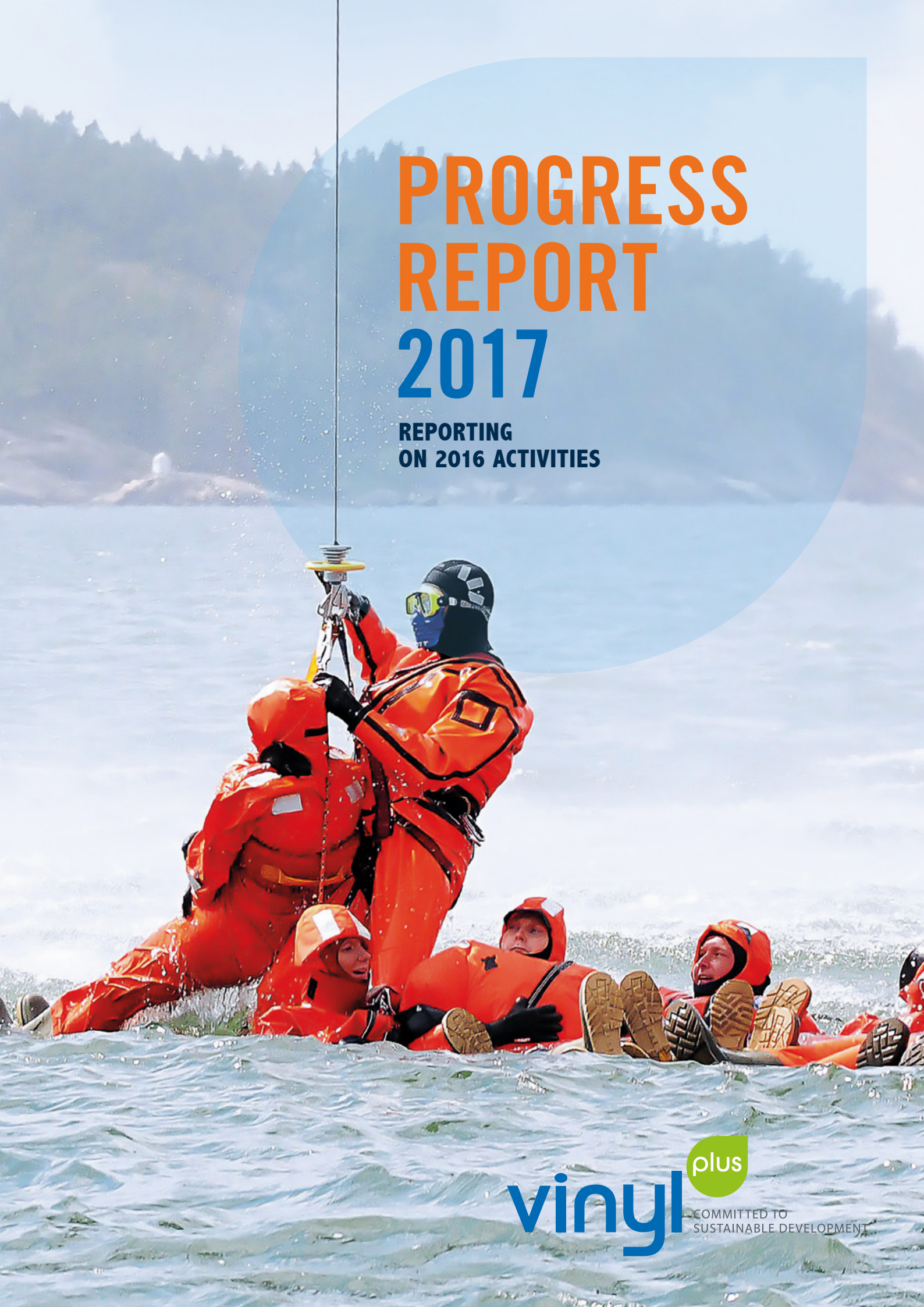

PROGRESS REPORT 2017

REPORTING ON 2016 ACTIVITIES

vinyl plus

COMMITTED TO SUSTAINABLE DEVELOPMENT

VinylPlus Partners

IN 2016, THE CONTRIBUTORS WERE:

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Aliaxis Group (Belgium)
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Beaulieu International Group (Belgium)
Berry Plastics (Germany)*
Bilcare Research (Germany)
BM S.L. (Spain)
BT Bautechnik Impex GmbH & Co. KG (Germany)
BTH Fitting Kft. (Hungary)
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Mondoplastico SpA (Italy)
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Norsk Wavin A/S (Norway)
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NYLOPLAST EUROPE BV (Netherlands)
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Sattler PRO-TEX GmbH (Austria)
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Serge Ferrari SAS (France)
Sika Services AG (Switzerland)
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SKZ-Testing GmbH (Germany)
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Tarkett France (France)
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Tarkett Limited (UK)
TMG Automotive (Portugal)
Tönsmeier Kunstoffe GmbH & Co. KG (Germany)
Uniroyal Global Limited, former Wardle Storeys (UK)
Uponor Infra Oy (Finland)
Veka AG (Germany)
Veka Ibérica (Spain)
Veka Plc (UK)
Veka Polska (Poland)
Veka SAS (France)
Verseidag-Indutex GmbH (Germany)
Vescom BV (Netherlands)
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)

PVC PRODUCERS CONTRIBUTING TO VINYLPLUS IN 2016

INOVYN (Belgium, Germany, Italy, Netherlands, Norway, Spain, Sweden, UK)
Shin-Etsu PVC (Netherlands, Portugal)
VESTOLIT GmbH (Germany)
VINNOLIT GmbH & Co. KG (Germany, UK)
Vynova Group (Belgium, France, Germany, Netherlands, UK)

STABILISER PRODUCERS CONTRIBUTING TO VINYLPLUS IN 2016

Akdeniz Kimya A.S.
Asua Products SA
Baerlocher GmbH
Chemson Polymer-Additive AG
Galata Chemicals
IKA GmbH & Co. KG
PMC Group
Reagens SpA
Valtris Specialty Chemicals

PLASTICISER PRODUCERS CONTRIBUTING TO VINYLPLUS IN 2016

BASF SE
DEZA a.s.
Evonik Performance Materials GmbH
ExxonMobil Chemical Europe Inc.
LANXESS Deutschland GmbH
Perstorp Oxo AB

* Companies that joined VinylPlus in 2016

Launched in 2011, VinylPlus is the renewed 10-year Voluntary Commitment to sustainable development by the European PVC industry. The VinylPlus programme was developed through open dialogue with stakeholders, including industry, NGOs, regulators, civil society representatives and PVC users. The regional scope is the EU-28 plus Norway and Switzerland.

This report summarises VinylPlus' progress and achievements in 2016 in each of the five key sustainability challenges identified for PVC on the basis of The Natural Step (TNS) System Conditions for a Sustainable Society.

The Progress Report 2017 has been independently verified by SGS, while tonnages of PVC waste recycled and expenditures have been audited and certified by KPMG.

A full glossary of abbreviations appears at the end. For detailed descriptions of the projects and activities please visit **www.vinylplus.eu**.

Table of Contents

Governance

MANAGEMENT BOARD

VinylPlus is managed by a comprehensive board representing all European PVC industry sectors.

VinylPlus Board

Mr Dirk Breitbach – Vice Chairman[a] (EuPC[1] – Compounding sector)
Mr Filipe Constant – ECVM 2010[2]
Mr Alexandre Dangis – EuPC
Dr Brigitte Dero – General Manager (ECVM 2010)
Mr Joachim Eckstein – EuPC
Mr Stefan Eingärtner – Deputy General Manager
Dr Josef Ertl – Chairman of VinylPlus[b] (ECVM 2010)
Mr Rainer Grasmück – Treasurer (ESPA[3])
Mr Andreas Hartleif – Vice Chairman[c] (EuPC – Rigid PVC sector)
Dr Zdenek Hruska – ECVM 2010
Dr Ettore Nanni – ESPA
Mr Hans-Christoph Porth – ECVM 2010[d]
Mr Maarten Roef – EuPC (Rigid PVC sector)[e]
Mr Nigel Sarginson – European Plasticisers[4]
Mr Arjen Sevenster – Controller (ECVM 2010)
Mr Niels Rune Solgaard-Nielsen – EuPC (Rigid PVC sector)[f]
Mr Stefan Sommer – ECVM 2010
Mr Chris Tane – ECVM 2010[g]
Mr Remco Teulings – EuPC (Flexible PVC sector)
Mr Geoffroy Tillieux – Controller (EuPC)
Mr Joachim Tremmel – European Plasticisers
Mr Christian Vergeylen – EuPC (Flexible PVC sector)

[a] Until 6 October 2016
[b] From 15 April 2016
[c] From 6 October 2016
[d] From 27 April 2016
[e] From 6 October 2016
[f] Until 6 October 2016
[g] Until 27 April 2016

MONITORING COMMITTEE

The VinylPlus Monitoring Committee guarantees an independent evaluation of the initiatives undertaken in the framework of the Voluntary Commitment. It thus plays a fundamental role in ensuring VinylPlus' transparency, participation and accountability, and in providing guidance and advice. Open to external stakeholders, the Committee met twice in 2016, 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.

Members

Mr Werner Bosmans – Directorate-General Environment (DG ENV), European Commission
Prof. Alfons Buekens[5] – Chairman of the Monitoring Committee
Dr Alain Cavallero – Secretary General of ESPA
Mr Alexandre Dangis – VinylPlus Board Member
Dr Brigitte Dero – General Manager of VinylPlus
Ms Martina Dlabajova(*) – Member of the European Parliament
Mr Joachim Eckstein – VinylPlus Board Member
Dr Josef Ertl – Chairman of VinylPlus
Mr Rainer Grasmück – Treasurer of VinylPlus
Mr Sylvain Lefebvre – Deputy General Secretary, industriAll European Trade Union[6]
Mr Eric Liégeois – Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), European Commission
Mr Nuno Melo(*) – Member of the European Parliament

(*) From 11 April 2017

1 EuPC: European Plastics Converters (www.plasticsconverters.eu)
2 ECVM 2010: the formal legal entity of ECVM (The European Council of Vinyl Manufacturers – www.pvc.org), registered in Belgium
3 ESPA: The European Stabiliser Producers Association (www.stabilisers.eu)
4 European Plasticisers: formerly ECPI (The European Council for Plasticisers and Intermediates), is a sector group within CEFIC, the European Chemical Industry Council. European Plasticisers (www.europeanplasticisers.eu) is legally represented in VinylPlus by PlasticisersPlus, the legal entity registered in Belgium
5 Formerly Professor at the Vrije Universiteit Brussel (VUB, Free University of Brussels – www.vub.ac.be) and currently Invited Professor at Zhejiang University, China (www.zju.edu.cn)
6 IndustriAll: European Trade Union (www.industriall-europe.eu)

JOSEF ERTL

Chairman of VinylPlus

Foreword

VinylPlus' commitment to sustainable development was tangible in 2016 for each of the five challenges of the programme. I would first like to mention our contribution to the movement towards a circular economy, which is now one of the key objectives of EU policy.

