Innovative solutions for circular technical plastics

Innovation Forum for Plastics
Bringing together innovative solutions for the circular economy

19 April, Brussels

Hosted by EuRIC

PRIMUS

Reforming secondary plastics to become the primary raw material choice for added value products

Innovation Forum 4 Plastics

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SIDE EVENT

INNOVATION FORUM

CIRCULAR PLASTICS

PRIMUS

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EXECUTIVE SUMMARY

- Project Name: PRIMUS
- Project start/end: 05/2022 – 04/2025
- Coordinator Name and Contact: Anna Tenhunen-Lunkka - anna.tenhunen-lunkka@vtt.fi
- Project website: https://www.primus-project.eu/
- Project LinkedIn: https://www.linkedin.com/company/primus-project

PRIMUS

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PROJECT DESCRIPTION

PRIMUS at a glance

PRIMUS aims to support the **circulation of non-recycled** or underutilized **plastics** and aims to create **added value products** from **plastic waste** to support the market development of recycled plastics and capture the value lost today by utilising **advanced mechanical recycling** coupled with **novel pretreatment and analytics**.

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PROJECT OUTCOMES

- Achieved Project outcomes
  1. **Characterisation recyclates' suitability for the 4 PRIMUS Demo cases.** Novel sustainable added-value recyclate-based products produced ready to up-scale:
     1. **DEMO 1** PC/ABS to automotive interiors responding to injection and surface/aesthetics necessities with 80-90% recycled content
     2. **DEMO2** PP/EPDM for automotive cooling circuits and its elements for injection with 20-25% recycled content
     3. **DEMO3** HIPS from refrigerators to refrigerators' inner linings to demonstrate recyclate safety in food contact for thermoformed process with 50-60% recycled content
     4. **DEMO4** EPDM to washing machine seals chemically compatible with detergents with 20% of recycled content
  2. **Establish an EU-wide accepted definition for a recyclate** with broad engagement of the European plastics sector and recyclers. (link)
  3. **Characterisation and development of three brominated flame retardants** (BFRs) extraction approaches (scCO2, DES, catalyst) to TRL4-6.
  4. **Develop sensor-based identification of plastic waste degradation** degree with active hyperspectral sensor (AHS) (link)
  5. **Sustainability assessment focused on plastic recyclates with system dynamics model** (first of its kind). Including legislation, technology development and social acceptance. (link to webinar invitation)
  6. **PRE-1000 method validated.** One EU standard to determine the quality and general product safety of recyclates. (link to webinar)

- Expected Project results
  1. Up-scale the 4 PRIMUS Demo cases formulation to a preindustrial scale.
  2. Establish a robust, reliable, and reproducible **sampling protocol for feedstock and recyclate material** to be applied in the 4 PRIMUS Demo cases.
  3. The **recyclate food safety compliance and certification of styrenics.**
  4. Develop a **traceability system (DPP) for recyclates** linked with LCA&SA.

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CLUSTERING

- Requested Collaboration points (*e.g.* joint activities, cluster events, future opportunities, collaborations)
  1. PRIMUS organise the **Boosting Plastic Recycling Webinar series with cross-project collaboration**. Proposed topics: debromination methods, traceability of recyclates, recyclate food safety compliance.
  2. Participation in **PRIMUS final event**
  3. Further **joint research projects** to up-scale debromination methods at higher TRL-level, and apply the PRE-1000 validation.
  4. Create an **Independent Expert Report** among EU-projects of circular products and information exchanges across the product life cycle.

- Elaborate one key policy message that you have so far (e.g. policy development)

Addressing the complex challenge to significantly increasing the recycling of plastic waste into new and also value-added products requires multifaceted solutions that involve stakeholders across the value chain.

1. Improve **end-of-waste criteria** for proper EOL plastic management.
2. Improve **separate waste collection system** and its monitoring with incentives.
3. Conflict between complying technical limit of chemical legislations (POP, REACH) and achieving ambitious recycled content targets (plastic strategy, chemical strategy, waste framework directive). This could be solved by **leveraging WEEE, REACH, RoHS, POP, ESPR to establish strong link between waste and product legislations.**
4. **Tax incentive for recyclable practice** and tax burden for the use of virgin material could boost recyclates usage.
5. **Use an EU standard for waste management practice** to improve the uncollected and illegal waste that pose significant environmental and health risks.
6. Create a **unified market for recycled materials** that creates stability for recycling facilities.

