vinyl plus®

2024 Progress Report

REPORTING ON
2023 ACTIVITIES

Photo: VinylPlus®

TABLE OF CONTENTS

MESSAGE FROM THE CHAIRMAN

Photo: courtesy of Marcel Van Der Burg

01

Dr Karl-Martin Schellerer
Chairman of VinylPlus

2023 was a very demanding year for VinylPlus, as the PVC industry continued to face unprecedented regulatory and macro-economic challenges. However, even in a year characterised by extreme uncertainty, our commitment did not waver – as it never has. Our industry can tackle demanding challenges thanks to hard work and close cooperation among our founding members and partner companies, as well as among PVC sectoral and national associations.

Thanks to this cooperation, we were able to provide a huge amount of validated information within very short deadlines in response to ECHA's three calls for evidence to contribute to the *Investigation report on PVC and PVC additives*. We contributed an impressive number of studies and a large amount of data and research, all based on solid technical and scientific foundations. Although the final Report recognizes that we are adequately managing the risks associated with our production, we will continue to respond to issues highlighted by ECHA, though in our opinion these might not always be justified.

At the global level, UNEP intergovernmental negotiations are currently ongoing to develop an international legally binding instrument on plastic pollution, which is likely to have an impact on the global plastic production system. Together with the other regional PVC and plastics associations, we intend to proactively contribute to the discussions on how to eliminate plastics pollution at a global level through science-based policies also harnessing the power of voluntary commitments like VinylPlus.

We are convinced that cooperation and dialogue between industry and regulators are paramount for a successful industrial transition to sustainability and a circular economy and that a clear and supportive regulatory framework is essential to any successful business. This is especially the case with recycling.

VinylPlus has always been setting a course towards a circular economy for PVC, which is a versatile, highly recyclable, and inherently low-carbon material, and which is an enabler of the green transition. However, as you will read in this report, VinylPlus' tremendous annual growth rate in recycling over the last two decades is stagnating. Persistent high inflation has negatively impacted the construction sector, putting our network of recyclers in difficulty and reducing demand for recyclates as well as for primary PVC in the EU. In addition, the recycling system continues to be under scrutiny from regulators.

We will continue to work with the competent institutions and authorities to achieve a fair regulatory framework that can support the industry in achieving the recycling targets that the EU itself has set. The *Restriction on Lead in PVC* adopted by the European Commission in May 2023 is a good example. It restricts the import of lead-containing PVC products from third countries where lead is still used as a stabiliser, while enabling the recycling of PVC products containing legacy-lead additives in a manner that safeguards human health and the environment. At the same time, VinylPlus has taken several steps to support new technologies that allow the separation and treatment of PVC waste containing legacy additives.

I would also like to underline the continuous progress of the VinylPlus® Product Label, one of our flagship initiatives, which obtained the European-level accreditation by Accredia in September 2023. Moreover, the VinylPlus® Product Label was recognized among the most valued certification schemes included in the multi-material label developed by the Belgian Construction Certification Association to certify the quality and sustainability of windows and doors manufactured in Belgium.

Throughout 2023, VinylPlus continued to engage with stakeholders, developing successful partnerships, joint projects and initiatives. Examples such as VinylPlus® Med and Garden to Connect were presented along with other PVC industry initiatives in the Plastics Pavilion at the World Congress of Architects 2023 in Copenhagen.

Finally, on behalf of the entire VinylPlus family, I would like to express our most sincere and heartfelt thanks to Brigitte Dero, who stepped down from the position of Managing Director at the end of 2023, having guided VinylPlus for 10 years. We all appreciated her enthusiasm, energy, determination and strength in thinking ahead with a clear vision of the future of our industry. We wish Brigitte all the best for her future!

We warmly welcome Charlotte Röber, who succeeded Brigitte in the position. Charlotte knows the PVC industry very well from her successful work as Managing Director of EPPA, the European trade association representing the manufacturers of PVC window systems. We wish Charlotte every success in her new, broader role for the European PVC value chain!

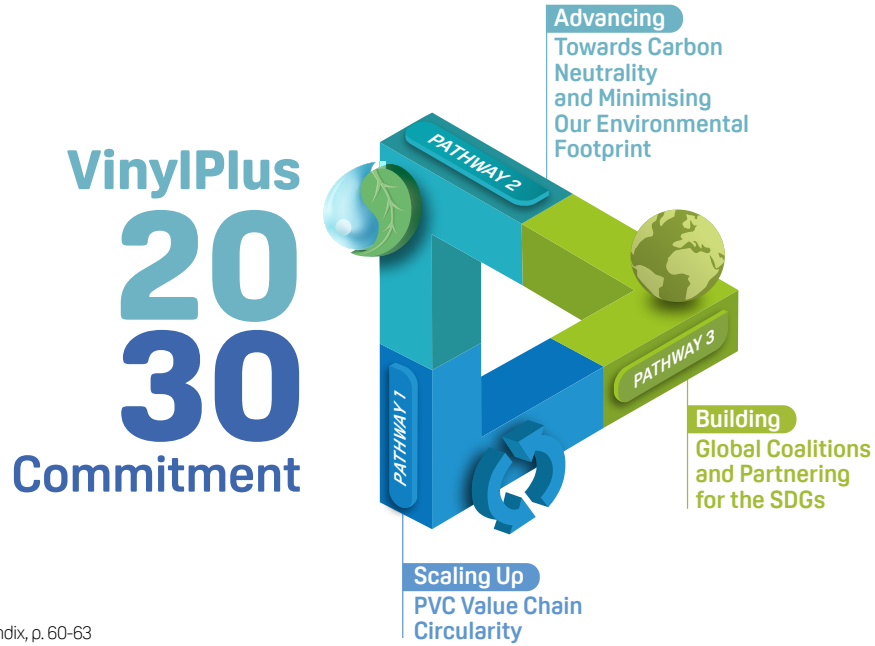
ABOUT VINYLPLUS

Photo: VinylPlus®

02

VinylPlus® is the European PVC industry's commitment to sustainable development. Through VinylPlus, the European PVC industry is creating a long-term sustainability framework for the entire PVC value chain, improving PVC products' sustainability and circularity and their contribution to a sustainable society.

Launched in June 2021, the VinylPlus 2030 Commitment[1] builds upon a track record of more than 20 years of progress and achievements throughout the EU-27, Norway, Switzerland and the UK.



1 Targets, deadlines and status of achievement are summarised in the Appendix, p. 60-63

CHARLOTTE RÖBER
Managing Director of VinylPlus

A sustainable industry embraces a long-term vision that will have a broad, transformative impact on its value chain and on the environment. Such a vision has been at the heart of our Commitments for more than two decades. With our third 10-year Commitment to 2030, we have set 3 pathways with ambitious targets toward our value chain circularity, the minimisation of our environmental footprint, and the creation of partnerships to address the global priorities. In the first three years of the VinylPlus 2030 Commitment, we faced three major global crises: climate, conflict and Covid. These three 'Big Cs' have had a significant impact on our activities, particularly those relating to PVC waste collection and recycling. However, this context has made collaboration and motivation stronger than ever throughout the whole PVC value chain: we continue to address these 3 Cs with our pathways towards the 3 elements of sustainability – environmental, social and economic sustainability.

GOVERNANCE

I would like to express our most sincere and heartfelt thanks to Brigitte Dero, who stepped down from the position of Managing Director at the end of 2023, having guided VinylPlus for 10 years.

Dr Karl-Martin Schellerer
Chairman of VinylPlus

Photo: VinylPlus®

03

VinylPlus aisbl is the legal entity set up to provide the organisational infrastructure to manage and monitor the implementation of the European PVC industry's Commitment to sustainable development.

In January 2024, there was a major change at the head of the organisation: Charlotte Röber took over the role of Managing Director of VinylPlus, succeeding Dr Brigitte Dero in the position.

From left to right:
Charlotte Röber, Dr Karl-Martin Schellerer & Dr Brigitte Dero

Photo: VinylPlus®

VINYLPLUS STEERING BOARD

VinylPlus is managed by a Steering Board composed of six voting members and six substitutes, all from partner companies in representation of VinylPlus founding members,[2] and with the participation of the VinylPlus and the Vinyl Foundation[3] Managing Directors.

The Steering Board is supported by an Advisory Council composed of representatives from the VinylPlus member associations and groups of partner companies chosen to ensure a broad representation of all sector groups. Its role is to monitor industry trends, as well as regulatory and policy developments, and to advise the Steering Board.

MEMBERS

Mr Christophe André | ECVM 2010[4]

Mr Dirk Breitbach | EuPC[5]

Dr Brigitte Dero[(a)] | Managing Director of VinylPlus

Mr Hendrik Fischer | European Plasticisers[6]

Mr Andreas Hartleif[(b)] | EuPC

Mr Carsten Heuer[(c)] | EuPC

Mr Karsten Jänicke[(c)] | EuPC

Mr Andy Jones | ESPA[7]

Dr Ettore Nanni | Treasurer (ESPA)

Dr Matthias Pfeiffer | European Plasticisers

Mr Hans-Christoph Porth | ECVM 2010

Ms Charlotte Röber[(d)] | Managing Director of VinylPlus

Dr Karl-Martin Schellerer | Chairman (ECVM 2010)

Mr Geoffroy Tillieux | Managing Director of the Vinyl Foundation

Ms Myriam Tryjefaczka | Vice Chairwoman (EuPC)

Mr Arnaud Valenduc | ECVM 2010

Mr Christian Vergeylen[(b)] | EuPC

2 See p. 57

3 Vinyl Foundation: the funding mechanism run by EuPC to collect PVC converters' contribution to VinylPlus (www.vinylfoundation.org)

4 ECVM 2010: the formal legal entity of ECVM (The European Council of Vinyl Manufacturers – www.pvc.org), registered in Belgium

5 EuPC: European Plastics Converters (www.plasticsconverters.eu)

6 European Plasticisers: is a Sector Group within Cefic, the European Chemical Industry Council. European Plasticisers (www.europeanplasticisers.eu) is legally represented in VinylPlus by PlasticisersPlus, the legal entity registered in Belgium

7 ESPA: European Stabiliser Producers Association is a Sector Group within Cefic. ESPA (www.stabilisers.eu) is legally represented in VinylPlus by StabilisersPlus, the legal entity registered in Belgium

(a) Until December 2023 **(b)** Until October 2023 **(c)** From October 2023 **(d)** From January 2024

MEMBERS

Ms Laure Baillargeon | Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), European Commission

Mr Werner Bosmans | Directorate-General Environment (DG ENV), European Commission

Mr Armand De Wasch | Euroconsumers Group[8]

Dr Brigitte Dero[(a)] | Managing Director of VinylPlus

Prof. Dr Ir. Jo Dewulf[9] | Chairman of the Monitoring Committee

Mr Ondřej Knotek | Member of the European Parliament

Mr Sylvain Lefebvre | Deputy General Secretary, industriAll European Trade Union[10]

Mr Nuno Melo | Member of the European Parliament

Dr Ettore Nanni | Treasurer of VinylPlus

Ms Charlotte Röber[(b)] | Managing Director of VinylPlus

Mr Geoffroy Tillieux | Managing Director of the Vinyl Foundation

8 European consumer organisation (www.euroconsumers.org)
9 Faculty of Bioscience Engineering, Ghent University, Belgium (www.ugent.be/en)
10 industriAll: European Trade Union (www.industriall-europe.eu)

(a) Until December 2023 **(b)** From January 2024

MONITORING COMMITTEE

The VinylPlus Monitoring Committee is the independent body supervising the implementation of the Commitment. It plays a fundamental role in ensuring the transparency, participation and accountability of VinylPlus, as well as in providing guidance and advice.

Open to all external stakeholders, it currently includes representatives of the European Commission, the European Parliament, academic institutions, trade unions and consumer organisations, as well as representatives of the European PVC industry. The Committee met formally twice in 2023, in April and in November.

To ensure maximum transparency, the minutes of each Monitoring Committee meeting are published on the VinylPlus website after formal approval at the following meeting.

2023 Activities

Photo: VinylPlus®

04

PATHWAY 1

#Circular Economy

SCALING UP PVC VALUE CHAIN CIRCULARITY

In line with the relevant EU policies, such as the Chemicals Strategy for Sustainability and the Circular Economy Action Plan under the European Green Deal, VinylPlus is leading the European PVC industry towards a circular economy, by improving the sustainability performance of PVC, boosting recycling and ensuring the safe and sustainable use of recyclates.

VinylPlus is committed to recycling at least 900,000 tonnes per year of PVC waste into new products by 2025 and 1 million tonnes by 2030. The objective is to transform PVC waste into a high-quality, safe and valued resource, contributing in particular to SDG12 – sustainable consumption and production – of the United Nations 2030 Agenda.

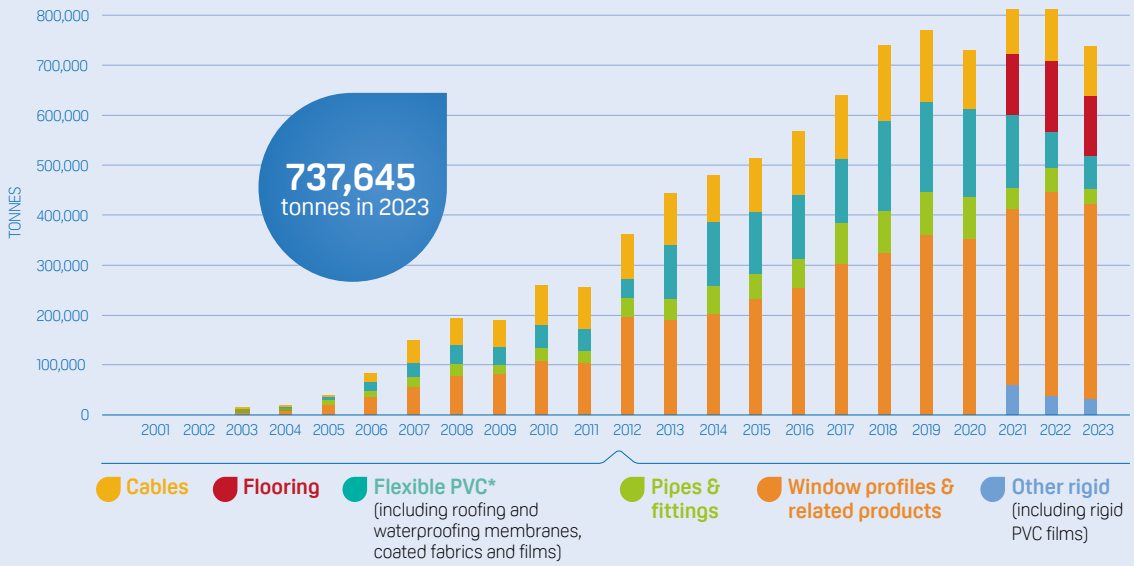
Since research and innovation play a critical role in achieving circularity targets, VinylPlus is concentrating its efforts and resources to support technical projects, R&D and innovation in three main areas:

IMPROVE
existing collection and recycling schemes and set up new ones for additional PVC streams

SUPPORT
the development of chemical recycling and other recycling and sorting technologies

INVESTIGATE
solutions to detect, sort and remove legacy additives from end-of-life PVC products

PVC RECYCLED WITHIN THE VINYLPLUS FRAMEWORK



* Including flooring until 2020

1 ADVANCING OUR CIRCULARITY AMBITIONS

In 2023, 737,645 tonnes of PVC waste were recycled within the VinylPlus framework (a 9.3% decrease compared to the previous year), of which 61.7% was pre-consumer waste and 38.3% post-consumer waste.

Photo: courtesy of Paola Pivi/Palazzo Strozzi, Florence (Italy)

8.8 million
tonnes of PVC recycled since 2000

17.6 million
tonnes of CO_2 saved since 2000

+ 1,500
direct jobs in recycling plants

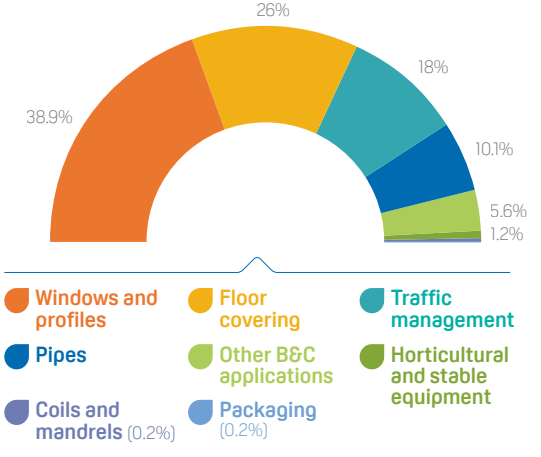
The amount of PVC waste recycled represented around 24.3% of the total PVC waste generated in 2023 in the EU-27, Norway, Switzerland and the UK.

