upPE-T

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Disclaimer and acknowledgement

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Disclaimer

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Document information

Additional author(s) and contributing partners

Name	Organisation
Kari Heikkinen	LUT

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Glossary

Result: Any output from the project that cannot be classified as an invention.

Artefact: A tangible output that is used to deliver dissemination activity, e.g., scientific publication, deliverable, software, training material or policy brief.

Abbreviations

GA: Grant Agreement
KPIs: Key Performance Indicators
MOOC: Massive Open Online Course
WP: Work Package
PEDR: Plan of Exploitation and Dissemination of the Results
TBA: To be announced
VR: Virtual reality

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Executive summary

This deliverable D8.5 "Dissemination activities report v1" presents an update on the dissemination activities carried out along the first 24 months of execution of the up-PET project. It is aligned with Dissemination Strategy explained in PEDR and its' updates (D8.1 and D8.2, respectively).

It lists the dissemination artefacts prepared by up-PET. These artefacts are being classified to i) deliverables, ii) scientific articles in journal and workshop posters, iii) dissemination events such as up-PET webinars and other related events and iv) other up-PET dissemination artefacts such as MOOCs, Citizen Awareness Platform, Citizen Awareness Mobile application, and Policy Brief.

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1 Introduction

This deliverable D8.5 presents a report and an evaluation of the dissemination activities carried out in the framework of the upPE-T project until M24 – "mid-term assessment" – following the initiatives taken in first PEDR version (D8.1) and in alignment with the PEDR update (D8.2) at the same time than this deliverable. Foremost, this deliverable presents the collective work carried out in different WPs and Task 8.2 'Dissemination Activities and Networking'.

Dissemination is a key for the achievement of the goals under this project to support the impact desired from the project. To this end, the consortium – not only under WP8 but also other work packages – has carried out plans for various dissemination activities (publications, posters, webinars, and works-shop etc.), organising and participating in them that are connected with the topics addressed by the up-PET but also with the topics that are commonly relevant with sister projects.

The reader should be aware that both the *overview of the metrics* (KPIs) for the dissemination activities and *the dissemination plan* for next period M25-M36 are illustrated in the PEDR update deliverable, i.e., **D8.2**.

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2 up-PET Dissemination activities

2.1 Alignment with PEDRs

Deliverable D8.1 (PEDR) and its' later updates illustrate the strategy for carrying out Dissemination Activities and potential updates to it. Overall strategy and the purpose, with tools, channels, stages etc. are being described there. An update to first PEDR is being delivered as the same time, and it has rather impact for the next dissemination activities report, to be delivered at M36.

According to the D8.1, dissemination activities have been during M1-M10 in initial stage and during M11-M24 in targeted stage. In initial stage, the focus of dissemination activities was less imminent, and most events were rather communication oriented as no real result was yet produced, apart from one review article, in the project but in targeted stage first results were made and first project-driven dissemination artefacts were created.

2.2 Dissemination Activities Canvas status at M24

Figure 1 presents an overview of the status of up-PET dissemination activities. The figure has two "boxes". The upper box illustrates the list of different dissemination artefacts made until M24. The lower box illustrates on the other hand, current plans for the next 12 months if known.

Each dissemination artefact has been given a distinct number. As an example, R201 means that is a dissemination artefact mostly stemming from work from WP2 and number is just listed that 01 would be the first result coming from that WP, 02 the result and so on. The same numbering applies to other WPs. The stickers are color-coded, and e.g., yellow is a color for scientific result, blue is a workshop poster or oral presentation, black is a policy-oriented dissemination artefact, white is a webinar event and green would be an online repository.

