenter
	<p>Task leaders makes a 10 min. presentation per task + 2 min. short discussion</p> <p>Technical working session:</p> <ul style="list-style-type: none"> <li>• CO2 extraction process for the removal of phthalates</li> <li>• Extraction process for phthalates and lead removal using (NA)DES as co-solvents</li> <li>• Development of MoS4-LDH based process for lead removal</li> </ul>	CTB, Fr-ICT, Aimplas, UVEG
<b>16:00-16:30</b>	<b><u>WP3 – Continuous extraction of PVC containing LS</u></b>	<b>Fr-ICT</b>
	<p>Start up WP3 (M15)</p> <p>Task leaders makes a 10 min. presentation per task + 2 min. short discussion</p>	CTB, Fr-ICT, Aimplas, UVEG, Deceuninck, Danosa, Promolding
<b>16:30-16:45</b>	<b><u>Open issues Day 1 + closing remarks Day 1</u></b>	

## Agenda – Day 2: May 27<sup>th</sup>, 2020 [Join Microsoft Teams Meeting](#)

TIME	SUBJECT	Presenter
<b><u>Technical Working session II</u></b>		
WP progress, main results, deliverable status and plans for the next period		
<b>09:00-10:00</b>	<b><u>WP4 – Recycling/Reuse of byproducts and their safe handling</u></b>	<b>Azor</b>
	<p>Start up WP4</p> <p>Task leaders makes a 10 min. presentation per task + 2 min. short discussion</p>	CTB, Fr-ICT, Aimplas, UVEG, Deceuninck, Danosa, Azor
<b>10:00-11:00</b>	<b><u>WP6 - Regulating framework and policies for the health, safety and environmental risks for all proposed activities.</u></b>	<b>Vertech</b>

TIME	SUBJECT	Presenter
	Task leaders makes a 10 min. presentation per task + 2 min. short discussion	VERTECH, CTB, AIMPLAS, UVEG, Fraunhofer, DECEUNINCK, DANOSA, AZOR, PROMOLDING, ENCO, SIE, OVAM, Vinylplus
11:00-11:15	Break	
<b><u>Dissemination, exploitation and coordination</u></b>		
WP progress, main results, deliverable status and plans for the next period		
11:15-12:00	<b><u>WP7 - Dissemination, Exploitation and Business Planning</u></b> Task leaders 5-10 min. per running task + 2 min. discussion	<b>Enco</b> All partners
12:00-12:45	<b><u>WP8 – Coordination</u></b> Task leaders 5-10 min. per running task + 2 min. discussion	<b>CENTEXBEL</b> All partners
12:45-13:00	Short recap Action Plan for the next 6 months Planning of the next meeting, AOB, Closing remarks	All

## 2. Attendees

**Day 1: May 26<sup>th</sup>, 2020**

Attendee Name	Company/institute name
Vanessa Gutiérrez Aragonés	AIMPLAS
Marta Estellés Luna	AIMPLAS
Antonio Sola Bernabeu	AZOR
Ascensión Marin Moya	AZOR
Maria Teresa Mira Galvan	AZOR
Guy Buyle	CTB
Stijn Corneillie	CTB
Tom Vercoutere	CTB
Isabel De Schrijver	CTB
Eva Del Amo	DANOSA

Javier Escudero	DANOSA
Giuseppe Salvio	ENCO
Marco de la Feld	ENCO
Jan Diemert	Fraunhofer ICT
Jänisch Thorsten	Fraunhofer ICT
Sebastian Reinhardt	FRAUNHOFER ICT
Andrei Holzer	FRAUNHOFER ICT
Ariane Zwintscher	Fraunhofer ITEM
Katherine Blümlein	Fraunhofer ITEM
Laurent Philippet	IRIS
Tomeu Coll	IRIS
Els Herremans	OVAM
Daniel Vlasveld	PROMOLDING
Ingmar Drost	SIE
Jorge Barona	SIE
Antonio Ribera	UVEG
Mathilde Fiorletta	VERTECH
Arjen Sevenster	VINYLPUS
Philippe Gabriels	VINYLPUS