The circular economy is not only about waste management, but also consists of continued efforts to do more with less. The driver is innovation, which creates ways to reduce emissions and the consumption of raw materials and resources. Innovation also improves energy and cost efficiency, and increases products' useful life. The activities of VinylPlus contribute to all these objectives.

Despite some challenges, we continued to increase the volume of recycled PVC, which rose to 569,000 tonnes in 2016. That implies a saving of more than 1.1 million tonnes of CO_2. Unfortunately, legacy additives remain an open issue, which has had a negative impact on demand for recycled PVC. We are confident that the ever-increasing number of studies in support of PVC recycling and of recycled product safety can lead to balanced solutions that combine maximum safety with increased potential for recycling.

Our commitment to reducing energy consumption by both resin producers and converters continues. We also confirmed the commitment taken to the sustainable use of additives, documenting the cessation of sales of lead stabilisers in the EU-28 and continuing to develop a methodology for evaluating the sustainable use of additives. All this has been carried out transparently and in constant dialogue with our stakeholders – something demonstrated by the credibility that our annual VinylPlus Sustainability Forum is gaining each year. The central role of communications has been reaffirmed by the VinylPlus Board as a key component of our programme, to build sustainability awareness along the value chain and in dialogue with stakeholders.

I must say that our commitment is seen and recognized more and more outside VinylPlus. We are extremely proud of the fact that our programme was selected as a "Highly Commended" entry by The Circulars 2017, the prestigious circular economy award programme run by the World Economic Forum and the Forum of Young Global Leaders. The programme offers recognition to individuals and organisations across the globe that have made notable contributions to the circular economy in the public and private sectors and in wider society. This is a great achievement for our entire industry.

None of these achievements would have been possible without the tireless efforts of people at all levels in our industry. It is one of the pleasures of my role to be able to work closely with colleagues who bring such energy and dedication to our goals. People are the pillar of our success.

Josef Ertl

Chairman of VinylPlus

VinylPlus Contribution to the Sustainable Development Goals

On 25 September 2015, the General Assembly of the United Nations adopted the resolution *'Transforming our world: the 2030 Agenda for Sustainable Development'*, a transformative plan of action to address urgent global challenges over the next 15 years. Based on 17 Sustainable Development Goals (SDGs[7]), it seeks not only to eradicate extreme poverty, but also to integrate and balance the three dimensions of sustainable development – economic, social and environmental.
Together, the SDGs form a comprehensive global vision to ensure sustainable social and economic progress worldwide.

The SDGs define global sustainable development priorities and aspirations for 2030 and seek to mobilise global efforts around a common set of goals and targets.
They call for worldwide action by governments, business and civil society, and will shape future policies, action plans and initiatives at the international, national and regional levels.
While the SDGs primarily target governments, they recognize the key role that business can and must play in achieving them.

VinylPlus aims to proactively contribute to addressing the global challenges and priorities through its sustainability programme.
While PVC products can potentially play a role in achieving many of the 169 targets within the SDGs, the following chart focuses on the direct contribution of the European PVC industry's Voluntary Commitment, based on the SDG Compass approach[8].

[7] https://sustainabledevelopment.un.org/sdgs
[8] http://sdgcompass.org

CHALLENGE 1
CONTROLLED-LOOP MANAGEMENT

- **TARGET 9.5** Research and development – Programmes and progress relating to materials stewardship
- **TARGET 12.5** Waste management
- **TARGET 13.1** Energy efficiency, GHG emissions, recycling

CHALLENGE 2
ORGANOCHLORINE EMISSIONS

- **TARGET 1.5** Disaster/emergency planning and response
- **TARGET 3.9** Occupational health and safety
- **TARGET 8.8** Labour/management relations; Occupational health and safety
- **TARGET 9.4** Environmental investments
- **TARGET 12.4** Environment

CHALLENGE 3
SUSTAINABLE USE OF ADDITIVES

- **TARGET 6.3** Water quality
- **TARGET 12.4** Environment

CHALLENGE 4
SUSTAINABLE USE OF ENERGY AND RAW MATERIALS

- **TARGET 7.3** Energy efficiency
- **TARGET 8.4** Resource efficiency
- **TARGET 12.2** Energy and resource efficiency
- **TARGET 13.1** Energy efficiency, GHG emissions, recycling

CHALLENGE 5
SUSTAINABILITY AWARENESS

- **TARGET 3.9** Occupational health and safety
- **TARGET 4.4** Employee training and education
- **TARGET 4.7** Education for sustainable development
- **TARGET 5.1** Gender equality
- **TARGET 8.8** Labour/management relations; Occupational health and safety
- **TARGET 12.6** Reporting
- **TARGET 12.7** Procurement practices
- **TARGET 12.8** Product and service information and labelling
- **TARGET 12.a** Support developing countries
- **TARGET 17.7** Knowledge transfer
- **TARGET 17.16** Partnership
- **TARGET 17.17** Partnership

CHALLENGE 1

CONTROLLED-LOOP MANAGEMENT:

"We will work towards the more efficient use and control of PVC throughout its life cycle." [9]

RECYCLING TARGET

In 2016, PVC waste recycling within the VinylPlus framework reached 568,696 tonnes, with a significant increase in volumes in Austria, Germany, Italy, Poland, The Netherlands and the UK.

Recovinyl[10] was the main contributor, with a registered volume of 560,492 tonnes of recycled PVC waste.

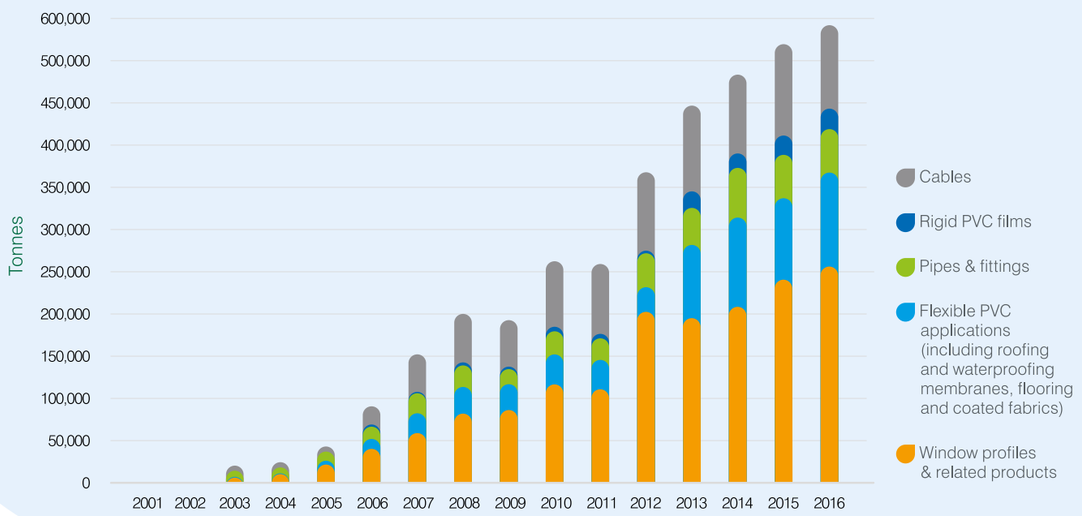
The recycling market remained quite stable throughout the year, with some increase in cable recycling and in demand for PVC waste for flooring.

PHOTO: COURTESY OF RESYSTA®

[9] Targets, deadlines and status of achievement are summarised in Appendix 1, p. 30

[10] Recovinyl: 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 Voluntary Commitments (www.recovinyl.com)

PVC recycled within the Vinyl 2010 and VinylPlus frameworks



Resistant, easy to clean and maintain, PVC decking is an excellent solution for outdoor surfaces.

Converters and recyclers continued to express concern over uncertainties in the implementation of relevant EU regulations such as REACH[11], CLP[12] and Waste[13].

Industry-Sector Projects for PVC Waste Management

EPPA's[14] main activities in 2016 included the launch of the 'Hybrid Project', aimed at developing and monitoring the best available recycling technologies for PVC window profiles made of hybrid materials; the development of a voluntary standard for the controlled-loop recycling of PVC window profiles; and the assessment of working conditions where PVC recyclates are present.

The 2016 annual report by VITO[15] stated that TEPPFA[16] members used about 62,000 tonnes of PVC recyclates in 2015, a fall of almost 30% from 2014. This first decline since 2011 was mainly due to worries and uncertainties over the EU regulatory framework on the use of recycled PVC. Advocacy and communications activities continued in 2016 to promote Environmental Product Declarations (EPDs) and EU Product Environmental Footprint (PEF), as well as the use of recyclates in long-life, quality products.

PHOTO: COURTESY OF PROTAN

ESWA[17] recycled 5,082 tonnes of roofing and waterproofing membranes in 2016 through its project Roofcollect® (www.roofcollect.com), a 56.4% increase from 2015.

PHOTO: COURTESY OF BEAULIEU NV

Vinyl plank floorings offer long-lasting comfort, they are water resistant and suitable for every room.

As announced in last year's Progress Report, EPFLOOR[18] was dissolved at the end of 2015, but the flooring industry remained committed to recycling and to the Voluntary Commitment. ERFMI[19] took over EPFLOOR's rights and obligations for 2016. A new initiative will be established in 2017. ERFMI collected 4,207 tonnes of flooring waste (a 2.6% increase on 2015) and produced 3,811 tonnes of R-PVC. In 2016, the Association for the Recycling of PVC Floor-Coverings (AgPR[20]) celebrated its 25th anniversary.

The Fraunhofer IVV Institute (www.fraunhofer.de) CREASOLV project to investigate a solvent-based recycling process for difficult-to-recycle PVC waste, including flooring, ended in 2016. These pilot-scale experiments showed a reduction of legacy phthalates. Confirmation of technical feasibility would still be required, by testing the resulting material in actual flooring production.

