Progress Report 2023

REPORTING ON 2022 ACTIVITIES

vinyl plus®
COMMITTED TO SUSTAINABLE DEVELOPMENT

CONTENTS

01 MESSAGE FROM THE CHAIRMAN

PVC, and plastics in general, have revolutionised our daily lives and nearly all industrial sectors.
They have brought undeniable societal benefits in terms of health and safety, energy saving and material conservation and contributed to food availability and societal wellbeing.
Their value became even more evident during the COVID-19 pandemic thanks to their role in safety devices that protected health.

At the same time, being a responsible industry, we are conscious that we have to minimise our impact on climate and the environment. We have been doing this through VinylPlus since 2000.

Concern about the environmental impact of plastics is growing in Europe and the rest of the world. In March 2022, at the 5th UN Environment Assembly, governments agreed to negotiate an international legally binding instrument by 2024 to end plastic pollution, including in the marine environment. In Europe, the European Commission published its Restrictions Roadmap under the EU Chemicals Strategy for Sustainability, which resulted, among other things, in a request to ECHA in May 2022 to produce an investigation report on PVC and its additives.

We fully support a rigorous, comprehensive and science-based investigation process which takes into account the socio-economic importance of PVC. All PVC industry sectors have worked hard to contribute to ECHA's calls for evidence with validated information and scientific studies. We look forward to continuing to work with ECHA and the European Commission in a science- and risk-based framework. We are convinced that the work we have been carrying out for over 20 years to make the PVC industry and its products more sustainable is concrete proof of our permanent engagement.

As you will read in this Progress Report, we invested a lot of effort and resources into our Pathway 1 in 2022, as we recognize that a prerequisite for any material to have a sustainable future is that it be handled in a circular manner. A lot has been done, and in Europe, PVC applications are more sustainable and safer than ever, and will continue to be so in the future, thanks to tools we have developed, such as for example the Additive Sustainability Footprint® methodology. This allows us to evaluate the safe and sustainable use of additives also from a forward-looking perspective, and we hope it will be taken up as a model by other industries.

Moreover, in all these years we have provided, through in-depth research including numerous studies, the broadest guarantees that recycled PVC can be used without making a compromise in matters of health and safety of users and consumers.

We are also investing heavily in research and development projects aimed at removing legacy additives from waste, increasing chemical recycling and extracting and exploiting waste-to-energy by-products for the parts of PVC waste that cannot be mechanically recycled in an eco-efficient manner.

Throughout 2022 all VinylPlus committees worked hard to progress towards the targets set in our VinylPlus 2030 Commitment. We kicked off a series of initiatives aimed at supporting our companies' efforts in reducing water and energy consumption, increasing the use of renewable energy and raw material, and minimising any accidental spillage of PVC into water and the environment.

We have continued our path towards sustainable development through certified and traceable products by updating our VinylPlus® Product Label, which has been included in procurement systems in Belgium and Italy. In addition, five companies have obtained our VinylPlus® Supplier Certificates.

I would like to underline the success of projects such as VinylPlus® Med, for the recycling of medical devices, and Garden to Connect, which promotes the reuse of PVC waste and has been extended to Rwanda. Both have proven to be effective initiatives to build partnerships and engaging stakeholders. We have also continued to engage with younger generations and civil society through partnerships in sports events.

Beyond the targets of our 2030 Commitment, we are facing uncertainties over the evolution of the EU regulatory framework. We are committed to working collaboratively and transparently with regulators to ensure our industry can achieve its sustainable transition and that PVC continues to be a building block of our societies. Along with high sustainability ambitions, EU regulators have made commitments for the competitiveness of the European industry. These commitments are key, as providing regulatory predictability and a fair regulatory framework is essential to boost innovation and reach the EU's goals.

Dr Karl-Martin Schellerer
Chairman of VinylPlus

02

OUR COMMITMENT TOWARDS 2030

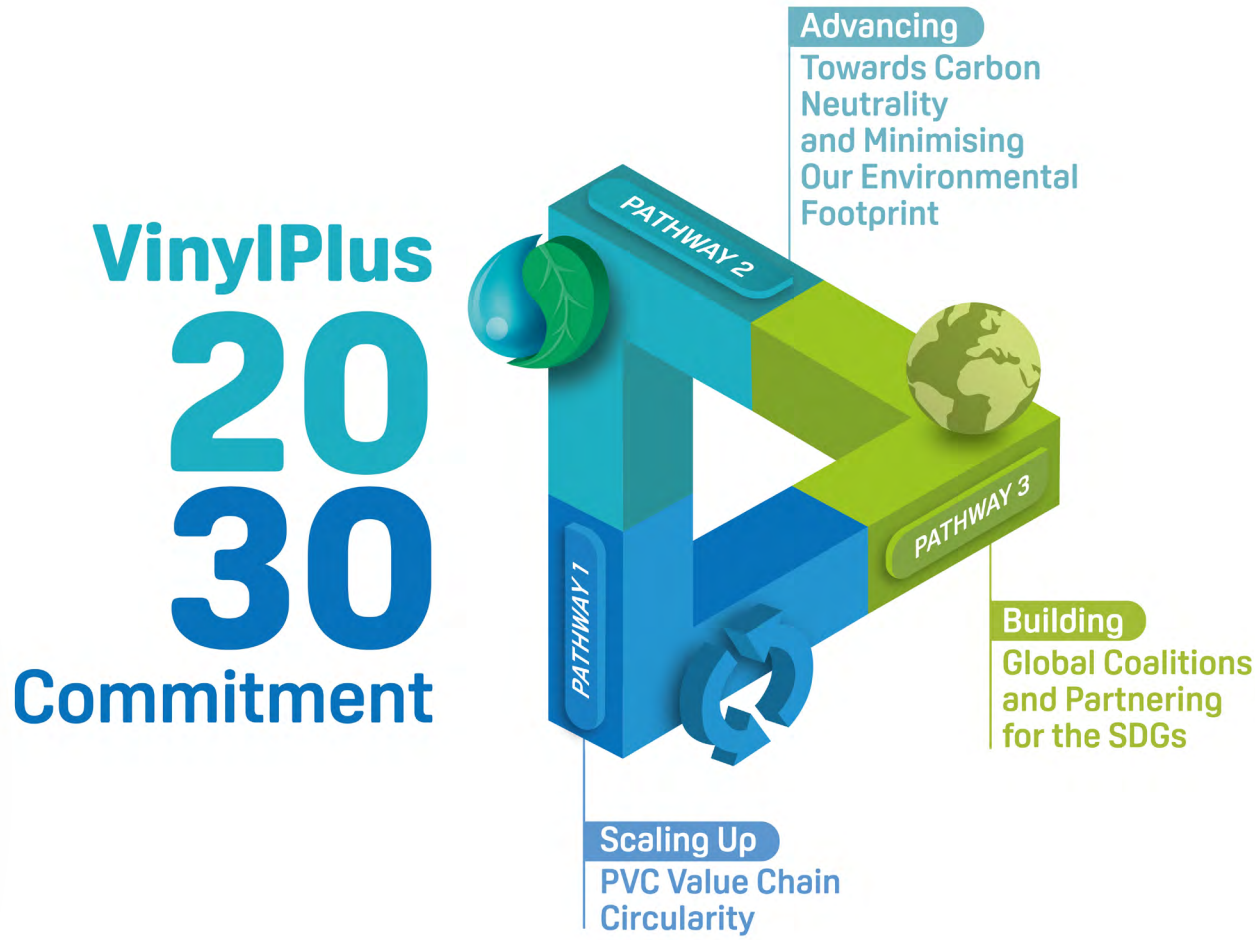
VinylPlus® is the European PVC industry's commitment to sustainable development. Through VinylPlus, the European PVC industry is creating a long-term sustainability framework for the entire PVC value chain, improving PVC products' sustainability and circularity and their contribution to a sustainable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

Brigitte Dero
Managing Director of VinylPlus

TOWARDS 2030

Within the next 10 years, the resin and additives producers, converters and recyclers of the PVC industry will actively work together and share responsibility for accelerating the transition of the European PVC value chain to a circular economy. We will act as a pacesetter in innovation, collaboration and communication, adhering to science-based principles to demonstrate that PVC is a material of choice for a sustainable society, thereby acting at the forefront of the circular economy and sustainable development in the plastics sector both in Europe and worldwide.



[1] Targets, deadlines and status of achievement are summarised in the Appendix, p. 55

03

2022 ACTIVITIES

PATHWAY 1

#Circular Economy

Scaling up PVC Value Chain Circularity

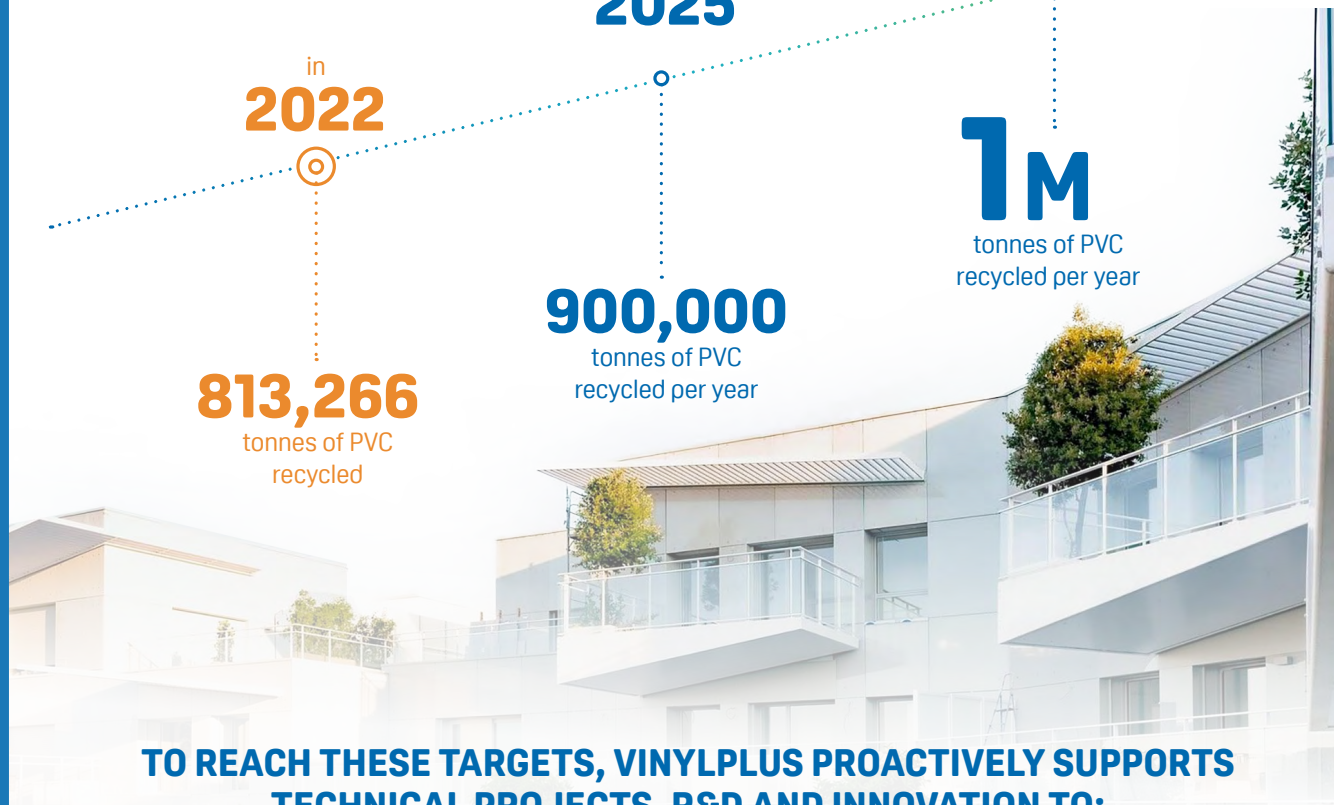
In line with the relevant EU policies, such as the Chemicals Strategy for Sustainability and the Circular Economy Action Plan under the European Green Deal, VinylPlus is leading the European PVC industry towards a circular economy, by improving the sustainability performance of PVC, boosting recycling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

OUR RECYCLING TARGETS

in **2022**
813,266 tonnes of PVC recycled

by **2025**
900,000 tonnes of PVC recycled per year

by **2030**
1M tonnes of PVC recycled per year



TO REACH THESE TARGETS, VINYLPLUS PROACTIVELY SUPPORTS TECHNICAL PROJECTS, R&D AND INNOVATION TO:

- 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

Photo: courtesy of Philippe Chancel

1.1 Advancing our circularity ambitions

Through target 1.1.1, 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.