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Thank you!

Carolina Mejía Niño

Senior Innovation Manager
MONDRAGON Corporation

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GREEN3D

Innovation Forum 4 Plastics

Bringing together innovative solutions for the circular economy

19 April, Brussels

SIDE EVENT

INNOVATION FORUM

CIRCULAR PLASTICS

THE GREEN 3D

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EXECUTIVE SUMMARY

- Project Name: GREEN3D
- Coordinator Name and Contact: Rocco Lagioia / green3d@green3d.eu
- Project website: https://www.green3d.eu/
- Project LinkedIn: https://www.linkedin.com/company/green3d/

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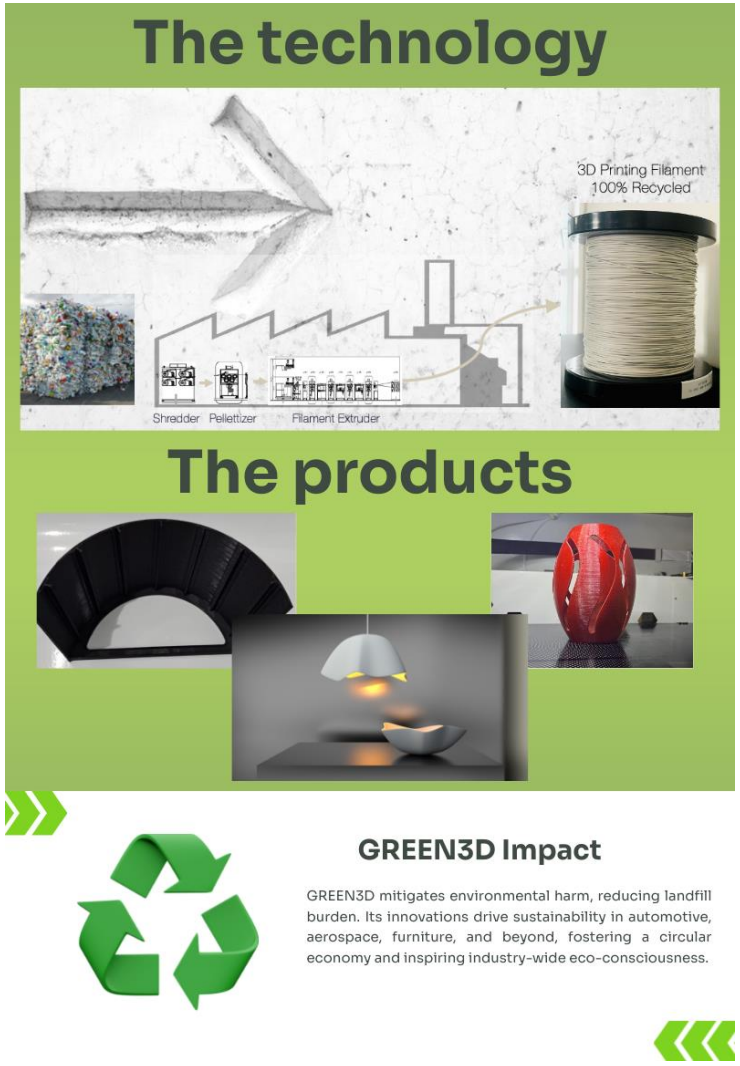
PROJECT DESCRIPTION

- Project description



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PROJECT OUTCOMES

- Achieved Project outcomes

1. ABS and PET plastic waste recycled into 3D printing filament.
2. 3D printing filament successfully used for aerospace components and Hotels FF&E products.
3. LCA showed emission reduction by 42%.
4. Investment Break-Even at 5 months from plant turn-key.
5. Pilot plant current capacity: 4.5 tonnes/year.

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CLUSTERING

- Requested Collaboration points (e.g. joint activities, cluster events, future opportunities, collaborations)
  1. Additional materials to be tested for 3D printed filament production.
  2. Impurities to be tested up to 30% in weight.
  3. Market validation in additional sectors.
  4. Common Consortium-based projects.
  5. Brainstorming on further project development at the Innovation Forum on May 21-22.