Unrelated to industry's best efforts, recycled PVC volumes decreased due to several factors: the persistent competitive prices of virgin material, including low-priced imports, the current economic downturn in the building and construction (B&C) sector and the impacts of European regulations on legacy additives.[11]

In 2023, recycling and converting activity declined overall in Europe – and not just in the PVC sector. This applied both to pre-consumer recycling, where lower industrial production reduced the amount of waste available, and to post-consumer recycling, which was significantly affected by a decline in the construction industry. Flooring and pipes sectors registered the most consistent decline, particularly in pre-consumer waste recycling.

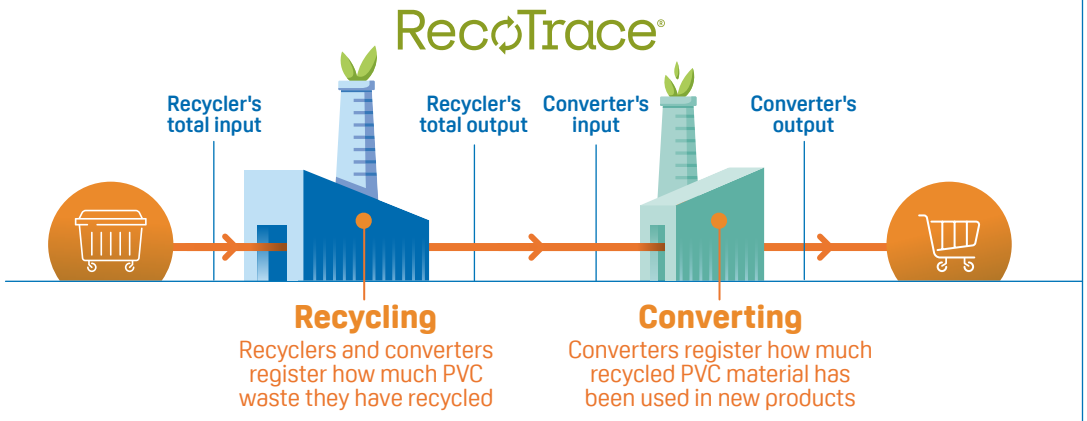
Demand for recycled PVC (rPVC) decreased compared to previous year (- 12.5%), confirming the trend started in the last quarter of 2022, which was possibly also due to extremely high energy costs. The registered uptake of rPVC from converters was 469,916 tonnes in 2023, a 16.4% decrease compared to 2022.

USAGE OF 2023 rPVC



11 Legacy additives are substances that are no longer used in new PVC products but can be present in recycled PVC

COLLECTING DATA FROM RECYCLERS & CONVERTERS



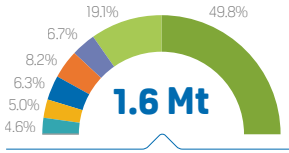
TRACKING PROGRESS AND DATA COLLECTION

Recovinyl® monitors, verifies and reports European PVC recycling and the use of recycled PVC in Europe.[12] The Circular Plastics Alliance (CPA)[13] has recognized the Recovinyl® audit framework as one of the approved auditing systems and schemes to ensure that collected data comply with the CPA Audit Framework.

In an era where monitoring polymer circularity has become increasingly crucial, particularly in the context of initiatives like the Circular Plastics Alliance (CPA), VinylPlus and Recovinyl® have played a leading role in founding PolyREC® (www.polyrec.eu) in 2021. This organisation brings together major players across the polymer value chain, recyclers, and Plastics Europe to collaborate on monitoring, verifying, and reporting plastics recycling and uptake data in Europe. It has since evolved into a multi-polymer data collection platform to help the European plastics industry fulfil its commitment to use 10 million tonnes of recycled plastics in new products in Europe by 2025.

PolyREC® utilises a common data collection system, RecoTrace®, which was originally developed for PVC and now extended to cover all main polymers. While Recovinyl® retains ownership of RecoTrace,® PolyREC® has been granted a 10-year free license to utilise the platform.

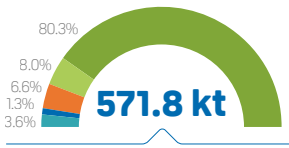
In 2021, 301 plants, located in 23 European countries recorded their recycling and recycled plastics use in RecoTrace® as follows.



Total reported plastic waste **net input** into European recycling operations

LDPE/LLDPE HDPE PP Mixed PO PET PVC EPS + PS Others (0.1%)

Recycling: Around 1.6 million tonnes of plastics waste were reported to RecoTrace® as net input to European recyclers. PVC waste was the most represented in the reported quantities, at about 49.8%, followed by polyolefins. European recyclers reported output of around 1.4 million tonnes of recycled plastics. PVC was the most represented (54.1%) recycled polymer, followed by polyolefins.



Total reported **output** from European converting operations

LDPE/LLDPE HDPE PP Mixed PO PET PVC EPS

Conversion of recycled plastics into new products: Participating companies reported an output of 571,800 tonnes, mostly PVC (80.3%). Building and construction applications represented about 60% of the reported quantities, and packaging 12.5%.

Source: PolyREC®

12 Recovinyl was set up in 2003 to facilitate PVC waste collection and recycling in the framework of the European PVC industry's Commitments (www.recovinyl.com)

13 CPA: Circular Plastics Alliance. The European Commission's multi-stakeholder platform aimed at boosting the market for recycled plastics to 10 million tonnes by 2025 (https://ec.europa.eu/growth/industry/policy/circular-plastics-alliance_en)

EVALUATING OPPORTUNITIES TO ACHIEVE HIGHER RECYCLING RATES OF POST-CONSUMER PVC WASTE IN EUROPE

In 2023, the VinylPlus Circular Vinyls Committee analysed applications, projects and initiatives with a view to increasing end-of-life PVC recycling and defined a strategic action plan for the coming years. Proposed action areas focus on achieving full traceability of rPVC, stimulating the use of rPVC in new products and increasing the Recovinyl® network through the involvement of new PVC recyclers and converters in the reporting system via Recovinyl® Regional Representatives and national and sectoral associations.

Other actions include the development of additional collection schemes, the enhancement of chemical and mechanical recycling capacity and focussing on how to support industry investment in the development of technologies for sorting and legacy additives extraction.

To exploit all the possible opportunities to achieve higher recycling rates for post-consumer PVC waste in Europe, VinylPlus continues to support innovative projects to improve the existing collection and recycling of specific PVC applications, set up additional collection and recycling schemes where appropriate and increase the use of recycled PVC in new products.

Photo: courtesy of Qingyang Zhu

IMPROVING COLLECTION AND RECYCLING

As reported in previous years' Progress Reports, **EPPA**[14] is implementing a five-year action plan developed in 2020 that aims to increase the amount of post-consumer windows recycled and the use of rPVC-U (unplasticised recycled PVC). The plan focuses on France, Germany and Poland.

In France, the EPPA partner UFME[15] continued actively to promote recycling in the window sector. It expanded to 137 (a 50% increase from 2022) the number of signatories to its label FERVAM (Filière Engagée pour le Recyclage et la Valorisation des Menuiseries), which values best practices in the recycling of windows. Through its participation in VALOBAT,[16] UFME is committed to supporting the doors and windows sector in waste management. Throughout 2023, EPPA supported the progressive consolidation of the reporting of rPVC volumes generated and used in France in the RecoTrace® system for all FERVAM signatories.

In Poland, participation in the BUDMA 2023 exhibition held in Poznań reinforced the presence of EPPA in the Polish market. At BUDMA, EPPA organised a conference entitled *Window Profiles with PVC and Their Value Chain: Key to Climate*

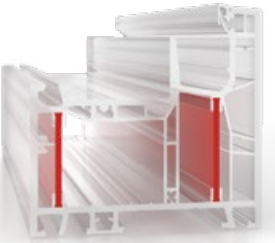
14 EPPA: the European Trade Association of PVC Window System Suppliers (www.eppa-profiles.eu)
15 UFME: Union des Fabricants de Menuiseries (Association of Doors and Windows Manufacturers – www.ufme.fr)
16 VALOBAT: a collective initiative of 48 players in the construction products and materials sector in France (www.valobat.fr)

The Waste Shipment Regulation (WSR), which is currently under revision, sets the rules for the shipment of waste within and outside the European Union.

The current proposal maintains PVC on a 'green list' which benefits from streamlined procedures for shipments of waste within the EU, safeguarding the established and well-functioning PVC recycling schemes in Europe. This measure facilitates the intra-EU commercial rules. The final text is expected to be endorsed by the EU institutions in early 2024.

Protection and Business Development. In May 2023, EPPA launched the OKNOREC PVC window collection and recycling project. The initiative aims to raise awareness of the recyclability of old PVC profiles from windows. The project's primary focus is to enhance collection processes for PVC profiles, to ensure their proper recycling and minimise waste. The OKNOREC project aligns with EPPA's overarching goals within the framework of the VinylPlus 2030 Commitment. Several initiatives are already ongoing, such as webinars and training courses for window manufacturers, distributors and window installation companies, as well as informative and promotional media campaigns.

In Germany, the consolidated partnership with Rewindo[17] focused on communications and advocacy initiatives, such as a meeting with members of the Bundestag in spring 2023. It also included networking initiatives, such as visits to craft fairs and recycling centres to gain further contacts in the target groups and exchange cases of best practice. Studies are currently underway to evaluate the reductions in energy and CO_2 consumption achieved through recycling. The Rewindo network continued to expand in 2023 with the addition of companies active in glass, fittings and reinforcement. More candidates from the value chain were ready to join in 2024.



The results of EPPA activities have demonstrated its success at delivering good practices beyond actors involved in end-of-life PVC windows management to increase the closed-loop recycling of end-of-life PVC. They have also shown the EPPA's contribution to an increase in the amount of rPVC used in new products, which reduces the global environmental footprint of PVC profiles.

Photo: courtesy of aluplast

17 Rewindo: the German recycling initiative for PVC windows, roller shutters and related products (www.rewindo.de)

Photo: courtesy of Molecor

To secure access to sufficient recycled rigid PVC from end-of-life PVC pipes, TEPPFA[18] started preparatory works in 2023 that are expected to support an increase in collection.

The restriction[19] on the use of lead (Pb) and its compounds in PVC, which entered into force on 29 May 2023, bans the use of lead-containing recyclates from rigid PVC profiles in PVC pipes, providing for a 36-month transition period. (Also see page 24). Furthermore, from 29 November 2024 onwards, manufacturers will have to comply with a mandatory certification of origin of the rPVC used as well as a mandatory product marking, when using rigid lead-containing PVC recyclates in new products. Until the entry into force of this restriction, the rPVC used by TEPPFA members was originated both from pipes and from profiles, with the greater majority from profiles.

In 2023, TEPPFA's German member KRV (www.krv.de) concluded a mass flow analysis (MFA) in Germany and a similar study is ongoing in the Netherlands. Further MFA studies are likely to be progressively rolled out by TEPPFA in priority European countries, starting with the UK in 2024. Through the mass flow analyses, TEPPFA aims to find out the potential non-collected volume. They are expected to set the baseline for future pilot collection, sorting and recycling projects of end-of-life plastic pipes at the national levels from 2025 onwards.

In 2023, TEPPFA also continued a project[20] aiming to open non-pressure product standards up for an increased use of recycled content without compromising on quality, performance and longevity.

18 TEPPFA: the European Plastic Pipes and Fittings Association (www.teppfa.eu)
19 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0923
20 See p. 16 of VinylPlus Progress Report 2023

Two technical projects promoted by **ERFMI**[21] and **VinylPlus Italia** with the support of VinylPlus aim to improve collection schemes and the quality of PVC waste sent to recycling. Both projects include the setting up of new collection points for PVC waste, as well as technologies to sort and separate old PVC containing legacy additives, so that no contaminated material is sent to recycling.

In Germany, ERFMI started a pilot project within the **Revinylfloor** initiative in 2022, aiming to increase the collection of PVC floor coverings from scraps and end-of-life products. The pilot project involved two wholesalers, Lotter + Liebherr (www.lotter-liebherr.de) and Laminat Depot (https://laminatdepot.de), which set up collection centres in some of their locations. By the end of 2023, 65 tonnes of post-consumer flooring were collected, 10% of which consisted of offcuts from the installation process. The collected materials were processed into fine regrind PVC at the AgPR[22] recycling plant in Troisdorf, Germany, and then sold. This initiative was a success, with a greater volume of PVC collected than expected at Lotter + Liebherr's Bonn location, so the company decided to extend this best practice to its locations in Frankfurt and Essen. ERMFI's objective now is to broaden this initiative to gather additional insights and perform a comprehensive cost analysis, while evaluating the current wholesalers' branch infrastructure.

To obtain a better quality of PVC waste, ERFMI commissioned additional tests[23] in 2023 to sort flooring containing legacy low-molecular-weight (LMW) plasticisers from flooring that does not, using the near-infrared sensor technology provided by Steinert (https://steinertglobal.com). Preliminary tests showed a concentration of orthophthalate content close to zero after sorting. Further tests were planned in 2024 to confirm the results.

In parallel, ERFMI and its members have worked with the consultancy Oakdene Hollins (www.oakdenehollins.com) to assess the feasibility of implementing a sorting and recycling process on a commercial scale utilising the technologies explored by ERFMI within the Revinylfloor project. This work also included making realistic high-level projections of the levels of investment needed, the associated costs, the expected levels of revenue and the potential payback.

In Italy, **WREP** (Waste REcycling Project) is continuing to promote the development of pilot schemes for sorting, collecting and recycling PVC from bulky urban waste in collaboration with multiutilities and recyclers. In 2023, the number of partners involved in the operational phase increased to six recyclers and 13 multiutilities, and growing interest was recorded from potential partners in many Italian regions.

In 2023, the project was also extended to the collection of post-consumer PVC products from demolition and renovation activities with the signature of three Memoranda of Understanding with ANCE Verona (National Association of Building Constructors), ANCE Padova and CNA Veneto

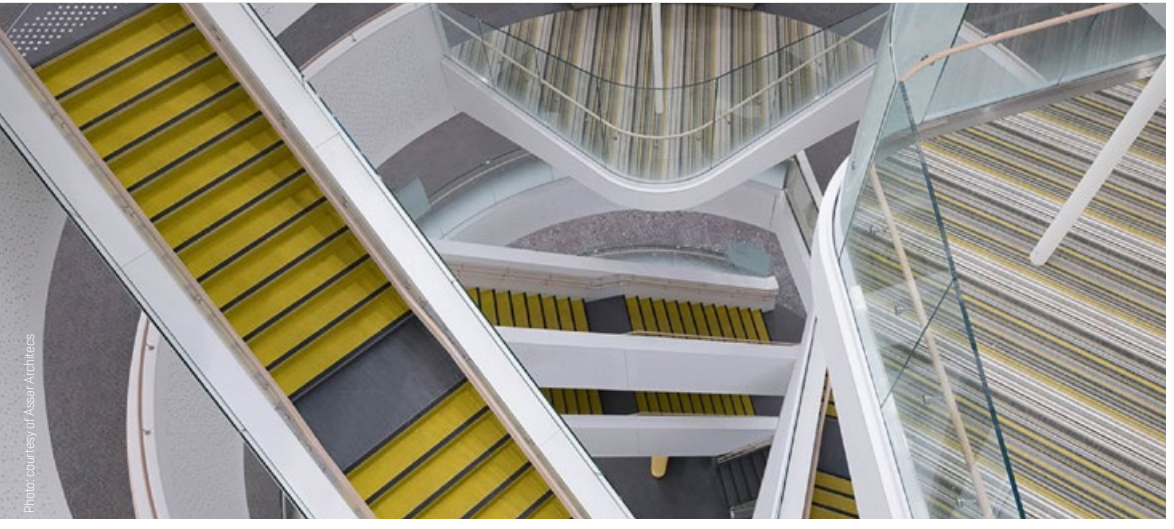


Photo: courtesy of Asser Architects

21 ERFMI: European Resilient Flooring Manufacturers' Institute (www.erfmi.com)
22 AgPR: Arbeitsgemeinschaft PVC-Bodenbelag Recycling (Association for the Recycling of PVC Floor-Coverings – www.agpr.de)
23 Also see p. 21 of VinylPlus Progress Report 2023

(National Crafts Confederation). These aim to implement a system for the collection, selection, treatment and recycling of waste from windows, shutters, pipes and other PVC products, coming from both production activities and the collection of separated urban demolition and installation waste.

A handheld device[24] to sort PVC from other plastics in post-consumer waste was tested further in 2023. Developed by Phoenix RTO (www.phoenix-rto.com), the detector uses near-infrared hyperspectral technology (NIR). It helped to reduce the percentage of impurities in collected PVC from an average of 3% to less than 1%.

In 2023, Phoenix was asked to carry out further feasibility studies based on scanning equipment that is already used to manage electric and electronic waste. One study aims to develop a handheld scanner that detects the presence of lead (Pb) in PVC cables. Another is targeting a system that separates ground cables that contain lead from those that do not.

Tests conducted by Phoenix showed that the most effective technology that could currently be applied to the detection of lead in PVC products to be recycled is XRF (X-ray fluorescence spectroscopy) technology. (See also page 25).