In 2022, 813,266 tonnes of PVC waste were recycled within the VinylPlus framework, of which 62.42% was pre-consumer waste and 37.58% post-consumer waste.

The amount of PVC waste recycled represented around 27% of the total PVC waste generated in 2022 in the EU-27, Norway, Switzerland and the UK.

Demand for recycled PVC (rPVC) remained very high until the third quarter of the year, in a very competitive market.Despite governments incentives supporting the B&C (building and construction) sector, a slight decrease in market demand was registered in the last quarter of 2022, possibly also due to extremely high energy costs.

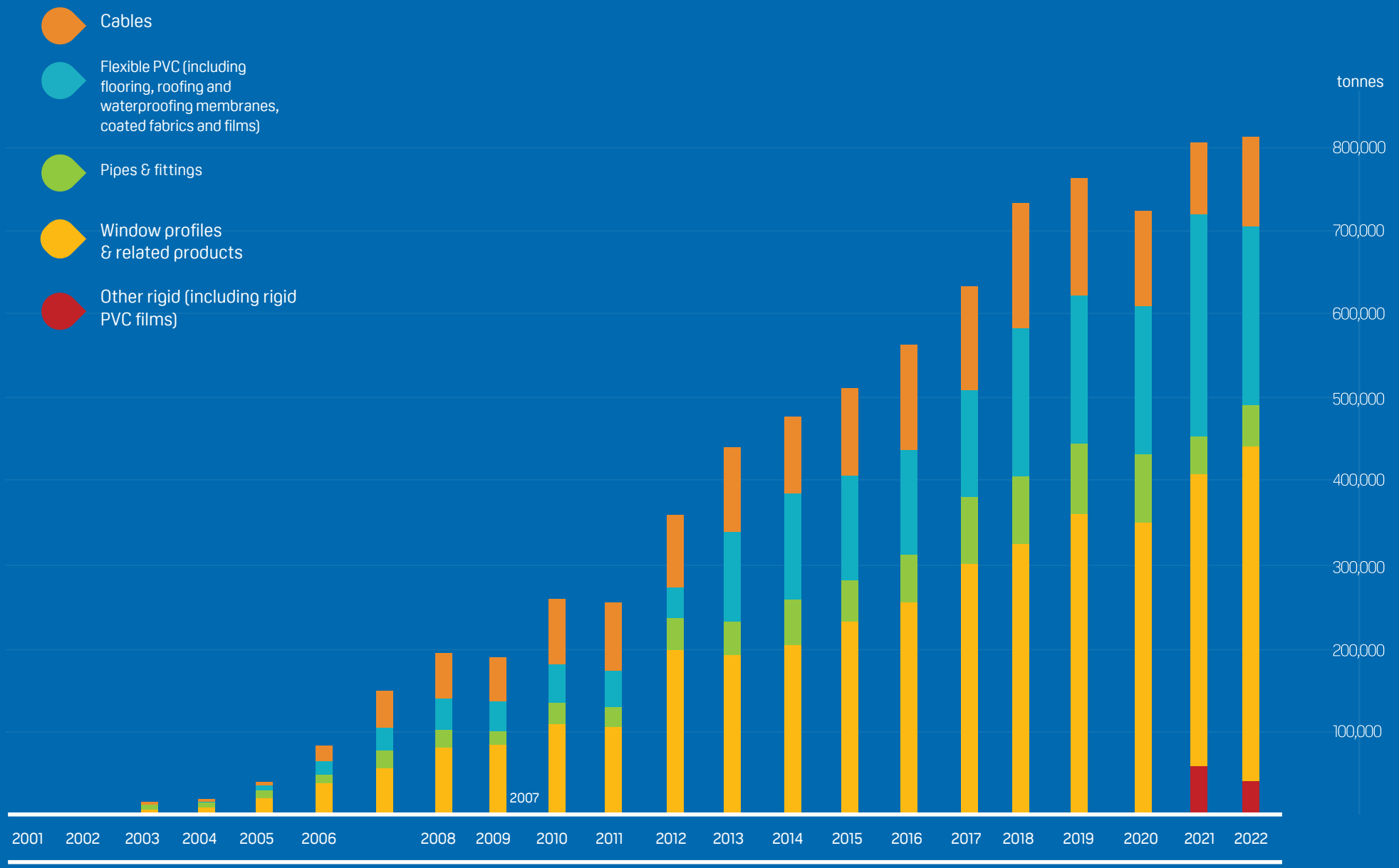
The registered uptake of rPVC from converters reached 561,795 tonnes in 2022, a 24.8% increase compared to the previous year.

This result was achieved also thanks to the extension of the network of converters utilising the RecoTrace™ (https://recotrace.com) data collection system. (See p. 12).

8.1M
tonnes of PVC recycled since 2000

16.2M
tonnes of CO_2 saved since 2000

+1.6k
direct jobs in recycling plants



PVC RECYCLED WITHIN THE VINYLPLUS FRAMEWORK

Tracking Progress

recovinyl plus®

PROVIDES

reliable | traceable | audited

DATA ON PVC RECYCLING AND THE USE OF RECYCLED PVC IN NEW PRODUCTS

Recovinyl® monitors, verifies and reports European PVC recycling and the use of recycled PVC in Europe.[2]

The European Commission has recognized Recovinyl® and its data collection system RecoTrace™ as one of the approved data collectors for the Circular Plastics Alliance (CPA).[3] RecoTrace™ was used as a blueprint and became the first system to comply with the CPA monitoring requirements and Audit Protocol.

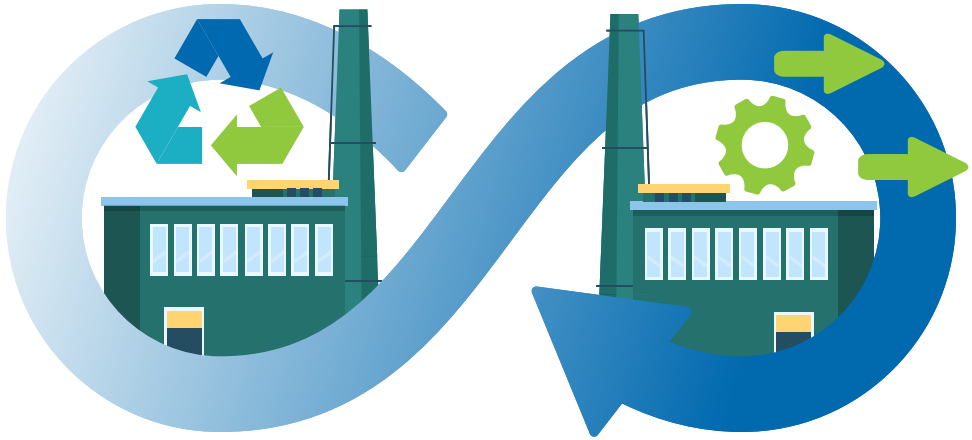
The Circular Plastics Alliance has committed to increase the EU market for recycled plastics to 10 million tonnes by 2025. VinylPlus plays an active and decisive role in both the CPA Construction Working Group and the CPA Monitoring Secretariat with its efforts to increase PVC recycling in the EU.

The mechanism established by the CPA to track progress is the first ever EU-wide transparent and trusted monitoring system, thanks to the auditing and the traceability of both the platforms and the data.

[2] Set up in 2003, Recovinyl is the organisation aimed at facilitating PVC waste collection and recycling in the framework of the European PVC industry's Commitments (www.recovinyl.com)
[3] 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)

Collecting data

RecoTrace™



RECYCLING ACTIVITY
Recyclers and converters register how much PVC waste they have recycled

CONVERTING ACTIVITY
Converters register how much recycled PVC material has been used in new products

Recovinyl® is pleased to witness a growing number of PVC converters adopting its data collection system, RecoTrace.™ In 2021, the system recorded 450kt of rPVC uptake by converters, and in 2022, that number soared to an impressive 562kt. We remain committed to expanding our network of converters to ensure we have accurate figures on rPVC uptake in Europe and confirm the long-term sustainability of PVC.

Ingrid Verschueren
General Manager, Recovinyl

Providing accurate estimates of recycling potentials

In 2022, the dynamic waste model developed by the consultancy Conversio (www.conversio-gmbh.com) for the PVC industry was approved for use by the converter sectors, which were then provided with specific training sessions.

The Conversio model is a powerful and unique tool for the plastics industry, as it enables an estimation of the annual quantities of post-consumer PVC waste generated in Europe by 20 product categories.

Taking into account also PVC waste streams that do not have formally established collection schemes (see p. 14) and rPVC volumes not yet traced and certified through the Recovinyl® system, Conversio data estimates that 35% of PVC waste is currently being recycled in Europe.

Photo: courtesy of Hufton+Crow, Jacopo Salimbe

Evaluating opportunities to achieve higher recycling rates of post-consumer PVC waste in Europe

A review of existing collection and recycling schemes was carried out in 2022, in collaboration with the main sectoral organisations.

TARGET 1.1.3 **achieved**

ERFMI[4] analysed challenges and potential solutions to improve flooring recycling. The investigation also focused on the various existing collection schemes in Austria, France, Germany, Sweden, Switzerland, and the UK.
It looked at how the systems work, what is collected and what are the final applications for the recyclates.

EPPA[5] confirmed the consolidation and the business value of the post-consumer recycling schemes for window profiles. Converters have the tools, capacity and product design for the uptake, while consumers are increasingly accepting recycled products. In terms of collection, clearing-house projects are operational in Germany, France and Poland, and separate collection schemes have been established in numerous European countries. These collection schemes encompass drop-off at municipal waste collection sites and recyclers picking up waste directly from construction sites. According to the Conversio waste model, volumes of end-of-life PVC window profiles are expected to increase continuously until 2040.

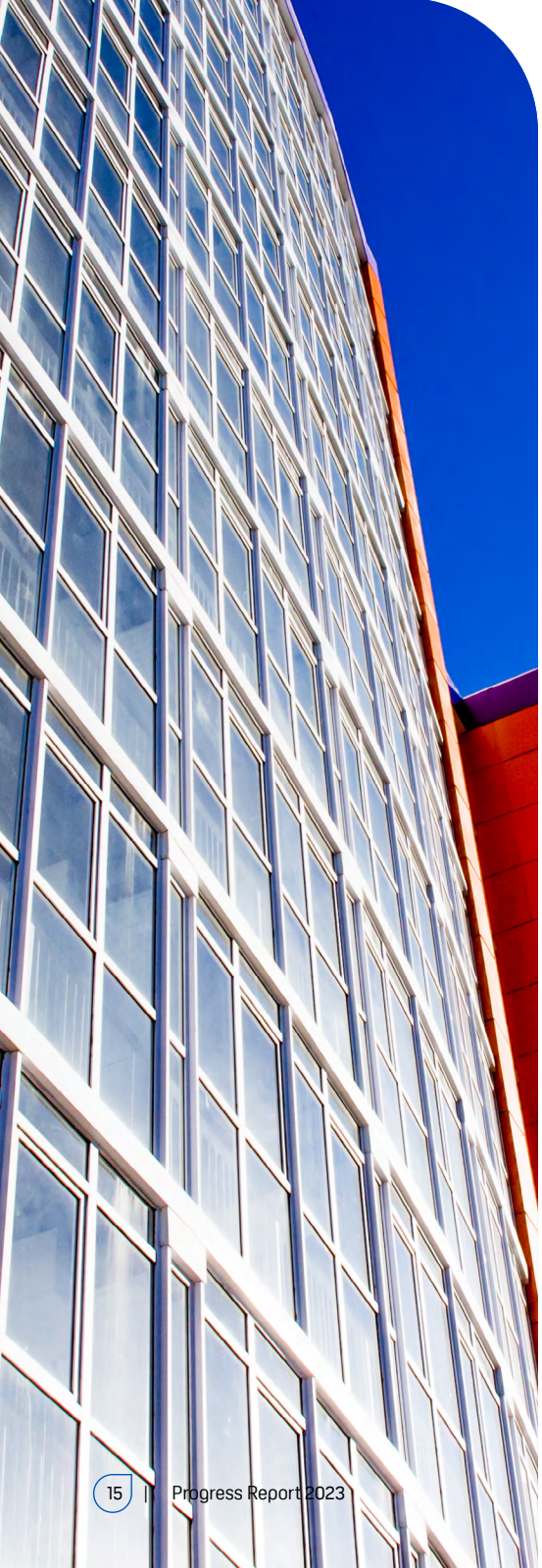
TEPPFA[6] reported how collection schemes for end-of-life PVC pipes are in place in numerous European countries including Austria, Belgium, Denmark, Germany and the Netherlands, for both pre- and post-consumer waste. Several of the countries collect mixed pipes, including those produced from other polymers. The systems do vary across EU Member States and again confirms separation and sorting are the key to ensuring high-quality consistent recyclate.