**Day 2: May 27<sup>th</sup>, 2020**

Attendee Name	Company/institute name
Vanessa Gutiérrez Aragonés	AIMPLAS
Marta Estellés Luna	AIMPLAS
Antonio Sola Bernabeu	AZOR
Ascensión Marin Moya	AZOR
Maria Teresa Mira Galvan	AZOR
Guy Buyle	CTB
Stijn Corneillie	CTB
Tom Vercoutere	CTB
Isabel De Schrijver	CTB
Javier Escudero	DANOSA
Eva Del Amo	DANOSA
Giuseppe Salvio	ENCO
Marco de la Feld	ENCO
Andrei Holzer	Fraunhofer ICT
Sebastian Reinhardt	FRAUNHOFER ICT
Ariane Zwintscher	Fraunhofer ITEM

Katherine Blümlein	Fraunhofer ITEM
Laurent Philippet	IRIS
Tomeu Coll	IRIS
Els Herremans	OVAM
Luk Umans	OVAM
Chris de Rujiter	PROMOLDING
Daniel Vlasveld	PROMOLDING
Ingmar Drost	SIE
Jorge Barona	SIE
Antonio Ribera	UVEG
Mathilde Fiorletta	VERTECH
Arjen Sevenster	VINYLPUS
Philippe Gabriels	VINYLPUS

### 3. Presentations

All presentations will be available on the REMADYL intranet private area ([www.remadyl.eu](http://www.remadyl.eu))

### 4. Minutes

#### Day 1 – 26<sup>th</sup> May, 2020 – Online meeting

#### Introduction

##### SUBMITTED DELIVERABLES

- Official deliverables submitted during the last 6 months:
  - o D7.3 Exploitation Key Results – Draft – ENCO - M6
  - o D7.8 Communication & Dissemination Plan – Draft – ENCO – M6
  - o D7.11 Overview standards & legislation – SIE – M6
  - o D8.2 Data Management Plan – SIE – M6
- *Inofficial* deliverables submitted during the last 6 months:
  - o Status update (short !) to the PO – M6
  - o Progress report – M9

##### UPCOMING DELIVERABLES

- Official Deliverables for the coming 6 months

<b>D2.2</b>	Selection of suitable (NA)DES for the extraction of Pb or/and phthalates	2	CTB	OTHE R	CO	<del>M12</del> M15
<b>D7.1</b>	Market analysis (preliminary)	7	ENCO	R	CO	<del>M12</del> M15
<b>D2.1</b>	Protocol extractive extrusion: defining the required process parameters for the extraction of phthalates in a batch process	2	Fh-ICT	R	CO	M15
<b>D2.3</b>	Protocol: definition of the process parameters for the extraction of Pb or/and phthalates in a batch extraction process using (NA)DES as co-solvents	2	CTB	R	CO	M15

<b>D4.4</b>	Contaminant assessment and Guidelines and methodology for safe handling of the byproducts metals & phthalates, including safety sheets assessing levels and estimated risks form the removal of LS from PVC (preliminary)	4	Fh-ITEM	R	PU	M18
<b>D7.4</b>	Exploitation of Key Results – Report on implemented activities and updated planning	7	ENCO	R	CO	M18
<b>D7.9</b>	Communication & Dissemination – Report on implemented activities and updated planning	7	ENCO	R	PU	M18
<b>MS2</b>	'Go' for development of continuous lab scale DEHP removal	2	CTB			<del>M15</del> M18

- A **postponement of 3 months** has been asked for:
  - o **Deliverable 2.2: M12->M15**
  - o **Deliverable 7.1: M12->M15**
  - o **Milestone 2: M15->M18**
- Unofficial deliverables
  - o Next Newsletters
  - o **Status update** (short!) to the project officer in **M12**

Certain deliverables have been postponed, and it is not yet clear how this will affect the planning of the other WP and the overall project duration. Since the project is only in its first year we will wait-and-see if it is still possible to catch up the 3 months delay. If this is not the case, we will contact the project officer to request an overall extension of the project.

## **WP1 Recyclate characterization and sorting**

### **Task 1.1 Production of model samples**

- Several model samples had already been produced during the project. However, some additional samples were required for some research partners:
  - o DECEUNINCK delivered an additional batch of Pb-stabilized virgin PVC compound to AIMPLAS.
  - o DECEUNINCK delivered real waste PVC samples to IRIS for evaluation of the detection technique.
  - o DANOSA delivered a first batch of additional plasticized PVC samples to IRIS (samples containing DIDP, DIUP and DTDP).
  - o DANOSA is in the progress of compounding a large batch of plasticized PVC containing DEHP, to provide to the research partners.
  - o CTB is to provide Pb stabilizer to UVEG, to evaluate the LDH.
- Subtask 1.1.2 is currently ongoing, through collection of TDS, formulations and sorting analysis tools of OVAM.