In Germany, **VinylPlus Deutschland** continued its successful **PVC Recyclers meet PVC Converters** event series in 2023 in collaboration with Rewindo, AgPR and IVK Europe.[25] The project aims to raise awareness of existing PVC recycling activities and boost rPVC uptake by reaching out to demolition experts, recyclers, converters and recycling experts from the entire PVC value chain. Activities included two on-site events – one at the Forbo Novilon BV plant in the Netherlands and the other in Bad Dürkheim, Germany in partnership with BASF. The events involved more than 70 delegates. VinylPlus Deutschland also participated in 'Fachtagung Abbruch', Europe's major conference on demolition and dismantling with over 1,200 attendees in 2023, which was held in Berlin. The events were excellent occasions for the exchange of information and views over several topics relevant to recycling: the opportunities and limitations of mechanical recycling, including legal aspects; the need for new mechanical recycling solutions that replace waste incineration (with energy recovery); the need for other recovery options that contribute to recycling targets; and the future role of other recovery technologies, such as chemical recycling.

In France, the law on the fight against waste and on the circular economy, known as the AGEC law,[26] required the establishment of an Extended Producer Responsibility (EPR) scheme for building and construction products from the 1st of January 2022. This EPR aims at organising collection, sorting, reuse and recycling of building and construction products at a national scale under the umbrella of Producer Responsibility Organisations (PROs).

Photo: courtesy of Finstral

In 2023, **VinylPlus France** actively followed the implementation of the French EPR, and, via Kaléi (www.kalei-services.org) and SNEP (www.snep.org), two national associations in charge respectively of flexible and rigid PVC building applications, joined the PROs coordination body OCA Bâtiment (www.oca-batiment.org) to ensure that:

- Waste collection guidelines are developed
- PVC waste recyclability is considered
- Individual producers' collection and recycling systems are supported
- Research projects for plastics sorting and separating legacy additives from soft PVC waste are launched.

The operational activities for collection started in May 2023. In 2024, VinylPlus France and its local partners will continue to actively participate in the EPR implementation, sharing all their experience on collection and recycling of PVC products.

24 See p. 18 of VinylPlus Progress Report 2023
25 IVK Europe: Industrieverband Kunstoffbahnen e.V. (Plastic Sheets and Films Association – www.ivk-europe.com)
26 www.legifrance.gouv.fr/jorf/id/JORFTEXT000041553759

ADVANCING CIRCULARITY IN THE HEALTHCARE SECTOR

PVC is widely used in the healthcare industry for its versatility, functionality, reliability and high safety standards. Most PVC medical waste is non-infectious and can be properly sorted, collected and recycled.

VinylPlus® Med was initiated in 2021 to accelerate circularity in healthcare across Europe through the recycling of discarded single-use PVC medical devices. The objective was to demonstrate that PVC waste from medical devices can be turned into REACH-compliant high-quality recyclates through energy-efficient and environment-friendly processes and then reused by European PVC converters to make durable products for healthcare settings. VinylPlus® Med started as a pilot project in Belgium[27] in partnership with the waste management company Renewi (www.renewi.com/en) and the recycler Raff Plastics (www.raffplastics.be/en). In 2023, it extended its base to 29 hospital sites (an increase of 19 sites from 2022) and collected around 3,500 kg of PVC waste, equivalent to around 87,500 face masks. Two additional waste storage spaces were made available by Renewi in Belgium, in Brugge and in Mol. Progress made in 2023 also confirmed that it is possible to expand the collection of PVC medical devices to several departments in hospitals: CHU St Pierre, in Brussels, was the first hospital to extend PVC waste collection to all its departments. VinylPlus® Med has now been recognized as a best practice by several publications in the Belgian healthcare sector. A study[28] carried out by LCA experts of EcovaMed (www.ecovamed.com) showed that the cradle-to-grave GHG emissions of a medical PVC tubing can be cut by 25% through recycling instead of incineration with energy recovery.

VinylPlus® Med's results have exceeded expectations. The project not only promotes a new collection and recycling scheme for PVC medical devices, but it has also opened the way for collaborations with other medical recycling schemes and new partnership projects. (See partnership projects on page 41).

VINYLPLUS® MED: PVC MEDICAL RECYCLING PROCESS

SINGLE-USE MEDICAL DEVICE

COLLECTION AFTER USE

HIGH-QUALITY REGRIND

WALL COVERING FOR HEALTHCARE

vinyl plus med

by **2023** numbers

29 hospitals currently involved

35 hospitals on waiting list

3.5 tonnes PVC medical devices collected

87.5k oxygen masks

27 See p. 17 of VinylPlus Progress Report 2023

28 EcovaMed, *Recycling PVC-based medical device cuts greenhouse gas emissions by 25% compared to incineration*, January 2024, available on www.ecovamed.com/#publications

Based on VinylPlus® Med's successful results in Belgium, a pilot project will be launched in France in 2024 with Terra (https://terra.coop), experts in circular economy, and Medtronic (https://europe.medtronic.com), a global healthcare technology leader, to meet the demand from French hospitals attracted by the Belgian project. Medtronic is the main supplier of the PVC medical devices recycled by VinylPlus® Med. The French pilot scheme will also include the recycling of rigid PVC medical devices, such as the disposable laryngoscope blades.

Furthermore, the handheld NIR device[29] developed within the VinylPlus® Med project to detect the presence of orthophthalates in PVC waste was adopted by the British Plastics Federation (BPF)[30] to relaunch the RecoMed (https://recomed.co.uk) take-back scheme in the UK.

The **VinylPlus® PharmPack** project run by VinylPlus Deutschland intends to demonstrate the recyclability and sustainability of pharma blisters made of aluminium and PVC in the context of the European Packaging Directive 94/62/EG and national laws. The project was developed in partnership with Perlen Packaging (www.perlenpackaging.com), Liveo Research (www.liveoresearch.com), Hundhausen Kunststofftechnik (https://hkt-achim.de) and Neidhardt Rohstoff (www.neidhardt-rohstoff.de). Several small-scale tests for the separation of PVC from aluminium were successfully carried out by Fraunhofer IVV.[31] Laboratory tests carried out on the produced recyclates at Perlen Packaging and Liveo Research yielded promising results. Larger-scale trials were scheduled to take place in 2024 at Fraunhofer IVV, following the installation of a dedicated pilot plant. The rPVC produced in the pilot plant will then be further tested by Perlen and Liveo to verify whether the quality obtained is suitable for use in new products.

29 See p. 16-17 of VinylPlus Progress Report 2023
30 BPF: British Plastics Federation, the leading trade association for the UK plastics industry (www.bpf.co.uk)
31 Fraunhofer IVV: Fraunhofer Institute for Process Engineering and Packaging (www.ivv.fraunhofer.de)

SIMONE DOYLE
Head of Risk Management Unit, European Chemicals Agency (ECHA)

"The investigation on PVC and its additives represents the first case of such an exercise from ECHA. The innovative approach we used for PVC can be re-purposed in the near future for other assessments seeking to explore the whole lifecycle and circularity of products.

Having available alternatives is not enough. They need to be safer, technically feasible and economically viable. ECHA will increasingly deploy a grouping approach for substances in order to avoid regrettable substitution.

Thank you to each and every one of you from the PVC industry for participating in the Calls for Evidence within the framework of the Investigation Report. ECHA privileges a fact-based approach and hence greatly appreciates external input.

2 FOSTERING SCIENCE-BASED SOLUTIONS FOR THE SAFE AND SUSTAINABLE USE OF ADDITIVES

The VinylPlus commitment to circularity implies providing solid evidence to demonstrate the safe use of additives and of PVC articles containing recyclates with legacy additives. It also involves support for participation in R&D projects that detect, sort, reduce or remove legacy additives in PVC waste streams.

VINYLPLUS CONTRIBUTION TO THE ECHA INVESTIGATION ON PVC & PVC ADDITIVES

In addition to progressing toward the targets set in its Commitment under the three pathways, VinylPlus strives to provide regulators with data and evidence for supporting risk management of PVC where appropriate. In 2023, an important development took place with the publication of the ECHA[32] Investigation report on PVC and PVC additives.[33]

In 2022, the European Commission asked ECHA to carry out an investigation on PVC and PVC additives and to present the results in a report. The investigation took place from May 2022 to November 2023. In this period, VinylPlus responded to three Calls for Evidence and two questionnaires. To address these requests for information, VinylPlus, together with its members and partner companies, sectoral and national associations, collaborated extensively with ECHA. VinylPlus provided a large quantity of data, studies, research and reviews on PVC and its additives. ECHA published the final Investigation report on PVC and PVC additives in November 2023.

The ECHA report highlights the clear progress made by the industry over more than 20 years: it shows that risks linked to the production of PVC are adequately controlled, several additives used in PVC do not present a risk, having substituted SVHC (substances of very high concern) additives, and PVC is being recycled across the EU. In its report, ECHA points to potential risks and suggests potential regulatory action in four areas (for some specific plasticisers, heat stabilisers and flame retardants, as well as for microparticles emissions at recycling facilities and landfills). However, ECHA makes several assumptions where data is already under development or needs to be developed in order to confirm whether the assumption is accurate or not.

The evidence submitted by VinylPlus throughout the investigation process demonstrates the safety of PVC for human health and the environment, and VinylPlus is firmly committed to continue working with regulators to address data gaps. After a meticulous study of the ECHA investigation report and its annexes, VinylPlus published a response[34] to the ECHA report.

32 ECHA: European Chemicals Agency (https://echa.europa.eu)
33 https://echa.europa.eu/documents/10162/17233/rest_pvc_investigation_report_en.pdf/98134bd2-f26e-fa4f-8ae1-004d2a3a29b6?t=1701157368019
34 https://www.vinylplus.eu/news/vinylplus-responds-to-the-echa-investigation-report-on-pvc-and-pvc-additives/

In February 2023, EPPA organised the *Fit for 55 with sustainable PVC windows and pipes* workshop in the European Parliament.

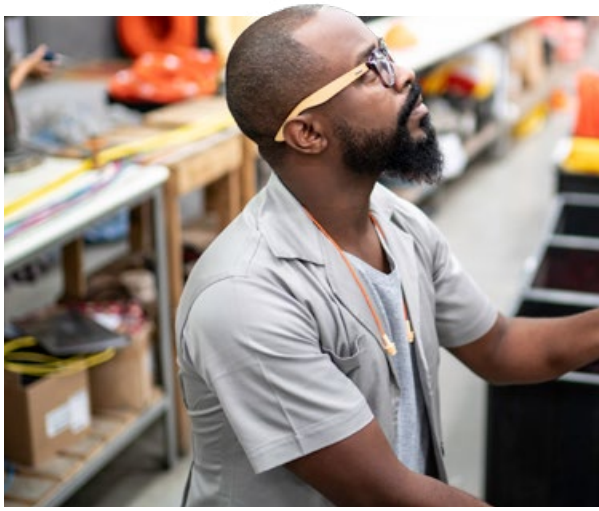
This raised awareness of the need for a derogation for PVC profile recycling in the context of the discussions on the regulation of lead in recycled articles. MEPs, European Commission representatives and key delegates from the windows and pipes industries participated in the event, which resulted in an informative, frank and open discussion.

The regulation adopted in May 2023 – after joint legislative action of the Commission, Member States and the European Parliament – prohibits PVC articles containing lead from being placed on the market, if the concentration of lead is equal to or greater than 0.1% by weight of the PVC material. The restriction applies to all PVC articles that cannot be recycled in a closed loop and thereby explicitly exempts PVC profiles that contain lead as a legacy additive in recycle from old PVC window profile waste. This exemption also applies to PVC pipes and PVC sheets recycled in a closed loop.

FOR A SAFE USE OF ADDITIVES AND RECYCLATES WITH LEGACY ADDITIVES

European Plasticisers commissioned Virginia Tech (https://vt.edu) to carry out scientific research to assess **plasticisers concentration under equilibrium conditions**[35] in the framework of the Cefic Long-range Research Initiative (LRI – http://cefic-lri.org). The research, which was co-funded by VinylPlus, measured the impact of plasticisers on indoor air quality. It concluded that, at ambient room temperature, the saturated vapour concentration of a plasticiser in the microchamber is independent of the plasticiser concentration in standardised testing sheets. A first paper on the research, *A rapid microchamber method to measure SVOC emission and transport model parameters*,[36] was published in February 2023 in the scientific magazine Environmental Science Processes & Impacts. A second paper *Association between Emission Parameters and Material-phase Concentrations of Phthalate Plasticizers and their Alternatives*[37] was published by Aerosol and Air Quality Research in January 2024. Overall, these papers support the conclusion that there is minimal loss of plasticisers from flexible PVC articles in everyday use.

A systematic review and **meta-analysis study on phthalate exposure** and neurotoxicity in children was commissioned to Epicurus-Reviews



by European Plasticisers. The study was completed in 2023 and was recently accepted for publication in the International Journal of Public Health. The paper concluded that there is no proof of an association between phthalate exposure and neurotoxicity in children.

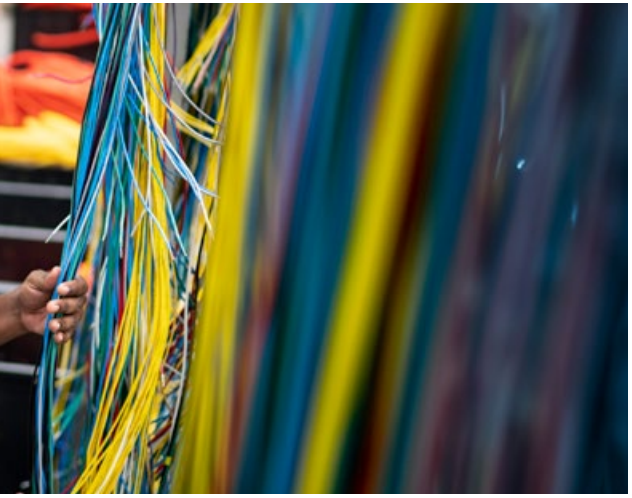
DETECTING AND SORTING LEGACY ADDITIVES FROM PVC WASTE STREAMS

As reported in previous pages, tests and research developed in the framework of the VinylPlus® Med, WREP and Revinylfloor projects confirmed that analytical

35 Assessing exposure to semi-volatile organic compounds (SVOCs) that are emitted from consumer products and building materials in indoor environments is critical for reducing the associated health risks. Many modelling approaches have been developed for SVOC exposure assessment indoors. However, the applicability of these tools depends on the availability of model parameters such as the gas-phase concentration at equilibrium with the source material surface, and the surface-air partition coefficients. The researchers illustrated how the resulting parameters can be applied to predict concentrations of different plasticisers in indoor compartments as well as human exposure indoors

36 https://pubs.rsc.org/en/content/articlepdf/2023/em/d2em00507g

37 https://aaqr.org/articles/aaqr-23-07-tn-0163



techniques such as NIR technology and XRF detectors are the most promising to detect and sort PVC waste containing legacy additives such as LMW orthophthalates (NIR) and lead (XRF).

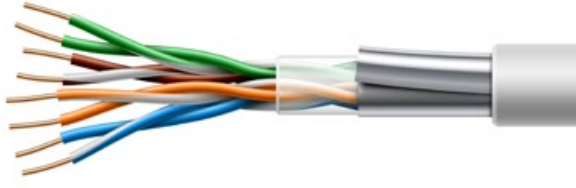
In 2023, VinylPlus Italia commissioned a feasibility study for the development of an industrial technology capable of **separating lead-containing PVC cables.** The study involved several partners, including Ateco Polimeri (www.atecopolimeri.it), a member company of VinylPlus Italia specialised in the treatment of post-consumer cables, which provided expertise on and samples of end-of-life PVC cables. Tests conducted by Phoenix RTO, the company in charge of the study, showed that the most effective technology to detect lead (Pb) presence in PVC products to be recycled was XRF (X-ray fluorescence spectroscopy). The study confirmed that the XRF technology would make it possible to hypothesise the design of an industrial in-line pilot system able to select and recognize plastic materials (PVC in particular) with presence of lead. This industrial separation line could also be integrated with the NIR technology to detect traces of other substances that are currently not allowed under European regulation or might not be in the future, such as DEHP (Di-(2-ethylhexyl) phthalate) and MCCP (medium-chain chlorinated paraffins).

Based on the feasibility study, VinylPlus decided to finance the design of a pilot plant to be installed at a partner company of VinylPlus Italia, where the appropriate tests will be carried out to obtain all the necessary information for an industrial project.

REDUCING AND REMOVING LEGACY ADDITIVES FROM PVC WASTE STREAMS

REMADYL[38] is a project funded by the European Union in the framework of the Horizon 2020 Research and Innovation Programme,[39] involving a consortium of 15 multidisciplinary European partners, including VinylPlus, with the primary goal of recycling end-of-life PVC applications containing hazardous legacy substances. These include low-molecular-weight phthalate plasticisers (mainly DEHP) and heavy metal-based stabilisers (mainly cadmium or lead). Although there are currently valid REACH derogations for the use of PVC containing certain legacy substances (e.g., cadmium- or lead-based stabilisers), technologies enabling to decontaminate the recycling cycles are essential to support the transition towards the circular economy, and REMADYL's targets are fully aligned with the European Chemicals Strategy for Sustainability.