Circularity is also progressing in the **healthcare sector** thanks to programmes such as VinylPlus® Med[7] in Belgium (see p. 17) and VinylPlus® PharmPack in Germany (see p. 18).

Other identified PVC waste streams (including films and sheets, leisure applications and cables) do not have formally established and consolidated collection schemes.

In 2023, VinylPlus will continue to work on the gap analysis of product types for which no formal collection scheme exists by prioritising applications, projects and initiatives, while taking into account what recycling technology could be utilised in the short term. It will also explore some immediate opportunities to increase recycled volumes in the Czech Republic – where relatively large PVC volumes might be available, mainly from cables, flooring and membranes; and in Poland – where, according to EPPA, 30,000 to 40,000 tonnes of pre- and post-consumer profiles could be recovered in the upcoming years.

[4] ERFMI: European Resilient Flooring Manufacturers' Institute (www.erfmi.com)
[5] EPPA: the European Trade Association of PVC Window System Suppliers (www.eppa-profiles.eu)
[6] TEPPFA: the European Plastic Pipes and Fittings Association (www.teppfa.eu)
[7] vinylplusmed.eu



To exploit all the possible opportunities to achieve higher recycling rates of 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.

Improving collection and recycling

With the aim of increasing the amount of post-consumer windows recycled and rPVC-U (unplasticised recycled PVC) used, EPPA developed a five-year action plan, focusing on France, Germany and Poland – the three countries with the most promising opportunities to increase recycling further.

In Germany, the partnership with Rewindo[8] helped to build closer relationships with politicians, authorities, converters and recyclers, thanks also to the 20th anniversary of the Rewindo scheme in summer 2022. There were intense promotion and communications activities for window recycling involving the entire supply chain and with civil society.

In France, the EPPA partner UFME[9] expanded to 100 the number of signatories of 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,[10] UFME is committed to supporting the doors and windows sector in waste management.

After setting up an organisational and managerial structure in Poland, EPPA obtained the patronage of the Polish Ministry of Climate and started cooperation with 11 recyclers in the north of the country. Five new collection points were set up to increase the infrastructure available for the collection and recycling of post-consumer windows.

[8] Rewindo: the German recycling initiative for PVC windows, roller shutters and related products (www.rewindo.de)
[9] UFME: Union des Fabricants de Menuiseries (Association of Doors and Windows Manufacturers – www.ufme.fr)
[10] VALOBAT: a collective initiative of 26 players in the construction products and materials sector in France (www.valobat.fr)

In 2022, **TEPPFA** started a project to explore the potential to significantly increase pre- and post-consumer waste volumes, either via strengthening efforts in the existing network or via additional EU collection schemes. The demand for rigid recycled PVC, especially in non-pressure multilayer sewage pipes and in cable ducts, is increasing driven by recycled content legislation in some EU Member States as well as the sustainability ambitions of TEPPFA's company members.

In line with its sustainability strategy to pave the way for the increased use of recycled content, TEPPFA has started a project to open up related product standards. Today most non-pressure product standards allow the use of a limited percentage of recycled content from pipe waste, but some barriers can be removed to further increase it without compromising on quality, performance and longevity.

Photo: courtesy of Molecor

WREP, the Italian Waste Recycling Project, is promoting the development of pilot schemes for sorting, collecting and recycling PVC from bulky urban waste in collaboration with multi-utilities and recyclers. To date, the operational phase has involved five recyclers and five multi-utilities in the northeast of Italy, in Lazio and in central Tuscany. Another six utilities and recyclers have also expressed their interest in joining the project.

A handheld device[11] to sort PVC from other plastics using near-infrared hyperspectral technology (NIR) developed by Phoenix (www.phoenix-rto.com) was tested in the collection centre of Progetto Ambiente (the utility of Aprilia, Lazio). The device enabled the detection and separation of other plastics (around 1%) from PVC, thus reducing the presence of contaminants to close to zero. In addition, the handheld device software was developed further to detect the presence of orthophthalates in PVC for medical applications and been used in the VinylPlus® Med programme.

Following a meeting with ANCE Veneto (the Veneto Region branch of the National Association of Building Builders), it was agreed to extend the WREP project to builders registered with the association so that they can sort and recover PVC from the construction sector.

WREP was included as a best practice in the Regional Urban and Special Waste Management Plan of the Veneto Region and is part of a LIFE project submitted by the Veneto Region.

In 2022, VinylPlus Deutschland continued its **PVC Recyclers meet PVC Converters** event series, with the support of VinylPlus, AgPR,[12] Rewindo and IVK Europe.[13] The objective of the project is to raise awareness of existing PVC recycling activities and boost rPVC uptake. After a two-year break due to the COVID-19 pandemic, two events were held on site in 2022, in Lüneburg and Worms, involving around 60 recycling experts from the entire PVC value chain.

[11] https://www.youtube.com/watch?v=LywL5VbETTI
[12] AgPR: Arbeitsgemeinschaft PVC-Bodenbelag Recycling (Association for the Recycling of PVC Floor-Coverings – www.agpr.de)
[13] IVK Europe: Industrieverband Kunstoffbahnen e.V. (Plastic Sheets and Films Association – www.ivk-europe.com)

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. That is why VinylPlus actively supports initiatives aimed at increasing the recycling potential of PVC waste in the healthcare sector.

VinylPlus® Med was initiated in February 2021 to accelerate circularity in healthcare across Europe through the recycling of discarded single-use PVC medical devices. A pilot project was launched in Belgium partnering with Renewi (www.renewi.com/en) as the waste management company, Raff Plastics (www.raffplastics.be/en) as the recycler and VinylPlus for the European PVC industry.

Initially launched at Europe Hospitals, the VinylPlus® Med pilot project extended its base to 10 hospitals in 2022.

Preliminary tests run in 2022 showed that the collected medical devices can be turned into high-quality recyclates through energy efficient and environmentally positive processes, and that the recyclates can be reprocessed into long-lasting products for the healthcare sector such as wall covering and flooring. To ensure that the collected devices do not contain SVHC (Substances of Very High Concern), a new handheld, cost-efficient NIR device was developed in collaboration with Phoenix (see also WREP project on page 16), which is able to sort out soft PVC waste containing orthophthalates.

The prototype was validated with 45 transparent soft PVC samples of known plasticiser composition. The first unit was manufactured and delivered in December 2022. (See also partnership projects on page 39).

VINYLPLUS® MED: PVC Medical Recycling Process

Single-use medical device → Collection after use → High-quality regrind → Wall covering for healthcare

vinyl med plus® by 2022 numbers

10 hospitals currently involved

35 hospitals on waiting list

1 tonne PVC medical devices collected

EQUIVALENT TO

35k oxygen masks

PVC has a range of properties which are not found in other materials. Thanks to these properties, the material is particularly suitable for use in medical equipment

Ramboll Denmark
2021

Launched in 2021, **VinylPlus® PharmPack** is a programme aimed at demonstrating the sustainability and recyclability of PVC/aluminium pharma blister packaging in the framework of the European packaging directive 94/62/EG and national laws. Small-scale trials performed by Fraunhofer IVV[14] in 2022 successfully demonstrated the separation of PVC from aluminium.

At laboratory scale, the PVC recyclates fulfilled the standard properties which are relevant for film production. Further pilot-plant-scale trials are needed to generate sufficient PVC recyclate volumes, so that film manufacturers can further test the processing and product performance of the recyclates.

1.2 Fostering science-based solutions for the safe and sustainable use of additives

In 2022, VinylPlus continued to engage with regulatory bodies to overcome legislative uncertainties, by providing science-based risk evaluations to demonstrate the safe use of additives and of PVC articles containing recyclates with legacy additives.[15]

In parallel, VinylPlus supported participation in R&D projects that detect, sort, reduce or remove legacy additives in PVC waste streams.

Europe needs proactive industries to accelerate a pragmatic transition towards sustainability and a circular economy. VinylPlus has been proactive in phasing out additives of concern, surpassing regulatory standards, and seeking to ensure the safety of the additives utilised. I commend VinylPlus for setting an example with the positive approach it has taken to advance towards a circular and carbon-free economy.

Ondřej Knotek
Member of the European Parliament

[14] Fraunhofer IVV: Fraunhofer Institute for Process Engineering and Packaging (www.ivv.fraunhofer.de)
[15] Legacy additives are substances that are no longer used in new PVC products but can be present in recycled PVC

ECHA INVESTIGATION ON PVC AND ITS ADDITIVES

In May 2022, the European Commission asked ECHA to produce an investigation report on PVC and its additives by May 2023 – a very challenging timeline for a report with such a broad scope. VinylPlus welcomed the opportunity to provide validated information to ECHA's work. VinylPlus responded to three Calls for Evidence launched by ECHA, as well as two questionnaires by Ramboll.

VinylPlus provided extensive data and reports supporting the safe and sustainable use of PVC and its additives, including information on volumes and uses of PVC, volumes and use of plasticisers and stabilisers, volumes of waste, recycling and end-of-life information, and migration and exposure data for additives.

VinylPlus fully supports a rigorous, comprehensive, and science-based investigation process and looks forward to contributing further to the ECHA investigation report and working together with ECHA and the European Commission in a science- and risk-based framework.

For a safe use of additives and recyclates with legacy additives

An extensive gap analysis on existing scientific data that support the safe and sustainable use of additives was carried out in 2022, with specific regard to additives highlighted in the 2022 Ramboll report.[16]

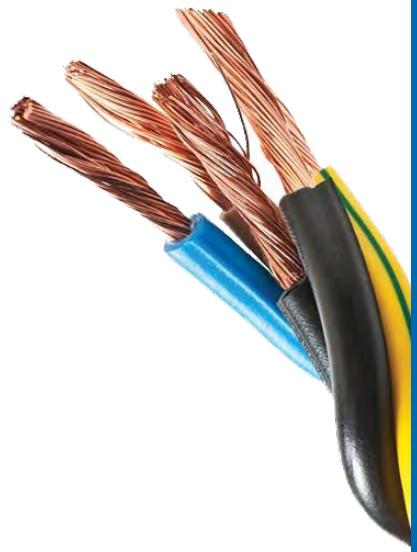
Following German authorities' call for evidence on a proposal for a broad **bisphenol A (BPA)** restriction in articles marketed in Europe,[17] a study was undertaken of the socio-economic impacts of exposure to endocrine-disrupting substances present in soft rPVC.

The study included the screening of BPA content in flexible waste streams. BPA was phased out of PVC resin production by all ECVM member companies in 2001.

Although not used anymore by the European PVC industry, legacy endocrine-disrupting substances such as BPA can still be present in some old end-of-life products.

The socio-economic value of soft PVC recycled applications was investigated by RDC Environment[18] in 2018.

The modelling of leaching potential from soft PVC containing BPA was completed and integrated in the Ramboll study (2021) on BPA pathways in the environment.



[16] *The Use of PVC (poly vinyl chloride) in the Context of a Non-Toxic Environment*, a study tasked by the Commission's DG ENV and published in February 2022 (https://op.europa.eu/en/publication-detail/-/publication/e9e7684a-906b-11ec-b4e4-01aa75ed71a1)
[17] https://echa.europa.eu/documents/10162/450ca46b-493f-fd0c-afec-c3aea39de487
[18] RDC Environment: Belgian consulting company (www.rdcenvironment.be)

LEAD IN RECYCLED PVC

VinylPlus achieved the complete replacement of lead-based stabilisers in PVC in the EU market on a voluntary basis by the end 2015, ahead of EU regulation. But lead-containing PVC in end-of-life articles still needs to be recycled, supporting the circular economy. In November 2019, the REACH Committee accepted the European Chemical Agency's (ECHA) proposal for the revision of lead-content limits in articles containing recycled PVC, which was subsequently rejected by the EU Parliament.[19] A new restriction proposal on lead in PVC was approved by the REACH Committee in December 2022. The proposal allows for a 10-year derogation limit up to 1.5% of lead content by weight in rigid rPVC and demands for the closed-loop recycling of PVC profiles and sheets after 36 months from the entry into force of the Regulation.[20] This widely supported proposal shall enter into force shortly after publication in the Official Journal of the European Union.

VinylPlus welcomes the compromise achieved on the REACH restriction on lead in PVC, which is the result of fruitful discussions between regulators, industry, and other stakeholders. This regulatory measure is crucial as it prevents imports of lead-containing PVC from outside the EU and provides a way forward to recycle lead-containing PVC. It will enable the PVC industry to meet its ambitious recycling targets in a way that is safe for human health and the environment.