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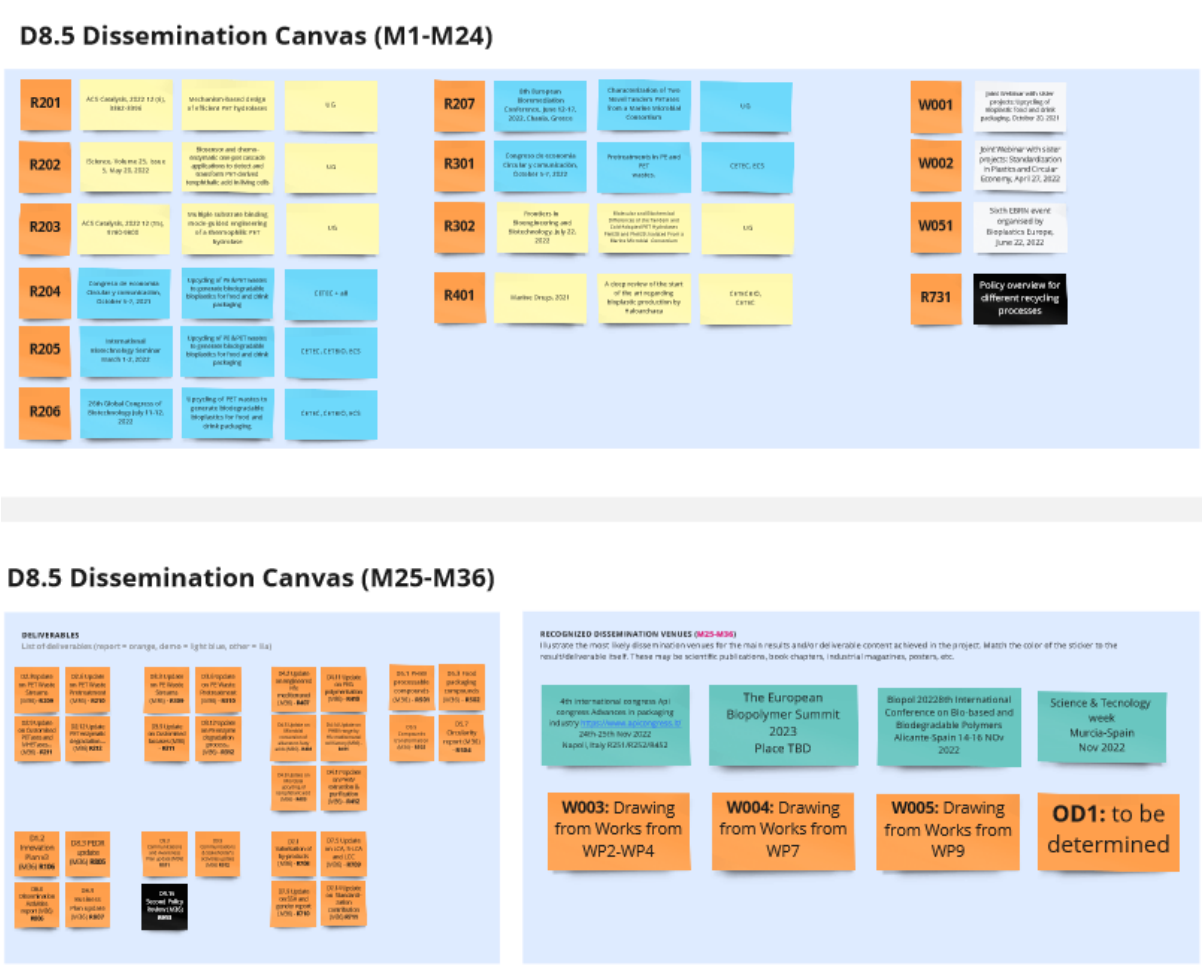

Figure 1: up-PET dissemination canvas update at M24 – Results and deliverables.

2.3 Deliverable Dissemination artefacts

If we also look the deliverables (**Class 01 in PEDR**) submitted until M24 (see Figure 2 below), the artefacts are also color-coded per their type. Most are reports (all but five out of 48 deliverables), that are indicated with the orange color. Two (lilac) are online sites such as project website and up-PET MOOC site. Lastly, there are two deliverables with the blue color that are demonstrators such as the Citizen Awareness Platform and Mobile Application for Citizen Awareness and one deliverable for Policy Brief (black). These latter three are also considered as other deliverable artefacts.

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Figure 2: up-PET deliverables until M24 – as artefacts.

2.4 Non-deliverable Dissemination artefacts

In carrying out dissemination activities the following artefacts have been created based on the classifications illustrated in PEDR: **Class 02** was for Scientific Publications, Workshops and Posters, **Class 03** was named as Dissemination Events and foremost is used as events in which networking while disseminating results are listed and **Class 04** was reserved for other kind of dissemination activities such as training and policymaking.

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2.4.1 Scientific articles and workshop posters

The following **thirteen (13)** dissemination artefacts (*left and middle column below*) have been prepared and disseminated either in scientific jounals, in workshops or in conference events. There are **five** articles **in journals**, **six posters and two oral presentations** in a conferences or events. They have been numbered similarly.