### **Task 1.2 Evaluation of detection techniques**

- The current goal is to **evaluate** several detection techniques for their use as **inline** detection system, for LS monitoring EOL PVC waste, **by M12 in Task 1.2**.

This goal was **achieved** as following techniques were evaluated

#### **Detection techniques for Pb detection**

- **X-ray fluoresces**. This technique is a possible option, but has too **many drawbacks**:
  - o Samples require contact



- Long acquisition times (30s)
- Safety risks of X-ray radiation.
- **LIBS (laser induced breakdown spectroscopy)**. This technique was selected as the viable option for inline analysis due to its **many advantages**:
  - non-contact
  - non-destructive
  - robust and fast (0,1 ms) commercial systems
  - compatible with inline integration.
- The main **downside** is the **caution required** for the high-powered laser. This can be easily solved with the installation of protective panels all around the system and repetitive notices to the user to wear proper laser safety goggles
- A system has been recently purchased and is available at IRIS. The laser was **integrated and mounted on a conveyor belt** for future inline test.
- IRIS was not able to extensively test the system yet due to lab restrictions. There was a promising '**proof-of-concept**' results which saw a detection limit of as low as 0,1% for Pb in PVC
- The LIBS system also offers several system advantages
  - Using a collinear excitation and detection geometry
  - Allowing for small deviations in the sample's height (approx. 10mm), for the focus of the laser. **Sample height will be a very important parameter** for the system
- LIBS **should also be able to detect other metals** (e.g. Cd/Sb). Theoretically the technique should work with all the metals (if it is within the range of the concentration and limit of detection).
- In the **future work** carried out with the **LIBS system, model samples of PVC** will be tested first. Hereafter a **real waste PVC stream** will be evaluated and tested. The main difficulties in handling real PVC samples lies in the **fouling of the sample**. The surface of real PVC waste streams can be contaminated with dirt. The influence of this dirt on the system and measurement results will have to be investigated, along with possible solutions to the problem (e.g. an additional cleaning laser).
- Furthermore, the **throughput of the system will be optimized**, by researching the **number of spectra required based on the PVC size piece restriction (25-60mm)**, of each sample, for a correct Pb measurement.
- It is expected that the Pb content will be homogeneously distributed throughout the sample (the Pb concentration at the surface should be similar to that of the center).

#### **Detection techniques for plasticizer detection**

- FTIR spectroscopy was **not selected** because:
  - It requires contact
  - It is slow
  - It has overlapping in spectra
- Raman spectroscopy was **not selected** because:
  - It has along integration time
  - It has a weak collected signal
  - Sample fluorescence can lead to misinterpretation

- **NIR spectroscopy was selected** because:
  - It can discriminate between plasticizers
  - It is fast
  - Is non-contact
  - Is ideal for inline process
- New NIR equipment is being purchased by IRIS
  - Extended Near Infrared spectroscopy (1000-2500 nm, larger range than standard NIR)
  - First results with DPHP and DOP showed it should be possible to discriminate between the plasticizers
  - Delivery of the NIR is still pending.
- Care must be taken with the interpretation of plasticizer concentration results, since the plasticizer concentration can be different at the surface due to migration. The NIR system should be capable of measuring 1mm into the sample.

### **Task 1.3 Development of a monitoring system for detecting lead and phthalates**

- Proof of concept trials will be executed on the PVC sizes of 25-60 mm
- Future experiments to be done towards the integration
  - Repeat offline measurements on Pb reference samples, optimize laser and detector parameters (energy, focusing distance, delay laser/detector, acquisition time etc.).
  - Once previous parameters are known, move to real PVC stream and do fine adjustments.
  - Check if dust and dirt are an issue for the detection.
  - Move to online measurements and set the number of laser pulses required per piece for an optimal signal.
  - Assess the achievable throughput and capacities.
- Although no plasticized PVC recycling is happening in DANOSA or DECEUNINCK, the possibilities for inline integration will also be evaluated.
- Since 2 separate detection techniques are used for the Pb and the Plasticizers, the possibilities to use both detection techniques in line will also be evaluated.