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CLUSTERING

- Elaborate one key policy message that you have so far (e.g. policy development)
  1. Mandatory Environmental Criteria: The European Commission could establish mandatory environmental criteria for public procurement contracts, requiring public authorities to prioritize products and services that demonstrate a reduced environmental impact, such as those made from recycled materials or produced using sustainable processes.
  2. Capacity Building and Training: The Commission could invest in capacity building and training programs for procurement officers to increase awareness and understanding of sustainable procurement practices. By equipping public authorities with the necessary knowledge and skills, they can make more informed decisions and actively support the adoption of GREEN3D products.
  3. Certification and Labeling Programs: The Commission could introduce certification and labeling programs specifically tailored to environmentally-friendly products, including those manufactured by GREEN3D. These programs would provide clear and transparent information to public procurement officers, making it easier for them to identify and select sustainable options.

THE GREEN 3D

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SCAN ME

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Circular Flooring

Innovation Forum 4 Plastics

Bringing together innovative solutions for the circular economy

19 April, Brussels

SIDE EVENT

INNOVATION FORUM

CIRCULAR PLASTICS

Circular Flooring

Funded by the European Union

EXECUTIVE SUMMARY

- Project Name: Circular Flooring
- Project start/end: 6 / 2019 – 8 / 2024
- Coordinator Name and Contact: Fraunhofer Institute IVV

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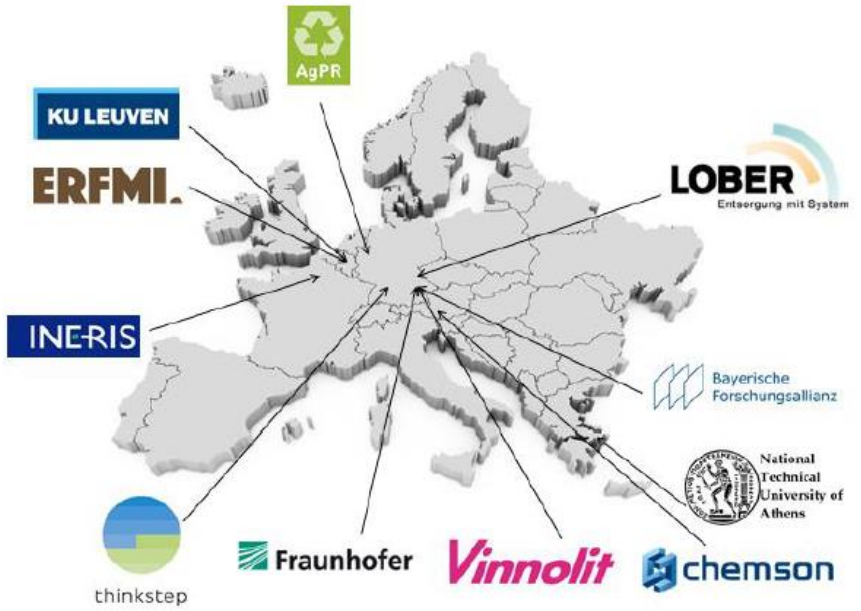

- Project website: www.circular-flooring.eu
- Project LinkedIn: https://www.linkedin.com/company/65675248