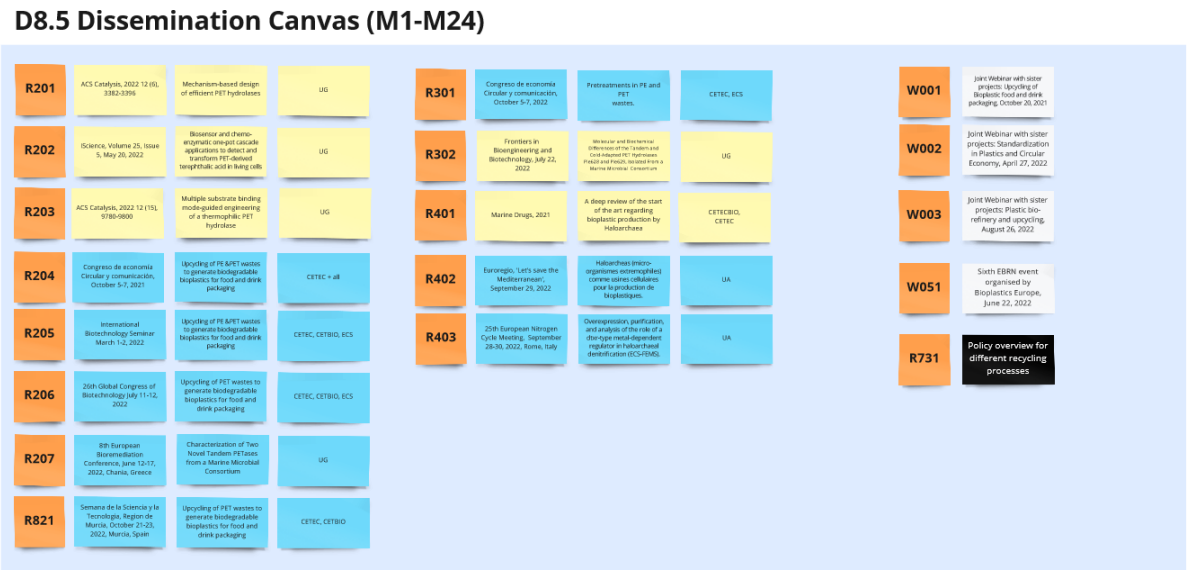


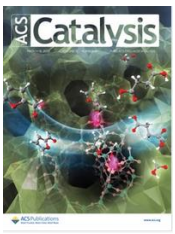
Figure 3: up-PET class 02 dissemination artefacts (publications and posters).

The following Table 1 will describe the details of each of dissemination artefact in Class 02. Table lists the name of the artefacts, contributors to it, its' status and linking to the Work Package, Task and numbered based on explained before. Furthermore, the last row has the full abstract of the artefact.

Table 1: Scientific publications, workshops and posters of up-PET.

R201 – work in WP2, task 2.3	'Mechanism-based design of efficient PET hydrolases' **Contributors: UG**	**STATUS**

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019–2020] under grant agreement No [number]

DOI: https://doi.org/10.1021/acscatal.1c05856 Repository link: Yes Open Science (**Y**/N): Peer review (**Y**/N): Joint publication (Y/**N**):	Journal of ACS Catalysis https://pubs.acs.org/journal/accacs ISSN: 2155-5435, Publisher: ACS Publications Publication Date: February 28, 2022	Published 

ABSTRACT:

Polyethylene terephthalate (PET) is the most widespread synthetic polyester, having been utilized in textile fibers and packaging materials for beverages and food, contributing considerably to the global solid waste stream and environmental plastic pollution. While enzymatic PET recycling and upcycling have recently emerged as viable disposal methods for a circular plastic economy, only a handful of benchmark enzymes have been thoroughly described and subjected to protein engineering for improved properties over the last 16 years. By analyzing the specific material properties of PET and the reaction mechanisms in the context of interfacial biocatalysis, this Perspective identifies several limitations in current enzymatic PET degradation approaches. Unbalanced enzyme–substrate interactions, limited thermostability, and low catalytic efficiency at elevated reaction temperatures, and inhibition caused by oligomeric degradation intermediates still hamper industrial applications that require high catalytic efficiency. To overcome these limitations, successful protein engineering studies using innovative experimental and computational approaches have been published extensively in recent years in this thriving research field and are summarized and discussed in detail here. The acquired knowledge and experience will be applied in the near future to address plastic waste contributed by other mass-produced polymer types (e.g., polyamides and polyurethanes) that should also be properly disposed by biotechnological approaches.

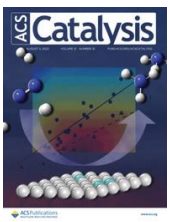
R202, work in WP2, Task 2.3	'Biosensor and chemo-enzymatic one-pot cascade applications to detect and transform PET-derived terephthalic acid in living cells' **Contributors: UG**	**STATUS**

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019–2020] under grant agreement No [number]

DOI: https://doi.org/10.1016/j.isci.2022.104326 Repository link: Yes Open Science (**Y**/N): Peer review (**Y**/N): Joint publication (Y/**N**):	Journal of iScience https://www.sciencedirect.com/journal/iscience ISSN: 2589-0042, Publisher: Elsevier, Publication Date: May 20, 2022	Published 

ABSTRACT:

Plastic waste imposes a serious problem to the environment and society. Hence, strategies for a circular plastic economy are demanded. One strategy is the engineering of polyester hydrolases toward higher activity for the biotechnological recycling of polyethylene terephthalate (PET). To provide tools for the rapid characterization of PET hydrolases and the detection of degradation products like terephthalic acid (TPA), we coupled a carboxylic acid reductase (CAR) and the luciferase LuxAB. CAR converted TPA into the corresponding aldehydes in *Escherichia coli*, which yielded bioluminescence that not only semiquantitatively reflected amounts of TPA in hydrolysis samples but is suitable as a high-throughput screening assay to assess PET hydrolase activity. Furthermore, the CAR-catalyzed synthesis of terephthalaldehyde was combined with a reductive amination cascade in a one-pot setup yielding the corresponding diamine, suggesting a new strategy for the transformation of TPA as a product obtained from PET biodegradation.