To test energy and material recovery from PVC waste, 100 tonnes of shredded post-consumer PVC flooring were supplied by AgPR to Oreade-Suez[21] in France, an energy recovery company that uses the SOLVAir® (www.solvairsolutions.com) treatment system for the control of air emissions. The recovered NaCl (salt) is purified by Resolest (www.resolest.fr) and used in a Solvay plant to produce soda ash, thus replacing virgin NaCl. Further trials will be undertaken in 2017.

[11] REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals (http://ec.europa.eu/growth/sectors/chemicals/reach/index_en.htm)
[12] CLP: Classification, Labelling and Packaging of substances and mixtures (http://echa.europa.eu/regulations/clp/legislation)
[13] Waste Framework Directive and related legislation (http://ec.europa.eu/environment/waste/legislation)
[14] EPPA: European PVC Window Profile and Related Building Products Association, an EuPC sectoral association (www.eppa-profiles.eu)
[15] VITO: Vlaamse Instelling voor Technologisch Onderzoek (Flemish Institute for Technological Research – www.vito.be)
[16] TEPPFA: European Plastic Pipes and Fittings Association, an EuPC sectoral association (www.teppfa.eu)
[17] ESWA: European Single Ply Waterproofing Association, an EuPC sectoral association (www.eswa.be)
[18] EPFLOOR: European PVC Floor Manufacturers, an EuPC sector group (www.epfloor.eu)
[19] ERFMI: European Resilient Flooring Manufacturers' Institute, an EuPC sectoral association (www.erfmi.com)
[20] AgPR: Arbeitsgemeinschaft PVC-Bodenbelag Recycling (Association for the Recycling of PVC Floor-Coverings – www.agpr.de)
[21] http://www.industriesduhavre.com/industries/oreade.html

In the framework of the Turquoise project, I.déel (http://i-deel-in.com) was set up as a company to commercialise Novafloor (www.novaplak.com) products. Novafloor's formwork sheets – made of 100% recycled PVC and marble powder, and recyclable – will be used in new Paris subway stations.

In 2016, ERPA[22] and IVK Europe[23] carried out a strategic review of their recycling schemes with the objective of creating a structure to act as a link between the different participants in the product value chain: converters (IVK/ERPA members), recyclers and customers of IVK/ERPA members. The new structure, which includes a project manager dedicated to the recycling of PVC films and coated fabrics, is expected to facilitate closer cooperation among converters, recyclers and customers, as well as to improve post-consumer recycling. In total, 24,061 tonnes of rigid PVC films (including PVC packaging, PVC-aluminium pharmaceutical blister and PVC-PE composite films) were recycled in 2016 within the VinylPlus framework, as were 8,187 tonnes of post-consumer PVC coated fabrics.

Other Recycling Projects

Since 2015, VinylPlus has supported the recycling consortium Resysta® (www.resysta.com/en/), which produces a wood-like material based on rice husks and PVC, recyclable after use. The consortium includes a number of VinylPlus partner companies in several industry sectors.

The Ebene project on end-of-life professional furniture was initiated in France in 2014 by SFEC[24]. In 2016, the project focused on enhancing recycling.

RecoMed is a partnership project between the British Plastics Federation (BPF[25]) and Axion Consulting[26] (the UK agent of Recovinyl), launched in the UK in 2014. It aims to collect and recycle non-contaminated PVC medical products from UK hospitals, such as IV solution bags, oxygen masks, oxygen tubing and anaesthetic masks. The project currently involves nine hospitals, with another three in the process of joining. In 2016 it collected 1,394 kg of PVC waste, including in excess of 60,000 oxygen masks and tube sets.

RecoMed, winner of the Sustainability INOVYN Awards 2016, is extending its scheme to veterinary clinics and university training facilities.

In Denmark, the WUPPI[27] scheme focuses on the collection and recycling of rigid PVC. WUPPI currently works with a Dutch recycler, due to the fact that Danish legislation forbids the use of recyclates containing legacy substances.

In Italy, WREP, a joint technical project led by PVC Forum Italia[28] aimed to define the amount of PVC available for recycling in Italy; evaluate the quantities currently recycled; and devise a pilot collection scheme to improve the collection and recycling of PVC waste. The project involved DAE srl, the Italian agent of Recovinyl, and Plastic Consult (www.plasticconsult.it). The analysis showed that less than half of the PVC potentially available for recycling is currently being recycled. This is mainly because collection points are scattered around the territory and the majority of recyclers are micro and small enterprises, which are affected more by the complex regulatory framework. Several meetings were organised with the competent authorities, and discussions are ongoing to set up a pilot project to collect and sort end-of-life PVC products in the Venice area.

In 2016, the VinyLoop Ferrara plant produced 3,777 tonnes of R-PVC, a decline of 16.2% from 2015. VinyLoop® has been granted REACH authorisation[29] to sell R-PVC containing DEHP. Nevertheless, the air-monitoring and bio-monitoring controls ECHA[30] requested of downstream users caused unease in the market, reducing demand for VinyLoop® R-PVC.

LEGACY ADDITIVES

Legacy additives are substances that are no longer used in new PVC products but that can be present in recycled PVC. Since the use of legacy additives may be restricted by legislation, VinylPlus is committed to addressing the issue in cooperation with regulatory authorities.

Resysta® products provide a sustainable alternative to tropical wood for several applications. They thus help safeguard forests and provide a recycling option for rice production waste.

VinyLoop® (www.vinyloop.com) is a physical, solvent-based technology that can recycle difficult-to-treat, end-of-life PVC waste and produces high-quality R-PVC compounds.

In the past few years, VinylPlus has contributed to discussions on legacy additives by supporting research and a considerable number of studies. All the studies conducted so far confirm that recycling PVC waste containing legacy additives can be considered a viable option, since health and environmental exposures are well within the acceptable levels.

In 2016, VinylPlus commissioned two further studies to FABES (www.fabes-online.de) to consolidate the results of its previous study, which evaluated migration models for cadmium, lead, tin and zinc in both rigid and flexible PVC – and for DEHP in just flexible PVC. The first study – aimed at determining the diffusion and partition coefficients of lead, cadmium, zinc and DEHP from recycled PVC in water, saliva and sweat – confirmed that migration rates from both rigid and flexible PVC are very low. The second study investigated the migration behaviour of chemicals from PVC flooring, focusing on DEHP. The study was concluded in December 2016. However, since DEHP solubility in water is extremely low and it tends to form colloid solutions, the study concluded that additional data might be needed to fully understand the migration behaviour.

Arche Consulting (www.arche-consulting.be) was commissioned by VinylPlus to carry out two risk assessments of lead migration, one for PVC waste during storage and the other for recycled PVC during use. Both studies demonstrated that the risks to human health and the environment are controlled.

[22] ERPA: European Rigid PVC Film Association, an EuPC sectoral association (www.pvc-films.org)
[23] IVK Europe: Industrieverband Kunstoffbahnen e.V. (Association of Coated Fabrics and Films – www.ivk-europe.com)
[24] SFEC: Syndicat Français des Enducteurs Calandreurs, the French Association of Calenderers (www.sfec-services.org)
[25] BPF: British Plastics Federation, the leading trade association for the UK Plastic Industry (www.bpf.co.uk)
[26] Axion Consulting: resource recovery expert, a division of Axion Recycling Limited (www.axionconsulting.co.uk)
[27] WUPPI: Danish company set up to collect and recycle rigid PVC (www.wuppi.dk)
[28] PVC Forum Italia: the Italian association of the PVC value chain (www.pvcforum.it)
[29] http://www.vinyloop.com/en/products-en/reach-and-clp.html
[30] ECHA: European Chemicals Agency (http://echa.europa.eu)

COURTESY OF MOLECOR

PVC pipes offer excellent hydraulic properties, including for example higher flow rates than traditional pipes of the same bore.

A further study was carried out in 2016 by CATS Consultants GmbH (www.catsconsultants.com): *'Health Risk of Occupational Lead (Pb) Exposure in Conventional PVC Recycling and Converting Operations'*. The study showed that in general lead levels in blood were within the normal range for not exposed population. However, a few (5%) occupationally exposed individuals had values at a level where subclinical and reversible neurotoxicity may start to occur. It was not possible to make a direct link between current occupational exposure and these blood levels, as some of these 5% of individuals had either previously been exposed to lead at the workplace, or lived in old houses.

RDC Environment (www.rdcenvironment.be) and BIPRO (www.bipro.de) are currently carrying out a study of the socio-economic impact of hazardous classification of post-consumer PVC waste. The study began in July 2016, and conclusions are expected in June 2017.

Cadmium Restriction

EU Commission Regulation 494/2011 set a limit for polymers of 100 ppm of cadmium, with a derogation of up to 1,000 ppm allowed in specified rigid PVC construction products for cadmium originating from recyclate. These limits are to be reviewed by 31 December 2017. In 2016, the EU Commission asked ECHA to carry out a review of the cadmium restrictions by September 2017. As part of this review, ECHA contracted VITO, which had already in 2009[31] developed an impact assessment of various possible options to reconcile the recycling of PVC waste still containing legacy cadmium with the restrictions of Annex XVII[32] of REACH. To contribute to the review, the PVC industry is modelling the amount of waste that could arise up to 2050, as well as its cadmium content.

[31] For further information also see Vinyl 2010 Progress Report 2011, *'REACH and Recycling'*, p. 35-36 (http://www.vinylplus.eu/uploads/Modules/Documents/Executive_Summary/Progress%20Report%202011/vinyl2010_progress_report_2011_English.pdf)

[32] Annex XVII: Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles of the REACH Regulation (http://www.reach-compliance.eu/english/REACH-ME/engine/sources/reach-annexes/launch-annex17.html)

[33] http://www.solvay.com/en/markets-and-products/featured-products/solvair-solutions.html

CONTROLLED-LOOP COMMITTEE

Regulatory constraints related to the presence of legacy additives are still considered a major threat to recycling post-consumer waste. There is evidence that both Pb (lead) and DEHP, present as legacy additives in recyclates, continue to impact recycling markets. However, the VinylPlus Controlled-Loop Committee (CLC) recommended maintaining the target of recycling 800,000 tonnes per year by 2020 and continuing to strive for additional volumes via the Recovinyl scheme.

While confirming the overall recycling target for 2020, the detailed analysis carried out by the CLC as part of the mid-term review showed that the objective of developing and exploiting innovative technology to recycle 100,000 tonnes per year of difficult-to-recycle PVC material by 2020 can no longer be considered realistic. None of the explored technologies or projects – some of which are promising but still at an experimental stage – is expected to be able to contribute sufficient recycling quantities by 2020 to achieve this objective. The target was consequently withdrawn. Nevertheless, VinylPlus will continue to pursue efforts to find technically and economically viable solutions for difficult-to-recycle PVC.