Circular Flooring

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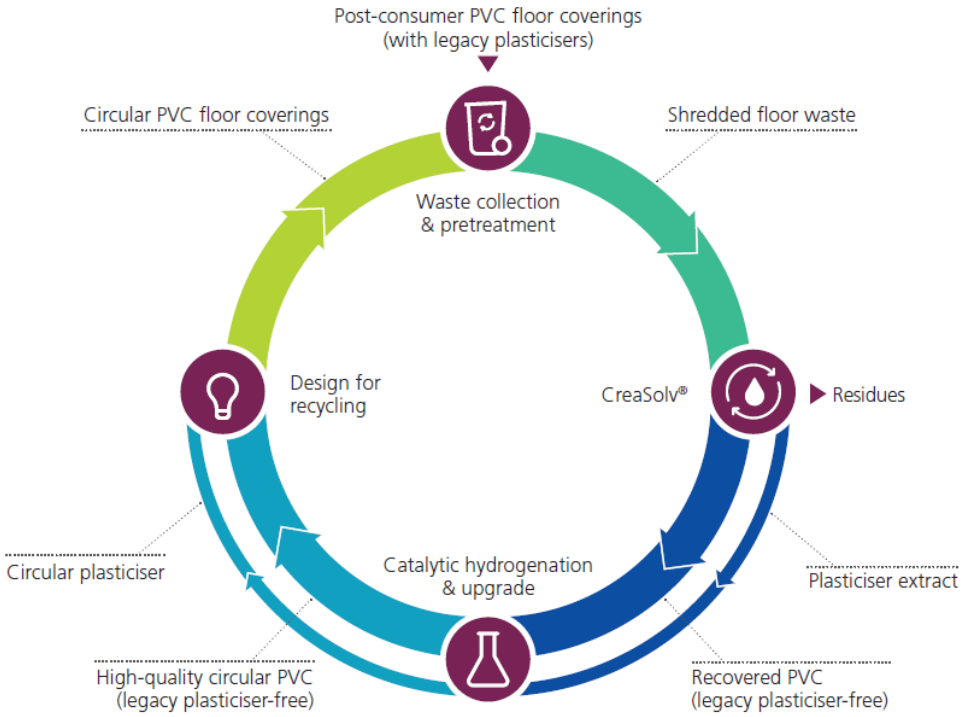
PROJECT DESCRIPTION

- Enable the circular use of plasticized PVC from waste flooring by a recycling process that eliminates legacy phthalic acid esters that are not compliant with the EU REACH Directive.
- Develop a process for recovering secondary legacy phthalate-free PVC from flooring waste, thus preventing usable resources from landfill or incineration
- Demonstrate circularity of PVC in flooring and applicability of phthalate free plasticizers that are compliant to REACH from waste flooring
- Assessment of environmental, health and safety impacts and techno-economic feasibility



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PROJECT OUTCOMES

- Achieved Project outcomes
  1. Market study justified PVC Flooring recycling
  2. Feasibility of phthalate reduction in PVC recyclate through solvent-based purification
  3. Feasibility of phthalate hydrogenation
  4. Process implementation in pilot plant (TRL 6), processing at scale
  5. PVC recyclate with acceptable properties for reprocessing
  6. Economic sustainability of process confirmed

- Expected Project results
  1. Extraction yield >90%
  2. Phthalate concentrations below 1000 ppm
  3. Secondary phthalate free plasticizer
  4. Upscale to TRL 5/6
  5. Circularity of PVC in flooring
  6. Circularity of plasticizers in flooring
  7. Economy, LCA, Communication

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CLUSTERING

- Requested Collaboration points (*e.g.* joint activities, cluster events, future opportunities, collaborations)
  1. Circular Flooring contributed to Plastics Circularity Conference, 2020, Forum4Plastics 2023
  2. Circular Flooring Expert Days 2021 und 2023
  3. Announcement of our final event in Brussels on July 4, 2024
  4. Transfer of knowledge and technology to hard PVC or other waste plastics from building and construction
  5. Current and future collaboration with cluster R&D and industry partners in new proposals

- Elaborate one key policy message that you have so far (e.g. policy development)

  It is essential to convey
  that the use of most durable materials like PVC brings incredible CO_2-savings
  as well as
  information on the benefits of circular use of durable plastics (like PVC flooring),
  which should not be hindered by setting too low thresholds for hazardous substances (REACH, POP) or by too fast reduction of thresholds ("safety of investment in recycling technology").

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Circular Flooring

Thank you!

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PLAST2bCLEANED

Innovation Forum 4 Plastics

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19 April, Brussels

SIDE EVENT

INNOVATION FORUM

CIRCULAR PLASTICS

[Project logo]

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EXECUTIVE SUMMARY

- Project Name: PLAST2bCLEANED
- Project start/end: 1st Jun 2020- 29th Feb 2024
- Coordinator Name and Contact: Esther van den Beuken, esther.vandenbeuken@tno.nl
- Project website: https://plast2bcleaned.eu/
- Project LinkedIn: https://www.linkedin.com/company/plast2bcleaned/

[Project logo]