R203, work in WP2, Task 2.3	'Multiple Substrate Binding Mode-Guided Engineering of a Thermophilic PET Hydrolase' **Contributors: UG**	**STATUS**
DOI: https://doi.org/10.1021/acscatal.2c02275 Repository link: Yes Open Science (**Y**/N): Peer review (**Y**/N):	Journal of ACS Catalysis https://pubs.acs.org/journal/accacs ISSN: 2155-5435, Publisher: ACS Publications Publication Date: July 27, 2022	Published 

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Joint publication (Y/**N**):		

ABSTRACT:

Thermophilic polyester hydrolases (PES-H) have recently enabled biocatalytic recycling of the mass-produced synthetic polyester polyethylene terephthalate (PET), which has found widespread use in the packaging and textile industries. The growing demand for efficient PET hydrolases prompted us to solve high-resolution crystal structures of two metagenome-derived enzymes (PES-H1 and PES-H2) and notably also in complex with various PET substrate analogues. Structural analyses and computational modeling using molecular dynamics simulations provided an understanding of how product inhibition and multiple substrate binding modes influence key mechanistic steps of enzymatic PET hydrolysis. Key residues involved in substrate-binding and those identified previously as mutational hotspots in homologous enzymes were subjected to mutagenesis. At 72 °C, the L92F/Q94Y variant of PES-H1 exhibited 2.3-fold and 3.4-fold improved hydrolytic activity against amorphous PET films and pretreated real-world PET waste, respectively. The R204C/S250C variant of PES-H1 had a 6.4 °C higher melting temperature than the wild-type enzyme but retained similar hydrolytic activity. Under optimal reaction conditions, the L92F/Q94Y variant of PES-H1 hydrolyzed low-crystallinity PET materials 2.2-fold more efficiently than LCC ICCG, which was previously the most active PET hydrolase reported in the literature. This property makes the L92F/Q94Y variant of PES-H1 a good candidate for future applications in industrial plastic recycling processes.

R204, work in WP2, Task 2.3	'Molecular and Biochemical Differences of the Tandem and Cold-Adapted PET Hydrolases Ple628 and Ple629, Isolated from a Marine Microbial Consortium' **Contributor: UG**	**STATUS**
DOI: https://doi.org/10.3389/fbioe.2022.930140 Repository link: YES Open Science (**Y**/N): Peer review (**Y**/N): Joint publication (Y/**N**):	Frontiers in Bioengineering and Biotechnology https://www.frontiersin.org/ ISSN: 2296-4185, Publisher: Frontiers Publication Date: July 21, 2022	Published 

ABSTRACT:

Polybutylene adipate terephthalate (PBAT) is a biodegradable alternative to polyethylene and can be broadly used in various applications. These polymers

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can be degraded by hydrolases of terrestrial and aquatic origin. In a previous study, we identified tandem PETase-like hydrolases (Ples) from the marine microbial consortium I1 that were highly expressed when a PBAT blend was supplied as the only carbon source. In this study, the tandem Ples, Ple628 and Ple629, were recombinantly expressed and characterized. Both enzymes are mesophilic and active on a wide range of oligomers. The activities of the Ples differed greatly when model substrates, PBAT-modified polymers or PET nanoparticles were supplied. Ple629 was always more active than Ple628. Crystal structures of Ple628 and Ple629 revealed a structural similarity to other PETases and can be classified as member of the PETases IIa subclass, α/β hydrolase superfamily. Our results show that the predicted functions of Ple628 and Ple629 agree with the bioinformatic predictions, and these enzymes play a significant role in the plastic degradation by the consortium.

R401, work in WP4, Task 4.3	'Haloarchaea as Cell Factories to Produce Bioplastics' **Contributors: CETEC, CETECBIO**	**STATUS**
DOI: https://doi.org/10.3390/md19030159 Repository link: Yes Open Science (**Y**/N): Peer review (**Y**/N): Joint publication (**Y**/N):	Journal of Marine Drugs https://www.mdpi.com/journal/marinedrugs ISSN: 1660-3397, Publisher: MDPI Publication Date: March 18, 2021	Published

ABSTRACT:

Plastic pollution is a worldwide concern causing the death of animals (mainly aquatic fauna) and environmental deterioration. Plastic recycling is, in most cases, difficult or even impossible. For this reason, new research lines are emerging to identify highly biodegradable bioplastics or plastic formulations that are more environmentally friendly than current ones. In this context, microbes, capable of synthesizing bioplastics, were revealed to be good models to design strategies in which microorganisms can be used as cell factories. Recently, special interest has been paid to haloarchaea due to the capability of some species to produce significant concentrations of polyhydroxyalkanoate (PHA), polyhydroxybutyrate (PHB), and polyhydroxyvalerate (PHV) when growing under a specific nutritional status. The growth of those microorganisms at the pilot or

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industrial scale offers several advantages compared to that of other microbes that are bioplastic producers. This review summarizes the state of the art of bioplastic production and the most recent findings regarding the production of bioplastics by halophilic microorganisms with special emphasis on haloarchaea. Some protocols to produce/analyze bioplastics are highlighted here to shed light on the potential use of haloarchaea at the industrial scale to produce valuable products, thus minimizing environmental pollution by plastics made from petroleum.

