INEOS Inovyn

A Solution for PVC Cable Waste Legacy Additives Extraction

Project Circle

PVC4Cables Conference
October 16, 2024
Prague, Czech Republic

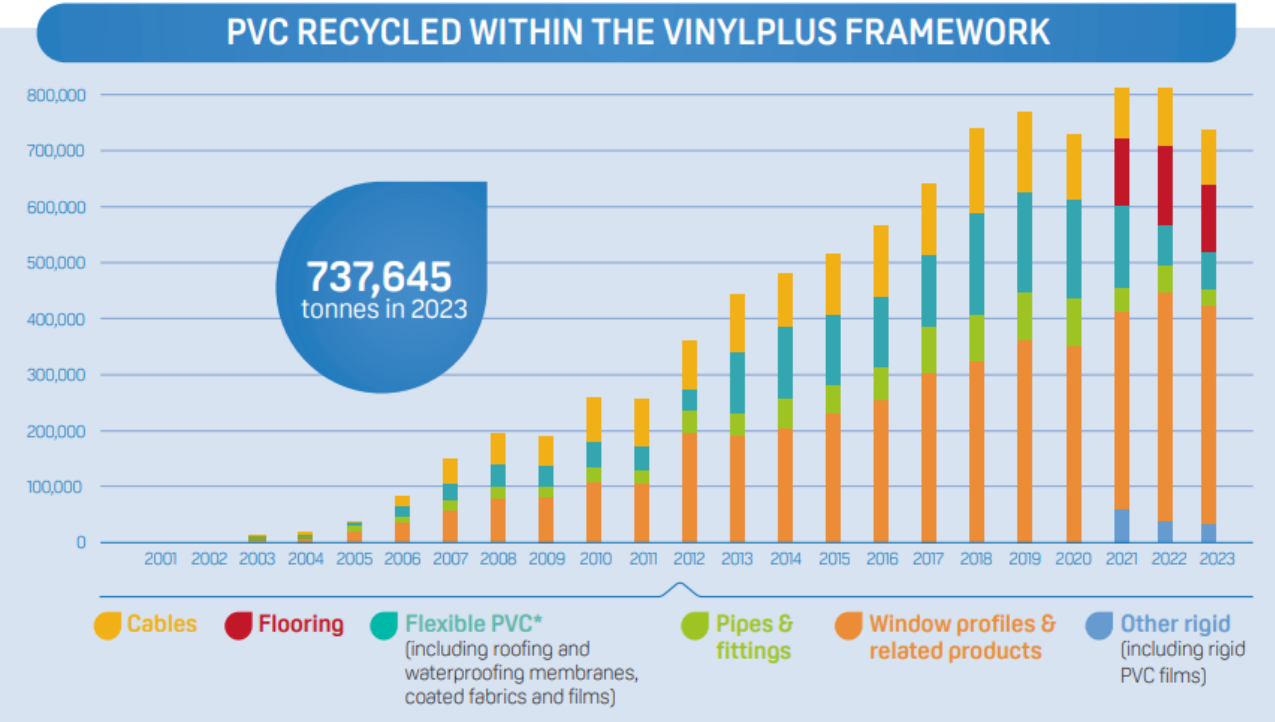
Advanced recycling technology development

Project Circle roadmap

- Objective
  - Develop the technologies to recycle all PVC that’s non mechanically recyclable
- Aim
  - Development of Dissolution, Pyrolysis and Gasification technology
  - First industrial dissolution technology plant by 2030
- Feedstock
  - PVC waste that can’t be recycled mechanically, like composites and legacy additives containing ones
  - Need for sorting on PVC application and presence/absence of legacy additives

Mechanical recycling of cables

Cables is 1 of the main PVC application of the mechanical recycling



	Tonnage recycled 2022			Tonnage recycled 2023		
	Total tonne	Post-consumer	Pre-consumer	Total tonne	Post-consumer	Pre-consumer
Cables	101 239	91 958	9 281	97 586	88 345	9 241

Tonnages of PVC recycled in the EU-27 plus Norway, Switzerland and the UK, within the operations of Recovinyl AISBL in the framework of VinylPlus

REACH Regulations applicable to pipes

Treat for the mechanical recycling of post-consumer cables

Restrictions on stabilisers

- If the concentration of **lead** ≥ 0.1wt% of the PVC material, it shall not be placed on the market or used in PVC articles. This restriction applies as of November 29, 2024
  - Provisions to support the circular economy
    - 24 M transition period for **PVC articles containing recovered flexible PVC, i.e., until May 28, 2025** to comply with the restriction
    - 10 years derogation for PVC articles with recovered rigid PVC (lead <1.5wt%), i.e., until May 28, 2033. To be reviewed in 2028
- If the concentration of **cadmium** is ≥ 0.01wt% of PVC material, it shall not be placed on the market