## **WP2 Batch extraction of PVC containing LS**

### **Task 2.1 Extraction of phthalates using scCO<sub>2</sub>**

- Initial tests with dry blends were successful with high extraction efficiencies of 92,81% and 99,99%.
- PVC sheets showed much lower extraction efficiencies, but were still able to extract large parts of the plasticizers.
- The main question is which PVC flow rate is required to remove the plasticizers.
  - Therefore, Solubility curves of DEHP in scCO<sub>2</sub> under different temperature/pressure conditions have been measured.
  - Higher temperatures require higher pressures to solubilize DEHP. Since extrusion requires high temperatures, high pressures would also be

- required. The required pressures at these temperatures are too high for the extrusion process (>150 bar).
- An additional approach has been taken. Co-solvents have been investigated for their potential to improve the solubility of DEHP. All co-solvents were able to reduce the required pressure to below 150 bar.
  - The most promising co-solvent is EtOH, since it increases the solubility; is a green solvent; and should be easy to separate from DEHP due to its low boiling point.
- Future works
- Doing semi-continuous extractions experiments on the plasticized PVC compound delivered by DANOSA
  - If the semi-continuous trials give positive results, the influence of extraction parameters will be further investigated, for optimization towards a large-scale process.
  - Solubility measurements of DEHP in liquid CO<sub>2</sub>, since the DEHP is better soluble at lower temperatures.

### **Task 2.2 Extraction of LS using NADES**

- First tests were executed with a PVC dryblend compound.
- These results showed that the Pb was soluble in many different NADES. The extraction conditions were therefore further investigated. This led to the conclusions, that higher temperatures and lower PVC/NADES ratios led to better extraction results. Furthermore, the lowest concentrations of Pb were already achieved relatively fast (after 2h, the shortest time interval).
- An additional large-scale batch extraction was performed using this NADES, to evaluate the properties of the PVC samples after extraction. The mechanical properties of the different PVC samples were all within the required boundaries. The main observation was the decrease in density of the PVC, which is due to the fillers (Ca) being dissolved.
- Some trials using scCO<sub>2</sub> to extract Pb were performed. Pure scCO<sub>2</sub> is not able to extract Pb. However, a complexant was identified, which was able to extract Pb.
- All previous tests were executed on PVC compound, where the Pb is concentrated on the surface of the PVC grain. However, in recycled PVC the Pb will be more evenly distributed throughout the polymer matrix. Therefore, a new set of extraction experiments is currently ongoing. The first results showed much less dissolution of Pb in the NADES on the recycled PVC. However, pure ethylene glycol or Lactic acid were able to extract a significant amount of Pb. These results do have to be repeated and verified. Trials using ethylene glycol in scCO<sub>2</sub> will also be performed, to evaluate if faster extraction conditions can be achieved. Furthermore, other NADES mixtures are still under investigation.
- The Pb species to extract will presumably be an organic mixture of phthalates, sulfides and phosphites. It should not be expected for the stabilizer to be spent during the lifetime and processing.

### **Task 2.3 Development of MoS<sub>4</sub>-LDH based extraction process for Pb.**

- UVEG is preparing large quantities of LDH. Currently larger scale precursor synthesis is possible. This precursor is still intercalated with nitrate, which must be exchanged with molybdate. The optimal conditions for the exchange reaction need to be further investigated.
- The synthesized LDH will be used to carry out tests, to evaluate the Pb-capture performance on aqueous systems.
- Extrusion trials at AIMPLAS.
  - o UVEG is aiming to use a 100µm melt filtration to stop LDH particles typically around 200µm – 500 µm.
  - o Pilot extrusion trials were performed on a single screw extruder equipped with melt filtration. Several PVC samples were used. It was not possible to extrude grey recycled PVC, due to too many contaminations. Therefore, a virgin PVC compound was used for the first extrusion trials. The virgin PVC compound gave no problems and is currently used on the model material for future extrusion trials.
  - o A commercial inorganic material like LDH (Montmorillonite) was purchased to test the extrusion process and melt filtration. Adding the inorganic material caused the melt pressure to increase immediately, as soon as the material reached the 200µm melt filter. It was possible to filter out the commercial inorganic material.
  - o The LDH precursor (LDH MgAl) was also used to evaluate the filtration process. The melt filter did not break. However, ICP-MS analysis of the PVC found that the LDH concentrations in the filtered and non-filtered PVC were similar. This leads to the conclusion that the melt filtration has a low filter capacity. It is assumed that the LDH is being delaminated due to the shear forces inside the extruder. To test this hypothesis a translucent polymer will be extruded and filtered, in order to visually evaluate what happens to the LDH.