R204, work in WP2, Task 2.2 / Task 2.4	'Upcycling of PE &PET wastes to generate biodegradable bioplastics for food and drink packaging' **Contributors: CETEC, CETECBIO**	**STATUS**
Joint poster (**Y**/N):	Congreso de economía Circular y comunicación, October 5-7, 2021 https://ecca-economiacircular.com/ Presentation Date: October 7, 2021	Presented ECCA

ABSTRACT:

Los envases de plástico, que constituyen casi el 60% del total de residuos plásticos en Europa, son muy problemáticos desde el punto de vista medioambiental y de gestión de residuos debido a su durabilidad y resistencia a la degradación. El polietileno (PE) y el tereftalato de polietileno (PET) son los principales plásticos usados en los envases de alimentos y bebidas (43% PE y 19% PET). La gestión sostenible de estos residuos plásticos se ha convertido en un problema muy desafiante para la sociedad global.

R205, work in WP2, Task 2.2 / Task 2.4	'Upcycling of PE &PET wastes to generate biodegradable bioplastics for food and drink packaging' **Contributors: CETEC, CETECBIO, ECS**	**STATUS**
Joint poster (**Y**/N):	International Biotechnology Seminar March 1-2, 2022 https://www.plasticsbiotech.com/en/ Presentation Date: March 2, 2022	Presented INTERNATIONAL SEMINAR BIOTECHNOLOGY applied to the plastics sector

ABSTRACT:

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019-2020] under grant agreement No [number]

Polyethylene (PE) and Polyethylene terephthalate (PET) are the main plastics used in food and beverage packaging (43% PE and 19% PET). The sustainable management of these plastic wastes has become a very challenging problem for global society. The upPE-T project aims to turn plastic food and drinks packaging waste into a valuable resource for making PHBV bioplastics. To achieve this goal, we are working on developing biocatalytic degradation routes to break down the two most commonly used packaging plastics: PET and PE. The resulting products will be used in fermentation strategies to produce biodegradable bioplastics.

R206, work in WP2, Task 2.2 / Task 2.4	'Upcycling of PE &PET wastes to generate biodegradable bioplastics for food and drink packaging' **Contributors: CETEC, AU, ECS**	**STATUS**
Joint poster (**Y**/N)	26th Global Congress of Biotechnology July 11-12, 2022 https://www.plasticsbiotech.com/en/ Presentation Date: July 12, 2022	Presented 26th Global Congress on Biotechnology July 11-12, 2022 | Vienna, Austria

ABSTRACT:

Polyethylene terephthalate (PET) is one of the primary plastics used in food and beverage packaging, around 19%. The sustainable management of these plastic wastes has become a challenging problem for the global society. The upPE-T project aims to turn plastic food and drink packaging waste into a valuable resource for making PHBV bioplastics. To achieve this goal, we are working on developing biocatalytic degradation routes to break down one of the most commonly used packaging plastics: PET. The resulting products were used in fermentation strategies to produce biodegradable bioplastics.

R207, work in WP2, Task 2.3	'Pretreatments in PE and PET wastes.' **Contributors: UG**	**STATUS**
Joint poster (Y/**N**):	8th European Bioremediation Conference, June 12-17, 2022, Chania, Greece https://www.ebc-viii.tuc.gr/en/home Presentation Date: June 14, 2022	Presented EBC-VIII

ABSTRACT:

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019–2020] under grant agreement No [number]

Biodegradation of plastic polymers by marine microorganisms is relatively understudied compared to their terrestrial counterparts. In a previous study, we have demonstrated the biodegradation of the aliphatic-aromatic co-polyester polybutylene adipate terephthalate (PBAT) by a marine microbial consortium. Here, we propose the enzymatic mechanism for the plastic biodegradation by this consortium. Two putative tandem PETases, Ple628 and Ple629 were identified as the potential PBAT-degrading enzymes using meta-omic approaches. We have recombinantly expressed, purified and characterized these enzymes. Both enzymes classify as α/β hydrolases and are phylogenetically related to previously identified terrestrial PETases. Although the enzymes have a high amino acid identity to each other, Ple629 was an order of magnitude more active than Ple628 on PBAT, PBAT-derivatives as well as PET nanoparticles. Similarly, Ple629 was much more active on small model substrates such as bis(2-hydroxyethyl) terephthalate. Both enzymes are mesophilic, with their temperature optima around 30 °C. For both enzymes, the terephthalate-diol monoester was the main degradation product, which only slowly degraded to terephthalic acid and the diol. We present biochemical evidence that Ple628 and Ple629 perform the first step of the PBAT-PET degradation, as predicted using meta(omic) methods. These findings help us understand how aromatic polyesters may be degraded in the marine environment.