Brigitte Dero
Managing Director of VinylPlus

To demonstrate the safe use of plasticised PVC and support scientifically solid risk assessments, a scientific project has been ongoing since 2017 to develop **PBPK (physiologically based pharmacokinetic) models** for several plasticisers. As reported in previous Progress Reports,[21] the PBPK models for DINCH (di-isononyl cyclohexanoate) and DINP (di-isononyl phthalate) were validated and published in peer-reviewed journals in 2019 and 2020, respectively. A PBKP model for DPHP (di(2-propyl heptyl) phthalate) was published in a peer-reviewed journal[22] in September 2021. The model was refined in 2022 to improve the simulations of the venous blood concentrations of the primary monoester metabolite. Results have been accepted for publication in a peer-reviewed journal.[23] Modelling and validation for DEHT (di-ethylhexyl terephthalate) and DOA (di-octyl adipate) were submitted for publication in 2022. Results for DEHT have been accepted for publication in a peer-reviewed journal.[24] Work on the DINA (di-isononyl adipate) model is ongoing. The project is scheduled to be completed in the first quarter of 2023.

European Plasticisers[25] commissioned Virginia Tech (https://vt.edu) to carry out scientific research to assess **plasticisers concentration under equilibrium conditions** 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. Two papers on the study are being prepared and are scheduled to be submitted for publication in 2023.

[19] See p. 27 of VinylPlus Progress Report 2021
[20] https://ec.europa.eu/transparency/comitology-register/screen/documents/082090/2/consult?lang=en
[21] Also see p. 30 of VinylPlus Progress Report 2021
[22] https://www.frontiersin.org/articles/10.3389/fphar.2021.692442/full
[23] https://www.frontiersin.org/articles/10.3389/fphar.2023.1111433/full
[24] https://www.frontiersin.org/articles/10.3389/fphar.2023.1140852/full
[25] European Plasticisers: a Sector Group within Cefic, the European Chemical Industry Council (www.europeanplasticisers.eu)

If a durable, chemical-resistant product, suitable for wet rooms[26] is needed, PVC flooring cannot be replaced by other products. For example, there is no substitute for PVC wet room flooring. This is partly because PVC flooring is the only product with a fully sealed surface membrane, and partly because, according to the instructions of the Danish Building Research Institute, only PVC is approved for wet room use. Similarly, in clinical premises, where there are strict requirements for hygiene and chemical resistance, such as laboratories, physics rooms and hospitals, only PVC flooring can be used. PVC flooring is the only product that ensures a fully sealed surface.

Ramboll Denmark
2021

Reducing and removing legacy additives from PVC waste streams

Co-funded by VinylPlus, **Revinylfloor** is the platform set up within ERFMI to promote a circular economy for the PVC flooring sector in Europe and to increase the amount of post-consumer PVC recycled.

Revinylfloor collects and separates flooring that does not contain legacy plasticisers (which is sent for mechanical recycling) from flooring that does contain legacy plasticisers (which needs to be treated with alternative recycling processes, such as dissolution and extraction).

In 2022, collection trials started in Germany with two distributors of floor coverings. In the Netherlands, the Dutch installers association BPV was involved in identifying suitable contractors. Trials carried out on mixed post-consumer floor coverings with commercially available NIR (near-infrared) sorting technologies were very promising: less than 0.2% of legacy additive remained in the positive output. Further trials to finetune the process were scheduled for the first quarter of 2023.

Extraction trials using supercritical CO_2 technology were also successfully completed on 200 kg of post-consumer PVC flooring. The samples obtained will be assessed by nine ERFMI members in their laboratories to evaluate the possibility of using the recyclates in their products.

[26] Wet room: a type of water-proofed room with a drain in the floor often serving as an open-plan shower, e.g., bathrooms, spas, saunas, swimming pools

Photo: courtesy of Philippe Chancel

Launched in June 2019, the **REMADYL** project[27] is aimed at removing hazardous legacy phthalates and lead from end-of-life PVC and at recycling it into high-purity PVC.[28] This innovative continuous one-step process is based on an extractive extrusion technology, which is combined with new solvents and melt filtration. The project is expected to reduce the risk of retaining legacy substances in recycled materials, therefore increasing the recycling rate of PVC waste while obtaining secondary raw materials of increased purity and desirable quality.

In 2022, investigations continued to improve the extractive extrusion technology and to test solvents. Good results were also obtained in the detection of DEHP and lead content in PVC samples. The project is scheduled to run till the end of 2023.

[27] https://cordis.europa.eu/project/id/821136 and www.remadyl.eu
[28] Also see p. 23-24 of VinylPlus Progress Report 2021

1.3 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.

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

Assessing chemical recycling technologies

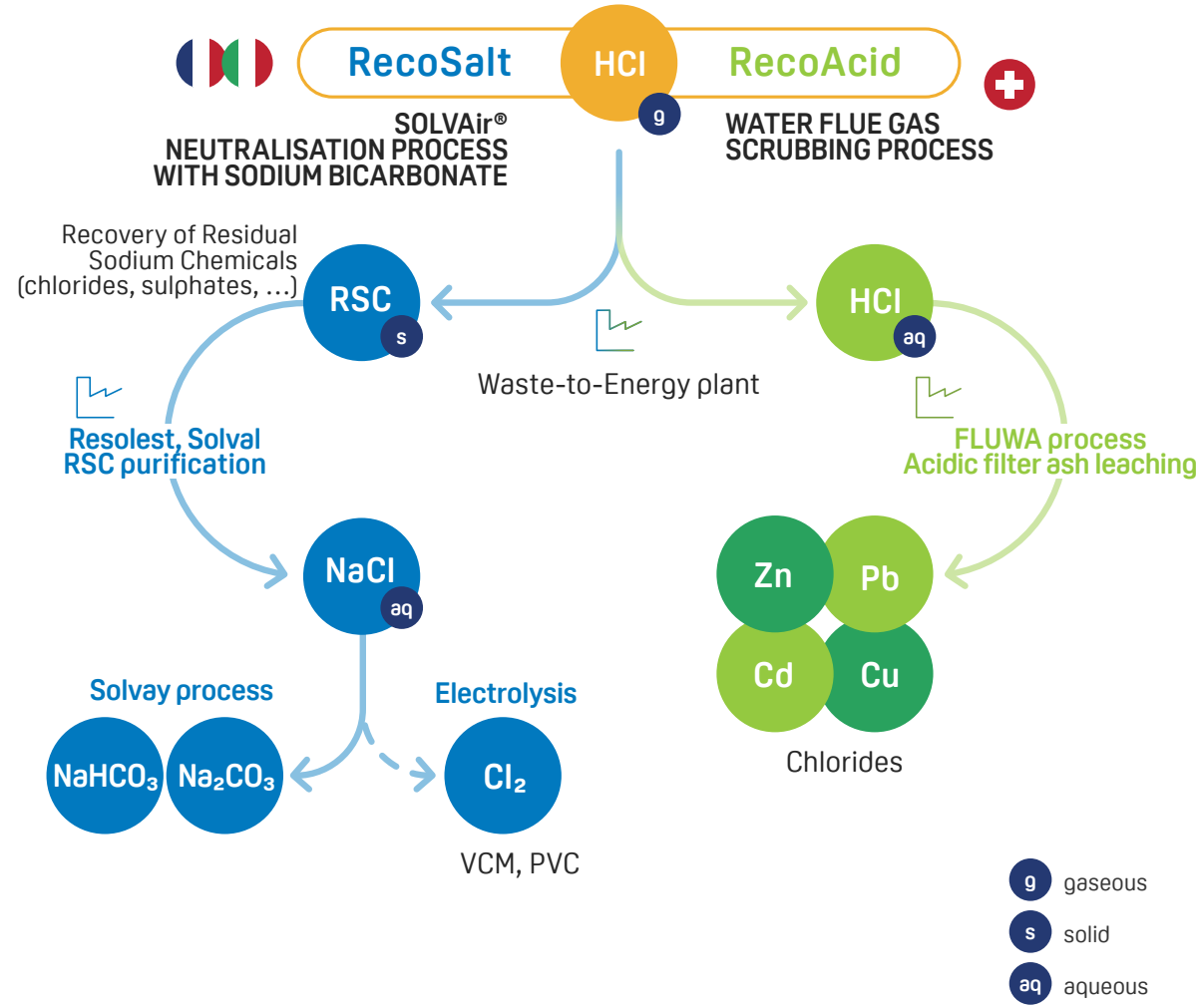
The **ChemRecPolymer** project[29] was submitted to the German Ministry of Education and Research (BMBF) in 2022 and is currently on hold. The submission did not receive the BMBF's support in its current form, since it did not completely fulfil all required criteria for the targeted research and innovation programme.

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. This chemical recycling process leads to the production of hydrochloric acid (HCl) in waste-to-energy treatment plants, which is then reused to obtain new products. It includes two major projects leading to the recovery and reuse of chlorine: RecoSalt and RecoAcid (previously named Vinyl Acid).

[29] Also see p. 20 of VinylPlus Progress Report 2022

vinyl plus RecoChlor
SUSTAINABLE CHLORINE RECOVERY AND RE-USE



The **RecoSalt** project is based on a chlorine chemical recycling process that was studied at the Oreade-Suez plant in France in 2019-2020.[30] After successful preliminary test results, the chlorine neutralisation technology based on the SolvAir® process was selected for further trials. The large-scale trials originally planned in 2022 could not be implemented, mainly due to capacity reasons, but discussions continue with other plants across the EU which use the SolvAir® neutralisation technology.

Based on the FLUWA technology,[31] **RecoAcid** focuses on additional HCl generation from PVC wastes that are not suitable for mechanical recycling. It involves Swiss municipal solid waste incineration (MSWI) plants, since the FLUWA process will be mandatory in Switzerland in 2026.

The scope of the project is to increase the acid production in flue-gas scrubbers and to use the recovered acid for the recycling of heavy metals contained in MSWI filter ashes.

The trials carried out in 2022 at the AVAG KVA AG (https://www.avag.ch) MSWI plant in Thun, Switzerland, showed that non-recyclable PVC waste can be easily accepted in the waste incineration plant. The increased chlorine concentration in the flue-gas did not show any corrosion or other negative effects in the plants.

Trials also confirmed that the chlorine recovered in the wet flue-gas scrubber can be used to extract heavy metals such as zinc, lead, cadmium and copper from the fly ash and that the recovered heavy metals can be recycled.

At the trial completion, it was confirmed that, both from the incineration plant perspective and from an environmental point of view, wet flue-gas scrubbing in MSWI plants is a valid option for the recycling of PVC wastes which cannot be mechanically recycled.

[30] Also see p. 23 of VinylPlus Progress Report 2021
[31] https://www.vivis.de/wp-content/uploads/ASS/2013_ASS_377_398_Schlumberger.pdf

PVC Network representatives visiting AVAG Umwelt AG, Thun, Switzerland. On the right, Reto Riesen, AVAG Head of Safety, Quality and Environment.

Photo: VinylPlus®

Sorting and separation technologies for complex PVC products

The **EUPolySep** project is aimed at setting up a small pilot plant in Belgium to separate PVC from complex laminated products. The Australian PVC Separation (PVCS)[32] 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 a shipping container in Brisbane, Australia, was originally scheduled to be installed at the Centexbel (www.centexbel.be/en) facilities in Liège, Belgium, in 2022. Due to delays in the construction phase, the containerised pilot plant was completed in December 2022 and shipped from Australia in February 2023; delivery and installation in Belgium are scheduled in April/May 2023.

In 2020, **IVK Europe** started a technical project aimed at exploring the mechanical separation of soft PVC material lined with woven fabric or polyester.[33]

Based on the promising results of the trials carried out by the recycling company KKF reVinyl GmbH (re-vinyl.de), further processing tests were conducted in 2021 on different types of pre-consumption products with variable percentages of PVC. Part of the separated PVC was successfully utilised by KKF reVinyl in its production, while part of the recovered PVC was sent back to IVK Europe to be tested for reuse by member companies.

In 2022, one company started larger-scale trials which are continuing in 2023.

[32] PVCS: PVC Separation Pty Ltd is a proprietary and patented process for separating laminated polymer and other materials (www.pvcseparation.com)
[33] Also see p. 25 of VinylPlus Progress Report 2021

Photo: courtesy of ADAGP Noelle Hoeppe

1.4 Prioritising circularity through ecodesign

In October 2020, EPPA, ERFMI, IVK Europe and TEPPFA launched product teams to prepare **Design-for-Recycling (DfR) guidelines** for their sectors. The first draft guidelines applicable to PVC windows and doors were presented to the industry at the end of 2021. Based on three pillars – recyclability, recycled content and quality of the finished product – they provide guidance to developers in charge of the design of new products. They detail the many requirements to be fulfilled for a PVC product to be classified as 'designed for recycling'.