The project originally focused on the continuous extraction of DEHP and lead (Pb) stabilisers from selected end-of-life PVC waste streams. It was then shifted towards the development and scaling up of a batch or semi-continuous extraction process. The batch process, which offers very high flexibility in treatment conditions, is based on an extractive extrusion technology combined with innovative solvents and melt filtration. This development has the potential to rejuvenate 'old PVC' into REACH-compliant high-purity PVC. The project ended in 2023, and a *Summary of key achievements of the Remadyl H2020 Project*[40] was published in February 2024.



38 www.remadyl.eu
39 https://cordis.europa.eu/project/id/821136
40 https://zenodo.org/records/10679539

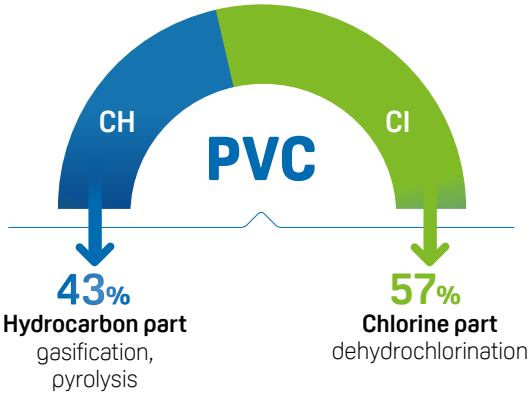
3 SUPPORTING INNOVATIVE RECYCLING TECHNOLOGIES

To accelerate towards circularity, VinylPlus is supporting the development of chemical recycling technologies capable of handling difficult PVC waste that cannot be mechanically recycled in an eco-efficient manner. It is also supporting the development of improved sorting and separation technologies for complex (e.g., composite) PVC products.

Some types of PVC waste (e.g., composites or waste contaminated by soil, glues or oils) are very difficult to recycle through standard mechanical recycling processes, as the costs and environmental impact currently exceed the economic and environmental benefits. These types of waste can nevertheless be recycled using emerging chemical recycling processes. In the case of PVC, both parts of the PVC molecule can be chemically recycled: the hydrocarbon part (43%) can be recycled using processes suitable for hydrocarbon polymers such as pyrolysis or gasification; the chlorine part (57%) can be recovered and used in the production of other raw materials and substances.

The recently published JRC Policy Reports, *Environmental and economic assessment of plastic waste recycling*[41] and *Towards a better definition and calculation of recycling*,[42] represent a good starting point for further discussion. In this regard, 20 associations in the plastics supply chain, including VinylPlus, co-signed an industry position paper that called on EU Member States to urgently adopt fuel-use-exempt mass balance as the EU harmonised mass balance method for allocating recycled content via chemical recycling.[43]

CHEMICAL RECYCLING OF PVC



31 DIFFERENT RECOVERY OPTIONS INVESTIGATED SINCE 2000

- **5** Conventional mechanical recycling with special features
- **2** Inclusion in other materials
- **3** Non-conventional mechanical recycling
- **7** Waste separation
- **8** Feedstock recycling
- **6** Incineration with energy recovery and material recycling

41 https://publications.jrc.ec.europa.eu/repository/handle/JRC132067
42 https://publications.jrc.ec.europa.eu/repository/handle/JRC131531
43 https://deutsche-bauchemie.de/positionspapiere/august-2022-position-on-mass-balance-chain-of-custody-and-environmental-product-declaration-epd

ASSESSING CHEMICAL RECYCLING TECHNOLOGIES

ChemRecPolymer, the multistakeholder project[44] submitted to the German Ministry of Education and Research (BMBF) in 2022, could not be financed due to significant reductions in the annual budget for Federal subsidies. The project is currently suspended.

RECOVERING AND RECYCLING CHLORINE FROM END-OF-LIFE PVC ARTICLES

VinylPlus® RecoChlor is a programme dedicated to the PVC waste treatment methodology to recover and recycle chlorine from difficult-to-recycle end-of-life PVC products. In the RecoChlor chemical recycling process, selected PVC wastes are thermally decomposed in modern waste-to-energy plants. These enable chlorine to be recovered either in the form of sodium chloride (RecoSalt, dry process) or as diluted hydrochloric acid (RecoAcid, wet process). The hydrocarbon part is used for energy recovery. Both RecoSalt and RecoAcid processes lead at the end to the production of new chemical substances that can be sold on the market.

In the **RecoSalt** process, the gaseous hydrochloric acid created by the thermal decomposition of PVC is neutralised by sodium bicarbonate (SOLVAir® process). The resulting sodium chloride is recovered, purified, and finally used in the production of new chemical substances (e.g., sodium carbonate). The recovery of sodium chloride from flue-gas-treatment residues is recognized as recycling operation in the Best Available Techniques Reference Document for Waste Treatment.[45]


Photo: EGVM

The RecoAcid process is based on the FLUWA technology, which will be mandatory in Swiss municipal waste-to-energy plants from 2026. Its aim is to increase acid production in flue-gas scrubbers, and then to use this generated acid to recover and recycle heavy metals contained in filter ashes.[46] Municipal waste-to-energy plants do not generate enough raw acid from the treatment of household waste, and the supply gap must be covered either by technical grade hydrochloric acid bought on the market or by hydrochloric acid generated in-situ from residual, mechanically non-recyclable PVC wastes.

44 Also see p. 20 of VinylPlus Progress Report 2022
45 Industrial Emissions Directive 2010/75/EU, Integrated Pollution Prevention and Control, section 5.5.1.3.1; October 2017
46 https://www.sciencedirect.com/science/article/abs/pii/S0956053X18301648

Good progress was also registered by the **Halosep®** process developed by Stena Metall in Denmark. Halosep® which is part of the EU LIFE programme, is now recognized as a Best Available Technique (BAT) by the Nordic Council of Ministers.[47] The process aims to recover chlorine in the form of salts from incineration waste residues. The main product is $CaCl_2$ (calcium chloride). Additional benefits include the recycling of some metals such as zinc.

SORTING AND SEPARATION TECHNOLOGIES FOR COMPLEX PVC PRODUCTS

The **EUPolySep** project aims to set up a small pilot plant in Belgium to separate PVC from complex laminated products. The Australian PVC Separation (PVCS)[48] technology was selected to be tested at pilot scale. This innovative process allows polymers to be delaminated and separated from polymer-composite structures for subsequent recycling. A pilot plant built in Australia was shipped to Belgium and installed at Centexbel (CTB) in Grâce Hollogne, Belgium, in June 2023. Following the installation, two separate start-up and commissioning engagements took place on site with an external engineering company. The pilot plant was made ready, and the first tests on composite PVC were scheduled to take place in the first semester of 2024.

Photo: courtesy of Architectural Polyvinyls

47 *BAT for combustion and incineration residues in a Circular Economy* (https://pub.norden.org/temanord2022-542/)
48 PVCS: PVC Separation Pty Ltd is a proprietary and patented process for separating laminated polymer and other materials (www.pvcseparation.com)

4 PRIORITISING CIRCULARITY THROUGH ECODESIGN

In the framework of the Circular Plastics Alliance, the European Commission issued Standardisation Request M/584 in 2022, which mandated the European Committee for Standardisation (CEN) and the European Committee for Electrotechnical Standardisation (CENELEC) to develop a series of design-for-recycling (DfR) standards for plastic products.

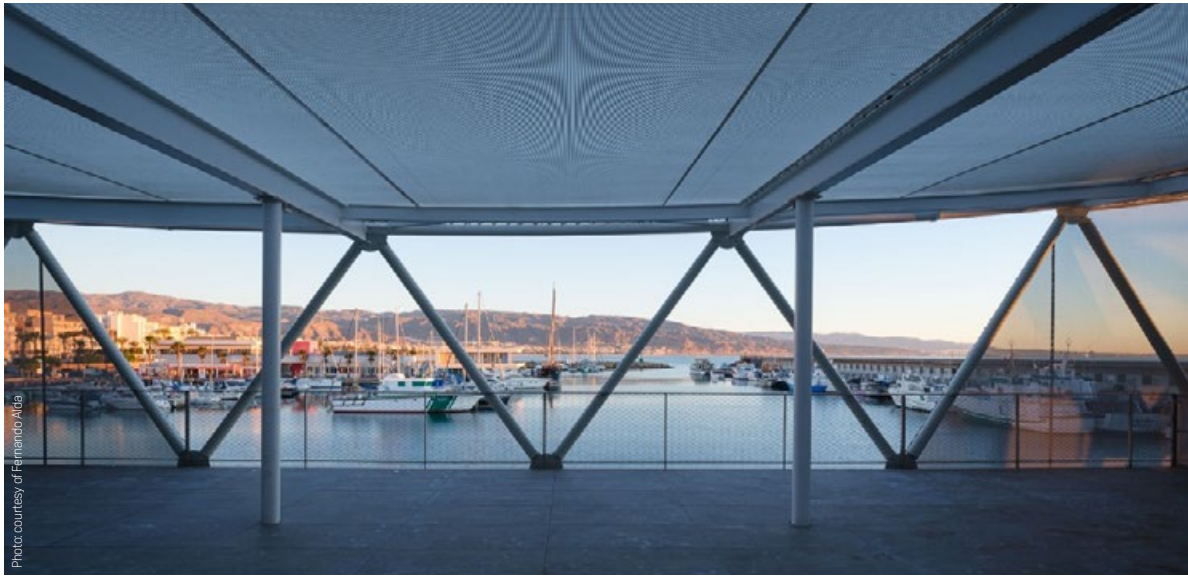


Photo: courtesy of Fernando Alda

In 2023, EPPA participated in the CEN Technical Committee 249 (Working Group 21 on Profiles for windows and doors), which is developing the *European Design-for-recycling of PVC-based profiles in the construction sector* Standard, scheduled to be finalised in 2024. At the same time, ERFMI participated in the CEN Technical Committee 134 (Working Group 10 on Resilient, textile, laminate and multilayer modular floor coverings), which is developing DfR guidelines for flooring.

On behalf of the PVC industry, EPPA also participated in the CEN Technical Committee 249 (Working Group 11 on Plastics Recycling), which will finalise the standardisation deliverable on rPVC characteristics (EN 15346). In June 2023, EPPA took over the chair position of the CEN/CENELEC coordination group "Circular Plastics," which is in charge of the development of design-for-recycling principles in major plastic-product sectors.

PATHWAY 2

#Decarbonisation and Environmental Footprint Minimisation

ADVANCING TOWARDS CARBON NEUTRALITY AND MINIMISING OUR ENVIRONMENTAL FOOTPRINT

Photo: courtesy of Cyril Lancelin

ADISA AZAPAGIC
ETHOS Research,
Chair of VinylPlus
Environmental Footprint
Committee

Climate change and environmental degradation are significant challenges faced by Europe and the world. The priority of the VinylPlus Environmental Footprint Committee (EFC) is to help the PVC value chain to address these challenges, with a focus on the reduction potential of the carbon and water footprints.

During 2023, the EFC has defined several projects to identify opportunities for reducing the carbon and water footprints through the use of alternative feedstocks and renewable energy sources. This work will be carried out in collaboration with external consultants, with the findings expected to be available by the end of 2024.

1 ADVANCING TOWARDS CARBON NEUTRALITY

VinylPlus started the selection process for a consultant to evaluate the potential and, by 2025, report on projected progress on core carbon reduction to be achieved by 2030.

The same consultant will also support VinylPlus in reporting on renewable energy use and on sustainable feedstock sourcing by 2025. After an in-depth screening of proposals received in 2023, in January 2024 the Environmental Footprint Committee (EFC) selected the consulting firm Carbon Minds (www.carbon-minds.com) to work with.

Photo: courtesy of Profine

2 EMBRACING THE SUSTAINABLE USE OF CHEMICAL SUBSTANCES

Additive Sustainability Footprint® Methodology

Development
Methodology developed in collaboration with The Natural Step[49]

Scope
Assesses the lifecycle sustainability of additives used in PVC products

Validation
Peer-reviewed by LCA experts and validated

The Additive Sustainability Footprint® (ASF)[50] is a methodology to proactively assess and promote the sustainable production and use of PVC additives throughout entire product lifecycles, including the roles of additives in the performance of PVC products.

In 2023, meetings were organised with ECHA (in April) and the European Commission (in June) to present and discuss the ASF methodology and the benefits the ASF tool can provide to users, regulators and society.

49 The Natural Step: sustainability expert (www.thenaturalstep.org)
50 https://www.vinylplus.eu/sustainability/our-contribution-to-sustainability/additive-sustainability-footprint/

PATRICK MOREL
Sustainability and Public Affairs Senior Manager of Kem One

Kem One, as a member of the European Council of Vinyl Manufacturers (ECVM) since 2022, is fully committed to the sustainable development of PVC. In 2024, Kem One will take part in the new campaign to verify the criteria of the ECVM Charter. We see compliance with the Charter as a key element in demonstrating to our customers and stakeholders our commitment to continuously improve our impact on human health and the environment.

3 MINIMISING OUR ENVIRONMENTAL FOOTPRINT

All ECVM members are committed to the continuous reduction of their environmental impact in conformity with the requirements of the ECVM Industry Charter[51] for the production of Vinyl Chloride Monomer (VCM) and PVC.

Third-party verification of compliance was carried out in 2022 by the certification body DEKRA GmbH (www.dekra.com), which confirmed an overall compliance rate of 89% for the plants of six out of the current seven ECVM members.

A new verification round by DEKRA was scheduled to take place at the end of the first quarter of 2024, at six sites of the new ECVM member Kem One and at all sites having shown partial or non-compliance during the first verification round.

A specific task force of the ECVM Production Committee is working on a further revision and update of the ECVM Industry Charter, which is scheduled to be finalised by the end of 2025.

VinylPlus decided to select a specialised consultant to support the PVC industry sectoral organisations in setting up appropriate indicators for the reduction of the **water footprint** in processes and products. The selection process was finalised in early 2024. The consultancy Carbon Minds was selected for this task.

Based on the most up-to-date background data – from Plastics Europe's eco-profiles programme for ethylene[52] and from Euro Chlor for chlorine[53] – and foreground data from the ECVM members' plants, an updated eco-profile quantifying the average cradle-to-gate environmental impacts of the production of VCM and PVC by the ECVM members was published in December 2022.

Minor revisions, including updated gate-to-gate water data and correction to the steam cracker model, were published, respectively, in March and June 2023.[54] The results of the new eco-profile will be published in Sphera's Managed LCA Content (previously known as Gabi) database and in the next version of the Ecoinvent database (v3.11).