The Committee focused in 2016 on two promising technologies for the recovery of energy and material from PVC on the basis that higher volumes may need to be treated by these means. An interesting development emerged from the SOLVAir® process developed by Solvay[33] to treat residues of flue gas treatment using sodium bicarbonate. This is being actively followed up by the CLC, especially since the EcoLoop feedstock recycling technology (www.ecoloop.eu) no longer appears to be a short-term option. The second option is the Halosep process, which recovers chlorine in the form of salts from incineration waste residues such as flue gas treatment waste (FGW) and HCl scrubber liquid. Having obtained LIFE funding from the EU, the Halosep technology will be used in a demonstration plant for the treatment of fly ash in Copenhagen, Denmark (www.stenametall.com/lifehalosep).

The Horticultural Spa & Apothecary Experience developed by the design studio Loop.pH employs a soilless method for cultivating plants where the roots are misted with nutrients inside an inflatable PVC membrane.

PHOTO: COURTESY OF LOOP.PH, LONDON, UK

CHALLENGE 2

ORGANOCHLORINE EMISSIONS:

"We will help to ensure that persistent organic compounds do not accumulate in nature and that other emissions are reduced." [34]

SAFE TRANSPORT

There were no transport accidents in Europe with VCM release in 2016.

PVC RESIN INDUSTRY PRODUCTION CHARTERS

The Industry Charters[35] for suspension (VCM & S-PVC Charter) and emulsion (E-PVC Charter) PVC are aimed at reducing their environmental impact in the production phase.
The last audit carried out by DNV[36] at the beginning of 2012 showed 96% full compliance, 1% partial compliance and 1% non-compliance; 2% of all applications of the standards could not be verified. The resin industry is continuing to work on – and is committed to – achieving full compliance by the end of 2020.

[34] Targets, deadlines and status of achievement are summarised in Appendix 1, p. 30

[35] The ECVM Industry Charters are available at http://www.pvc.org/upload/documents/ECVM_Charter_VCM__PVC.pdf and http://www.pvc.org/upload/documents/Emulsion.pdf

[36] DNV: Det Norske Veritas, a Norwegian testing and verification organisation (www.dnv.com)

CHALLENGE 3

SUSTAINABLE USE OF ADDITIVES:

"We will review the use of PVC additives and move towards more sustainable additive systems." [37]

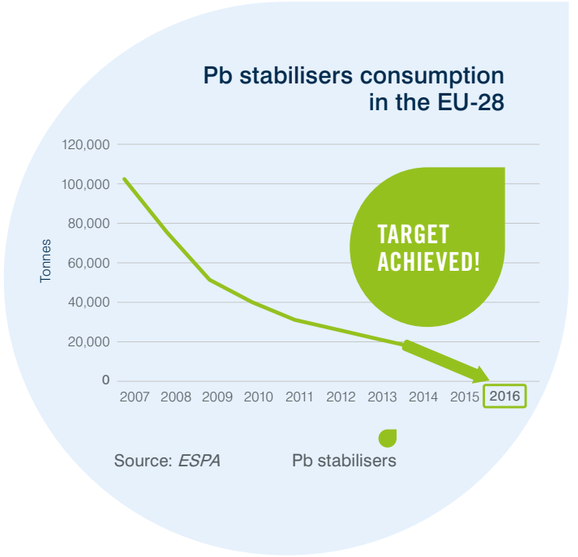
PHOTO: COURTESY OF GERFLOOR

PVC sport floors can be specifically designed to meet the different need of every sport.

Pb (LEAD) REPLACEMENT

By the end of 2015, ESPA members had completed the replacement of lead-based stabilisers for PVC applications in the EU-28. This achievement was verified in 2016 by an external audit company.

The market switch had already been confirmed at the beginning of 2016, as a public consultation called by ECHA registered very few requests to continue utilising lead-based stabilisers.



PLASTICISERS

European Plasticisers (former ECPI) estimates confirm a positive trend in Europe for High Molecular Weight (HMW) Ortho-phthalates, cyclohexanoates, terephthalates and other plasticisers, accompanied by a progressive decline in the use of Low Molecular Weight (LMW) Ortho-phthalates. This trend was corroborated by a review study of phthalates exposure in Europe conducted by Holger M. Koch and published in the *International Journal of Hygiene and Environmental Health*[38] in November 2016. The study showed a significant drop in exposure to key LMW phthalates in Germany from 1988 to 2015, while exposure to HMW phthalates stayed relatively steady despite increasing consumption.

Studies and Research

An epidemiology study, commissioned by European Plasticisers and carried out by Maastricht University (www.maastrichtuniversity.nl), was published in *Annals of Epidemiology*[39] in August 2016. The study examined the reliability of scientific papers that report an association between phthalate exposure and health effects such as obesity, asthma and reduced fertility.

Two scientific papers by Dr Dekant and Prof. Bridges were published in Autumn 2016 in *Regulatory Toxicology and Pharmacology*[40]. The first independent study developed a Quantitative Weight of Evidence (QWoE) methodology for the assessment of reproductive and developmental toxicity and its application for the classification and labelling of chemicals. The second paper, commissioned by European Plasticisers, applied the QWoE in a case study to assess the classification and labelling of DINP, DCHP and DnHP. Key conclusions showed that, based on existing data, DINP does not warrant any classification.

REACH Authorisation

ECHA's Committees for Risk Assessment (RAC) and Socio-economic Analysis (SEAC) expressed their support in September 2014 for authorising companies that had applied for Authorisation to continue to use DEHP in both virgin and recycled PVC and DBP in specific applications[41].

The European Commission in April 2016 definitively granted Authorisation for the use of DEHP in recycled soft PVC[42]. Authorisation for the use of new DEHP in products is still pending.

Regulatory Updates

The evaluation and Risk Management Option Analysis (RMOA) conducted by the French authorities on DINCH and DOTP concluded that no danger or risk is identified under REACH; therefore, no additional risk management measures are needed[43].

PVC pipes are resistant to earth movement, high pressure peaks or even earthquakes.

PHOTO: COURTESY OF MOLECOR

[37] Targets, deadlines and status of achievement are summarised in Appendix 1, p. 30
[38] http://www.sciencedirect.com/science/article/pii/S1438463916303431
[39] http://www.sciencedirect.com/science/article/pii/S1047279716301946
[40] http://www.sciencedirect.com/science/article/pii/S0273230016302574; http://www.sciencedirect.com/science/article/pii/S027323001630280X
[41] http://echa.europa.eu/addressing-chemicals-of-concern/authorisation/applications-for-authorisation-previous-consultations
[42] http://www.plasticsnewseurope.com/article/20160429/PNE/160429802/commission-authorises-dehp-use-for-recycled-soft-pvc
[43] http://www.ecpi.org/mediaroom/no-regulatory-risk-management-action-needed-dehtp-dinch-anses-confirms/

In upholstery, PVC shows great versatility in terms of patterns, prints and textures.

The Public Activities Coordination Tool (PACT) lists the substances for which a risk management option analysis (RMOA) is under development. The evaluation of ATBC conducted by ANSES[44] under the PACT RMOA concluded that there is *"low priority for further work"*[45].

The evaluation of DINCH, DEHTP, ATBC and TXIB in toys and childcare articles also conducted by ANSES showed no risk for the use of these substances[46].

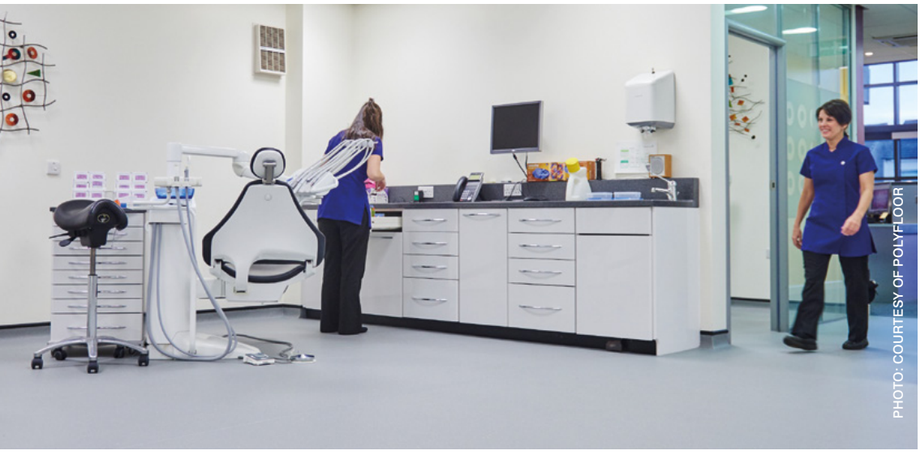
In 2014, the European Commission and Member States endorsed a four-year re-evaluation showing no risk for DINP and DIDP in consumer applications excluding toys and childcare articles that can be put in the mouth, which are restricted[47]. In spite of this, the Danish EPA submitted a dossier to ECHA in 2016, proposing that DINP be classified as a reproductive agent under the CLP Regulation. The Danish dossier is still pending.

A proposal to restrict DEHP, BBP, DBP and DiBP was submitted to ECHA[48] in April 2016. RAC's and SEAC's opinions are expected in 2017.

CRITERIA FOR THE SUSTAINABLE USE OF ADDITIVES

A methodology named ASF (Additives Sustainability Footprint) is being worked out by the VinylPlus Additives Task Force together with TNS, to develop a systematic framework to evaluate the use of substances utilised as additives in PVC products from the perspective of sustainable development. It is an evolution from the previous EPD*plus* and takes into account the current standard Environmental Product Declarations (EPDs) and the EU Product Environmental Footprint (PEF) scheme together with the TNS criteria for sustainability. The work started with PVC window profiles in 2016, and will continue with flexible applications in 2017.

Additive producers continued in 2016 to provide converter associations with the most recent data to help them update their Life Cycle Assessments (LCAs) and EPDs. ESPA completed LCAs for two of its main family of calcium-based stabilisers, and is working on LCAs for liquid mixed-metals stabilisers.



PVC is largely used in hospitals as it helps to create safe environments, thanks to its unique hygienic properties.