In 2022, all EPPA member companies certified with the VinylPlus® Product Label were trained and accompanied in implementation of the guidelines. This one-year industrialisation phase provided practical experience that can be incorporated into the guidelines.

In the meantime, the guidelines are also serving as a basis for the development of a European design-for-recycling standard. CEN/TC 249/WG 21 (Working Group 21 on 'Profiles for windows and doors' of CEN Technical Committee 249 on 'Plastics') is working on the standard, following a request in the Standardisation Mandate M/584 of the European Commission.[34]

[34] https://ec.europa.eu/growth/tools-databases/enorm/mandate/584_en

PATHWAY 2

#Decarbonisation and Environmental Footprint Minimisation

Advancing towards Carbon Neutrality and Minimising our Environmental Footprint

2.1 Advancing towards carbon neutrality

To evaluate the potential and, by 2025, report on projected progress on core carbon reduction to be achieved by 2030, VinylPlus started the selection process for a consultant in 2022. The selection is expected to be finalised by June 2023.

In this context, VinylPlus is also preparing a tender to produce reports, based on scientific evidence, on the uses of renewable energy and sustainable sourcing of feedstock. The reports will be produced by 2025.

PVC RESIN PRODUCTION

-9.5%
ENERGY CONSUMPTION

-14.4%
CO_2 EMISSIONS

to produce 1 tonne of PVC in 2015-2016 compared to 2007-2008

MAIN PVC APPLICATIONS

BETWEEN -16% AND -26.5%
IN ENERGY CONSUMPTION

for window profiles, pipes, flooring,
films and sheets in 2020 compared to 2010

2.2 Embracing the sustainable use of chemical substances

The Additive Sustainability Footprint® (ASF)[35] 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.

Assessing the use of PVC additives into an article with the ASF methodology allows additives producers to increase their scoring for the VinylPlus® Supplier Certificates (VSCs – see p. 36) and facilitates the awarding of the VinylPlus® Product Label for manufacturers of B&C products.

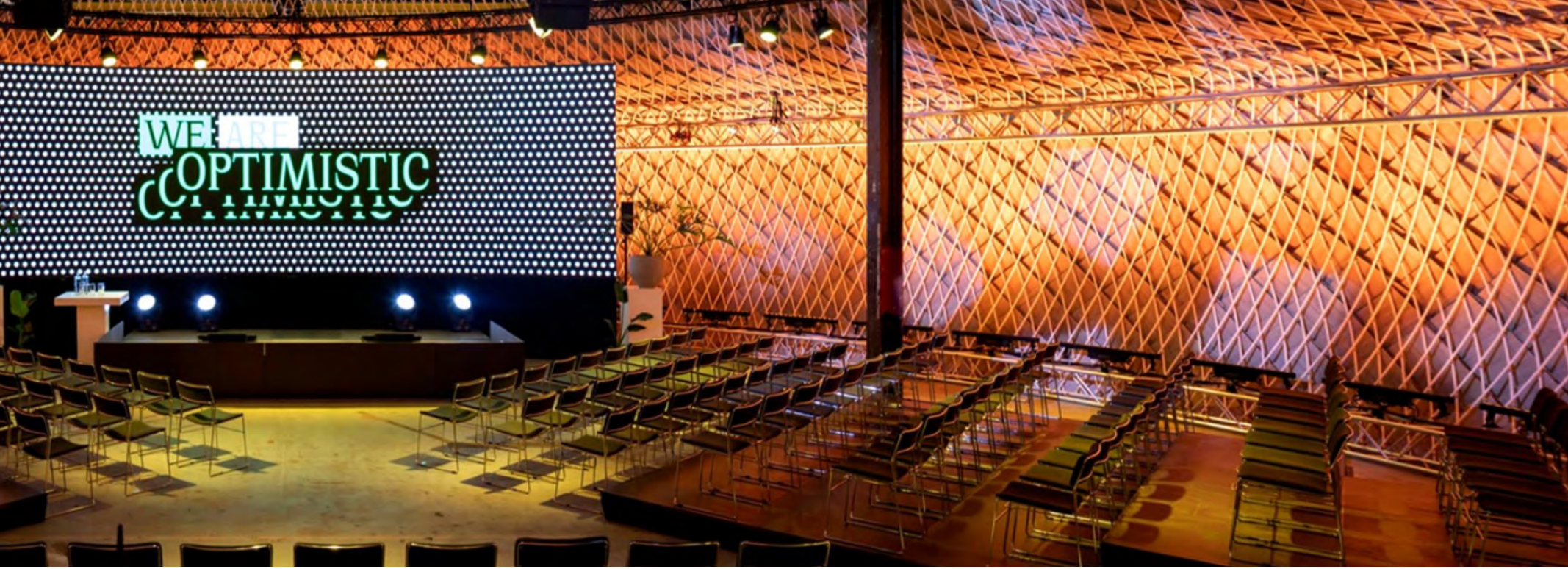
A summary report on the experience of the ESPA[36] and European Plasticisers members during the window profiles and homogeneous flooring pilot assessments has been prepared by The Natural Step.[37] The report is available on the VinylPlus website.[38]

Additive Sustainability Footprint Methodology

- Methodology developed in collaboration with The Natural Step.
- Assesses the lifecycle sustainability of additives used in PVC products.
- Peer reviewed by LCA experts and validated.

As part of the commitment to spread the knowledge and benefits of the ASF methodology among European PVC converters and to extend the adoption of the ASF and VSCs outside Europe, the methodology was presented at several events in 2022: the 3rd Annual PVC Compounding & Production Cycle Forum; the PVC Formulation event in Cologne, Germany; the 3rd PVC4Cables Conference in Bologna, Italy; and the ASEAN PVC Conference in Bangkok, Thailand.

[35] https://www.vinylplus.eu/sustainability/our-contribution-to-sustainability/additive-sustainability-footprint
[36] ESPA: European Stabiliser Producers Association is a Sector Group within Cefic (www.stabilisers.eu)
[37] The Natural Step: sustainability expert (www.thenaturalstep.org)
[38] https://www.vinylplus.eu/wp-content/uploads/2023/02/TNS-report_Lessons-with-ASF.pdf



A new paper on the *Assessment of the Sustainable Use of Chemicals on a Level Playing Field* by Prof. Mark Everard shows how ASF should be used to assess the sustainable use of any chemical in any product. The paper seeks to identify the characteristics of assessment systems that robustly inform the sustainable use of chemical substances throughout whole product lifecycles.

The paper also compares assessment systems commonly used to address aspects of chemical safety and sustainability. After undergoing a full peer review, the paper was published in an open-access form in the journal Integrated Environmental Assessment and Management.[39]

[39] https://setac.onlinelibrary.wiley.com/doi/epdf/10.1002/ieam.4723

> *The general conclusion of the market analysis is that the flexible PVC in the investigated products is not a material with obvious alternatives or potential for substitution … There are no materials or products able to live up to the technical functionality of flexible PVC, and the functionality provided by flexible PVC products cannot be supplied by other materials.*
>
> **Ramboll Denmark**
> *2021*

2.3 Minimising our environmental footprint

All ECVM[40] members are committed to the continuous reduction of their environmental impact in conformity with the requirements of the **ECVM Industry Charter**[41] for the Production of Vinyl Chloride Monomer and PVC, updated in 2019.

A third-party verification of compliance with the criteria of the 2019 version of the ECVM Charter was carried out in 2022 by the third-party certification body DEKRA GmbH (www.dekra.com). Forty EDC/VCM (ethylene dichloride/vinyl chloride monomer), sPVC (suspension polyvinyl chloride) and ePVC (emulsion polyvinyl chloride) plants owned by the ECVM members were audited based on 2021 data.

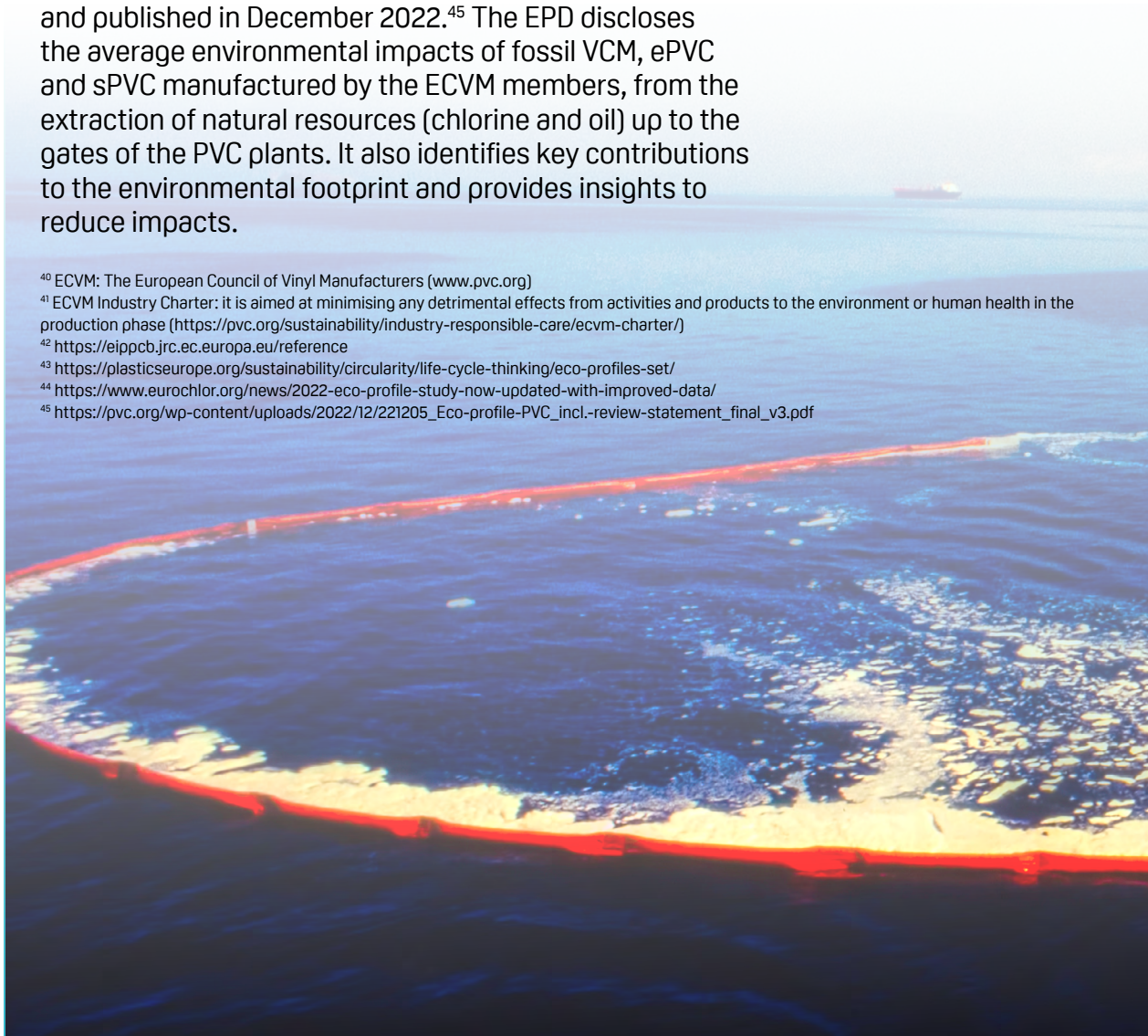
An overall compliance rate of 89% was observed, despite more-stringent criteria than the BAT-AELs (Best Available Technics-Associated Emission Limits) described in the relevant BREFs (BAT Reference Documents).[42]

A new verification, covering 2023 data from plants that failed to reach full compliance in 2022 and plants from the new member that joined in 2022, will be scheduled for early 2024.

To help the PVC industry sectoral organisations set up appropriate indicators for the reduction of the **water footprint** in processes and products, VinylPlus invited EurEau (the European Federation of National Associations of Water Services – www.eureau.org) to take part in a meeting in April 2023. EurEau will help the PVC industry in defining the key criteria to be monitored.

Based on most up-to-date lifecycle inventory (LCI) data from Plastics Europe's eco-profiles programme for ethylene,[43] and from Euro Chlor for chlorine,[44] an updated **Environmental Product Declaration (EPD)** on Vinyl chloride (VCM) and Polyvinyl chloride (PVC) was prepared and published in December 2022.[45] The EPD discloses the average environmental impacts of fossil VCM, ePVC and sPVC manufactured by the ECVM members, from the extraction of natural resources (chlorine and oil) up to the gates of the PVC plants. It also identifies key contributions to the environmental footprint and provides insights to reduce impacts.