R402, work in WP4, Task 4.3	'Haloarcheas (micro-organismes extremophiles) comme usines cellulaires pour la production de bioplastiques.' **Contributors: UA**	**STATUS**
Joint poster (Y/**N**):	International Conference Montpellier-France (EuroRegio) https://www.euroregio.eu/en/to-tackle-plastic-pollution-at-sea-the-international-conference-save-the-mediterranean-is-launched Presentation Date: September 29, 2022	Presented

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019–2020] under grant agreement No [number]

ABSTRACT:

In this project we work with microorganisms that live in highly saline environments such as the coastal salt flats from which common salt is obtained for human consumption. Some species of these microorganisms can produce polymers as reserve substances that are biodegradable polymers. These polymers belong to the group of biopolymers called polyhydroxyalkanoates and are characterized by being bioplastics with physicochemical properties of interest to produce packaging for cosmetics, food, etc. Microorganisms produce these compounds in high concentration when grown in culture media with certain nutritional conditions. To prepare the culture media, we use waste from other industries such as desalination plants (brine) or candy industries (glucose and starch residues). Thus, in the process that we have designed, by using waste from other industries as raw material to prepare the culture media, we recycle that polluting waste to grow microorganisms that produce the bioplastic of interest. This constitutes a circular economy project that provides a solution to the environmental problem suffered by the Mediterranean Sea due to the discharge of brines from desalination and water treatment plants (affects water quality and communities of fish, algae and aquatic plants such as Posidonia), and offers an alternative to produce biodegradable plastics without the need to resort to classical chemistry and petroleum as raw material for the production of plastics.

R403, work in WP4, Task 4.2	'Overexpression, purification, and analysis of the role of a dtxr-type metal-dependent regulator in haloarchaeal denitrification (ECS-FEMS).' **Contributors: UA**	**STATUS**
Joint poster (**Y**/N):	25th European Nitrogen Cycle Meeting, Italy, Rome https://enc2022.azuleon.org/ Presentation Date: September 29, 2022	Presented 

ABSTRACT:

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019-2020] under grant agreement No [number]

Halophilic archaea are extremophilic microorganisms showing unique metabolic characteristics to be adapted to the extreme conditions under which they live. These metabolic capabilities make them good bioremediation model organisms to remove contaminants and several toxic compounds from wastewater treatments or to remove contaminants like nitrate, nitrite, and ammonia, chlorine compounds such as perchlorate and chlorate, heavy metals, and aromatic compounds from saline and hypersaline environments. In parallel, the biomass can be used as natural source of natural compounds highly marketed like carotenoids and polyhydroxyalcanoates (bioplastics).

New advances in the understanding of haloarchaea metabolism, biochemistry, and molecular biology suggest that general biochemical pathways related to nitrogen (Nitrogen cycle: mainly denitrification), metals (iron, mercury, cadmium, copper), hydrocarbons, or phenols can be used for bioremediation proposals.The main goal of this work is to summarize the most recent results about the potential use of complete denitrifying haloarchaea in bioremediation processes carried out at a laboratory scale and the use of the biomass obtained to isolate pigments and bioplastics. The haloarchaeon Haloferax mediterranei has been used as model organisms for this research due to their promising physiological and metabolic characteristics regarding bioremediation.

R821, work in WP2, WP3 and WP4	'Upcycling of PE &PET wastes to generate biodegradable bioplastics for food and drink packaging' **Contributors: CETEC, CETECBIO**	**STATUS**
Joint poster (**Y**/N):	Semana de la Sciencia y la Tecnologia, Region de Murcia https://fseneca.es/secyt22/ Presentation Date: October 21-23, 2022	Presented

ABSTRACT:

This project has received funding from the [European Union's Horizon 2020 research and innovation programme][European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme][Euratom research and training programme 2019–2020] under grant agreement No [number]

2.4.2 Webinars and events

The following **four (4)** dissemination related events (right hand column in Figure 2) have been taken place during M1-M24. Three of them are co-organized webinars with sister projects, and one being organized event with BioPlastics Europe. Third one was along the Summer School with the topic of 'Plastic Biorefinery and Upcycling'. Table 2 contains information about the webinars and related dissemination events. This information contains also the activity report in relation to the activity.

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Table 2: Webinars and events at M24.

<table>
<tr><td>Webinar #1</td><td colspan="4">Short description of the dissemination event

Upcycling bioplastics of food and drink packaging</td></tr>
<tr><td>WP8, Task 8.2

 
</td><td>Type of the activity
Dissemi-nation</td><td>Date of the dissemination activity

20.10.2021</td><td>Number of attendees
+200 live online</td><td>Type of attendees:
Industry, Academia</td></tr>
<tr><td colspan="5">ACTIVITY REPORT:

 

All three projects gave a presentation in the October online joint webinar, in which IDI presented a complete overview of the European Policies in plastic, from the research they have done as part of task 9.5 in this first reporting year, and CETEC presented an overview of upPE-T project. They both participated in a discussion about the importance of clustering and answered the questions from the audience.