### **WP3 continuous lab-scale and pilot extraction processes**

The current state of the art shows it to be possible for plasticizers to be extracted with high efficiency in batch processes. The novelty of REMADYL is the possibility to extract the LS through a continuous process.

#### **Tasks (Continuous Lab-scale and Pilot extraction processes)**

- Task 3.1.1 CO<sub>2</sub> extractive extrusion of DEHP plasticizer (3 – 7 kg/h)
- Task 3.1.2 (NA)DES based extraction of phthalates and lead (CTB)
- Task 3.2 Continuous pilot scale of extractive extrusion (20 -30 kg/h)
- Task 3.3 Melt filtration (AIMPLAS)
- Task 3.4 Rejuvenated PVC on continuous pilot scale
- Task 3.5 Concept industrial extraction line (DECEUNINCK)

The tasks in WP3 still requires input from the ongoing research in WP2 for the definition of the experiments. The experiments carried out in WP2 must take into account the restrictions of the continuous extractive extrusion process (a maximum pressure of 150 bar).

- Fraunhofer-ICT -> the optimal process parameters for the scCO<sub>2</sub> extraction process.

- CTB -> input on the process parameters and the NADES solvents.
- Evaluation of the safety issues involved in the proposed protocols (e.g. the precautions required for the use of a (flammable) co-solvent).
- A large batch of model material (PVC plasticized with DEHP) is required to run the first extractive extrusion trials. Currently DANOSA is in the progress of producing this batch.

**Due to the delay in progress, WP3 is also being delayed for an additional 3 months.**

### **WP4 recycling and reuse of byproducts and their safe handling**

The objective of WP4 is the recovery of the legacy substances removed from PVC

- Separation of Pb salts from the LDH trapped in the metallic meshes of the melt filter
- Obtaining metallic Pb from salts for further uses in automotive batteries
- Safe recovering and management of phthalates
- Best practice guide for legacy substances removed

#### **Task 4.1 Safe recovery of the extraction process byproducts (lead salt and phthalate) (M12-M36). Task leader: UVEG.**

- Subtask 4.1.1. Recovery of DEHP
  - o Extraction of DEHP via distillation, extraction or membrane separation.
  - o The use of EtOH as co-solvent should allow for the separation through distillation.
  - o Possibilities to reuse the extracted DEHP for synthesis of other organic molecules will be evaluated or the possibilities for energy recovery.
  - o AIMPLAS will assist in the research of this task.
  - o Since no byproducts are yet available due to the delay, the timing of this work package will also have to be delayed for 3 months.
- Subtask 4.1.1. Recovery of Lead salt
  - o A methodology to separate the lead salt on metallic-filters and recover the LDH for further adsorption uses will be researched
  - o AZOR could do a first analysis on the Pb stabilizers added in prepared samples.

#### **Task 4.2 Recovering of high purity metallic lead (M18-M42)**

- The purity of the Pb samples will be evaluated. The amount of contaminants, which may compromise the metallurgic process, will be evaluated.
- Based on these results a theoretical calculation of the necessary fluxes in the metallurgic process will be executed.

#### **Task 4.3 Contaminants assessment and guidelines and methodology for safe handling of byproducts.**

- Contaminant assessment
  - o Characterization of the material for each relevant step of the process.
  - o Researching the use/generation of harmful substances during the process.

- Guidelines and methodology for safe handling and processing
  - o Best practice guide
  - o Risk management
- Input from partners required in order to start analytics and risk assessment
  - o A Telco will be organized to discuss the current process set-up, and which data may already be relevant for Fraunhofer-ITEM
    - Extraction protocol (temperatures, pressure, chemicals) used during WP2
    - Possible site visit in order to monitor the release of chemicals.
    - Analysis of the extracts already available at FRAUNHOFER ICT and CTB

## **WP6 Regulating framework and policies for the health, safety and environmental risks for all proposed activities**

WP6 has started in M7

### **Task 6.1. Environmental Life Cycle Assessment and Ecodesign**

Quantify the environmental impacts of the rejuvenated PVC and compare them with primary PVC production and other recycling systems