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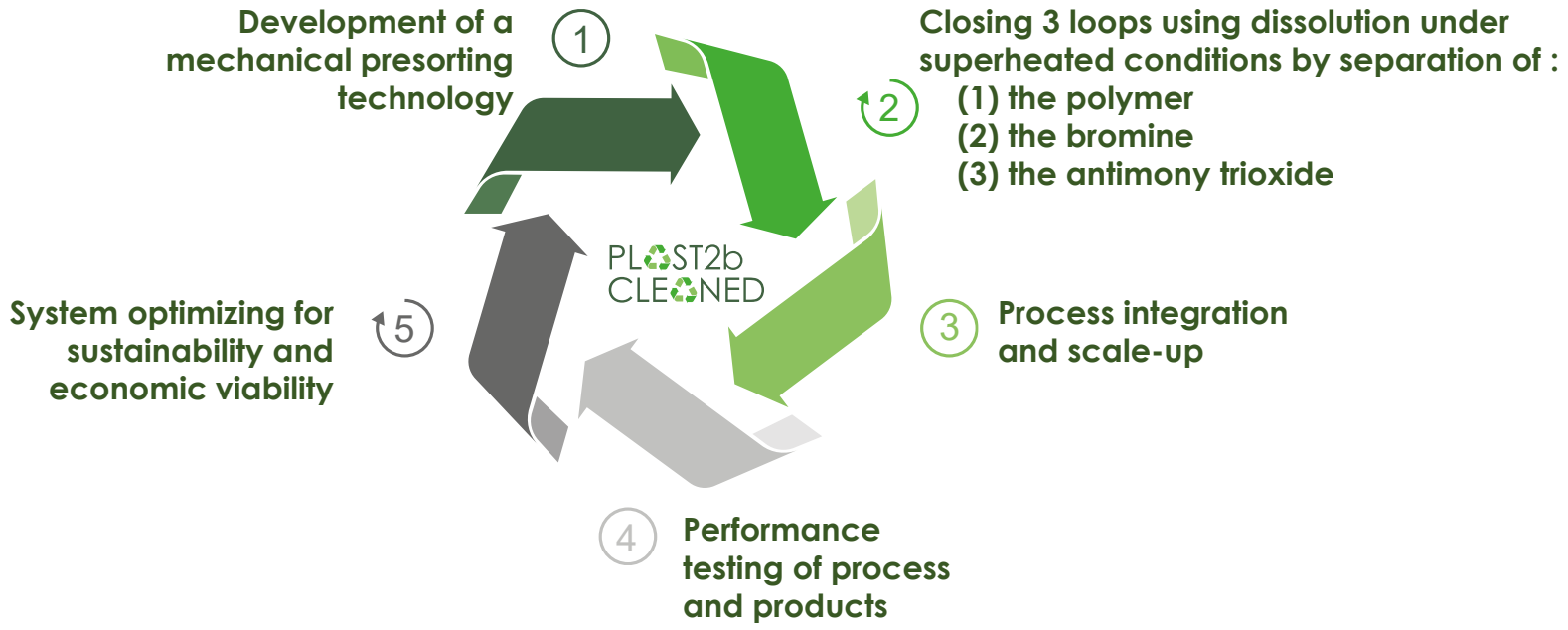
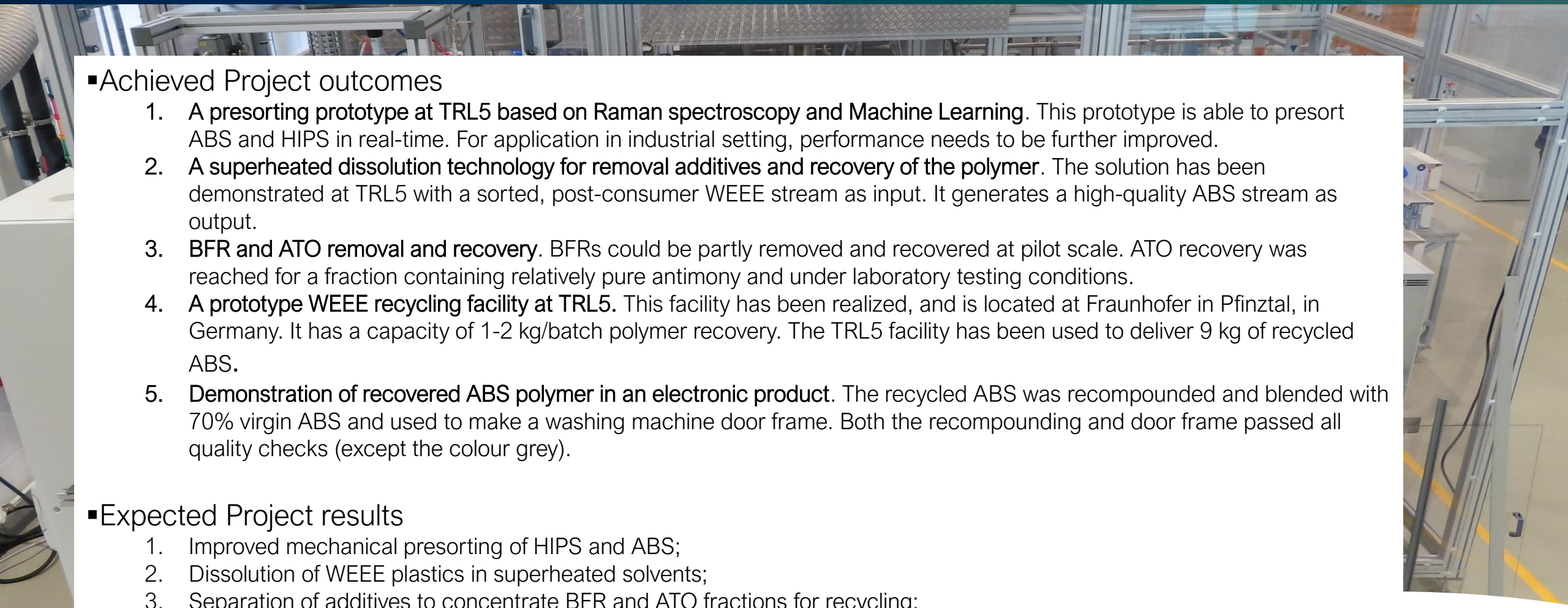
PROJECT DESCRIPTION