[44] ANSES: the French Agency for Food, Environmental and Occupational Health & Safety (www.anses.fr)
[45] http://www.consultations-publiques.developpement-durable.gouv.fr/IMG/pdf/RMOA_ATBC_vf_public.pdf
[46] https://www.anses.fr/en/system/files/CONSO2013SA0176RaEN.pdf
[47] For further information: *'Evaluation of new scientific evidence concerning DINP and DIDP'* (http://echa.europa.eu/ documents/10162/31b4067e-de40-4044-93e8-9c9ff1960715)
[48] https://echa.europa.eu/registry-of-submitted-restriction-proposal-intentions/-/substance-rev/13107/term
[49] Targets, deadlines and status of achievement are summarised in Appendix 1, p. 30
[50] https://ec.europa.eu/clima/policies/strategies/2020_en
[51] EATS: European Automotive Trim Suppliers Association (www.trimsuppliers.eu)
[52] EDEFA: European Decorative and Stationery Plastic Foils Association (www.edefa.org)

PVC window profiles provide excellent thermal insulation.

CHALLENGE 4

SUSTAINABLE USE OF ENERGY AND RAW MATERIALS:

"We will help to minimise climate impacts through reducing energy and raw material use, potentially endeavouring to switch to renewable sources and promoting sustainable innovation." [49]

ENERGY EFFICIENCY

PVC resin producers' commitment to improve energy efficiency by 20% from 2007 levels is considered a major contribution by the sector to achieving the EU 20/20/20 package[50] objective of a 20% reduction in CO_2 emissions by 2020.

Converters, too, are striving to increase their energy efficiency. However, it must be noted that raw materials production represents more than 80% of the energy demand in the life cycle of a PVC product. Therefore, from a life-cycle perspective, savings at the converting levels cannot have a substantial impact on the overall energy use. The complexity and variety of operations in the converting sectors mean that an overall target would be meaningless, as would targets for many of the subsectors. So PVC converters are committed to reporting annually their gains in energy efficiency.

PVC window profiles can play an important role in reducing energy losses in buildings.

Evaluation of available data to assess PVC converters' energy consumption continued in 2016. The analysis conducted so far for each EuPC sector group shows that EPPA and TEPPFA can follow an approach based on the EPD data, and that for ESWA and ERFMI this exercise was 'too complex' for the specificity of their production processes. The assessment was still ongoing for IVK and ERPA, while investigations for EATS[51] and EDEFA[52] would start in 2017.

256,607 tonnes of PVC window profiles were recycled in 2016 within the VinylPlus framework.

PHOTO: COURTESY OF REHAU

EPPA Industrial Energy Saving 2007-2013

The energy consumption of the 'top three' PVC window profile extrusion companies, measured over the period 2007-2013, resulted in a 23% saving for the energy consumption per tonne of PVC product (profile and dry blend). Around 145.6 MJ of electrical energy are now provided from renewable sources.

The peer group, which included 11 PVC window profile extrusion companies, reduced its specific energy consumption per tonne by 9% from 2009 to 2013.

TEPPFA

TEPPFA's members are committed to reducing their energy consumption by 5% from 2010 levels by the end of 2020. No significant change could be identified since the last EPD studies (2009 data), mainly due to the insufficient accuracy of the available data, even though enhanced efficiency solutions have already been implemented in production plants: new LED lighting in factories, AC motors instead of DC for extruders and more efficient cooling systems.

The next EPD update will provide more-reliable data to compare the average consumption estimate of 530 kWh per tonne of product reported in the current EPD (issued in Q2 2016, based on 2013 data).

[53] http://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm
[54] http://www.vinylplus.eu/uploads/docs/Report_on_Renewable_Raw_Materials.pdf
[55] Targets, deadlines and status of achievement are summarised in Appendix 1, p. 30
[56] http://www.amiplastics-na.com/events/Resources/Programme/PVC%20Formulation%202016%20Programme.pdf

SUSTAINABLE FOOTPRINT

As reported in previous years, a dedicated VinylPlus Task Force identified the EU Product Environmental Footprint (PEF) approach currently under development as a promising start. VinylPlus will continue to monitor developments in the EU PEF and will consider potential VinylPlus Sustainability Footprint metrics after the EU PEF pilot phase[53] has been completed.

RENEWABLE RAW MATERIALS

VinylPlus will continue to monitor developments in the production of PVC resin and additives from renewable raw materials, and will produce an updated Status Report by the end of 2020. The Status Report[54] on renewable raw materials completed in 2015 showed that PVC production from renewable resources is technically feasible, but not yet fully sustainable either from an economic or an environmental point of view.

PVC roofing membranes ensure excellent insulation.

PHOTO: COURTESY OF PROTAN

Debating sustainable cities at the VinylPlus Sustainability Forum 2016.

PHOTO: VINYLPLUS

CHALLENGE 5

SUSTAINABILITY AWARENESS:

"We will continue to build sustainability awareness across the value chain – including stakeholders inside and outside the industry – to accelerate resolving our sustainability challenges." [55]

STAKEHOLDER DIALOGUE AND COMMUNICATIONS

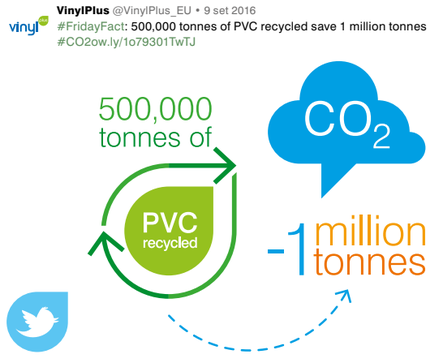
VinylPlus is committed to raising awareness of sustainability at all points on the value chain, as well as among other stakeholders – whether they be inside or outside the PVC industry. VinylPlus also promotes frank and open dialogue with all stakeholders, third parties, institutions and organisations in different communities – technical, political and social.

In April, VinylPlus contributed to the PVC Formulation 2016[56] conference in Cologne, Germany, with a presentation entitled, *'EPDplus, the new comprehensive VinylPlus approach for assessing the sustainable use of PVC additives'*.

Since 2013, the annual VinylPlus Sustainability Forum organised by VinylPlus has brought together stakeholders from academia, government bodies, the UN, the European Commission, NGOs, retailers, architects, designers and all sectors of the PVC industry. At the Forum, they discuss achievements and innovations and explore the way forward to a more-sustainable low-carbon future. The 4th VinylPlus Sustainability Forum, *'Smart Vinyl for Our Cities'*, took place in Vienna, Austria, in April 2016.

The third Partnering for VinylPlus Communication Event was held in Bonn, Germany, in June 2016 to share best practices and a common vision for VinylPlus communications. It was attended by 25

Twitter is an effective and versatile tool for VinylPlus communications with its stakeholders. This was confirmed by the number of followers of VinylPlus' Twitter account – @VinylPlus_EU – more than doubling in 2016



representatives of the VinylPlus Communications Committee, the PVC Network and Sector Groups linked to VinylPlus.

In September 2016, the VinylPlus sustainability programme was presented at the *'Transition to the Green Economy'* conference[57] held in Bratislava, Slovakia. The conference was held to attract the attention of all relevant stakeholders and create a space for informed discussion of the key questions over the transition to a green economy.

'Circular Economy in Practice' was the theme of the VinylPlus fourth stakeholder meeting, which took place in Rome, Italy, in October 2016. The objective was to discuss the contribution of the PVC industry to the circular economy. The meeting was attended by representatives from Italy's Presidency of the Council of Ministers; Ministries of Environment, Economic Development and Health; and National Health Institute.

In October 2016, VinylPlus contributed to the Global Chemical Industry European Convention in Florence, Italy, with a presentation on *'15 Years of Circular Economy in Practice – The European PVC Industry in Action'*.

[57] http://www.t2ge.eu/content/program
[58] http://www.vinylplus.eu//uploads/Modules/Documents/vinyl-in-european-stadiums-180416.pdf
[59] http://www.vinylplus.eu//uploads/Modules/Documents/showing-the-path-for-a-circular-economy-300516.pdf
[60] SSDC: Sectoral Social Dialogue Committee
[61] IndustriAll European Trade Union represents workers across supply chains in manufacturing, mining and energy sectors across Europe
[62] ECEG: European Chemical Employers Group. ECEG is the European employers' organisation representing the interests of the chemical, pharmaceutical, rubber and plastics industries at the European level (www.eceg.org)
[63] https://sustainabledevelopment.un.org/partnership/?p=91

VinylPlus participated in the EU Conference on Plastics, held in Rotterdam, The Netherlands in December 2016. Approximately 300 participants contributed to the development of the European Strategy on Plastics.

In 2016, VinylPlus published a new brochure on *'Vinyl in European Stadiums'*[58], highlighting how the use of PVC combines environmental responsibility and architectural potential. The fact sheet *'Showing the Path for a Circular Economy'*[59] maps out the role of VinylPlus in improving environmental protection in a sustainable and economically viable way.

Cooperation Agreement of the Social Partners of the European Chemical SSDC[60] and VinylPlus on the European PVC Industry

In order to review and update the Social Dialogue Charter dated October 2000 and part of Vinyl 2010, VinylPlus and IndustriAll[61] have developed a new cooperation agreement to be included in the PVC Industry Voluntary Commitment.

This agreement was endorsed by ECEG (European Chemical Employers Group)[62] and formally signed on 24 February 2017 between VinylPlus and the European Chemical SSDC (made of ECEG and IndustriAll) set up at the end of 2004 under the

Sharing best practices and fostering cooperation at the Global Vinyl Council meeting in Melbourne, Australia.

Brigitte Dero (VinylPlus), Sylvain Lefebvre (industriAll Europe) and Emma Argutyan (ECEG) after signing the Cooperation Agreement.

umbrella of the EU Commission Decision 98/500/EC promoting the dialogue between the social partners in the sectors at European level.

This joint commitment on the European PVC industry defines areas and subjects of joint activities of all three parties within this intensified cooperation for the period of 2016-2020.

These areas and subjects will be fully linked to the European Chemical Industry Sectoral Social Partners' 2015-2020 Roadmap and will focus on the following priorities:

- Health & Safety
- Education / training
- Knowledge transfer
- Sector evolution

This commitment to intensify cooperation has been agreed by VinylPlus on behalf of ECVM, ESPA and European Plasticisers (former ECPI). EuPC, VinylPlus' fourth member, agreed to be involved as well. The Cooperation Agreement will be updated accordingly.

The Cooperation Agreement is included in Appendix 2 of this Progress Report.