[40] ECVM: The European Council of Vinyl Manufacturers (www.pvc.org)
[41] 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/sustainability/industry-responsible-care/ecvm-charter/)
[42] https://eippcb.jrc.ec.europa.eu/reference
[43] https://plasticseurope.org/sustainability/circularity/life-cycle-thinking/eco-profiles-set/
[44] https://www.eurochlor.org/news/2022-eco-profile-study-now-updated-with-improved-data/
[45] https://pvc.org/wp-content/uploads/2022/12/221205_Eco-profile-PVC_incl.-review-statement_final_v3.pdf



Operation Clean Sweep® (OCS) is an international programme designed to prevent the leakage of plastic granules (pellets, flakes and powders) and help keep this material out of the marine environment.

VinylPlus signed up to an OCS commitment which it can carry out itself, namely *"encouraging its partners to pursue"* the six OCS objectives. All ECVM member companies have signed up to the OCS programme. The other VinylPlus founding members have also signed up and are encouraging their customers to sign up as well. Operation Clean Sweep® schemes are already implemented at most EuPC members' sites.

2.4 Responsible supplier criteria and programmes

With the objective of collecting and mapping the certification schemes used by the upstream supply chain, VinylPlus approached in 2022 Euro Chlor (www.eurochlor.org) and PetroChemicals Europe (www.petrochemistry.eu), the two sector groups of Cefic (the European Chemical Industry Council – https://cefic.org) representing the European producers of raw materials for PVC resins. Joint meetings have been scheduled to work on the production of an inventory by the end of 2024.

"PVC eyelets and grommets are used in a wide range of applications and sectors such as truck tarpaulins, boats, pool covers, B&C, tents shelters, etc. Our customers sell solutions built to withstand in extreme situations worldwide and are often exposed to harsh weather conditions… PVC is the only material that is suitable for high-frequency welding, which ensures that eyelets and grommets do not break from tarpaulins or foil.

Claus Ishøy
CEO, Carmo A/S

PATHWAY 3

#Coalitions and Partnerships

Building Global Coalitions and Partnering for the SDGs

3.1 Ensuring transparency and accountability

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

The Progress Report 2023 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. 51 for a list of members).

European Commission · European Parliament · Academia · euroconsumers · industriAll EUROPEAN TRADE UNION

Photo: Garden to Connect

3.2 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[46] and The Natural Step.

In 2022, the VinylPlus® Product Label was updated and integrated with new criteria to comply with the requirements of the Italian GPP CAM (minimum environmental criteria) for Building and Urban furniture, in terms of recycled content and use of by-products (as defined in the CPA Guidance Document on Waste).[47] The Product Label was also opened to companies that are not VinylPlus partners.

The updated version of the Product Label was launched in March 2022, and in August 2022 the VinylPlus® Product Label was mentioned in the Gazzetta Ufficiale (the Official Journal of Record of the Italian government) as a valid proof of certification for recycled content in the updated CAM.[48]

In December 2022, the updated Product Label was submitted for European accreditation by Accredia, the Italian accreditation body. In February 2023, Accredia confirmed[49] that the accreditation of the new version of the Product Label is now granted at the Italian level.

In 2022, VinylPlus also commissioned the Swiss organisation Ecobau[50] to carry out an assessment of the VinylPlus® Product Label criteria. Ecobau owns sustainability certification schemes for the building and construction sector in Switzerland and has developed a methodology to assess foreign Labels.

Ecobau provided an evaluation on how VinylPlus® Product Label criteria could be embedded into their criteria of ecoBKP, ecoDevis and ecoProducte for the profile product category (e.g., windows and doors).

To better align with the VinylPlus 2030 Commitment and the revised BRE's Responsible Sourcing Framework Standard BES 6001, as well as with changing EU policies and societal needs for sustainability, the VinylPlus® Product Label is currently undergoing a revision to version 2.0. This started in June 2022 and is expected to be completed in 2024.

[46] BRE: Building Research Establishment, UK-based certification experts on responsible sourcing for B&C products (www.bre.co.uk)
[47] https://ec.europa.eu/docsroom/documents/46954/attachments/8/translations/en/renditions/pdf
[48] https://www.gazzettaufficiale.it/do/atto/serie_generale/caricaPdf?cdimg=22A04307001000101100001&dgu=2022-08-06&art.dataPubblicazioneGazzetta=2022-08-06&art.codiceRedazionale=22A04307&art.num=1&art.tiposerie=SG (p.41)
[49] https://www.accredia.it/documento/circolare-informativa-dc-n-07-2023-disposizioni-in-merito-allaccreditato-per-lo-schema-vinylplus-product-label-v-1-4/
[50] Ecobau: Swiss organisation that simplifies sustainable planning and building (https://www.ecobau.ch/fr/home)

THE VINYLPLUS SUSTAINABILITY CERTIFICATIONS COMMUNITY CONTINUES TO EXPAND:

16 companies have been certified for

>500 products and product systems manufactured at

27 European sites

VinylPlus® Supplier Certificates (VSCs) are sustainability schemes for additive producers and compounders that are partners of VinylPlus. They allow raw material suppliers to demonstrate their sustainability efforts and help converters obtain the VinylPlus® Product Label.

In 2022, five companies – Akdeniz Chemson, Baerlocher, IKA, Polymer-Chemie and Reagens – obtained the VinylPlus® Supplier Certificate.

Promoting sustainable private and public procurement practices

In 2022, 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 media campaigns targeted **public procurers** and **corporate social responsibility** (CSR) **managers** in magazines such as KBD and Forum Nachhaltig Wirtschaften. Hotel and restaurant purchasers were also targeted through the magazine Hotelbau.

In Italy, VinylPlus Italia launched a communications campaign targeting public procurers, specifiers and the PVC value chain, including downstream users and recyclers, to promote a **widespread recognition of the VinylPlus® Product Label.**

It included close cooperation with Accredia and CAM reviewers for the inclusion of the Label in the Italian CAM. The Product Label was also presented to the Commune of Milan and to the Foundation Milano Cortina, in view of the 2026 Winter Olympics. In addition, in the framework of the PVC Academy online meetings, two workshops focused on the Product Label and CAM. In cooperation with the editor Infoprogetto, two webinars dedicated to specifiers and public administration technicians were organised, involving more than 260 engineers, architects and surveyors. A dedicated seminar was held in September at the international fair RemTech Expo.

In July 2022, EPPA presented VinylPlus and the Product Label in a half-day lecture at the forum of the exhibition **Fensterbau Frontale**, as well as with a joint booth with GKFP.[51]

The initiative was supported by media and social media communications. The recording of the Fensterbau Frontale Forum is available online.[52]

In December 2022, VinylPlus organised the VinylPlus Sustainability Certifications webinar ***'Facilitating PVC products selection by green procurers',*** which involved 140 delegates from 21 countries.

"We have a mission to drive our industry towards sustainability. The VinylPlus® Supplier Certificate validates and improves our sustainability approach. It provides openness and transparency through independent audits to allow stakeholders to make profound and informed choices.

Andy Jones
Baerlocher

[51] GKFP: Gütegemeinschaft Kunststoff-Fensterprofilsysteme e.V. (Quality Association for Plastic Window Profile Systems – www.gkfp.de)
[52] https://live.frontale.de/en/fensterbau-frontale-3

3.3 Engaging stakeholders in the sustainable transformation of the PVC industry

Under the theme *'Embracing EU Green Deal Ambitions'*, the 10th edition of the **VinylPlus Sustainability Forum (VSF)** took place in Brussels, Belgium in May 2022 and online. The VSF is the annual flagship initiative of the European PVC value chain, and it provides an opportunity for the industry to come together to discuss progress on sustainability and exchange points of view with partners and stakeholders. The 10th edition involved 490 stakeholders from 40 countries. The VSF2022 debated the dynamic policy landscape of the EU Green Deal and discussed how the European PVC industry can tackle the challenges of circularity, foster sustainable innovation and advance towards carbon neutrality by continuing to work together.

The VSF was preceded by the VinylPlus General Assembly, for VinylPlus partners only, which gathered around 100 participants.

VinylPlus also continued to co-operate with other regional PVC associations in 2022 and to actively share experience, knowledge and best practices in the **Global Vinyl Council's** (GVC) bi-annual meetings.

Photo: VinylPlus®

3.4 Partnering with stakeholders

To enhance the PVC industry's contribution to the SDGs, VinylPlus is committed to continuing to engage with civil society, including young generations, local communities, institutions and associations of public authorities, including at the cities and regions levels, as well as with the private sector, to develop partnerships, joint projects and initiatives.

Photo: VinylPlus®

Engaging with civil society

Sports play a key role in ensuring social wellbeing and spreading positive values such as education, fairness and gender equality. As part of its engagement with the sports community, VinylPlus supported the second edition of **She Runs – Active Girls' Lead** in September 2022. This international event was founded by the International School Sport Federation (ISF) to support women's empowerment and leadership for girls through sport and education. More than 300 girls aged 13 to 18 from 20 countries joined 2,000 girls from Brussels in the event.

She Runs was also the occasion to consolidate VinylPlus' partnership with ISF and apply the *Environmental Action* charter signed in 2019[53] to ensure the manufacture, supply and disposal of PVC products in accordance with VinylPlus' sustainability programme. The event reused the PVC flooring that had been used at the European Week of Sports in 2019, showing how the material is resistant to time, weather conditions and usage without losing its properties. The high-quality PVC mats provided for the yoga area were reused from the Belgium Yoga Day 2021. Pouches and bags distributed to participants were made from used PVC advertising banners.

Cycling is a key element of the European Commission's Urban Mobility Framework, which is part of the European Green Deal aiming for a climate-neutral Europe by 2050. Riding a bike instead of driving a car is climate-friendly, healthy and can help reduce congestion and pollution.

[53] Also see p. 20 of VinylPlus Progress Report 2019

In the case of jumping pillows, there are no alternatives with properties that can substitute flexible PVC. There are strict requirements for the level of pressure the fabric must be able to withstand without cracking, and flexible PVC is the only material that can meet these requirements. The safety aspect is crucial when it comes to jumping pillows, and manufacturers and dealers stress that safety is not something on which they can compromise.

Ramboll Denmark
2021

Aligned with its commitment to engage with the sports community and promote sustainability, VinylPlus launched the online campaign **(Re)cycling with PVC**[54] in July 2022. The campaign aims to raise awareness of how PVC (and recycled PVC) plays an important role in cycling, as it provides many of the essential components of a bicycle and related equipment.

VinylPlus® Med Belgian pilot project was officially launched in early 2022 to accelerate sustainability in the healthcare sector in Belgium through the recycling of discarded single-use PVC medical devices. The project is not only a way to extend the recycling of PVC waste, but also an effective initiative to build partnerships and engage with stakeholders, including the Belgian healthcare sector, adult day care centres, waste management companies, recyclers, the Belgian local authorities and European medical associations, as well as with media and civil society.

In 2022, the project received two important external recognitions: it received the bronze award among 36 projects in the Circularity category of the INOVYN Awards[55] and was included in the top three initiatives shortlisted for the first Trends Impact Awards, organised by the Belgian magazine Trends for companies or organisations that create sustainable value for society with their projects.[56]

[54] https://www.vinylplus.eu/sustainability/our-contribution-to-sustainability/partnering-with-the-sports-community/pvc-in-cycling/
[55] https://www.inovynawards.com/projects/awards-2022/completing-the-circle-turning-hospital-waste-into-medical-supplies/
[56] https://trends.knack.be/economie/bedrijven/renewi-medisch-afval-recycleren/article-normal-1913239.html

In February 2023, **VinylPlus® Med** celebrated its 1st anniversary.[57] In the presence of Belgian authorities, representatives of hospitals, the press, and the project partners, VinylPlus® Med showcased how a successful partnership between hospitals, waste management companies, recyclers and plastic converters can turn hospital plastic waste into durable hospital products.

Photo: VinylPlus®

From the left: Boris Dilliès, Mayor of Uccle; Brigitte Dero, VinylPlus Managing Director; Evelyn Vass, Operational Director at Europe Hospitals.

Engaging with institutions and local communities

Garden to Connect is a project developed by the PVC Information Council Denmark in partnership with Miklsn (miklsn.dk) and VinylPlus. Its objective is to promote the reuse of PVC pipes to make the urban landscape greener and bring people closer to nature and to each other. In 2022, Garden to Connect was selected for participation in the New European Bauhaus Festival,[58] the new flagship event of the European Commission, which aims to bring together talented people and ideas from all over Europe to contribute to the accomplishment of the European Green Deal. The mobile exhibition, situated in four central squares of Brussels, featured a sustainable urban garden made from used PVC pipes.