51 ECVM Industry Charter: it is aimed at minimising any detrimental effects from activities and products to the environment or human health in the production phase (https://pvc.org/wp-content/uploads/2023/04/ECVM-charter-pages.pdf)
52 https://plasticseurope.org/sustainability/circularity/life-cycle-thinking/eco-profiles-set
53 https://www.eurochlor.org/news/2022-eco-profile-study-now-updated-with-improved-data
54 https://pvc.org/wp-content/uploads/2023/06/230628_Eco-profile-PVC_june23.pdf

4 RESPONSIBLE SUPPLIER CRITERIA AND PROGRAMMES

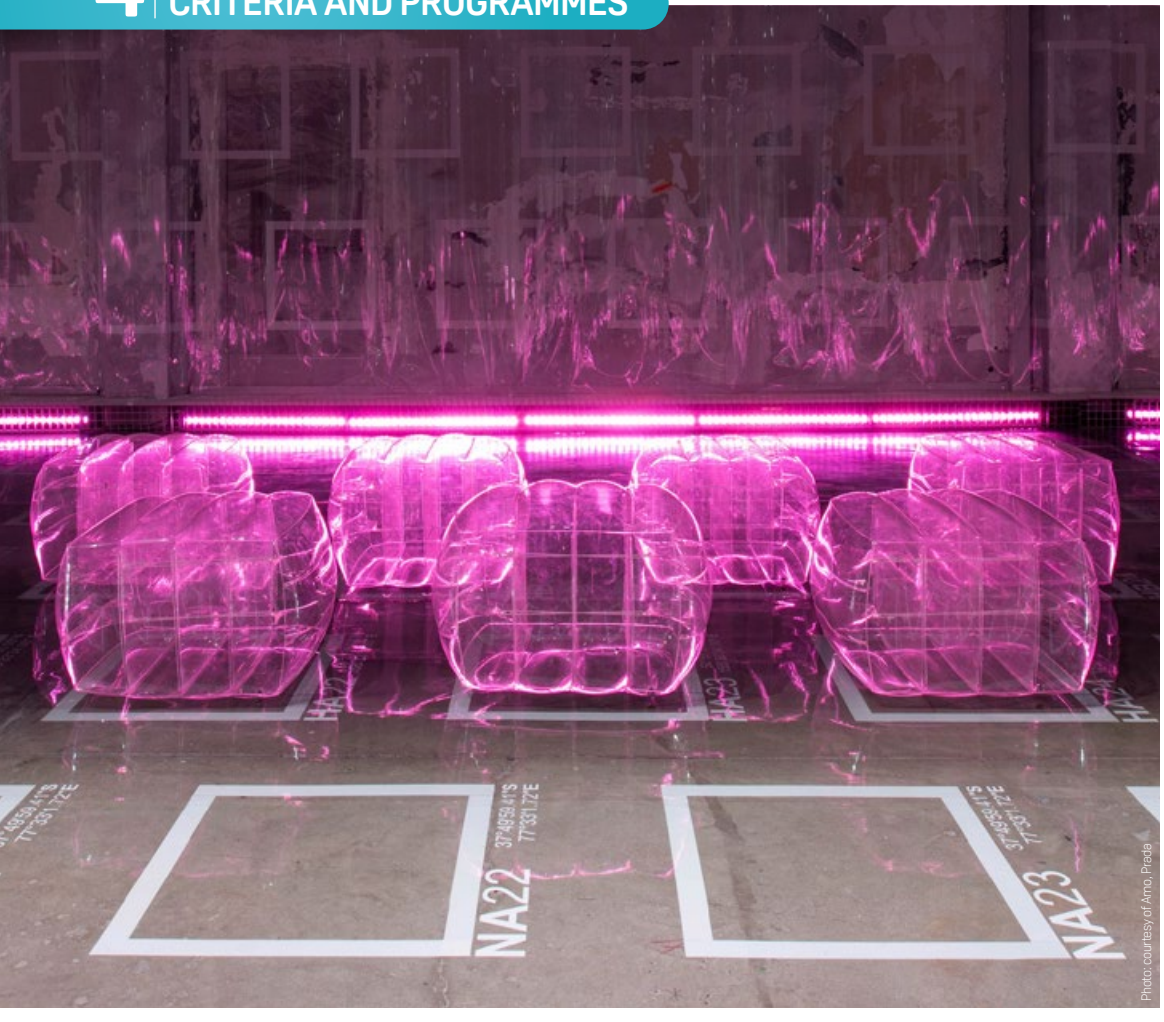


Photo: courtesy of Arno Preda

With the objective of collecting and mapping the certification schemes used by the upstream supply chain, VinylPlus approached Euro Chlor (www.eurochlor.org) and PetroChemicals Europe (www.petrochemistry.eu) in 2022 – the two sector groups of Cefic representing European producers of raw materials for PVC resins.

In April 2023, Euro Chlor presented its sustainability report to the EFC. Information on certification schemes from Petrochemicals Europe is expected to be received in 2024.

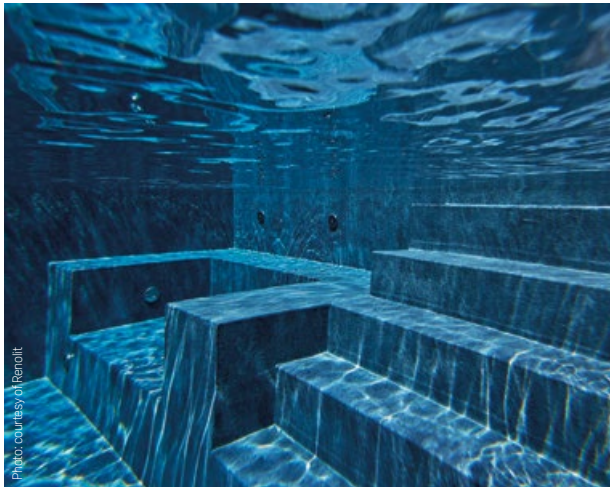


Photo: courtesy of Renolit

PATHWAY 3

#Coalitions and Partnerships

BUILDING GLOBAL COALITIONS AND PARTNERING FOR THE SDGs

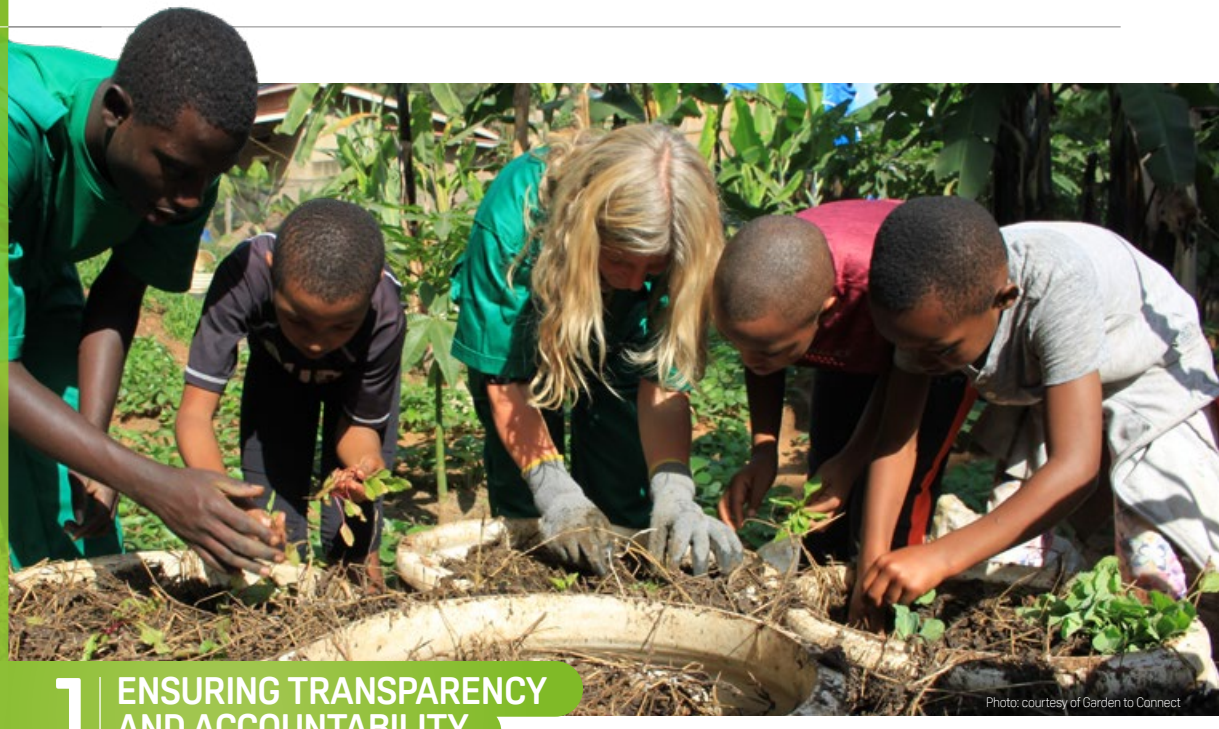


Photo: courtesy of Garden to Connect

1 ENSURING TRANSPARENCY AND ACCOUNTABILITY

Each year, VinylPlus publishes an independently verified and audited report on the progress made towards each target. The progress report is proactively circulated to all relevant stakeholders.

The Progress Report 2024 has been independently verified by SGS, while tonnages of recycled PVC waste and expenditures have been audited and certified by KPMG.

MONITORING COMMITTEE

To guarantee maximum transparency, accountability and participation, an independent body supervises the implementation of the Commitment, providing guidance and guidelines. (See p. 11 for a list of members).

2 CONTRIBUTING TO SUSTAINABLE DEVELOPMENT THROUGH CERTIFIED AND TRACEABLE PRODUCTS

VINYLPLUS SUSTAINABILITY CERTIFICATIONS

The VinylPlus® Product Label is a third-party-certified sustainability scheme for PVC products in the building and construction (B&C) sector, developed in cooperation with BRE[55] and The Natural Step.

In December 2022, the updated version of the VinylPlus® Product Label (v1.4) was submitted for European accreditation by Accredia, the Italian accreditation body. Accredia confirmed[56] the accreditation of the new version of the Product Label in Italy in February 2023 and at the European level[57] in September 2023.

In 2023, VinylPlus started working on a new version of the Product Label (v2.0) to better align its criteria with the VinylPlus 2030 Commitment and with the revised BRE's Responsible Sourcing Framework Standard BES 6001 (v4), as well as with the EU changing policies and societal needs for sustainability. The new sustainability criteria could include, for example, the use of renewable feedstock in the final product, adoption of measures to reduce water usage or abstraction, to minimise spillage of microplastics through Operation Clean Sweep,® to maintain biodiversity, to develop a site stewardship plan, and to promote human rights.

As the owner of the VinylPlus® Product Label, which is already held by the majority of the European PVC profile manufacturers, VinylPlus participated in the 2nd Stakeholder Meeting organised by the Belgian Construction Certification Association (BCCA) for the launch of the new version 2.0 of Duurzaam Schrijnwerk/Menuiserie Durable.

This is a multi-material label developed to certify the quality and sustainability of windows and doors manufactured in Belgium. The label is supported by the whole Belgian construction industry, and its criteria will be prescribed in public and private procurement specifications.

The VinylPlus® Product Label has been evaluated at the same level as other sustainability certification schemes, including FSC, PEFC and C2C, at bronze level. Window manufacturers are incentivised to use profiles with the VinylPlus® Product Label, since the latter can be used as proof of evidence for many criteria of the Duurzaam Schrijnwerk/Menuiserie Durable Label.

THE VINYLPLUS SUSTAINABILITY CERTIFICATIONS COMMUNITY CONTINUES TO EXPAND

verified vinyl® | VinylPlus® Supplier Certificates

18 companies certified

> 500 products and product systems manufactured at

29 European sites

55 BRE: Building Research Establishment, UK-based certification experts on responsible sourcing for B&C products (www.bre.co.uk)
56 www.accredia.it/en/documento/circolare-informativa-dc-n-07-2023-disposizioni-in-merito-allaccreditamento-per-lo-schema-vinylplus-product-label-v-1-4
57 www.accredia.it/en/documento/informative-circular-dc-n-39-2023-updating-dispositions-on-accreditation-according-to-the-scheme-vinylplus-product-label

ALEXANDER HOFER
CEO OF
IKA GROUP

We are a proud partner of VinylPlus, accompanying the whole history of VinylPlus over many years. We are committed in making the industry more sustainable. So, from the top of the company to the bottom, we believe in what we do with respect to the VinylPlus® Supplier Certificate and all the other sustainability actions we undertake. We have benefited a lot from this development and from this Certificate. We have learned a lot and had exchanges with external parties as well. We strongly believe in this proactive approach to further develop our industry, as we did already 20 years ago with other long-lasting targets.

VinylPlus® Supplier Certificates (VSCs) are sustainability schemes for additive producers and compounders that are partners of VinylPlus.

The VSCs set a new standard on transparency, traceability, and sustainable production, allowing raw material suppliers to demonstrate their sustainability efforts, and supporting buyers to select products with the highest sustainability performance. In addition, the VinylPlus® Supplier Certificates can help converters obtain the VinylPlus® Product Label. To date, six ESPA members and one compounder have obtained VSCs.

In the next few years, ESPA intends to extend the VinylPlus® Supplier Certificate to its members' sites outside Europe. In doing this, ESPA will also extend deeper knowledge of the ASF methodology, which helps companies meet the VSC criteria.

In Italy, a specific project aims to promote the VinylPlus® Supplier Certificate (VSC) for compounders and to support producers of PVC compounds for B&C in obtaining it. Seven partners of VinylPlus Italia engaged in this sustainability project. The consultant CESAP (https://cesap.com), an expert in training and audit for certification, is assisting the compounders in the steps to achieve the VSC.

PROMOTING SUSTAINABLE PRIVATE AND PUBLIC PROCUREMENT PRACTICES

In 2023, VinylPlus Deutschland continued to promote the VinylPlus® Product Label as the sustainability mark for B&C products and VinylPlus as a role model for sustainability.

Two dedicated media campaigns in the magazines KBD and Forum Nachhaltig Wirtschaften (both printed and digital editions) targeted respectively **public procurers** and **corporate social responsibility (CSR) managers.** The campaigns highlighted PVC products' contribution to sustainability and gave visibility to VinylPlus and its Product Label. A campaign was also run in the magazine Hotelbau to address purchasers from the hospitality sector.

3 ENGAGING STAKEHOLDERS IN THE SUSTAINABLE TRANSFORMATION OF THE PVC INDUSTRY

The 11th edition of the VinylPlus Sustainability Forum (VSF) took place in Florence, Italy, in May 2023. Under the theme *'Making the EU Green Deal Happen'*, the event was held in a presence-only format for the first time since the COVID-19 pandemic, and it gathered more than 160 delegates from 21 countries.

They debated sustainable solutions towards carbon neutrality, circularity in the building and construction sector, developments in green procurement and sustainable product certifications. High-level discussions on the contribution of PVC to a sustainable society took place in the context of upcoming European policy initiatives on plastics and PVC and regulatory challenges in the EU legislative framework. Participants appreciated these stimulating discussions as well as the opportunity for a face-to-face event. Networking spaces were available, and some of the VinylPlus flagship initiatives were exhibited, such as VinylPlus® Med, Garden to Connect and the Italian WREP. The VSF was preceded by the VinylPlus General Assembly, which was open only to VinylPlus partners and gathered around 100 participants.

Photo: VinylPlus®

The topics debated at the VSF were further explored in Germany at the 4th National VinylPlus Sustainability Forum organised by VinylPlus Deutschland at the University Club of Bonn. High-level speakers and stakeholders gathered to discuss the global transformation towards the circular economy and carbon neutrality and the related challenges for the chemical and plastic industries, and for the PVC value chain.

In December 2023, VinylPlus UK organised an online seminar[58] to update the national PVC industry on VinylPlus progress and perspectives, the global and European PVC market trends, as well as the UK legislative developments. The event saw the participation of 115 representatives from the entire PVC value chain and from academia.

The strong cooperation with the other regional PVC associations represented in the **Global**

58 www.youtube.com/watch?v=bohnWttQaug

Vinyl Council (GVC) continued in 2023. Experience, knowledge and best practices were actively shared, and there was a particular focus on hot topics such as the ECHA Investigation report on PVC and PVC additives, and the UNEP intergovernmental negotiations towards a Global Plastics Treaty.

VinylPlus was accredited in August 2023 as an observer organisation to the United Nations Environment Programme (UNEP). It then participated in the work of the **Third session of the Intergovernmental Negotiating Committee** to develop an international legally binding instrument on plastic pollution, including in the marine environment (INC-3). Participation in INC-3, which took place at the UNEP Headquarters in Nairobi, Kenya, from 13 to 19 November 2023, provided VinylPlus with an opportunity to interact with representatives of UNEA Member States, UN organisations, other plastic industry organisations and relevant stakeholders. On 12 November, the Global Vinyl Council, Vinyl Institute of Canada, the Vinyl Institute (USA) and VinylPlus co-hosted a Meet & Greet Reception. This gathered key stakeholders before the INC-3 meetings to exchange views on the potential development of the treaty and information on the benefits and sustainability of PVC products, as well as their importance and contribution to a sustainable society.

As a member of the Business and Industry Major Group (BIMG) accredited by UNEP, VinylPlus contributed its case history to the **BIMG Beacon Projects Report 2024**, the Major Group's flagship publication. The report serves as a platform to underscore the essential role that businesses play in advancing the UNEA-6 theme – *Effective, inclusive, and sustainable multilateral actions to tackle climate change, biodiversity loss, and pollution*. The report showcases successful projects or innovations that have demonstrated tangible impact in addressing one or more global environmental challenges. The BIMG Beacon Projects Report 2024 was launched at the 6th meeting of the United Nations Environment Assembly (UNEA-6) in February 2024 and submitted to representatives of UNEA Member States and stakeholders across the UNEP system.

4 PARTNERING WITH STAKEHOLDERS

To enhance the PVC industry's contribution to the SDGs, VinylPlus is continuing to engage with civil society, including younger generations, local communities, institutions and the private sector in order to develop partnerships, joint projects and initiatives.

ENGAGING WITH CIVIL SOCIETY

On the occasion of the International Day of Yoga 2023, VinylPlus renewed its traditional partnership with the Belgian Yoga Day.

VinylPlus took part in a yoga session in Brussels for young students of the IRSA (Institut Royal pour Sourds et Aveugles, Royal Institute for Deaf and Blind Children), as well as teachers, staff, children's families and friends of the IRSA.

The VinylPlus PVC yoga mats utilised for the event were then donated to the children to allow them to continue yoga lessons. The PVC mats had already been used at the 2021 Yoga Day. Thanks to the material's durability and flexibility, they can be reused several times.

As part of its engagement with the sports community, in 2023 VinylPlus has become a partner of the **Parc Hockey Club** of Brussels, one of the most representative team on the Belgian field and indoor hockey scene. In addition to a concrete support for the team, this collaboration provides VinylPlus with an opportunity to raise awareness of sustainability and the contribution of PVC to sports among young athletes. This is also thanks to PVC versatility, resistance and recyclability, which make it an ideal material for clothing, equipment and sport facilities. VinylPlus information banners, that are displayed during field hockey competitions, are reusable and will be recycled at the end of their life.