Engaging Globally

VinylPlus actively shares experience, knowledge and best practices with the other regional PVC associations at a global level. VinylPlus participated in Vinyl India® 2016 in April, the 6th International PVC & Chlor-Alkali Conference in Mumbai. It also participated in the bi-annual meetings of the GVC (Global Vinyl Council), in Vienna, Austria, in April and in Melbourne, Australia, in May.

In December 2016, VinylPlus was selected as a "Highly Commended" entry by The Circulars 2017, an initiative of the World Economic Forum and the Forum of Young Global Leaders. The Circulars is one of the world's premier circular economy award programmes, offering recognition to individuals and organisations that have made notable contributions to the circular economy in the public and private sectors and in wider society.

United Nations

VinylPlus continues to engage in a proactive dialogue with the UN. Vinyl 2010 (the predecessor of VinylPlus) was registered as a Partnership with the Secretariat of the United Nations Commission on Sustainable Development (UNCSD) in 2004. The VinylPlus Voluntary Commitment was included in the Rio+20 Registry of Commitments in 2012. VinylPlus is now registered as a 'SMART' partnership on the UN Partnerships for Sustainable Development Goals Platform[63]. Since 2013, VinylPlus has been a member of the Green Industry Platform (GIP), a joint initiative of the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP).

STEPHAN SICARS
UNIDO
Vienna, April 2016

"The role of VinylPlus aligns very well with the Sustainable Development Goals. VinylPlus allows industry to come together and discuss the main characteristics of sustainability and how they can contribute. VinylPlus can make that visible for Governments, for civil society..."

VINYLPLUS JOINT COMMUNICATIONS PROJECTS

Each year VinylPlus co-funds a range of projects with the aim of expanding the scope of its communications activities. Thirteen projects[64] were implemented in 2016, by five European industry sector organisations and six national PVC associations.

Lead Stabiliser Substitution: Yes we can… and we have already achieved it in the EU!

Boosting the image of VinylPlus' engagement towards a sustainable use of additives by promoting the PVC stabilisers industry's achievement of replacing lead-based stabilisers in the EU-28 by the end of 2015.

Project led by ESPA
Geographic scope: EU


PHOTO: COURTESY OF NOVAFLOOR

TURQUOISE

The TURQUOISE project was aimed at developing Novafloor visibility in France.
That included associated communications tools to increase sales of Novafloor's 100%-recycled PVC products.

Project led by SFEC
Geographic scope: France

Affordable Homes – ecological, cost-efficient and social

Conference aimed at municipal decision makers, planners and architects involved in or responsible for municipal and private building projects, as well as to window and flooring manufacturers.

Project led by AGPU[65]
Geographic scope: Germany

Media Field Trip: exploring the PVC value chain

Promotion of VinylPlus' and European Plasticisers' commitment to sustainability through a media trip in Germany. Journalists were shown production and recycling plants, and had the opportunity to see the plants in operation and get to know the people that work in the industry.

Project led by European Plasticisers
Geographic scope: EU

Flexible PVC in Our Cities: interactive infographic

A computer-generated interactive infographic showing the multiple uses of rigid and flexible PVC in everyday life. The infographic is available at: http://www.plasticisers.org/where-is-pvc-used and can be shared with interested parties.

Project led by European Plasticisers
Geographic scope: EU

Energy- and Resource-Efficient Building Products for Public Procurement

Promotion of PVC products, via relevant Green Public Procurement (GPP) media, as sustainable solutions in public procurement by demonstrating their energy- and resource-efficiency, and their low whole-life cost.

Project led by AGPU
Geographic scope: Germany

PVC Recycling

Improve the collection and recycling of PVC post-consumer waste with an online map of collection points in France.

Project led by SNEP[66]
Geographic scope: France

Outreach to National Association Members Not in TEPPFA

TEPPFA Roadshows with SME pipe producers who are not TEPPFA members, the TEPPFA Forum and an e-magazine. Target: pipe producers, the pipes sector and associated stakeholders and European policy makers; stakeholders from the plastic pipes industry; and members of national associations that are not in TEPPFA.

Project led by TEPPFA
Geographic scope: EU

PVC Goes Bio

Promotion of PVC as a key material for the bio-economy and circular economy. PVC pipes are needed in agriculture and pulp processing, as well as for fences, terraces, and railing systems. PVC profiles are also used in energy-saving applications.

Project led by FIPIF[67]
Geographic scope: Finland


PHOTO: COURTESY OF REHAU

Promotion of PVC as the Sustainable Material of Choice for Windows – aimed at architects, specifiers and installers

Engagement with UK specifiers and installers of PVC products and promotion of the VinylPlus scheme and PVC's sustainability credentials. Implementation of similar projects in other EU states.

Project led by EPPA
Geographic scope: UK-EU

Recycling Kit for Pipes and Windows

To raise awareness of PVC recycling in the building and construction sector. The recycling kit developed by PRE with TEPPFA and EPPA, shows the different stages of the recycling processes, where a new application is formed with recycled content.

Project led by PRE[68]
Geographic scope: EU

Achieve Acknowledgement for PVC Denmark's Closed-Loop Recycling

The project aims to study, document and mitigate resistance to the use of PVC-U in building products in the public area.

Project led by WUPPI
Geographic scope: Denmark

The New Age of PVC Pipes: designers, authorities, utilities

Objective: open a dialogue with Italian utilities and explore the possibility of cooperation in two fields of interest for PVC Forum and VinylPlus: piping and waste. Informing and sensitising designers, engineers and municipalities over the benefits of PVC pipes and the PVC industry's contribution to the circular economy.

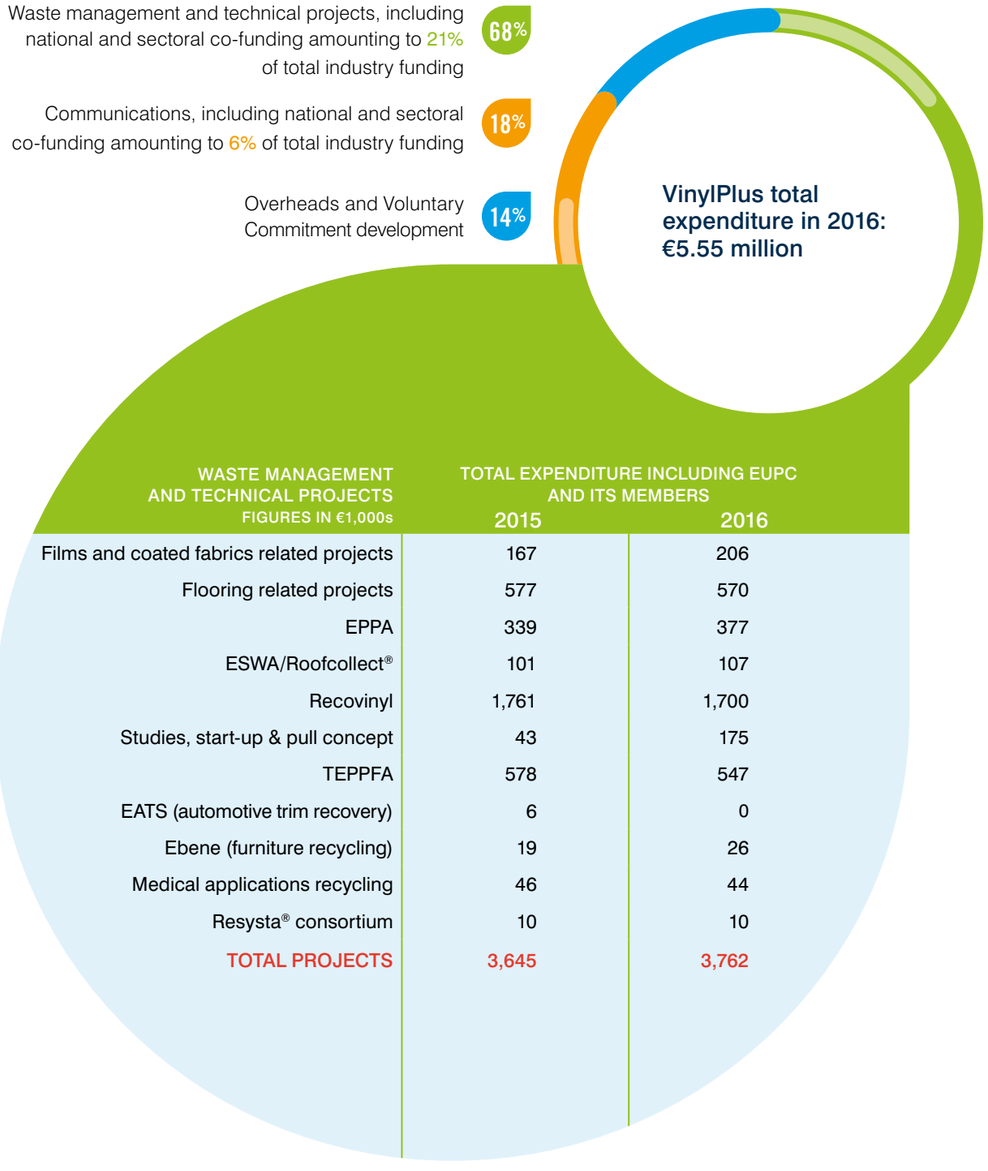
Project led by PVC Forum Italia
Geographic scope: Italy

[64] http://www.vinylplus.eu/community/communications-projects/2016-2
[65] AGPU: Arbeitsgemeinschaft PVC und Umwelt – the German association of the PVC value chain (www.agpu.com)
[66] SNEP: Syndicat National de l'Extrusion Plastique (http://snep.org/presentation-du-snep/)
[67] FIPIF: Finnish Plastics Industries Federation (www.plastics.fi/eng/)
[68] PRE: Plastic Recyclers Europe: the association of the European plastic recyclers (http://plasticsrecyclers.eu/)

Financial Report

Industry expenditure remained stable or only slightly increased in 2016. The increase in total expenditure (+€526,000 compared to 2015) reported below is mainly due to a change of scope of the reporting, which now also includes national and sectoral co-funding for communications projects, for a total of €327,000 in 2016.

Expenditure by VinylPlus, including EuPC and its members, and national and sectoral co-funding for communications projects, amounted to €5.55 million in 2016.