The workshop was attended by 158 people from different sectors though number of registrations was 249.</td></tr>
<tr><td>Webinar #2</td><td colspan="4">Short description of the dissemination event

Standardization in Plastics and Circular Economy</td></tr>
</table>

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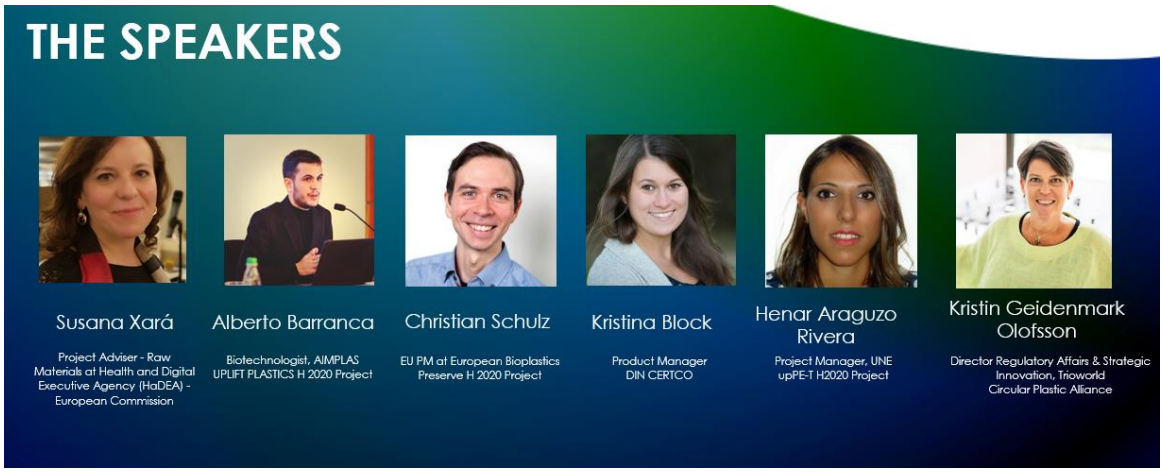
WP8, Task 8.2	Type of the activity	Date of the dissemination activity	Number of attendees	Type of attendees:
	Dissemi-nation	April 27, 2022	~100 live online	Industry, Academia

ACTIVITY REPORT:

All three projects had presenters also in the April online joint webinar, in which we had a moderator from up-PET and the speaker about the standardization. UNE presented a presentation with the title 'Fast track standards: CEN-CENELEC Workshop Agreements (CWAs)' in which i) two different paths from project results to standards was presented, ii) CWA development process was introduced, and iii) conclusion were drawn, and what reasons one should have to start a CWA process.

The workshop was attended by 94 people from different sectors though number of registrations was 117.



Networking event #1	**Short description of the dissemination event** Insights from Horizon projects: EU policy for bio-based and biodegradable plastics

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WP8, Task 8.2	Type of the activity Dissemination	**Date of the dissemination activity** June 22, 2022	**Number of attendees** N.A	**Type of attendees:** Industry, Academia

ACTIVITY REPORT:

An oral presentation of expected outcomes from up-PET were presented. These included i) overviews of the EU regulatory framework related to the upPE-T solutions, envisaged (Oct 2022 and Oct 2023), ii) analyses of policies related to the recycling of food and beverage plastic packaging in selected EU Member and candidate countries, envisaged (Oct 2021, Oct 2022, Oct 2023) and a comparative report (Oct 2024), iii). policy recommendations, envisaged (Oct 2024), and standardization reports, envisaged (Apr 2021, Oct 2021, Oct 2022, Oct 2023, Oct 2024). In principle, the presentation dealt with WP7 standardization task.

up-PET Workshop #1	**Short description of the dissemination event** Workshop on Citizen Awareness of Bioplastics upcycling			
WP8 and WP7, Task 8.2 and Task 7.3	**Type of the activity** Dissemination	**Date of the dissemination activity** October 20, 2022	**Number of attendees** 31	**Type of attendees:** Industry, Academia

ACTIVITY REPORT:

The workshop had altogether seven topics. First half an hour was used to introduce up-PET results from WP2-WP3. The presentation focused on enzymatic

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plastic degradation: firstly, it was introduced different plastic types and we are getting better and better to deal with the plastics but are not yet there. Secondly, state-of-the art enzymes classes and proof-of-concepts were also introduced and thirdly how nature provides us good examples. Thus, finally the presentation concluded with up-PET results and how up-PET helps the nature too.

Next there were presentations about Social Science and Humanities role in up-PET. It focuses on WP7 results explained later on the program, focusing on survey results from three European counties on the sentiment and habits of them towards recycling plastics. Active part of the workshop was to participate into the Quiz and answering to the same survey questions. The results of this Quiz and comparison to the survey results were discussed in the end of program. Furthermore, there was a short introduction to the Citizen Awareness Platform and to the up-PET MOOC.