Photo: VinylPlus®

Under the theme *Sustainable Futures leave no one behind*, the International Union of Architects (UIA) organised its **World Congress of Architects 2023** in Copenhagen in July 2023. As part of the World Congress, the Danish Plastics Federation (Plastindustrien – plast.dk/en) set up a Plastic Pavilion from 21 June to 14 July as a platform to display innovative and sustainable plastics. The Pavilion hosted events, talks, and public gatherings, and became a hub for dialogue on plastics for sustainable societies.

As a diamond sponsor of the Plastic Pavilion, VinylPlus showcased unique PVC solutions for building and construction, the medical sector, and smart cities and societies. About 20% of the products displayed in the Pavilion were made of PVC. They included flooring, rugs and wall coverings made from recycled PVC, as well as rPVC sewer pipes, greenhouse gutters and rPVC façade tiles. The event also provided an occasion to present specific initiatives through talks and one-on-one conversations, such as Garden to Connect, VinylPlus® Med, the VinylPlus 2030 Commitment, WUPPI and The Vinyl House.

Furthermore, VinylPlus presented Vinyl Veggies, a sculpture based on the principles of Garden to Connect and inspired by the Pompidou Centre in Paris. The sculpture showcased the


Photo: VinylPlus®

transformative potential of vertical farming and emphasised the role of PVC as a material for use in food production. Vinyl Veggies was made with used PVC pipes, designed to be disassembled and will host other vegetables and plants in the future.

VinylPlus® Med is proving to be an effective project not only for increasing collection and recycling in the healthcare sector, but also for attracting new partnerships and supporting their development. In 2023, a new collaboration was established with the adult day-care centre Ons Tehuis Brabant (onstehuisbrabant.be), EnAdviS (enadvis.be) and Veolia (veolia.com/en) for co-collection of discarded single-use PVC medical devices and PP Blue wraps[59] in four Flemish hospitals.

VinylPlus® Med's experience and results have been the basis for the development of the **Select4Care project**, in partnership with Denuo[60] and VIL.[61] The scope of the Select4Care project is to enhance the collection logistics chain, and thus increase the recycled volumes, of medical plastic (including PVC) waste from Flemish hospitals. It was developed in response to a call for projects launched by Circular Flanders, the Flemish hub for circular economy, to promote circular healthcare. Thanks also to VinylPlus® Med's experience and credentials, the Flemish Minister for Environment granted the Select4Care project a subsidy of €100,000 over two years.

In June 2023, a media field trip entitled **PVC-Recycling live erleben** was organised by VinylPlus Deutschland in partnership with EPPA for journalists to learn and understand circularity in profiles (U-PVC) and films (P-PVC). The event, which involved around 10 journalists, took place in Troisdorf, Germany and included a visit to Gerflor Mipolam's PVC flooring production facility and AgPR's PVC flooring recycling plant.

The **Preserve the water 'good' with SMART PVC piping systems** project, run by VinylPlus Italia, trained and informed designers, public procurers and specifiers in the benefits of PVC piping systems as a sustainable and cost-efficient solution to mitigate the effects of droughts. The project included the meeting *Preserve the water 'good'* in partnership with Utilitalia (utilitalia.it), Althesys (althesys.com/en) and Politecnico of Milan (polimi.it). The meeting targeted public administrations, public procurers and utilities. Key topics included quality and sustainability labels for PVC products and the benefits of PVC for

59 PP: Polypropylene is used to make surgical blue wraps. Blue wrap plays a critical role in maintaining the sterility of surgical instruments prior to use in the operating room

60 Denuo: the Belgian federation of the waste and recycling sector (https://denuo.be)

61 VIL: the Flemish Institute for Logistics (https://vil.be/en)

cost-efficiency and technical performance, as well as innovation and digitalization. In addition, a cycle of three webinars supported by the Italian Orders of Engineers and Architects was held in June 2023. Around 900 designers and specifiers participated in the webinars, and their feedback was extremely positive. Due to designers' interest in the topic, a dedicated volume on *The protection of the water resource, use of efficient and long-lasting PVC pipes* was produced. This was the 15th book in a VinylPlus Italia series on pipes.

In the UK, the project **18 months – 18 reasons to choose PVC** was relaunched with new and fresh infographics by VinylPlus UK. The project aimed to engage with industry stakeholders, improve the image of PVC and promote VinylPlus as a role model for sustainability commitment, using simple, emotional and fresh communications tools. The new infographics will be released in 2024 on the occasion of special events and will be supported by a social media campaign.

ENGAGING WITH INSTITUTIONS AND LOCAL COMMUNITIES

As recognized by the EU's New European Bauhaus, the Garden to Connect project contributes to a sustainable, beautiful and inclusive Europe.

In May 2023, Garden to Connect participated in the exhibition Next Library (nextlibrary.net/sessions/garden-to-connect-2) in Aarhus, Denmark. It attracted 300 participants from 29 nations in its urban gardens in the Next Library's SDG Outdoor Stage and in dedicated talks. The project was showcased at the Plastic Pavilion of the UIA World Congress of Architects 2023 in Copenhagen. It also appeared in the video of the EU project DivAirCity, a European project that *"recognizes, accepts and celebrates differences in cities and turns them into a true value to address the emergency of air pollution and climate change"*.


Photo: courtesy of Garden to Connect

In Rwanda, **Garden to Connect** organised three different initiatives. *Percussion to connect* transformed old PVC pipes into drums. In educational workshops, students learned how to produce prototypes of PVC pipe drums from end-of-life PVC pipes and cow hide. The drums were used in music classes and performances to promote the reuse of PVC and to raise awareness of the environment and of the health benefits of drumming. In the *PVC and dance for health* initiative, a performance raised awareness of how people and plants can be helped to grow. The scenography used PVC pipes as a creative base to show how they can be reused in artistic ways and used to create new moves. *Cooking home-grown vegetables*


Photo: courtesy of Garden to Connect

from Garden to Connect safely consisted of educational cooking workshops for the youth of the Indaro Centre. The initiative encouraged urban farming in old PVC pipes without the use of conventional pesticides and used pellets made from biomass waste left over from forest management, reforestation and furniture production.

VINYLPLUS ENDORSES THE ANTWERP DECLARATION

In February 2024, VinylPlus endorsed the Antwerp Declaration (antwerp-declaration.eu), which was presented at the European Industry Summit. The Declaration emphasises the necessity for a competitive and resilient EU industry to align with the European Green Deal and the urgent need for clarity, predictability, and confidence in Europe's industrial policy. More than 1,000 organisations from 25 industry sectors have to date signed the Antwerp Declaration.

The Antwerp Declaration for a European Industrial Deal

In Denmark, **WUPPI**,[62] supported by VinylPlus, continued to raise awareness of its collection and recycling activities and of the European PVC industry's achievements in sustainability and circularity. Communications with stakeholders were supported by multimedia and marketing campaigns and ad hoc newsletters. To increase volumes and improve collection efficiency, WUPPI in 2023 successfully established a partnership with Ragn-Sells, a corporate group involved in waste management, environmental services and recycling (ragnsells.com). In the framework of the project, WUPPI conducted an installation test of 3-layer sewer pipes. The pipes were produced from lead-free PVC waste by the VinylPlus partner Wavin in accordance with EN 13476, with 70% of recycled content in the intermediate layer. The project was also an occasion to further strengthen relationships with the Danish EPA (Miljøstyrelsen).

In Italy, the **2026 Winter Olympics Milano-Cortina** project addressed institutions, authorities, local administrations, Olympics organisers and companies of the PVC value chain. The project aimed to promote PVC and its applications as smart solutions for sustainable sport events. It also facilitated collaboration among companies, recyclers and other business partners to develop a virtuous system that can ensure the circularity and sustainability of products and productions, as requested by the Olympics' organisers, in line with national GPPs and REACH regulation. Collaborative contacts were developed and are still ongoing with Italian institutions, focusing in particular on recycled content for PVC applications and the development of dedicated waste management schemes. A brochure on sustainable sport events was produced for managers of winter sports facilities, institutions, public and private planners, and architects. It illustrates how to design and build sports structures and facilities with PVC in a sustainable and circular way.

62 WUPPI: Danish company set up to collect and recycle rigid PVC (wuppi.dk)

CHARLOTTE RÖBER
Managing Director of VinylPlus

"VinylPlus endorses the Antwerp Declaration, advocating for a competitive, resilient EU industry enabling the implementation of the European Green Deal. We echo the call for a clear and strong European industrial policy that is also the backbone of social, economic, and environmental sustainability in the European PVC sector providing increasingly sustainable solutions across vital sectors.

Financial Report

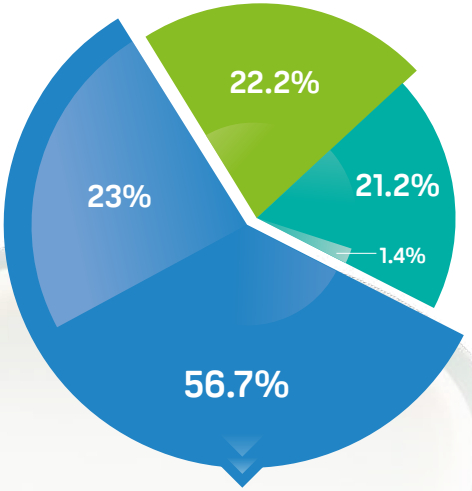
Photo: courtesy of Martin Sommerschield Kuvio & Mika Huisma

05

VINYLPLUS TOTAL EXPENDITURE IN 2023: €5.55 MILLION

In 2023, industry expense increased by 4.2% compared to 2022. Variations are minor and can be explained by variation in volumes collected and recycled or increased costs due to inflation.

The expenditure of VinylPlus – including EuPC and its members, as well as national and sectoral co-funding – amounted to €5.55 million in 2023.



Overheads and Commitment development

Communications
(including national and sectoral co-funding, which amounted to 1.4% of total industry funding)

Waste management and technical projects
(including national and sectoral co-funding, which amounted to 23% of total industry funding)

Waste management and technical projects

Total expenditure including EuPC and its members

Figures in €1,000s	**2022**	**2023**
Flooring related projects	775	657
EPPA	589	723
Recovinyl®	1,001	911
Studies, start-up & pull concept	293	306
TEPPFA	312	355
Medical applications recycling	96	104
Chemical recycling	1	60
EuPolySep (PVC composites delamination)	70	0
Sorting Pb from cable waste	0	30
Total projects	**3,137**	**3,145**

Recycled PVC Tonnages

Photo: courtesy of Bill Arnberg Studio

06

TONNAGES OF PVC RECYCLED IN THE EU-27 PLUS NORWAY, SWITZERLAND AND THE UK

Type of PVC (Waste Origin)	Tonnage recycled in 2022			Tonnage recycled in 2023		
	Total tonne	**Post-consumer**	**Pre-consumer**	**Total tonne**	**Post-consumer**	**Pre-consumer**
Profiles	408,151	169,770	238,381	391,093	152,585	238,508
Pipes	49,664	10,955	38,709	30,471	6,983	23,488
Cables	101,239	91,958	9,281	97,586	88,345	9,241
Flexibles	216,278	23,722	192,556	67,720	25,107	42,613
Rigid film	20,820	5,654	15,166	20,399	5,140	15,259
Coated fabrics		*Reported under Flexibles*		83	0	83
Flooring		*Reported under Flexibles*		118,379	3,248	115,131
Other rigid	17,114	3,535	13,579	11,913	1,250	10,663
Total	**813,266**	**305,594**	**507,672**	**737,645**	**282,658**	**454,986**

The table above summarises the 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, in the period 1 January 2023 to 31 December 2023.

The table on the right summarises the uptake of recycled PVC by applications in 2023.

The complete Report of Factual Findings regarding the Agreed-Upon Procedures (AUP) Engagement can be found on page 51.

RECYCLED PVC UPTAKE BY APPLICATIONS IN 2023

Applications	Total tonne
Building & Construction	26,180
Coils and mandrels	830
Floor covering	122,009
Horticultural and stable equipment	5,470
Pipes	47,516
PVC packaging	738
Traffic management	84,501
Windows and profiles	182,672
Total	**469,916**

Verification Statements

Photo: courtesy of Philippe Chancel

07

KPMG CERTIFICATION OF EXPENDITURE

INDEPENDENT ACCOUNTANTS' REPORT ON APPLYING AGREED-UPON PROCEDURES

To VinylPlus AISBL and European Commission

SCOPE OF WORK

In accordance with our engagement letter with VinylPlus AISBL (hereafter "the Association") dated March 25, 2024, we have been requested to perform the procedures agreed with you and set out below relating to the existence of the expenses of the project VinylPlus based on the overview, analytical accounting and supporting documents provided to us by the Association.

Our report is solely for the purpose of assisting the Association in validating the existence of the expenses of the project VinylPlus based on the overview, analytical accounting and supporting documents provided to us by the Association and may not be suitable for another purpose. This report is intended solely for the Association and should not be used by, or distributed to, any other parties, except for informational purposes to the European Commission in the VinylPlus Progress Report 2024.

RESPONSIBILITIES OF THE ENGAGING PARTY

The Association has acknowledged that the agreed-upon procedures are appropriate for the purpose of this engagement.

The Association is responsible for the subject matter on which the agreed-upon procedures are performed.

INDEPENDENT AUDITOR'S RESPONSIBILITIES

We have conducted the agreed-upon procedures engagement in accordance with the International Standard on Related Services (ISRS) 4400 (revised) *"Agreed-Upon Procedures Engagements"*. An agreed-upon procedures engagement involves our performing the procedures that have been agreed with the Association, and reporting the findings, which are the factual results of the agreed-upon procedures performed. We make no representation regarding the appropriateness of the agreed-upon procedures.

This agreed-upon procedures engagement is not an assurance engagement. Accordingly, we do not express an opinion or an assurance conclusion. Had we performed additional procedures, other matters might have come to our attention that would have been reported.

This report relates only to the expenses specified above and does not extend to any financial statements of the Association, taken as a whole.

This engagement is separate from the audit of the annual financial statements of the Association and the report here relates only to the expenses specified above and does not extend to the Association's annual financial statements taken as a whole.

As regards to our audit work on the Association's financial statements, our work was carried out in accordance with the statutory and professional obligations and was not planned or conducted in contemplation of your requirements or any matters. In particular, the scope of our audit work has been set and judgments made by reference to our assessment of materiality in the context of the financial statements taken as a whole, rather than in the context of your needs. Accordingly, we do not accept or assume any responsibility to you in relation to our audit report and accept no liability to you in connection therewith in the context of this agreed-upon procedures engagement.

PROFESSIONAL ETHICS AND QUALITY CONTROL

We have complied with the ethical requirements of the IESBA Code of Ethics issued by the International Ethical Standards Board for Accountants as well as with the Belgian independence rules and other relevant ethical requirements applicable in Belgium.

We are the statutory auditor of the Association and are therefore independent from the Association in accordance with the Belgian independence rules and other relevant ethical requirements applicable in Belgium.

Our firm applies International Standard on Quality Management (ISQM) *1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements*, which requires the firm to design, implement and operate a system of quality management including policies or procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

PROCEDURES AND FACTUAL FINDINGS

We have performed the procedures described below, which were agreed upon with the Association, on assisting the Association in validating the existence of the expenses of the project VinylPlus based on the overview, analytical accounting and supporting documents provided to us by the Association and are summarized as follows:

Obtain the total amount of eligible costs declared in accompanying costs statements and verify compliance with the following conditions:

a. The costs were incurred between January 1, 2023 and December 31, 2023;

b. The costs are recorded in the accounts of the contractor;

c. Inspect that the costs above EUR 5,000 agree to supporting documents such as invoices, justification of accruals.

Our procedures will not address the following characteristics of these costs as these are either not formally defined or are subjective in nature:

- "they are connected with the subject of the agreement";
- "they are necessary for the implementation of the action which is subject of the grant";
- "they comply with requirements of applicable tax and social legislation";
- "they are reasonable, justified, and comply with the requirements of sound financial management, in particular regarding economy and efficiency";
- "the cost of staff assigned to the action, comprising actual salaries plus social security charges and other statutory costs included in the remuneration, does not exceed the average rates corresponding to the beneficiary's usual policy on remuneration";
- "the corresponding salary costs of personnel of national administrations relate to the cost of activities which the relevant public authority would not carry out if the action concerned were not undertaken";
- "excessive or reckless expenditure shall not be considered eligible".

d. Verify the mathematical accuracy of the breakdown of costs declared in the table presenting the supported charges for the different projects of VinylPlus ('the Association'), as included in the VinylPlus Progress Report related to the activities of the year 2023.

e. Check that these costs are recorded in the financial statements 2023 of the Association.

f. For projects included in the VinylPlus Progress Report, obtain confirmation of costs from legal entity managing or contributing to the project or from external advisor.