WASTE MANAGEMENT AND TECHNICAL PROJECTS FIGURES IN €1,000s	TOTAL EXPENDITURE INCLUDING EUPC AND ITS MEMBERS 2015	2016
Films and coated fabrics related projects	167	206
Flooring related projects	577	570
EPPA	339	377
ESWA/Roofcollect®	101	107
Recovinyl	1,761	1,700
Studies, start-up & pull concept	43	175
TEPPFA	578	547
EATS (automotive trim recovery)	6	0
Ebene (furniture recycling)	19	26
Medical applications recycling	46	44
Resysta® consortium	10	10
TOTAL PROJECTS	3,645	3,762

Recycled PVC Tonnages

The table below summarises the tonnages of PVC recycled within the VinylPlus framework in the period 1 January 2016 to 31 December 2016, 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 at page 27.

Project	Type of PVC	Tonnage recycled in 2015	Tonnage recycled in 2016
EPCoat (incl. Recovinyl)	Coated fabrics	10,853*	8,187*
Post-consumer Flooring Recycling initiative (formerly **EPFLOOR**)	Flooring	3,938*	3,811*
EPPA (incl. Recovinyl)	Window profiles & related profiles	232,757**	256,607**
ESWA – ROOFCOLLECT® and Recovinyl	Flexible PVC	87,537 which consists of:	91,811 which consists of:
ESWA – ROOFCOLLECT® Recovinyl	Flexible PVC	3,249*	5,082*
	Flexible PVC applications	84,289**	86,729**
TEPPFA (incl. Recovinyl)	Pipes & fittings	49,412**	57,005**
ERPA via Recovinyl (incl. CIFRA and Pack-Upgrade Project)	Rigid PVC films	24,371**	24,061**
Recovinyl (incl. VinyLoop Ferrara)	Cables	106,044	127,214
TOTAL		**514,913**	**568,696**

* Tonnage including Norway and Switzerland
** Tonnage including Switzerland

Verification Statements

KPMG CERTIFICATION OF EXPENDITURE

Independent Accountants' Report on Applying Agreed-Upon Procedures

To the Management of VinylPlus

We have performed the procedures agreed with you and enumerated below with respect to the costs of the supported charges for the different projects of VinylPlus, as included in the VinylPlus Progress Report for the period from January 1, 2016 to December 31, 2016 prepared by the management of VinylPlus.

Scope of Work

Our engagement was carried out in accordance with:

- International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-Upon Procedures regarding Financial Information* as promulgated by the International Federation of Accountants ('IFAC');
- the *Code of Ethics for Professional Accountants* issued by the IFAC. Although ISRS 4400 provides that independence is not a requirement for agreed-upon procedures engagements, you have asked that we also comply with the independence requirements of the *Code of Ethics for Professional Accountants*.

We confirm that we belong to an internationally-recognized supervisory body for statutory auditing.

VinylPlus' management is responsible for the overview, analytical accounting and supporting documents. The scope of these agreed upon procedures has been determined solely by the management of VinylPlus. We are not responsible for the suitability and appropriateness of these procedures.

Because the procedures performed do not constitute either an audit or a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not express any assurance on the cost statement.

Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with International Standards on Auditing or International Standards on Review Engagements other matters might have come to our attention that would have been reported to you.

Sources of Information

This report sets out information provided to us by the management of VinylPlus in response to specific questions or as obtained and extracted from VinylPlus information and accounting systems.

Procedures and Factual Findings

a. Obtain the breakdown of costs declared in the table presenting the supported charges for the different projects of VinylPlus, as included in the VinylPlus Progress Report related to the activities of the year 2016 and verify the mathematical accuracy of this.

   The total expenses amount to KEUR 5,547.

   We found no exceptions as a result of applying this procedure.

b. Verify that these costs are recorded in the financial statements 2016 of VinylPlus AISBL.

   We found no exceptions as a result of applying this procedure.

c. For project ESWA, for all individual expenses greater than EUR 100, agree these expenses to the supporting document and verify that they were incurred between January 1, 2016 and December 31, 2016.

   We found no exceptions as a result of applying this procedure.

d. For project ESWA, for all individual expenses greater than EUR 100, verify that these expenses are recorded in the accounts of the contractor no later than December 31, 2016.

   We found no exceptions as a result of applying this procedure.

e. For project Recovinyl, reconcile costs declared in the table presenting the supported charges for the different projects of VinylPlus with the income recognized in financial statements of Recovinyl AISBL.

   We found no exceptions as a result of applying this procedure.

f. For project not covered by the above procedures, obtain confirmation of costs from legal entity managing or contributing to the project.

   We found no exceptions as a result of applying this procedure, which represents 22.45% of total expenses.

Note that financial statements of VinylPlus AISBL, TEPPFA AISBL and Recovinyl AISBL are certified by KPMG.

Use of this Report

This report is intended solely for the information and use of the management of VinylPlus board, and is not intended to be and should not be used by anyone other than these specified parties.

KPMG Réviseurs d'Entreprises/Bedrijfsrevisoren
Statutory Auditor represented by

DOMINIC ROUSSELLE,
Partner

Mont-Saint-Guibert, April 11, 2017

KPMG REPORT OF FACTUAL FINDINGS REGARDING THE AGREED-UPON PROCEDURES ("AUP") ENGAGEMENT: TONNAGES OF PVC RECYCLED IN THE EU-28 (PLUS NORWAY AND/OR SWITZERLAND) IN 2016, WITHIN THE DIFFERENT PROJECTS OF VINYLPLUS

To the General Manager of VinylPlus AISBL
(hereafter "VinylPlus")

We have performed the procedures agreed with you and enumerated below with respect to the tonnages of recycled PVC (within the following projects of VinylPlus) in 2016:

- in the EU-28 by the sector association The European Plastic Pipes and Fittings Association (hereafter "TEPPFA");
- in the EU-28 (plus Norway and Switzerland) within the ROOFCOLLECT system by the members of the sector association European Single ply Waterproofing Association (hereafter "ESWA") and by the sector association European PVC window Profile and related building Products Association (hereafter "EPPA");
- in the EU-28 (plus Norway and Switzerland) by the (members of the) Arbeitsgemeinschaft PVC-Bodenbelag Recycling (hereafter "AgPR");
- in the EU-28 (plus Norway and Switzerland) within the EPCoat project by the members of the Industrieverband Kunststoffbahnen e.V. (hereafter "IVK"); and
- in the EU-28 (plus Switzerland) within the operations of Recovinyl,

as at April 3, 2017, set forth in the accompanying engagement letter dated March 31, 2017. Our engagement was undertaken in accordance with the International Standard on Related Services (ISRS 4400) applicable to Agreed-Upon Procedures Engagements. The procedures were performed solely to assist you in evaluating the tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2016 and are summarized as follows:

With regard to the MS Excelspreadsheet "KPMG calculation_consoTrecycled_VinylPlus (2016)" for the accounting period January 1, 2016 to December 31, 2016, prepared by management of VinylPlus, regarding the tonnages of recycled PVC (within the above-mentioned projects of VinylPlus) in 2016, we performed the following procedures:

1. Verify, in sheet "VinylPlus 2016" (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 2016 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 Réviseurs d'Entreprises SCRL civile/KPMG Bedrijfsrevisoren burg. CVBA on request of the legal entities listed below, concerning:
     - tonnages of PVC flooring recycled in the EU-28 plus Norway and Switzerland in 2016, by the (members of the) AgPR;
     - tonnages of flexible PVC recycled in the EU-28 plus Norway and Switzerland in 2016, within the ROOFCOLLECT system by the members of the ESWA; and
     - tonnages of PVC recycled in the EU-28 plus Switzerland in 2016, within the operations of Recovinyl;
   - Recycling confirmations regarding PVC flooring;
   - Extracts of Recovinyl internal audit tracking system on audit status for relevant companies; and
   - Communication from the concerned projects of VinylPlus,

   obtained by management of VinylPlus and/or the Senior Project Controller, Mr Geoffroy Tillieux;
2. Verify, in sheet "VinylPlus 2016" the mathematical accuracy of the calculations (to avoid double counting), regarding the quantities of recycled PVC in 2016;
3. Verify, in sheet "Table for progress report" (which contains the table for publication in the VinylPlus Progress Report 2017), the mathematical accuracy of the calculations in column E regarding the tonnages recycled in 2016, based on the concerned tonnages mentioned in sheet "VinylPlus 2016".

The table mentioned above is reproduced in the VinylPlus Progress Report 2017, at page 25 with a total recycled tonnage for 2016 of 568,696 tonnes.

We report our findings below:

- with respect to the procedures 1, 2 and 3, we found no exceptions.

Because the above procedures do not constitute either an audit or a review made in accordance with International Standards on Auditing or International Standards on Review Engagements we do not express any assurance on the tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2016, as of April 3, 2017.

Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to our attention that would have been reported to you.

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 publication for informational purposes in the VinylPlus Progress Report 2017. 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 2016 and items specified above and does not extend to any financial statements of VinylPlus, taken as a whole.

KPMG Réviseurs d'Entreprises/Bedrijfsrevisoren
Statutory Auditor represented by

DOMINIC ROUSSELLE,
Partner

Mont-Saint-Guibert, April 6, 2017

SGS INDEPENDENT VERIFICATION STATEMENT ABOUT THIS VINYLPLUS PROGRESS REPORT 2017

SGS is the world's leading inspection, verification, testing and certification company. We are recognized as the global benchmark for quality and integrity. With more than 90,000 employees, we operate a network of more than 2,000 offices and laboratories around the world.

SGS was commissioned by VinylPlus to provide an independent verification of the "Progress Report 2017". This report presents the commitments and achievements made by the VinylPlus project in 2016.

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 tonnage of PVC waste recycled (verified by KPMG);
- The chapter Financial Report (verified by KPMG);
- The chapter KPMG Certification of Expenditure;
- The chapter KPMG Limited Review of Tonnages.

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 2017" represents VinylPlus' performance in 2016 in a reliable way; this report reflects the effort of VinylPlus to comply with its new Voluntary Commitments of June 2011.

IR PIETER WETERINGS
SGS Belgium NV
Certification and Business Enhancement
Certification Manager
22 March 2017

[69] See special issue of Journal of Cleaner Production and in particular Broman, G.I. and Robèrt, K.H., 2017. A framework for strategic sustainable development. Journal of Cleaner Production, 140, pp.17-31. http://www.sciencedirect.com/science/journal/09596526/140/part/P1.
[70] See http://futurefitbusiness.org

TNS Commentary on VinylPlus Progress Report for 2016

The Natural Step acts as an external advisor, stakeholder intermediary and capacity builder to VinylPlus. Our comments here are based on our 'outside-in' sustainability perspective on the industry and from engaging directly with VinylPlus throughout the year.