Versatile Vinyl for a Resilient Europe

Choosing the right materials is essential to build a resilient Europe – from the hidden infrastructure that transports drinking water, to medical devices and hospital buildings, to the wind turbines that produce green energy. Through the Versatile Vinyl for a Resilient Europe awareness campaign,[59] VinylPlus is engaging public opinion in a factual and open debate on the transition to a more sustainable and climate-neutral future.

Photo: courtesy of Nature Urbaine

In 2022, VinylPlus supported the extension of the **Garden to Connect** project in **Rwanda** aimed at upcycling waste pipes for kitchen gardening and community building. Rwanda has a long tradition of urban agriculture and the rapid urbanisation and many ongoing water infrastructure projects resulted in installation waste. Together with two local NGOs, Garden to Connect is currently developing a pilot project that turns waste into plant containers. In Rusheshe, Kigali, it enables local food production through the reuse of pipes and educates local communities about gardening, reuse and nature conservation. In the Indaro Center, in Kigali, children learn about gardening and the reuse of building materials.

[57] https://www.vinylplus.eu/news/from-pvc-medical-devices-to-hospital-wall-covering/ and https://vimeo.com/vinylplus
[58] https://new-european-bauhaus.europa.eu/get-involved/festival_en
[59] https://www.vinylplus.eu/sustainability/versatile-vinyl/

In Denmark, WUPPI,[60] supported by VinylPlus, continued in 2022 to raise awareness of its collection and recycling activities and of the European PVC industry's achievements in sustainability and circularity. Intensive communication with stakeholders was supported by multimedia campaigns and ad hoc newsletters.

In the framework of the project, WUPPI conducted an installation test with 3-layer pipes produced from lead-free PVC waste. The pipes will be installed in new infrastructures in Lemvig municipality. The project was also an occasion to further strengthen relationships with the Danish EPA (Miljøstyrelsen).

[60] WUPPI: Danish company set up to collect and recycle rigid PVC (www.wuppi.dk)

"Marine fenders are used to prevent boats, ships, and other naval vessels from colliding … Our fenders and buoys are used by fishermen, maritime authorities, naval defences, rescue teams, divers, etc. Soft PVC is the only material that can be used for fenders and buoys for technical reasons.

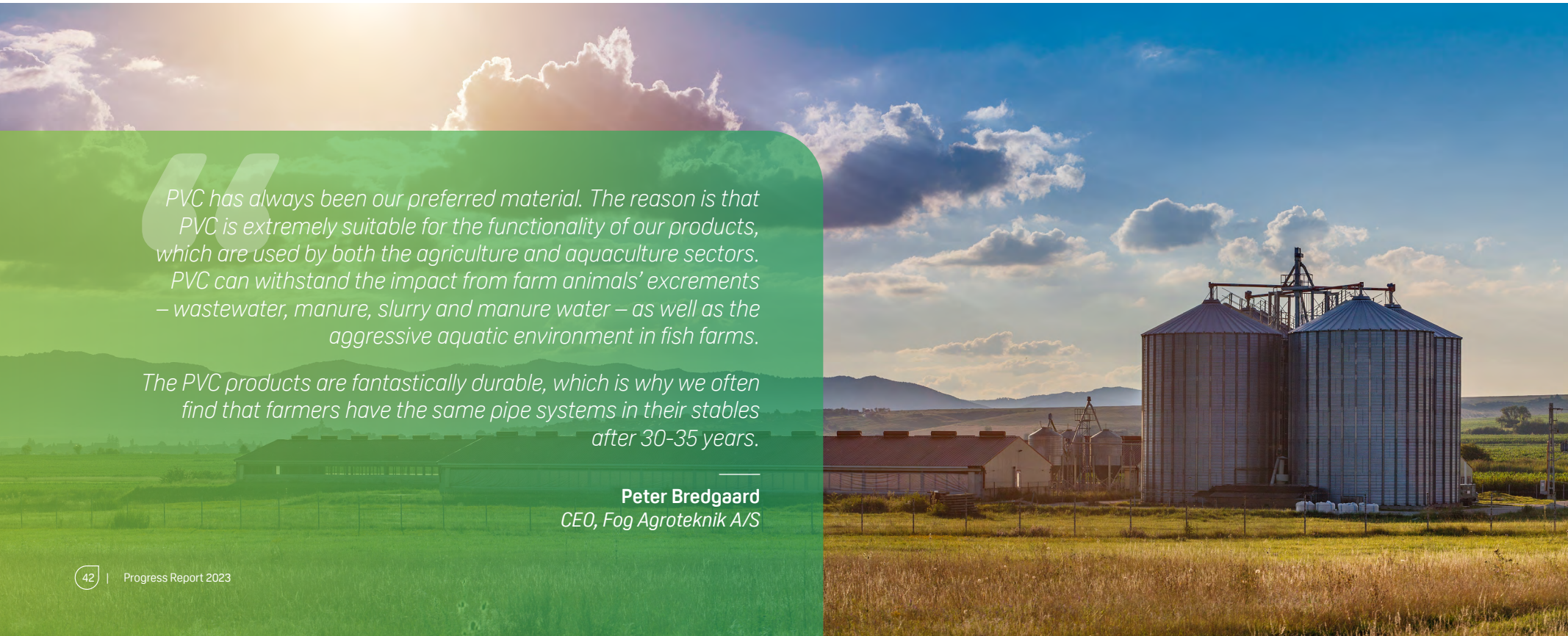
An EU restriction on the production of our product would only lead to a loss of European jobs and tax revenues. As PVC is the only material suitable for marine fenders, which are essential for the marine sector, other non-EU companies would simply take over the market.

Lars Bering
Managing Director,
Dan Hill Plast A/S

Photo: courtesy of Dan Hill Plast A/S

In France, VinylPlus France, together with other industry and sectoral associations, started an action plan in 2022, which aimed to engage with French politicians and institutions, and to raise awareness of PVC sustainability and the VinylPlus 2030 Commitment at the national and local level. The project will continue in 2023 and will provide French regulators with information and scientific data relevant to the evolving EU policy framework.

In Italy, the 2026 Winter Olympics Milano-Cortina triennial project, which was started in 2020, engages with institutions, authorities, local administrations, and Olympic organisers. It aims to raise awareness of how PVC can contribute to a sustainable sporting event, thanks to its sustainability and recyclability features, as well as its technical and economic characteristics. In 2022, information-exchange meetings were organised with the Commune of Milan, Fondazione Milano Cortina and ARPAV, the Veneto Region Agency for the Environment. Furthermore, information on the contribution of PVC to sustainable sporting events was spread through traditional and social media and in a webinar for companies and designers.



"PVC has always been our preferred material. The reason is that PVC is extremely suitable for the functionality of our products, which are used by both the agriculture and aquaculture sectors. PVC can withstand the impact from farm animals' excrements – wastewater, manure, slurry and manure water – as well as the aggressive aquatic environment in fish farms.

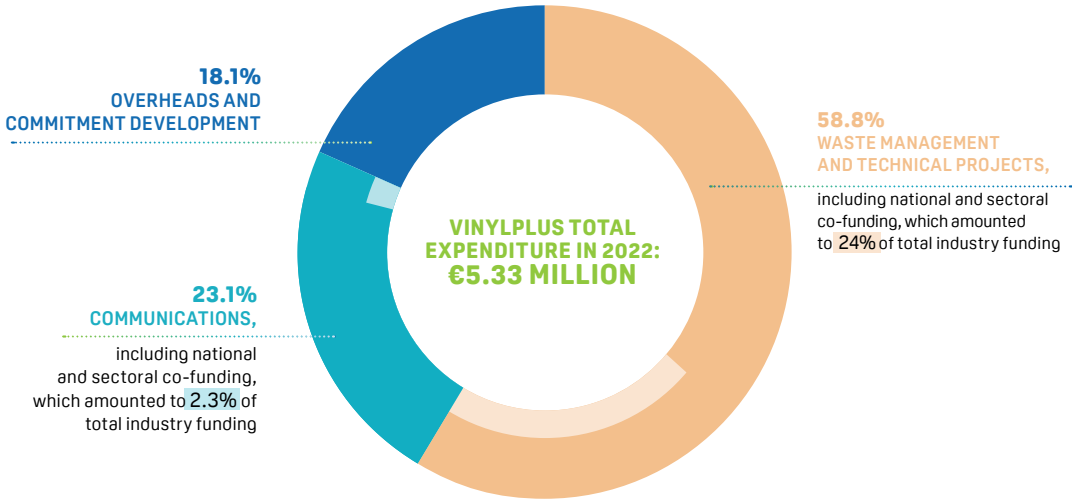
The PVC products are fantastically durable, which is why we often find that farmers have the same pipe systems in their stables after 30-35 years.

Peter Bredgaard
CEO, Fog Agroteknik A/S

04 FINANCIAL REPORT

In 2022, industry expense increased by 4.6% compared to 2021. 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 €5.33 million in 2022.



WASTE MANAGEMENT AND TECHNICAL PROJECTS	TOTAL EXPENDITURE INCLUDING EUPC AND ITS MEMBERS	
Figures in €1,000s	**2021**	**2022**
Films and coated fabrics related projects	91	0
Flooring related projects	770	775
EPPA	633	589
ESWA/Roofcollect®	0	0
Recovinyl®	1,000	1,001
Studies, start-up & pull concept	219	293
TEPPFA*	257	312
Medical applications recycling	60	96
Chemical recycling	38	1
EuPolySep (PVC composites delamination)	70	70
TOTAL PROJECTS	**3,137**	**3,137**

* Expense allocation takes into account collected polymer

05 RECYCLED PVC TONNAGES

The table summarises the tonnages of PVC recycled within the VinylPlus framework in the period 1 January 2022 to 31 December 2022, by initiatives of EuPC sector groups and sectoral associations, and by Recovinyl.

The complete Report of Factual Findings regarding the Agreed-Upon Procedures (AUP) Engagement can be found on page 47.

[A] Tonnage including Norway and Switzerland

[B] Tonnage including Switzerland

[C] New category in 2022: reallocation from Other rigid and Flexible PVC and films

PROJECT	TYPE OF PVC	TONNAGE RECYCLED IN 2021		TONNAGE RECYCLED IN 2022	
		POST-CONSUMER	PRE-CONSUMER	POST-CONSUMER	PRE-CONSUMER
Recovinyl® (incl. IVK Europe)	Coated fabrics	476 [A]	1,301 [A]	Reported under Flexible PVC for competition law compliance reasons	
Flooring post-consumer recycling initiative (part of **Revinylfloor**)	Flooring	2,162 [A]	1,662 [A]	1,772 [A]	1,743 [A]
EPPA (incl. Recovinyl®)	Window profiles & related profiles	141,420 [B]	213,909 [B]	169,770 [B]	238,381 [B]
TEPPFA (incl. Recovinyl®)	Pipes & fittings	10,254 [B]	34,043 [B]	10,955 [B]	38,709 [B]
Other rigid	Other rigid	25,991	32,065	3,535	13,579
	Rigid PVC film [C]	_ [C]	_ [C]	5,654	15,166
Recovinyl and **ESWA – Roofcollect®**	Flexible PVC (and films in 2021)	262,760 which consists of:		212,763	
ESWA – Roofcollect®	Flexible PVC	217 [A]	0	Reported under Flexible PVC	
Recovinyl® (excluding Revinylfloor)	Flexible PVC (and films in 2021)	40,500 [B]	222,043 [B]	21,950 [A]	190,813 [A]
Recovinyl®	Cables	74,253	10,479	91,958	9,281
TOTAL		**295,273**	**515,502**	**305,594**	**507,672**
		810,775		**813,266**	

KPMG Certification of Expenditure

Independent Accountants' Report on Applying Agreed-Upon Procedures

To VinylPlus AISBL

Scope of Work

In accordance with our engagement letter with VinylPlus AISBL (hereafter "the Association") dated 24 March 2023, 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 in the VinylPlus Progress Report 2023.

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 Company 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, 2022 and December 31, 2022;
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 2022.
e) Check that these costs are recorded in the financial statements 2022 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 3,848.
- As a result of applying procedures d), e) and f), we found no exceptions. The total expenses amount to KEUR 5,338.