We report our factual findings below:

- As a result of applying procedures a, b and c, we found no exceptions. The total amount of costs including financial charges indicated in the cost statement amount to KEUR 4,174.
- As a result of applying procedures d, e and f, we found no exceptions. The total expenses amount to KEUR 5,548.

Our report is solely for the purpose set forth in the first paragraph of this report and for your information and is not to be used for any other purpose or to be distributed to any other parties, except for informational purposes in the VinylPlus Progress Report 2024. Should any third party wish to rely on the report for any purpose they will do so entirely at their own risk. This report relates only to the expenses of the project VinylPlus and items specified above and does not extend to any financial statements of VinylPlus, taken as a whole.

KPMG Réviseurs d'Entreprises – Bedrijfsrevisoren
Statutory Auditor represented by

Michaël Focant
Réviseur d'Entreprises
Liège, April 11, 2024

KPMG REPORT ON TONNAGES RECYCLED

AGREED-UPON PROCEDURES REPORT ON TONNAGES OF PVC RECYCLED IN THE EU OF THE 27 PLUS SWITZERLAND, NORWAY AND THE UK IN 2023, WITHIN THE OPERATIONS OF RECOVINYL AISBL

To Recovinyl AISBL and the Director of the Technical Department of the European Plastics Converters ("EuPC") who is responsible for consolidating the tonnages of recycled PVC within the context of VinylPlus and/or the Board of VinylPlus

PURPOSE OF THIS AGREED-UPON PROCEDURES REPORT AND RESTRICTION ON USE AND DISTRIBUTION

In accordance with our engagement letter with Recovinyl AISBL (hereafter 'the Association' or 'Recovinyl') dated February 28, 2024, we have performed the procedures agreed with you and set out below relating to validating the tonnages of PVC recycled in the EU of the 27 plus Switzerland, Norway and the UK in 2023, within the operations of Recovinyl.

Our report is solely for the purpose of assisting Recovinyl in validating the tonnages of PVC recycled in the EU of the 27 plus Switzerland, Norway and the UK in 2023, within the operations of Recovinyl and may not be suitable for another purpose. This report is intended solely for Recovinyl and should not be used by, or distributed to, any other parties, except for informational purposes to the Director of the Technical Department of the European Plastics Converters (EuPC) and/or the Board of VinylPlus and in the VinylPlus Progress Report 2024. Should any third party wish to rely on the report for any purpose they will do so entirely at their own risk.

RESPONSIBILITIES OF THE ENGAGING PARTY

Recovinyl has acknowledged that the agreed-upon procedures are appropriate for the purpose of this engagement. Recovinyl is responsible for the subject matter on which the agreed-upon procedures are performed.

INDEPENDENT AUDITOR'S RESPONSIBILITIES

We have conducted the agreed-upon procedures engagement in accordance with the International Standard on Related Services (ISRS) 4400 (revised) *"Agreed-Upon Procedures Engagements"*. An agreed-upon procedures engagement involves our performing the procedures that have been agreed with Recovinyl, and reporting the findings, which are the factual results of the agreed-upon procedures performed. We make no representation regarding the appropriateness of the agreed-upon procedures.

This agreed-upon procedures engagement is not an assurance engagement. Accordingly, we do not express an opinion or an assurance conclusion. Had we performed additional procedures, other matters might have come to our attention that would have been reported.

This report relates only to the tonnages of PVC recycled in the EU of the 27 plus Switzerland, Norway and the UK in 2023 specified above and does not extend to any financial statements of Recovinyl, taken as a whole.

PROFESSIONAL ETHICS AND QUALITY CONTROL

We have complied with the ethical requirements of the IESBA Code of Ethics issued by the International Ethical Standards Board for Accountants. For the purpose of this agreed-upon procedures engagement, there are no independence requirements with which we are obliged to comply.

Our firm applies International Standard on Quality Management (ISQM) 1, *Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements*, which requires the firm to design, implement and operate a system of quality management including policies or procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

PROCEDURES AND FACTUAL FINDINGS

We have performed the procedures described below, which were agreed upon with Recovinyl, on assisting Recovinyl in validating the tonnages of PVC recycled in the EU of the 27 plus Switzerland, Norway and the UK in 2023, within the operations of Recovinyl, and are summarized as follows:

With regard to the MS Excel spreadsheet *"Audit 2023 Recovinyl Overviews (including the recycling and converting overview)"* regarding the tonnages of recycled PVC, for the accounting period January 1, 2023 to December 31, 2023, prepared by management of Recovinyl AISBL, KPMG is hereby requested to perform the following procedures:

1. **Check the mathematical accuracy of the calculations**

a. in the sheet 'Quantity by recycler' regarding:

- the total input into recycling process (net) tonnages of PVC waste per recycler (which is the sum of the tonnages of post-consumer and pre-consumer PVC waste per recycler);
- the total tonnage (input into recycling operation) of PVC waste;
- the total audited input into recycling operation of PVC waste;
- the percentage of audited tonnages per recycler (which is the audited tonnage of PVC waste per recycler divided by the total tonnage of PVC waste per recycler);
- the overall percentage of audited tonnages (which is the total audited tonnage of PVC waste divided by the total tonnage of PVC waste);
- the total output quantity of recycled PVC;

- the total audited output quantity of recycled PVC;
- the percentage of audited output quantity per recycler (which is the ratio of the audited quantity of recycled PVC per recycler to the total quantity of recycled PVC per recycler);
- the overall percentage of audited output quantity (which is the ratio of the total audited quantity of recycled PVC to the total quantity of recycled PVC);

b. in the sheet 'Waste Origin Totals' regarding:

- the total tonnages of post-consumer recycled PVC per detailed waste origin, the total quantity of pre-consumer PVC waste per detailed waste origin, the total quantity of PVC waste per detailed waste origin (which is the sum of the total tonnages of post-consumer and pre-consumer PVC waste per detailed waste origin) and their total tonnages based on the sheet "Waste origin by Recycler";
- the total tonnages of post-consumer PVC waste per general waste origin group, the total tonnages of pre-consumer PVC waste per general waste origin group, the total tonnage of PVC waste per general waste origin group (which is the sum of the total tonnages of post-consumer and pre-consumer PVC waste per general waste origin) and their total tonnages based on the sheet 'Waste origin by Recycler';

2. Perform the following procedures regarding the following information:

a. in the sheet 'Quantity by recycler', for a random sample which in total amounts to at least 70% of the total audited tonnages of PVC waste and recycled PVC, we will compare the data per recycler and the audited tonnage of PVC waste and recycled PVC mentioned in the audit reports from the auditors appointed by Recovinyl, for the accounting period January 1, 2023 to December 31, 2023; and

b. in the same sheet 'Quantity by recycler', for the recyclers, from the same random sample of point 2a, that have "100%" as percentage of audited tonnages per recycler, compare the data per recycler, the tonnage of post-consumer PVC waste, the tonnage of pre-consumer PVC waste and the tonnage of recycled PVC with the tonnage of post-consumer PVC waste, the tonnage of pre-consumer PVC waste and the tonnage of recycled PVC mentioned in the audit reports from the auditors appointed by Recovinyl, for the accounting period January 1, 2023 to December 31, 2023; and

With regard to the MS Excel spreadsheet *"Audit 2023 Recovinyl Overviews (including the recycling and converting overview)"* regarding the uptake of recycled PVC, for the accounting period January 1, 2023 to December 31, 2023, prepared by management of Recovinyl AISBL, KPMG is hereby requested to perform the following procedures:

1. Check the mathematical accuracy of the calculations

a. in the sheet 'Quantity by converter' regarding:

- the total quantity of recycled PVC bought/ received per converter (converting input);
- the total tonnage of recycled PVC used in production of new products (converting output) per converter;
- the total tonnage of recycled PVC bought/ received by converters (converting input), which is the sum of the total quantity of recycled PVC received by individual converters;
- the total tonnage of recycled PVC used in new products (converting output), which is the sum of the total quantity of recycled PVC used in new products by individual converters;
- the total audited tonnage of recycled PVC for converting input per converter and the total audited tonnage of recycled PVC for converting output per converter;
- the percentage of audited tonnages per converter (which is the audited tonnage of recycled PVC per converter divided by the total tonnage of recycled PVC per converter) for converting input and converting output;
- the overall percentage of audited tonnages (which is the total audited tonnage of recycled PVC divided by the total tonnage of recycled PVC) for converting input and converting output;

b. in the sheet 'Applications Totals' regarding:

- the total tonnages of recycled PVC per detailed application ('used in') based on the sheet 'Application by Converter';
- the total tonnages of recycled PVC per general application based on the sheet 'Application by Converter';

2. Perform the following procedures regarding the following information:

a. in the sheet 'Quantity by converter', for a random sample which amounts to at least 70% of the total audited tonnage of recycled PVC, we will compare the data per converter and the audited tonnage of recycled PVC, with the data of the audited tonnage of recycled PVC mentioned in the audit reports from the auditors appointed by Recovinyl, for the accounting period January 1, 2023 to December 31, 2023.

The tables mentioned above are reproduced in the VinylPlus Progress Report 2024, on page 47.

We report our factual findings below:

- With respect to the procedure 1.a (tonnages of recycled PVC and uptake of recycled PVC) we found no exception;
- With respect to the procedure 1.b (tonnages of recycled PVC and uptake of recycled PVC) we found no exception;
- With respect to the procedure 2.a (tonnages of recycled PVC and uptake of recycled PVC) we found no exception;
- With respect to the procedure 2.b (tonnages of recycled PVC) we found no exception.

The total recycled tonnage for 2023 amounts to 737,644.51 tonnes, of which 282,658.47 tonnes were post-consumer and 454.986.04 pre-consumer. A total uptake of 469,915.51 tonnes of recycled PVC was registered in the RecoTrace® system in 2023.

KPMG Réviseurs d'Entreprises – Bedrijfsrevisoren
Statutory Auditor represented by

Michaël Focant
Réviseur d'Entreprises
Liège, April 11, 2024

SGS INDEPENDENT VERIFICATION STATEMENT ABOUT THE VINYLPLUS PROGRESS REPORT 2024

SGS is the world's leading testing, inspection and certification company. We are recognized as the global benchmark for sustainability, quality and integrity. Our 99,000 employees operate a network of 2,600 offices and laboratories around the world.

SGS was commissioned by VinylPlus to provide an independent verification of the 'Progress Report 2024'. This report presents the commitments and achievements made by the VinylPlus project in 2023.

The purpose of the verification was to check the statements made in the report. SGS was not involved in the preparation of any part of this report or the collection of information on which it is based. This verification statement represents our independent opinion.

VERIFICATION PROCESS

The verification consisted of checking whether the statements in this report give a true and fair representation of VinylPlus' performance and achievements.

This included a critical review of the scope of the Progress Report and the balance, and the unambiguity of the statements presented.

THE VERIFICATION PROCESS INCLUDED THE FOLLOWING ACTIVITIES:

- Desktop review of project-related material and documentation made available by VinylPlus such as plans, agreements, minutes of meetings, presentations, technical reports and more.

- Communication with VinylPlus personnel responsible for collecting data and writing various parts of the report, in order to discuss and substantiate selected statements.
- Communication with some members of the Monitoring Committee.

THE VERIFICATION DID NOT COVER THE FOLLOWING:

- The underlying data and information on which the desk-top review documentation is based.
- The Financial Report.
- The Recycled PVC Tonnages.
- The KPMG Certification of Expenditure.
- The KPMG Report on Tonnages Recycled.

VERIFICATION RESULTS

Within the scope of our verification, VinylPlus has provided objective evidence of its performance in relation with its commitments in the VinylPlus programme.

It is our opinion that this 'Progress Report 2024' represents VinylPlus' performance and activities in 2023 in a reliable way.

ir Pieter Weterings
SGS Belgium NV
Certification Manager
02/04/2024

VinylPlus Founding members & Partners

Photo courtesy of Deceuninck

VinylPlus involves 200 partners across Europe, from resins and additives producers to plastics converters, and a network of 150 recyclers.

Since 2000, the European PVC industry has been strongly committed to implementing a long-term sustainability framework for the entire PVC value chain and to improving PVC products' sustainability and circularity, as well as their contribution to a sustainable society.

VINYLPLUS FOUNDING & CURRENT MEMBERS

ECVM

The European Council of Vinyl Manufacturers represents seven leading European producers of PVC resin, which account for around 85% of the PVC resin manufactured in Europe. These businesses operate around 46 different plants spread over 29 sites and employ approximately 8,000 people.

www.pvc.org

EuPC

European Plastics Converters is an association representing more than 50,000 companies in Europe, which produce over 50 million tonnes of plastic products every year from both virgin and recycled polymers. They employ more than 1.6 million people, generating turnover in excess of €260 billion per year.

www.plasticsconverters.eu

ESPA

The European Stabiliser Producers Association represents eight companies that produce more than 95% of the stabilisers sold on the European market. They provide direct employment to more than 2,000 people in Europe.

www.stabilisers.eu

European Plasticisers

European Plasticisers is a Sector Group of Cefic representing 11 major European plasticiser manufacturers, producing approximately 90% of the plasticisers manufactured in Europe. Over €6 billion has been invested in innovative, safe and sustainable alternative plasticisers over the last 25 years.

www.europeanplasticisers.eu

EPPA

The European Trade Association of PVC Window System Suppliers, which represents the PVC profile industry across Europe, became a full member of VinylPlus in 2023. Representing 22 window system producers and national associations, EPPA currently covers over 90% of the European production of PVC window profiles.

www.eppa-profiles.eu

200 companies

3 national associate members

150 recycler partners

recovinyl

ecvm EUPC ESPA european plasticisers EPPA

VINYLPLUS PARTNERS

In 2023, the contributors were:

CONVERTERS:

A. Kolckmann GmbH (Germany)
Alfatherm SpA (Italy)
Aliaxis Group (Belgium)
Alphacan Srl (Italy)
Altro (UK)
Altro Debolon Dessauer Bodenbeläge GmbH & Co. KG (Germany)
aluplast Austria GmbH (Austria)
aluplast GmbH (Germany)
aluplast Srl (Italy)
alwitra GmbH & Co (Germany)
Amtico International (UK)
APA SpA (Italy)
Ateco Srl (Italy)
Beaulieu International Group (Belgium)
BM S.L. (Spain)
BMI Group (Germany)
Bonlex Europe Srl (Italy)
BT Bautechnik Impex GmbH & Co. KG (Germany)
BTH Fitting Kft. (Hungary)
CF Kunststofprofielen (Netherlands)
Chieftain Fabrics (Ireland)
CIFRA (France)
Copaco Screenweavers (Belgium)
Danosa (Spain)
Deceuninck Germany GmbH (Germany)
Deceuninck Ltd (UK)
Deceuninck NV (Belgium)
Deceuninck SAS (France)
Dekura GmbH (Germany)
DHM (UK)
Dow Belgium BV (Belgium)
Dyka BV (Netherlands)
Dyka Plastics NV (Belgium)
Dyka Polska Sp. z o.o. (Poland)
Dyka SAS (France)
Elbtal Plastics GmbH & Co. KG (Germany)
Epwin Window Systems (UK)
Ergis SA (Poland)
Eurocompound Srl (Italy)
Fatra a.s. (Czech Republic)
FDT FlachdachTechnologie GmbH & Co. KG (Germany)
FEB – Fachverband der Hersteller elastischer Bodenbeläge e.V. (Germany)
Finproject Spa (Italy)
Finstral AG (Italy)
FIP (Italy)
Forbo Flooring BV (Netherlands)
Forbo Flooring GmbH (Germany)
Forbo Novilon BV (Netherlands)
Forbo Sarlino SAS (France)
Forbo-Giubiasco SA (Switzerland)
Funke Kunststoffe GmbH (Germany)*
Funzionano AS (Norway)
Gealan Fenster-Systeme GmbH (Germany)
Georg Fischer Deka GmbH (Germany)
Gerflor Mipolam GmbH (Germany)
Gerflor SAS (France)
Gerflor SpA (Italy)
Gerflor Tarare (France)
Gernord Ltd (Ireland)
Girpi (France)
Gislaved Folie AB (Sweden)
Griffine Enduction (France)
Hamos GmbH (Germany)
Helioscreen (Belgium)
H-fasader AS (Norway)
Holland Colours NV (Netherlands)
Hundhausen Kunststofftechnik GmbH (Germany)
I.C.P. SpA (Italy)
Imerys Talc Europe (France)
Industrias REHAU SA (Spain)
Industrie Generali SpA (Italy)
Industrie Plastiche Lombarde SpA (Italy)
Inoutic/Deceuninck Sp. z o.o. (Poland)
Internorm Bauelemente GmbH (Austria)
Inverplast Srl (Italy)
IVC BVBA (Belgium)
Jimten (Spain)
Kisuma Chemicals BV (Netherlands)*
KRONOS International Inc (Germany)*
KURO Kunststoffe GmbH (Germany)
Liveo Research (Germany)
Lubrizol Advanced Materials Europe BVBA (Belgium)
Manufacturas JBA (Spain)
Marley Deutschland (Germany)
Marley Hungária (Hungary)
Mehler Texnologies GmbH (Germany)
Mermet Suncreen (France)
MKF-Ergis GmbH (Germany)
MKF-Ergis Sp. z o.o. (Poland)
Molecor (Spain)
Mondorevive SpA (Italy)
Nicoll (France)
Nicoll Italy (Italy)
Nordisk Wavin AS (Denmark)
Norsk Wavin AS (Norway)
NYLOPLAST EUROPE BV (Netherlands)
Objectflor Art und Design Belags GmbH (Germany)
Omya International AG (Switzerland)
Palram DPL Ltd (UK)
PCW GmbH (Germany)*
Perlen Packaging (Switzerland)
Pipelife Austria (Austria)
Pipelife Belgium NV (Belgium)
Pipelife Czech s.r.o (Czech Republic)
Pipelife Deutschland GmbH (Germany)
Pipelife Eesti AS (Estonia)
Pipelife Finland Oy (Finland)
Pipelife Hungária Kft. (Hungary)