- The LCA study will focus on the steps from collection to recycling of the PVC
- The functional unit will be:
  - o FU<sub>1</sub>: the recycling of 1kg of old PVC
  - o FU<sub>2</sub>: the production of 1 kg of PVC
    - Positive scenario: 20% primary + 80% rejuvenated PVC
    - Moderate scenario: 35% primary + 65% rejuvenated PVC.
    - Benchmark: 100% primary PVC.
- Following benchmark scenario's will be investigated
  - o FU<sub>1</sub>:
    - Mechanical (shredding/cutting) & non-conventional mechanical recycling (extra chemical step).
    - Feedstock recycling (chemical treatment) e.g. Creasolv
    - Incineration with energy and material recovery e.g. SOLVAir, Halosep, MVR. Since most incineration ovens cannot handle pure PVC, the incineration of a diluted PVC waste stream might have to be considered.
    - Landfilling
  - o FU<sub>2</sub>:
    - Production of PVC from suspension polymerization (S-PVC)
    - Production of PVC from emulsion polymerization (E-PVC)
- To start the WP, VERTECH has distributed templates for the data collection and gave a presentation for the set-up of the data-collection template.

- 
- VERTECH has contacted DECEUNINCK for the data of the life cycle inventory of the sorting line.
  - Future steps will require:
    - o the data collection from the research partners
    - o a data check
    - o modelling of the data
    - o refining of the results through several iterations.

#### **Task 6.2. Life Cycle costing and cost-feasibility analysis (M8-M46)**

- Analysis of the capital, operational costs. Evaluation of the profitability of the project over different lifespans
- The next steps will involve:
  - o Estimation of the discount rate.
  - o Refining of the LCC inventory:
    - Include the cost of (NA)DES, and sorting of PVC.
  - o Calculation of the LCC indicators including:
    - Net Present Value
    - Equivalent Annual Annuity
    - Cash flow year by year
  - o Sensitivity analyses on relevant parameters such as:
    - Plant capacity
    - Location of the plant
    - Price of rejuvenated PVC

#### **Task 6.3. Social Life Cycle Assessment (M8-M46)**

- Determination and evaluation of the social and socio-economic benefits of implementing the REMADYL technologies
- Discussion started with OVAM concerning the available data.
- SIE will be involved in the literature review and indicator selection.
- Next steps
  - o Literature review follow-up
  - o Stakeholder assessment (power-interest grid)
  - o Social indicators selection
  - o Performance Reference Point rating

#### **Task 6.4. Circularity Assessment (M8-M46)**

- definition of appropriate circular economy indicators through the complete PVC value chain.
- Different circularity scenarios will be evaluated
- Several useful sources of data have been identified
  - o The report on circular economy from OVAM. As soon as the report can be publicly disseminated it will be shared with VERTECH.
- The next steps of circularity assessment
  - o Review of the circularity report

- Selection of the circularity indicators
- Data collection from the technology developers

## **WP7 Dissemination, Exploitation and Business Planning**

### **Task 7.1. The market analysis**

- The due date has been postponed for 3 months.
- Technical business info was requested from the partners.
- Data on the actual trends in PVC recycling has been collected
- Existing solutions have been analyzed
- The competitor analysis has started
- Global and European PVC market actual situation and forecasting studied and developed
- During the next months, input will be requested for the PVC waste flow map.
- The EU regulations needs a contribution from SIE
- The market has strongly been influenced by COVID-19, a special paragraph will be dedicated to the subject in the market analysis. Most of the data, info and forecasting report collected until now could be not valid anymore due to the change of prices and market

### **Task 7.2. IPR management, Exploitation & business planning**

- During the next months a questionnaire will be sent to the partners in order to understand the proper IPR tool for the proposed innovations.
- The draft Plan for Exploitation of Key Results has been developed and submitted as a deliverable (D7.3).
- When the preliminary Market Analysis will be submitted (M15), a Business Model CANVAS (that will be included in the more detailed Business Plan)
- The results obtained in the other WPs (technical, LCA, LCC) will be fundamental input to refine (OPEX) and (CAPEX) needed to run the REMADYL Technology and to develop the Business Plan

### **Task 7.3 Dissemination & Communication Activities**

- The website has been improved graphically and functionally at M8 and it is constantly updated with the latest news and events of interest.
- 2000 REMADYL brochures have been sent by ENCO to the partners accordingly with M6 meeting minutes
- REMADYL roll-up has been designed, printed and it is available on the promotional materials section of REMADYL website
- REMADYL poster has been designed and improved and shared with partners; the downloadable and printable version have been uploaded respectively on the promotional materials section and on the private area of REMADYL website.
- REMADYL dedicated pages on:
  - Twitter ([www.twitter.com/REMADYL\\_EU](https://www.twitter.com/REMADYL_EU))
  - lideshare, ([www.slideshare.net/RemadylProject](https://www.slideshare.net/RemadylProject))
  - Youtube, ([www.youtube.com/channel/UC78TSEg92H4y4dIX0tEtlw](https://www.youtube.com/channel/UC78TSEg92H4y4dIX0tEtlw))