Restrictions on plasticisers since 2019

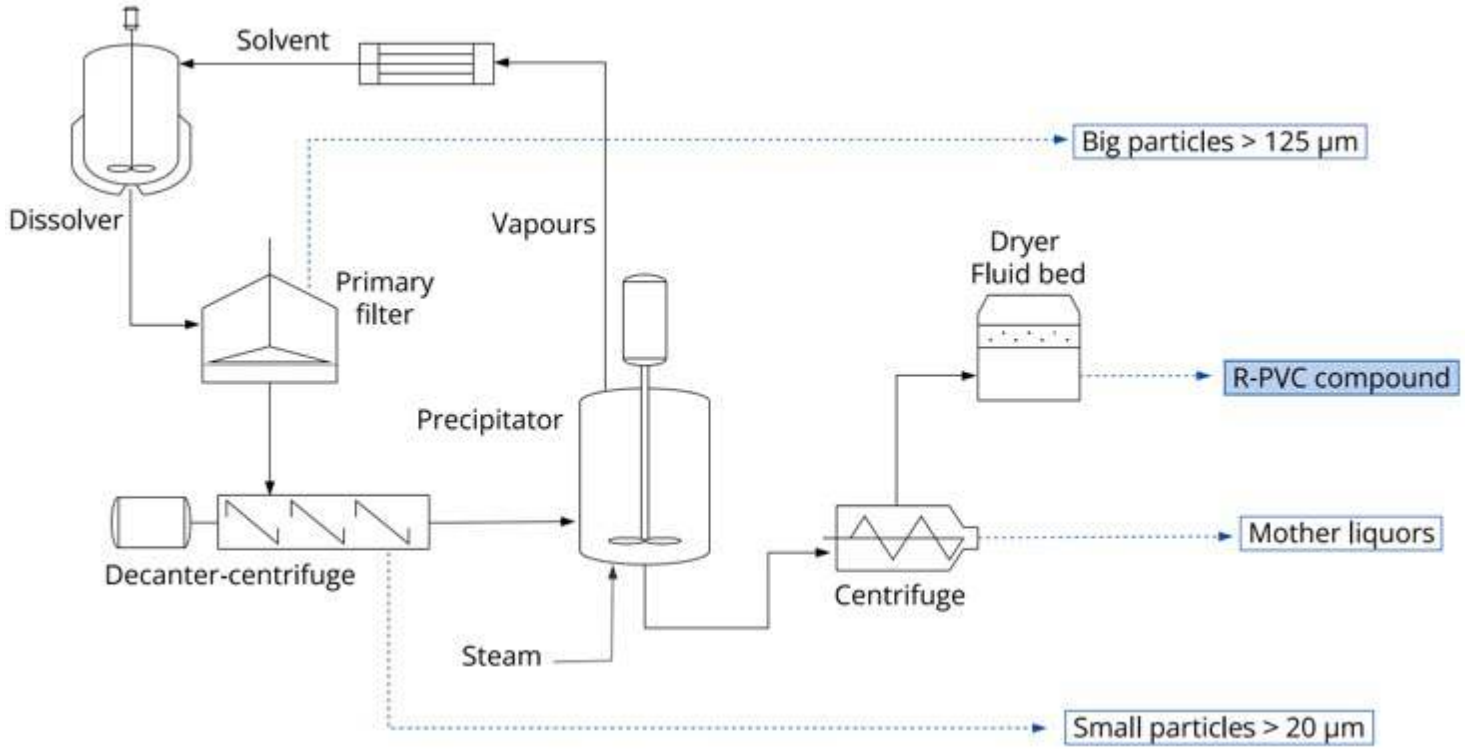
- Sum of **DEHP/DOP, DBP, DIBP and BBP** <=0.1wt% in plasticised material articles
- Since February 2015, only EU-based organisations that have successfully applied for an exemption to use DEHP/DOP, DBP and BBP or can use those phthalates in manufacturing

Vinyloop technology, industrial operation

Vinyloop plant closed due to REACH evolution on DEHP/DOP, DBP, DIBP and BBP

Vinyloop[tm] plant – Ferrara
2002 - 2018

- 2002-2018: Vinyloop® Industrial plant at Ferrara (Italy)
  - >15 years years of industrial experience with Tarpaulins & Cables
  - Fibers separated from PVC compound
  - Elimination of residual contaminations
  - Production of rejuvenated PVC compound
- Nominal capacity
  - Waste input : 10 000 T
  - Rejuvenated-PVC: 8 500 T



- Plant closed and dismantled due to REACH evolution on *legacy additives*
  - Plant not designed for the extraction of additives (stabilisers, fillers, plasticisers, etc.) from the PVC compound

Dissolution technology development

From Vinyloop^{tm} to Vinyloop^{tm} -D technology

- Lab-scale testing
  - Pb and Cd extracted from cables

    → *REACH compliant*
  - DEHP/DOP, DBP, DIBP and BBP extracted from cables and other flexible PVC applications

    → *REACH compliant*
- Pilot plant testing
  - Two pilot plants in operation at R&D centre in Jemeppe-sur-Sambre (B)

  → *Legacy additives extraction efficiency confirmed*
- Industrial operations
  - Aim: first industrial unit by 2030

Dissolution technology development

From Vinyloop^{tm} to Vinyloop^{tm} -D technology

- Walloon consortium CIRCPVC
  - Covers the entire chain, from collecting PVC waste at construction-demolition sites to production of rPVC not containing legacy additives

- Belgium national consortium DISSOLV
  - Aims at demonstrating the circularity of flexible PVC waste (flooring, carpets and tarpaulins) and recycling all extracted additives

What else?