The overall aim of PLAST2bCLEANED is to develop a human and environmentally safe recycling process for Waste Electrical and Electronic Equipment (WEEE) plastics in a technically feasible and economically viable manner.



PROJECT OUTCOMES



- Achieved Project outcomes
  1. **A presorting prototype at TRL5 based on Raman spectroscopy and Machine Learning**. This prototype is able to presort ABS and HIPS in real-time. For application in industrial setting, performance needs to be further improved.
  2. **A superheated dissolution technology for removal additives and recovery of the polymer**. The solution has been demonstrated at TRL5 with a sorted, post-consumer WEEE stream as input. It generates a high-quality ABS stream as output.
  3. **BFR and ATO removal and recovery**. BFRs could be partly removed and recovered at pilot scale. ATO recovery was reached for a fraction containing relatively pure antimony and under laboratory testing conditions.
  4. **A prototype WEEE recycling facility at TRL5.** This facility has been realized, and is located at Fraunhofer in Pfinztal, in Germany. It has a capacity of 1-2 kg/batch polymer recovery. The TRL5 facility has been used to deliver 9 kg of recycled ABS.
  5. **Demonstration of recovered ABS polymer in an electronic product**. The recycled ABS was recompounded and blended with 70% virgin ABS and used to make a washing machine door frame. Both the recompounding and door frame passed all quality checks (except the colour grey).

- Expected Project results
  1. Improved mechanical presorting of HIPS and ABS;
  2. Dissolution of WEEE plastics in superheated solvents;
  3. Separation of additives to concentrate BFR and ATO fractions for recycling;
  4. Energy efficient recovery of solvent and of polymer.

PLAST2bCLEANED
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CLUSTERING

- Requested Collaboration points

  Collaboration for further research to further develop the PLAST2bCLEANED technology at higher TRL-level and scale-up

- Key policy message:

  To perform further research and investing in scaling up plants, there is a strong need for a stable investment climate which can only be created by a consistent set of policy measures to arrange a sustainable and equal level playing field for complex recycling of brominated EEE waste in the EU, addressing:

  1. Equal EU transboundary requirements for all plastics containing products, half-products, raw materials and wastes.
  2. A stable regulatory environment for substances of concern with clear and realistic limit value projections.
  3. Creating an internal market for circular plastics, decoupled from the virgin plastics market.
  4. Creating sufficient plastic waste supply by increase of recyclable waste streams and by banning export of plastic waste.
  5. Internalize CO2 externalities, i.e. include CO2 price in the cost price in the plastics value chain including recycling.

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Thank you!

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