- LinkedIn ([www.linkedin.com/company/remadyl-project](http://www.linkedin.com/company/remadyl-project)) have been already created. Each account is linked to the REMADYL website and is conceived to echo and spread news on the project progress.
- **Feel free to share with ENCO any kind of useful article or info in order to publish them on the social media channels after being revised by the Project Coordinator and Vinylplus.**
- To share the info between all the partners and have every data on a single document, three tools have been created (two in an Excel format and one Google questionnaire):
  - Communication & Dissemination Logbook ([https://docs.google.com/spreadsheets/d/1CwhzhovQknkb8\\_f61EWjoikOJIRhUP/edit#gid=145969212](https://docs.google.com/spreadsheets/d/1CwhzhovQknkb8_f61EWjoikOJIRhUP/edit#gid=145969212))
  - Scientific publications database (Same link of C&D Logbook)
  - Event report (<https://forms.gle/TH8xQCEHsoPPWXGo8>)
- **C&D Logbook, Scientific publications database, Event report tools are not being used**
- The first issue of the Newsletter has been sent at M8 to more than 1700 contacts and the PDF version of the Newsletter has been published on the Newsletter section of the project website.
- The 2nd Newsletter will be sent at M14 and not at M12. The Newsletter subscribers needs to be increased.
- The calendar of news items on the website has been updated due to some delays and it has been re-scheduled in this way with the agreement to send the news items on the 28th of each month (a reminder has been sent to DECEUNINCK)

Deadline	Partner
End November	<a href="#">CENTEXBEL</a>
End February	<a href="#">FRAUNHOFER</a>
End March	<a href="#">AIMPLAS</a>
End April	<a href="#">UVEG</a>
End May	DECEUNINCK
End June	DANOSA
End July	PROMOLDING

- Cooperation with EuPC on the MORE platform started at M5
- Joined in November 2019 the Plastics Circularity Multiplier group
- 3 events have been postponed:
  - REMADYL was expected to be presented by the Project Coordinator at VinylPlus Sustainability Forum originally expected in June in Florence. The event has been postponed in October 2020 due COVID-19 and connected travel restrictions. **It will not be possible to present REMADYL at this event anymore.**
  - The event “Plastics Circularity Multiplier Conference” expected in June in Brussels has been postponed in October due to COVID-19.
  - The 2nd International conference on ‘Circular Economy for Textiles and Plastics’ expected in Bruges on 23-24 June 2020 has been postponed on 15-16 December 2020.

#### Task 7.4 Standardization and Legislation

- Reviewal of the listed standards and legislation does not indicate no advancements
- New perspective will be added in this report “ PVC with Lead is no problem, if recycling proves to be viable ”
- National scope will be added - starting with Spain & Belgium
- Establish network with related standardisation technical committees

### **WP8 Coordination**

Consortium agreement is finalized & signed

A new project officer has been appointed: Anna-Karin Runemo

- Communication with project officer
  - **Status update** (short!) to the project officer in **M12** -> **mails will be sent out soon to start the collection of the information.**

Budget – Prepayments check

- IRIS received an early prepayment, for their investment in the LIBS equipment
- Generally, the project seems to be in accordance with the used person months
- Some partners have a very high person month use, while others a rather low person month use.