The workshop was attended by 31 people from different sectors.

Webinar #3	**Short description of the dissemination event** Plastic biorefinery and upcycling			
WP8, Task 8.2   	**Type of the activity** Dissemi-nation	**Date of the dissemination activity** August 26, 2022 This Summer school webinar represented an opportunity for the European H2020 BIOTECH 09 Cluster, to gather and exchange experiences among early-career	**Number of attendees** 15 Ph.D. students	**Type of attendees:** Industry, Academia

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		researchers of the three EU projects, dedicated to the plastic upcycling topic: https://www.phd.engineering.aau.dk/Summer+School+2022		

ACTIVITY REPORT:

In this event, international PhD students from different Universities of Europe gathered to work on Biotechnological solutions for a sustainable plastic sector, focusing on the biotechnological recycling of plastic waste providing a general overview of the whole value chain.

Within this summer school program, the three sister European projects upLIFT, Preserve and upPE-T organized a workshop called BIOTECH09, where the three projects presented via webinar and where the students have created and pitched their own plastic biorefinery.

UG, UA, CETEC and BOKU sent a total of five PhD students and upPE-T coordinator gave an oral presentation with some of the latest project results from WP2 and WP4. Total participants in the workshop were 15 PhD students from different universities of Europe.

2.4.3 Class 04 artefacts: Platform, Mobile Application, MOOC and Policy Brief

The upPE-T partners have delivered one Policy brief at M24, and MOOC website has been established with several set of contents in multiple languages. In addition, there are tangible artefacts such as Citizen Awareness Platform and Citizen Awareness Mobile application that are in more detailed described in Table 3.

Table 3: Other dissemination artefacts delivered by M24.

Citizen Awareness Platform	**Short description of the dissemination artefact** A platform as a tool that would implement the up-PET citizen awareness strategy:

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WP8 and WP9, Task 8.2 and Task 9.4	Type of the activity	Date of the dissemination activity	Number of attendees	Type of attendees:
	Dissemi-nation	October 30, 2022	NA	Consortia, Advisory Board

ACTIVITY REPORT:

European citizens awareness platform will use Role Based Access Control model (RBAC) for an application access management. During the execution of Task 9.4 it has been decided that the developed platform must also support diffusion of the VR content for the VR mobile app (to be developed during the 2ndyear of the project) and host, disseminate the up-PET MOOCs. Platform requirements are listed, and framework illustrated. Timeline of development is described.

Mobile application (VR)	Short description of the dissemination artefact Citizen Awareness Mobile Application

WP8 and WP9, Task 8.2 and Task 9.4	Type of the activity	Date of the dissemination activity	Number of attendees	Type of attendees:
 	Dissemi-nation	October 30, 2022	NA	Consortia, Advisory Board

ACTIVITY REPORT:

The VR mobile app (targeting Android powered devices) aims at disseminating two important processes of the upPE-T project - (a) collecting, cleaning, sorting, and shredding various types of plastics and (b) using enzymes to degrade the pre-treated plastics to degrade the plastic polymer into its building blocks which are then used to produce bio-plastics by other upPE-T partners. Institute for Development and Innovation, Ecoplastics, and Enzymicals assisted Digiotouch with the 360-degree video recording and audio narration. Digiotouch has developed the VR mobile app and a server to display and host the videos

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respectively. The mobile app and the VR videos will be widely disseminated to raise public awareness on environmental issues on plastic and upcycling processes.

Policy Brief	**Short description of the dissemination artefact** First Policy Brief			
WP9, Task 9.5	**Type of the activity** Dissemi-nation	**Date of the dissemination activity** October 30, 2022	**Number of policy organisations / people** NA	**Type of attendees:** Consortia, Advisory Board

EXECUTIVE SUMMARY:

This policy brief is the first of the two policy reviews that are going to be prepared within the upPE-T project. It contains an overview of the policy framework at the EU level for the management of post-consumer plastic packaging waste for food and beverages. It contains an overview of provisions on the part of environmental policies, that are relevant for the recycling of food and beverage plastic packaging waste. The intention of this policy brief is to learn about the policies that are established at the EU level, but also to discern the areas that are not sufficiently or not at all regulated at the EU level. Content-wise, i) a short outline of key legislation is provided, ii) legislative requirements imposed on waste management activities are explained, iii) specifics that apply to packaging and packaging waste are provided and iv) recently introduced provisions applying to specific types of plastic products and plastic packaging are provided.

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3 Conclusions

This deliverable D8.5 "Dissemination activities report v1" presented the dissemination activities carried out and produced dissemination artefacts during the first 24 months of execution of the up-PET project.

These artefacts were classified to i) deliverables, ii) scientific articles in journal and workshop posters, iii) dissemination events such as up-PET webinars and other related events and iv) other up-PET dissemination artefacts.

This deliverable will be updated in each 12 months, next forthcoming at M36 and the final deliverable at M48. Artefacts from previous periods will be inserted to Appendix A for the update.