Pipelife Nederland BV (Netherlands)
Pipelife Norge AS (Norway)
Pipelife Polska SA (Poland)
Pipelife Sverige AB (Sweden)
Poliplast (Poland)
Poloplast GmbH & Co. KG (Austria)
Polyflor (UK)
Polymer-Chemie GmbH (Germany)
PreZero Kunststoffrecycling GmbH & Co. KG (Germany)
profine GmbH – International Profile Group (Germany)
profine Italia Srl (Italy)
PROJECT FLOORS GmbH (Germany)
Qi Sistemi Srl (Italy)
Redi (Italy)
REHAU AG & Co (Germany)
REHAU GmbH (Austria)
REHAU Ltd (UK)
REHAU SA (France)
REHAU SpA (Italy)
REHAU Sp. z o.o. (Poland)
RENOLIT Belgium NV (Belgium)
RENOLIT Cramlington Ltd (UK)
RENOLIT Hispania SA (Spain)
RENOLIT Ibérica SA (Spain)
RENOLIT Milano Srl (Italy)
RENOLIT Nederland BV (Netherlands)
RENOLIT Ondex SAS (France)
RENOLIT SE (Germany)
Riflex Film (Sweden)
Riuvert (Spain)
Roechling Industrial Lahnstein SE & Co. KG (Germany)
Saint Clair Textiles (France)
Salamander Industrie Produkte GmbH (Germany)
Sattler PRO-TEX GmbH (Austria)
Schüco Polymer Technologies KG (Germany)
Screen Protectors SL (Spain)
Serge Ferrari SAS (France)
Sika Services AG (Switzerland)
Sika Trocal GmbH (Germany)
SIMONA AG (Germany)
Sioen Industries (Belgium)
SKZ-Testing GmbH (Germany)
Soprema Srl (Italy)
Sovere SpA (Italy)
STIR Compounds Srl (Italy)
Stöckel GmbH (Germany)
Tarkett AB (Sweden)
Tarkett France (France)
Tarkett GDL SA (Luxembourg)
Tarkett Holding GmbH (Germany)
Tarkett Limited (UK)
Teraplast SA (Romania)
TMG Automotive (Portugal)
TPV Compound SpA (Italy)
Veka AG (Germany)
Veka Ibérica (Spain)
Veka Plc (UK)
Veka Polska (Poland)
Veka SAS (France)
Verseidag-Indutex GmbH (Germany)
Vescom BV (Netherlands)
Vinilchimica Srl (Italy)
Vi.Pa. Srl (Italy)
Vulcaflex SpA (Italy)
Wavin Baltic (Lithuania)
Wavin Belgium BV (Belgium)
Wavin BV (Netherlands)
Wavin France SAS (France)
Wavin GmbH (Germany)
Wavin Hungary (Hungary)
Wavin Ireland Ltd (Ireland)
Wavin Metalplast (Poland)
Wavin Nederland BV (Netherlands)
Wavin Plastics Ltd (UK)
Westlake Compounds Italy Srl (Italy)
Windmöller GmbH (Germany)

PVC RESIN PRODUCERS:

Ercros (Spain)
Kem One (France, Spain)
INEOS Inovyn (Belgium, France, Germany, Italy, Norway, Spain, Sweden, UK)
Shin-Etsu PVC (Netherlands, Portugal)
VESTOLIT GmbH (Germany)
Westlake Vinnolit GmbH & Co. KG (Germany)
Vynova Group (Belgium, France, Germany, Netherlands, UK)

PVC STABILISER PRODUCERS:

Akdeniz Chemson Kimya San. ve Tic. A.Ş.
Asúa Products S.A.
Baerlocher GmbH
Galata Chemicals GmbH
IKA GmbH & Co. KG
PMC Group Inc.
Reagens SpA
Valtris Specialty Chemicals Ltd

PVC PLASTICISER PRODUCERS:

BASF SE
DEZA a.s.
Eastman
Evonik Performance Materials GmbH
ExxonMobil Chemical Europe Inc.
Grupa Azoty ZAK SA
LANXESS Deutschland GmbH
Perstorp Oxo AB
Polynt Group
Proviron
Varteco

ASSOCIATE MEMBERS:

British Plastics Federation (BPF)
VinylPlus (UK)
VinylPlus Deutschland e.V. (Germany)
VinylPlus Italia (Italy)

* Companies that joined VinylPlus in 2023

Appendix

VinylPlus 2030 Commitment: Targets and deadlines

09

Photo: courtesy of Erik Nissen Jørgensen

PATHWAY 1: SCALING UP PVC VALUE CHAIN CIRCULARITY

"The PVC industry embraces the circular economy. We commit to building upon the achievements made over the last 20 years to accelerate towards circularity. We aim to ensure controlled-loop management of PVC, from circular product design, the development of additional collection schemes and advanced recycling technologies, to ensuring the safe use of recyclate in new high-performance, durable products."

ACTION AREAS AND TARGETS

1 ADVANCING OUR CIRCULARITY AMBITIONS

1. Achieve at least 900,000 and 1 million tonnes per year of recycled PVC used in new products by 2025 and 2030, respectively.
2. By 2024, set additional 'stretch' recycling targets.
3. Carry out a review of existing collection and recycling schemes by 2022.
4. By 2023, set-up a list of applications, projects, and initiatives where additional collection schemes to reduce landfill would be required.
5. Where appropriate, support the set-up of additional collection and recycling schemes and produce a status report by 2025.

2 FOSTERING SCIENCE-BASED SOLUTIONS FOR THE SAFE AND SUSTAINABLE USE OF ADDITIVES

1. Carry out a gap analysis on existing scientific data and review it annually starting from 2022.
2. Report annually on active support of and data generation for relevant risk assessment, human bio-monitoring and socio-economic studies.
3. Report annually on support given to technical projects that enable and demonstrate the safe use of recyclates containing legacy additives.
4. Continue investigating solutions to detect specific substances in PVC waste streams and produce a report by 2023.
5. By 2025, develop at least one sorting technology for PVC waste with specific additives.
6. Report annually on VinylPlus' continued support to relevant technical projects leading to the removal of legacy additives.

3 SUPPORTING INNOVATIVE RECYCLING TECHNOLOGIES

1. Assess where chemical recycling could be a valuable complementary recovery solution to mechanical recycling, based on cost-benefit and LCA assessments. By 2022, identify and evaluate relevant chemical recycling technologies for plastics waste containing PVC.
2. Confirm the feasibility of thermal treatment of difficult-to-recycle PVC waste to recover chlorine and move to an operational status (TRL 7)[63] by 2024.
3. By 2025, encourage the establishment of and participate in consortia aiming to build chemical recycling capacities for plastics waste containing PVC.
4. A valid sorting or separation technology for complex (e.g., composite) PVC products tested (TRL 5) by 2025.

4 PRIORITISING CIRCULARITY THROUGH ECODESIGN

1. Promote the ecodesign guidelines developed in the framework of the CPA to foster the PVC value chain's transition to circularity, and, starting from 2022, report annually on the best examples of products and services developed by VinylPlus partners.

Achieved · Achieved + ongoing · Partially achieved + ongoing

63 TRL: Technology Readiness Levels. A type of measurement system used to assess the maturity level of a particular technology (ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf)

PATHWAY 2: ADVANCING TOWARDS CARBON NEUTRALITY AND MINIMISING OUR ENVIRONMENTAL FOOTPRINT

"Sustainable chemistry and carbon neutrality are at the heart of a sustainable economy. By applying a science-based approach, we commit to ensuring that all PVC products, including their supply chains and manufacturing processes, continue to reduce their impact on human health and the environment."

ACTION AREAS AND TARGETS

1 ADVANCING TOWARDS CARBON NEUTRALITY

1. VinylPlus will evaluate the potential and, by 2025, report on projected core carbon reduction progress to be achieved by 2030.
2. By 2025, report on the use of renewable energy.
3. By 2025, report on sustainable feedstock sourcing.

2 EMBRACING THE SUSTAINABLE USE OF CHEMICAL SUBSTANCES

1. By 2021, organisation of at least one introductory ASF webinar by VinylPlus.
2. By 2022, produce a report on the sectors' / partners' experience and application of the ASF tool.

3 MINIMISING OUR ENVIRONMENTAL FOOTPRINT

1. By 2021, achieve full compliance with the ECVM Charter (updated version 2019).
2. Issue ECVM Charter updates in 2025 and 2030.
3. Sectors will set up, as appropriate, indicators to support the reduction targets of the water footprint of processes and products. Review reports will be produced in 2025 and 2030.
4. Triennial review on the improvement of the eco-profiles of PVC products, starting from 2022.
5. VinylPlus takes an active role in guiding its partners and will recommend relevant schemes for the minimisation and responsible treatment of spillages of polymers and polymer compounds, enabling VinylPlus partners to adopt one scheme by 2022.

4 RESPONSIBLE SUPPLIER CRITERIA AND PROGRAMMES

1. By 2024, produce an inventory of relevant certification schemes applied by the chlorine, ethylene and by other extractive industries, to provide the VinylPlus partners with relevant and transparent information on the sustainability progress of the upstream supply chain.

Achieved Partially achieved + ongoing

PATHWAY 3: BUILDING GLOBAL COALITIONS AND PARTNERING FOR THE SDGs

"Representing the united European PVC value chain as VinylPlus, we commit to ensuring transparency and accountability in its relationships with all stakeholders. Engaging with key stakeholders, including brand owners and specifiers, we will contribute to sustainable development through certified and traceable products. We will continue partnering with civil society, European and global organisations, as well as with the global PVC communities, to share our best sustainability practices and contribute to the UN SDGs."

ACTION AREAS AND TARGETS

1 ENSURING TRANSPARENCY AND ACCOUNTABILITY

1. A public, and independently audited, VinylPlus Progress Report will be published annually and proactively promoted to key stakeholders.
2. By 2021, each VinylPlus industry sector will define its specific contributions to the common targets and ensure that they are properly disseminated within the partner companies.
3. By 2025, develop guidelines and supporting information to help VinylPlus partners demonstrate the progress of the PVC value chain towards sustainability.

2 CONTRIBUTING TO SUSTAINABLE DEVELOPMENT THROUGH CERTIFIED AND TRACEABLE PRODUCTS

1. Extend the scope of the VinylPlus® Product Label:
   a. Obtain recognition by at least one additional major green building standard by 2022.
   b. Obtain the Label's inclusion in three different procurement systems by 2025.
   c. Expand the scope of the Label's certification scheme to at least one additional PVC application by 2025.
2. Extend the scope of the VinylPlus® Supplier Certificate:
   a. By 2022, five production sites to have obtained the VinylPlus® Supplier Certificate.
   b. By 2025, twenty production sites to have obtained the VinylPlus® Supplier Certificate.
3. Assess PVC products' contribution as sustainable solutions for end-users:
   a. Starting from 2023, produce a biennial report on contribution to climate change reduction by PVC products.
   b. By 2025, evaluate the potential of the 'Carbon handprint methodology'[64] or other suitable tool(s) to assess the contribution of PVC products to the improvement of the environmental footprint of end-users.

3 ENGAGING STAKEHOLDERS IN THE SUSTAINABLE TRANSFORMATION OF THE PVC INDUSTRY

1. Pursue engagement with international and intergovernmental organisations to share VinylPlus' knowledge, experience and business model for sustainability and report annually.
2. By 2024, engage regularly with at least one well-known NGO.
3. Co-operate with regional and global value chain bodies to exchange best practices and communicate the VinylPlus sustainability model at the regional and global levels. Annually report on progress, starting from 2022.

4 PARTNERING WITH STAKEHOLDERS

1. Keep engaging with civil society, including young generations, on joint projects for sustainable development and report annually.
2. By 2024, develop at least one joint project per year with local communities and institutions/ associations of public authorities to progress on one or more of the SDGs' targets.
3. By 2025, develop partnerships with three consumer-facing global brand owners or private sector sustainability leaders to progress on one or more of the SDGs' targets.

Achieved · Achieved + ongoing · Partially achieved + ongoing · Delayed + ongoing

64 Carbon handprint refers to the positive environmental impact of a product throughout its lifecycle. It can be used by organisations to communicate the climate benefits of their products, services, and technologies (researchgate.net/publication/330563782_Carbon_Handprint_Guide)

PVC: A SMART MATERIAL FOR A SUSTAINABLE SOCIETY

Photo: courtesy of Hufton+Crow

Polyvinyl chloride, or PVC, is one of the most versatile and widely used polymers in the world. PVC continues to make life safer and more comfortable through its extensive use in building and construction, as well as in water distribution, automotive products, cabling, smart cards and credit cards, packaging, fashion and design, sports, agriculture, telecommunications, medical devices and a wide array of other areas and products.

PVC is an intrinsically low-carbon plastic: 57% of its molecular weight is chlorine derived from common salt; 5% is hydrogen; and 38% is carbon. It is an extremely durable and cost-efficient material, which can be recycled several times at the end of its life without losing its essential properties.

Several PVC applications – such as pipes, window profiles, cables, flooring, membranes and films – have been analysed through lifecycle assessments (LCA) and in terms of eco-efficiency, and they have shown excellent environmental performance.

Photo: courtesy of Renolit

Thanks to their intrinsic characteristics and properties, PVC products can make positive contributions towards several targets of the UN Sustainable Development Goals (SDGs).

PVC, FROM MANUFACTURING TO RECYCLING

A closer look at the positive environmental impact and strategic importance of PVC

Chloralkali process

- Caustic Soda
- Hydrogen
- Chlorine

30% of the chlorine produced in Europe is used in PVC manufacturing.

PVC manufacturing

The PVC and additives value chain represents 20,000 companies, 80% of which are SMEs, and 500,000 employees.

Ethylene & Chlorine produces Ethylene Dichloride, which is turned into Vinyl Chloride Monomer

Chlorine from common salt makes up almost 60% of PVC, which intrinsically makes the material a low-carbon plastic.

Vinyl Chloride Monomeris transformed into the polymer Polyvinyl Chloride, or PVC

European PVC manufacturing is safe. Strict regulations and industry guidelines for how to handle PVC intermediates to prevent worker exposure and environmental emissions, and ensure safe transport.

Addition of plasticisers, stabilisers and other additives

PVC in itself is inert and non-toxic. EU regulation and industry innovation have resulted in the phase out of unwanted substances such as lead and SVHC phthalates during the last +20 years.

PVC contributes to the EU Green Deal & Strategic Resilience

Clean Energy & Decarbonisation

Safe hydrogen distribution


Wind turbine blades and cable profile


Biogas pipes and tank covers


PVC solar roofing membranes for solar panels

Medical Applications & Healthcare


Oxygen masks


Medical tubing


Floor, wall and ceiling coverings


Blood bags

PVC is the only material allowing blood to be stored for up to 49 days.

Affordable Housing & Renovation Wave


Windows


Pipes


Flooring


Cables

70% of the PVC is used for durable, affordable and recyclable building products.

PVC end of life & circularity

The industry is innovating to address the end of life of PVC containing legacy additives, for example by developing solutions to detect and extract specific substances in PVC waste streams and support safe recycling.

Recycling into pipes, windows, flooring, road safety etc. (35%)

Depending on application, PVC can be recycled up to 10 times without losing its functional properties. The VinylPlus 2030 Commitment targets 1M tonnes of PVC recycled/year by 2030. Since 2000, more than 8.8M tonnes have been recycled, saving around 17.6M tonnes of CO_2.

Energy recovery (46%)

Landfill (19%)

To further minimise landfilling and energy recovery, chemical recycling technologies are being developed to complement mechanical recycling.

vinyl plus®
COMMITTED TO SUSTAINABLE DEVELOPMENT

Avenue de Cortenbergh 71
B-1000 Brussels, Belgium
Tel. +32 (0)2 329 51 05
info@vinylplus.eu
www.vinylplus.eu

@VinylPlus_EU
VinylPlus
VinylPlus
VinylPlus

Cover photo: courtesy of Philippe Chancel