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 2023. 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
Statutory Auditor represented by

Michaël Focant
Réviseur d'Entreprises
Liège, April 17, 2023

KPMG Report on Tonnages Recycled

Agreed-upon procedures report on Tonnages of PVC recycled in the EU-27 (Plus Norway and/or Switzerland and the UK) in 2022, within the different projects of VinylPlus

Scope of Work

In accordance with our engagement letter with VinylPlus AISBL (hereafter "the Association") dated 24 March 2023, we have performed the procedures agreed with you and set out below relating to assist the Association in evaluating the tonnages of recycled PVC within the different projects of the Association in 2022.

Our report is solely for the purpose of assisting the Association in evaluating the tonnages of recycled PVC within the different projects of the Association in 2022 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 in the VinylPlus Progress Report 2023.

Responsibilities of the Engaging Party and the Responsible 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 tonnages of recycled PVC within the different projects of the Association in 2022 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 tonnages of recycled PVC within the different projects of the Association in 2022 specified above and does not extend to the Associations' annual financial statements taken as a whole.

As regards to our audit work on the Associations' 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 evaluating the tonnages of recycled PVC within the different projects of the Association in 2022 and are summarized as follows:

With regard to the MS Excelspreadsheet 'Calculation_ consoTrecycled_VinylPlus (2022)' for the accounting period January 1, 2022 to December 31, 2022, prepared by management of VinylPlus, regarding the tonnages of recycled PVC in 2022, we performed the following procedures:

1. Verify, in sheet 'VinylPlus 2022' (which contains detailed calculations for the management of VinylPlus), whether the quantities mentioned in the columns H, L, M and N, regarding the quantities of PVC that have been recycled in 2022 by the different projects of VinylPlus, agree with quantities that are mentioned in the:
    - Reports of Factual Findings regarding the Agreed-Upon Procedures (AUP) Engagements performed by KPMG Bedrijfsrevisoren – KPMG Réviseurs d'Entreprises BV/ SRL concerning the tonnages of PVC recycled in the EU-27 plus Switzerland and the UK in 2022, within the operations of Recovinyl
    - Recycling confirmations regarding PVC flooring
    - Extracts of Recovinyl internal audit tracking system on audit status for relevant companies
    - Communication from the concerned projects of VinylPlus.
2. Verify, in sheet 'VinylPlus 2022' the mathematical accuracy of the calculations (to avoid double counting), regarding the quantities of recycled PVC in 2022.
3. Verify, in sheet 'Progress report' (which contains the table for publication in the VinylPlus Progress Report 2023), the mathematical accuracy of the calculations in column F regarding the tonnages recycled in 2022, based on the concerned tonnages mentioned in sheet 'VinylPlus 2022'.

The table mentioned above is reproduced in the VinylPlus Progress Report 2023, on page 44.

We report our factual findings below:

- with respect to the procedures 1, 2 and 3, we found no exceptions. The total recycled tonnage for 2022 amounts to 813,266 tonnes.

As part of our AUP mission for Recovinyl, we have verified that 561,795 tonnes PVC recyclate uptake had been registered in the Recotrace system.

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 be distributed to any other parties, except for publication for informational purposes in the VinylPlus Progress Report 2023. 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 tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2022 and items specified above and does not extend to any financial statements of VinylPlus, taken as a whole.

KPMG Réviseurs d'Entreprises
Statutory Auditor represented by

Michaël Focant
Réviseur d'Entreprises
Liège, April 17, 2023

SGS Independent Verification Statement about the VinylPlus Progress Report 2023

SGS is the world's leading testing, inspection and certification company. We are recognized as the global benchmark for quality and integrity. With more than 97,000 employees, we operate a network of 2,650 offices and laboratories around the world.

SGS was commissioned by VinylPlus to provide an independent verification of the 'Progress Report 2023'. This report presents the commitments and achievements made by the VinylPlus project in 2022.

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 2023' represents VinylPlus' performance and activities in 2022 in a reliable way.

ir Pieter Weterings
SGS Belgium NV
Certification Manager
30/03/2023

07 GOVERNANCE

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, and with the participation of the VinylPlus and the Vinyl Foundation[61] 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[(a)] – ECVM 2010[62]

Mr Dirk Breitbach – EuPC

Mr Filipe Constant[(b)] – ECVM 2010

Dr Brigitte Dero – Managing Director of VinylPlus

Mr Hendrik Fischer – European Plasticisers[63]

Mr Andreas Hartleif – EuPC

Mr Andy Jones – ESPA[64]

Dr Ettore Nanni – Treasurer (ESPA)

Dr Matthias Pfeiffer – European Plasticisers

Mr Hans-Christoph Porth – ECVM 2010

Dr Karl-Martin Schellerer[(a)] – Chairman (ECVM 2010)

Mr Stefan Sommer[(c)] – Chairman (ECVM 2010)

Mr Geoffroy Tillieux – Managing Director of the Vinyl Foundation

Ms Myriam Tryjefaczka – Vice Chairwoman (EuPC)

Mr Arnaud Valenduc[(d)] – ECVM 2010[62]

Mr Christian Vergeylen – ECVM 2010

[(a)] From September 2022
[(b)] Until June 2022
[(c)] Until September 2022
[(d)] From June 2022

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 2022, in April and in December.

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

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[65]

Dr Brigitte Dero – Managing Director of VinylPlus

Prof. Dr Ir. Jo Dewulf[66] – Chairman of the Monitoring Committee

Mr Ondřej Knotek – Member of the European Parliament

Mr Sylvain Lefebvre – Deputy General Secretary, industriAll European Trade Union[67]

Mr Nuno Melo – Member of the European Parliament

Dr Ettore Nanni – Treasurer of VinylPlus

Mr Geoffroy Tillieux – Managing Director of the Vinyl Foundation

[61] Vinyl Foundation: the funding mechanism run by EuPC to collect PVC converters' contribution to VinylPlus (https://www.vinylfoundation.org)
[62] ECVM 2010: the formal legal entity of ECVM, registered in Belgium
[63] European Plasticisers is legally represented in VinylPlus by PlasticisersPlus, the legal entity registered in Belgium
[64] ESPA is legally represented in VinylPlus by StabilisersPlus, the legal entity registered in Belgium
[65] European consumer organisation (www.euroconsumers.org)
[66] Faculty of Bioscience Engineering, Ghent University, Belgium (www.ugent.be/en)
[67] industriAll: European Trade Union (www.industriall-europe.eu)

08 VINYLPLUS FOUNDING MEMBERS AND PARTNERS

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.

OUR FOUNDING MEMBERS ARE

The European Council of Vinyl Manufacturers, representing 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.

pvc.org

The European Stabiliser Producers Association, representing 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.

stabilisers.eu

European Plastics Converters, 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.

plasticsconverters.eu

European Plasticisers, 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.

europeanplasticisers.eu

200 COMPANIES

3 NATIONAL ASSOCIATE MEMBERS

recovinyl plus

150 recycler partners

VinylPlus Partners

In 2022, the contributors were

CONVERTERS:

A. Kolckmann GmbH (Germany)
Alfatherm SpA (Italy)
Aliaxis Group (Belgium)
Altro (UK)
Altro Debolon Dessauer Bodenbeläge GmbH & Co. KG (Germany)
aluplast Austria GmbH (Austria)
aluplast GmbH (Germany)
alwitra GmbH & Co (Germany)
AMS Kunststofftechnik GmbH & Co. KG (Germany)
Amtico International (UK)
APA SpA (Italy)
Beaulieu International Group (Belgium)
BM S.L. (Spain)
BMI Group (Germany)
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)
Finstral AG (Italy)
FIP (Italy)
Forbo Flooring BV (Netherlands)
Forbo Novilon BV (Netherlands)
Forbo Sarlino SAS (France)
Forbo-Giubiasco SA (Switzerland)
Funzionano AS (Norway)
Gealan Fenster-Systeme GmbH (Germany)
Georg Fischer Deka GmbH (Germany)
Gerflor Mipolam GmbH (Germany)
Gerflor SAS (France)
Gerflor Tarare (France)
Gernord Ltd (Ireland)
Girpi (France)
Gislaved Folie AB (Sweden)
Griffine Enduction (France)
Helioscreen (Belgium)*
Hamos GmbH (Germany)*
H-fasader AS (Norway)
Holland Colours NV (Netherlands)
Hundhausen Kunststofftechnik GmbH (Germany)
Imerys Talc Europe (France)
Industrias REHAU SA (Spain)
Industrie Plastiche Lombarde SpA (Italy)*
Inoutic/Deceuninck Sp. z o.o. (Poland)
Internorm Bauelemente GmbH (Austria)
IVC BVBA (Belgium)
Jimten (Spain)
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, former Low & Bonar GmbH (Germany)
Mermet Sunscreen (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)
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 France (France)
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)

* Companies that joined VinylPlus in 2022

PROJECT FLOORS GmbH (Germany)*
Redi (Italy)
REHAU AG & Co (Germany)
REHAU GmbH (Austria)
REHAU Ltd (UK)
REHAU SA (France)
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)
Resysta International GmbH (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)
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)
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)
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)
Windmöller GmbH (Germany)*

PVC RESIN PRODUCERS:

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

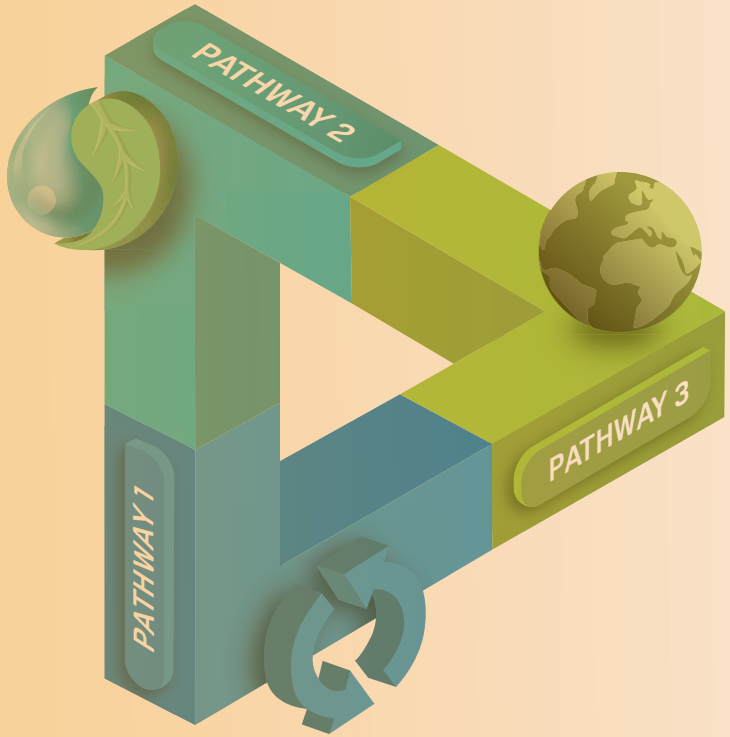
BASF SE
DEZA a.s.
Eastman
Evonik Performance Materials GmbH
ExxonMobil Chemical Europe Inc.
Grupa Azoty ZAK SA
LANXESS Deutschland GmbH
Perstorp Oxo AB
Polynt Group
Proviron
Varteco

ASSOCIATE MEMBERS:

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

09

APPENDIX



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

1.1 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. > Achieved
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.

1.2 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.
   > Achieved + ongoing
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.

1.3 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.
   > Achieved + ongoing
2. Confirm the feasibility of thermal treatment of difficult-to-recycle PVC waste to recover chlorine and move to an operational status (TRL 7)[68] 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.

1.4 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.
   > Partially achieved + ongoing

[68] TRL: Technology Readiness Levels. A type of measurement system used to assess the maturity level of a particular technology (https://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

2.1 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.

2.2 Embracing the sustainable use of chemical substances

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

2.3 Minimising our environmental footprint

1. By 2021, achieve full compliance with the ECVM Charter (updated version 2019).
   > Partially achieved + ongoing
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.
   > Achieved

2.4. 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.

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

3.1 Ensuring transparency and accountability

1. A public, and independently audited, VinylPlus Progress Report will be published annually and proactively promoted to key stakeholders.
   > Achieved + ongoing
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.
   > Achieved
3. By 2025, develop guidelines and supporting information to help VinylPlus partners demonstrate the progress of the PVC value chain towards sustainability.

3.2 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.*
      > Delayed + ongoing
   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.*
      > Achieved
   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'[69] or other suitable tool(s) to assess the contribution of PVC products to the improvement of the environmental footprint of end-users.*

3.3 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.
   > Partially achieved + ongoing

3.4 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.

[69] 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 (https://www.researchgate.net/publication/330563782_Carbon_Handprint_Guide)

10 PVC: A SMART MATERIAL FOR A SUSTAINABLE SOCIETY

Photo: courtesy of Rehau

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.

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

Cover photos: courtesy of Charles Emerson

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