**Planning: shift of 3 months of M12 & M15 items:**

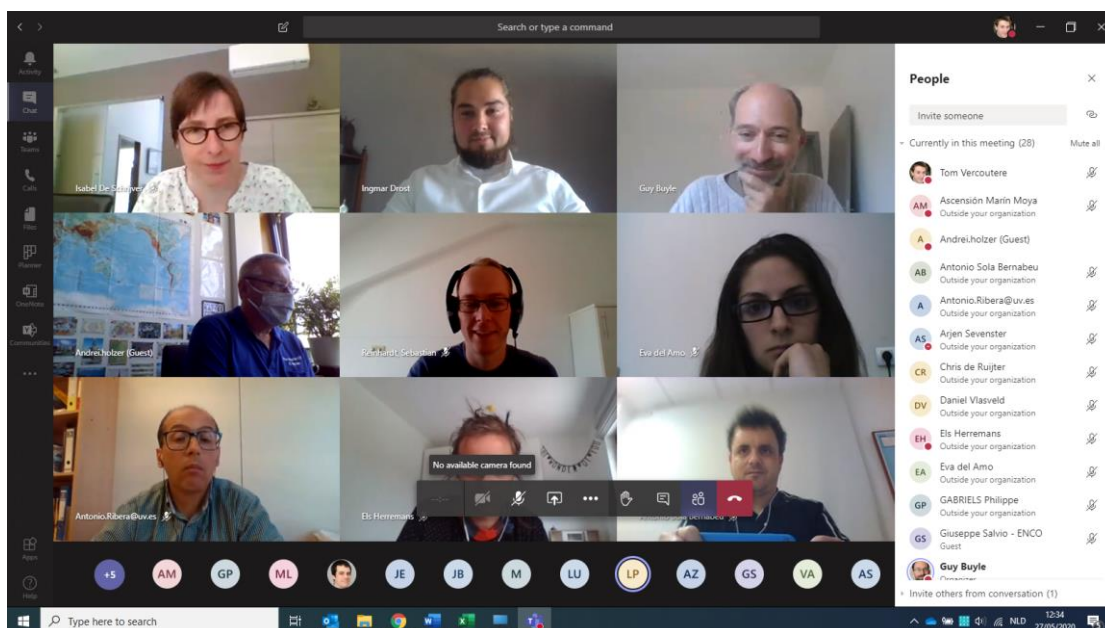
- **D7.1 Market Analysis M12 → M15**
- **D2.2 Selection (NA)DES M12 → M15**
- **D2.1 Protocol batch phthalates extractive extrusion M15 → M18**
- **D2.3 Protocol batch phthalates & lead (NA)DES M15 → M18**
- **MS2 – ‘Go for continuous’ M15 → M18**
- IRIS is not expecting a delay -> no extension of 3 months since the work packages are much more independent.
- For an overview of the new timing, see the GANNT chart at the end of the minutes.
- A discussion will be held on how WP4 can be started
  - Is it possible to already analyze some extracts from Fraunhofer-ICT?

**Data management plan**

- Questionnaire will be sent out again to update the data management plan

**Innovation management**

- Please share information concerning the evolution of the PVC recycling landscape.
- Please keep track if the internal project goals are in-line with the current PVC processing/recycling landscape.
- When communicating, always check beforehand for
  - IP related matters
  - check the communication concerning PVC



## 5. Action points

Work package	Partner	Action point	Timing
WP1	IRIS, DANOSA	Production of the different plasticizer's samples. Some plasticizers still have to be tested/produced.	TBD
WP1	DANOSA, Fraunhofer-ICT, CTB, AIMPLAS	Production of large batch plasticized PVC containing Pb	Week 28
WP1	CTB, UVEG	Providing Pb stabilizer to UVEG for testing of the LDH in aqueous media + information on the solvents of this Pb stabilizer	Week 24
WP3	Fraunhofer ICT, CTB	Exchange of information concerning the upscaling parameters and characteristics of the processes	M15
WP4	Fraunhofer ICT, CTB, Fraunhofer ITEM	Starting the analysis of the extracts from the experiments	TBD
WP4	AZOR, CTB, DECUNINCK	Providing Pb stabilizers for a first analysis.	Week 28
WP4	CTB, Fraunhofer ITEM, Fraunhofer ICT,	Organizing discussion on the start of WP4.3, and the available data	Week 28
WP6	VERTECH, CTB, Fraunhofer ICT,	Exchange of data concerning the extraction	TBD

	<b>AIMPLAS, UVEG</b>	process.	
<b>WP6</b>	<b>OVAM, VERTECH</b>	Sharing of the circularity report when it is published	TBD
<b>WP7</b>	<b>ENCO, VINYLPLUS, DANOSA, DECEUNINCK</b>	Input request on PVC waste flows	TBD
<b>WP7</b>	<b>All partners</b>	Questionnaire to understand the correct IPR tools	TBD
<b>WP7</b>	<b>All partners</b>	The second newsletter	M14
<b>WP8</b>	<b>All partners</b>	Status update for the project officer	M12
<b>WP8</b>	<b>All partners</b>	An updated version of the data management plan will be drawn up	TBD

**UPDATED GANTT CHART**