Celebrate the Wins but Avoid Complacency

We are pleased to observe continued year-on-year progress within the VinylPlus industry sustainability roadmap for the PVC sector in Europe, as reported in this publication. In some respects, 2016 was a year that created both momentum and recognition. In particular, the audited confirmation that lead substitution from European PVC production is complete, an award acknowledging VinylPlus' contribution to the circular economy and supportive messages from, and engagement with, key stakeholders. These wins should be celebrated and used as motivation.

At the same time we continue to face urgent and mounting sustainability challenges, and there is an acknowledgement of difficulties in hitting certain targets and in meeting increasing stakeholder demands. For example, our Dutch representatives participated in the VinylPlus Sustainability Forum this year and gave a clear message that downstream actors and public sector organisations are in need of tools to help understand and select PVC products that meet the highest sustainability performance and management standards. We again emphasise the relevance of and need for the VinylPlus labelling scheme as a critical tool in light of this.

Continued Work Needed to Secure a Place for PVC Products

The policy framework for the circular economy in Europe and, in particular, high-level investigations on a roadmap for plastics demonstrate how far we are from a sustainable society and the potential for change in resource flows within the economy. These conversations will continue to influence the PVC market, and indeed stakeholders will continue to ask where PVC products can be responsibly used in the circular economy and under what conditions. A clearer European stance on performance expectations and a focus on the applications where PVC offers the most sustainable value would go a long way in the dialogue in Europe and with the PVC industry globally.

The additives used in PVC formulations are critical in determining functional benefits, different applications for PVC products, impacts and management regimes. Therefore, we believe this topic is a priority and we welcome the additional studies looking into specific additives, including the conditions for safe and responsible use of legacy additives in recycled PVC.

In 2016 we also engaged more directly in the VinylPlus Additives Task Force and can state that there is renewed progress on piloting the Additive Sustainable Footprint methodology and criteria for assessing the sustainable use of additives. This is a priority as a building block for showing where attention is needed, where progress is being made and as a context for discussion with policy-makers and other stakeholders.

Making Use of TNS Support and Methods

From The Natural Step's point of view, we constantly evaluate our ability to influence industry and support its transformation toward sustainability. This is connected to our engagement and the use of methods we promote – both are available to anyone committed to the journey of sustainable development.

A business-NGO collaboration requires a good deal of trust and dialogue between people to stay on the path and we appreciate the opportunity to give critical input and advice to VinylPlus. At the same time, we provide a well-recognized open-source framework and a set of peer-reviewed principles to interpret the scientific requirements for sustainability and define paths to reach it. Each industry or actor can use these methods to interpret their challenges, set priorities and deliver results that match stakeholder expectations.

We make this point to encourage more actors to communicate how they are actively using such tools and share the results they are achieving on their own. A focus for us is also to provide additional guidance to enable that to occur, and in 2016 we undertook activities with VinylPlus to communicate how The Natural Step's approach provides the rationale and scientific guideposts for the circular economy.

Staying up to Date with Sustainability Science and Business application

We feel it is also relevant to communicate updates to research underpinning The Natural Step, since the VinylPlus platform builds upon it. The sustainability principles (system conditions) have recently undergone a major revision with a new set of criteria and definitions for social sustainability. It is a priority for us now to ensure that all our stakeholders take note of these developments[69] to stay up to date and make use of the additional guidance now available.

We can also observe that setting science-based targets is becoming an increasingly recognized approach for individual businesses. New developments such as the Future-Fit Business Benchmark[70] translate The Natural Step's thinking into a set of 'must-have' goals for each organisation to contribute to sustainability and make a credible contribution to the UN Sustainable Development Goals. We urge VinylPlus, its member organisations and its stakeholders to acknowledge the "line in the sand" we need to reach and to work together to address the sustainable performance gap.

The Path Ahead

Looking forward, and as noted in previous commentaries, we believe VinylPlus should continue to make progress across all of the five sustainability commitments. In particular, we suggest there be a strong focus on developing the industry's contribution to the circular economy, ensuring that PVC additives are assessed against a credible and holistic set of criteria and promoting the uptake of labelled products that set the performance benchmark and deliver a clear signal to the market.

LENA JOHANSSON,
Project leader

RICHARD BLUME,
Senior Advisor

The Natural Step Stockholm
The Natural Step

Appendix 1

VINYLPLUS VOLUNTARY COMMITMENT TARGETS

CHALLENGES

CONTROLLED-LOOP MANAGEMENT:

"We will work towards the more efficient use and control of PVC throughout its life cycle."

TARGETS

1. Recycle 800,000 tonnes/year of PVC by 2020. > **ongoing**

2. Exact definitions and reporting concept to be available by end 2011. > **achieved**

3. Develop and exploit innovative technology to recycle 100,000 tonnes/year of difficult-to-recycle PVC material (within the overall 800,000 tonnes/year recycling target) by 2020. > **withdrawn (see p. 12)**

4. Address the issue of 'legacy additives' and deliver a status report within each annual VinylPlus Progress Report. > **ongoing**

ORGANOCHLORINE EMISSIONS:

"We will help to ensure that persistent organic compounds do not accumulate in nature and that other emissions are reduced."

TARGETS

1. Engage with external stakeholders in the discussion on organochlorine emissions during 2012. > **achieved**

2. Develop a plan to deal with stakeholder concerns on organochlorine emissions by end 2012. > **achieved**

3. Compliance with the PVC resin Industry Charters by first Quarter 2012. > **partially achieved (see p. 13)**

3.a. Achieve full compliance by 2020.

4. Risk assessment for the transportation of major raw materials, in particular VCM, by end 2013. > **achieved in 2015**

5. Target zero-accident rate with VCM release during transportation in the next 10 years. > **ongoing**

SUSTAINABLE USE OF ADDITIVES:

"We will review the use of PVC additives and move towards more sustainable additive systems."

TARGETS

1. Lead (Pb) replacement in the EU-27 by end 2015 (extended to the EU-28 in 2014). > **achieved**

2. Robust criteria for the 'sustainable use of additives' to be developed, with status report by end 2012. > **achieved in 2014**

3. Validation of the robust criteria for the 'sustainable use of additives' in conjunction with the downstream value chain, with status report by end 2014. > **partially achieved**

3.a. Develop a methodology for the sustainable choice of additives for profiles and flexible applications.

3.b. Develop a systematic framework methodology, taking into account the EU PEF concept.

4. Other PVC additive producers and the downstream value chain will be invited to participate in the 'sustainable additives' initiative. > **ongoing**

SUSTAINABLE USE OF ENERGY AND RAW MATERIALS:

"We will help to minimise climate impacts through reducing energy and raw material use, potentially endeavouring to switch to renewable sources and promoting sustainable innovation."

TARGETS

1. Establish Energy Efficiency Task Force by end 2011. > **achieved**

2. PVC resin producers to reduce their specific energy consumption, targeting 20% by 2020. > **ongoing**

3. Define targets for specific energy reduction for converters by end 2012. > **partially achieved**[71]

3.a. PVC converters will report their gains in energy efficiency year on year.

4. Energy Efficiency Task Force to recommend suitable environmental footprint measurement by end 2014. > **delayed (waiting for the EU PEF pilot phase results)**

5. Establish Renewable Materials Task Force by end first Quarter 2012. > **achieved**

6. Renewable Materials Task Force's status report by end 2012. > **achieved + extended**

6.a. Updated status report by the end of 2020.

SUSTAINABILITY AWARENESS:

"We will continue to build sustainability awareness across the value chain – including stakeholders inside and outside the industry – to accelerate resolving our sustainability challenges."

TARGETS

1. VinylPlus web portal to go online in summer 2011. > **achieved**

2. VinylPlus Monitoring Committee, which will meet a minimum of twice a year, will be established by end 2011. > **achieved + ongoing**

3. A VinylPlus Membership Certificate will be launched end 2011. > **achieved**

4. A public, and independently audited, VinylPlus Progress Report will be published annually and proactively promoted to key stakeholders. With the first edition being published in 2012. > **achieved + ongoing**

5. Annual external stakeholder meetings will be organised, commencing in 2012. > **achieved + ongoing**

6. A VinylPlus product label will be launched by end 2012. > **launch achieved in 2014; implementation being reviewed**

7. ECVM will take an active role in promoting VinylPlus within international PVC industry organisations worldwide. > **ongoing**

8. ESPA stabiliser producers will actively promote VinylPlus outside the EU-28. > **ongoing**

9. VinylPlus will increase the number of programme participants by 20% compared to 2010 by end 2013. > **not achieved**[72]

10. VinylPlus will engage with five global brand holders by end 2013. > **partially achieved + ongoing**

11. A review of progress towards the globalisation of the approach will be undertaken by end 2015. > **achieved**

12. A Social dialogue commitment endorsed by the EU Sectoral Social Dialogue Committee for the Chemical Industry will be included in the VinylPlus programme by the end of 2016. > **achieved + ongoing**

[71] Converters are striving to increase their energy efficiency. However, due to the complexity and variety of operations in the converting sectors, an overall target would be meaningless, as would targets for many of the subsectors.

[72] Even if the target was not achieved in 2013, VinylPlus continued and will continue to work on increasing the number of programme participants

Appendix 2

COOPERATION AGREEMENT OF THE EUROPEAN CHEMICAL SECTORAL SOCIAL DIALOGUE COMMITTEE AND VINYLPLUS ON THE EUROPEAN PVC INDUSTRY

The industry associations ECVM, ECPI and ESPA on the one hand and EMCEF[73] on the other hand agreed in 2000 to a social dialogue on important issues for all involved partners, as part of the Vinyl 2010 programme.

As part of the 2015 VinylPlus revision and following the formal enlargement of the scope of the European Chemical Sectoral Social Dialogue Committee (SSDC) in 2015 to include, among others the plastics sector as well, VinylPlus, in charge of implementing the voluntary programme of the European PVC industry, and ECEG / IndustriAll Europe, together representing the European Chemical SSDC, have agreed to intensify their cooperation.
This cooperation agreement on the European PVC Industry defines areas and subjects of joint activities of all three parties within this intensified cooperation for the period of 2017-2020 (3 years) (with an annual evaluation of the cooperation at the Plenary of the SSDC).

These areas and subjects will be fully linked to the European Chemical Industry Sectoral Social Partners' 2015-2020 Roadmap and will focus on the following priorities:

- Health & Safety
- Education / training
- Knowledge transfer
- Sector evolution
- Objectives
- Agenda
- Expected results

The European Chemical Social Partners will actively engage with key stakeholders in order to pave the way towards a sustainable future as mentioned above and based on efficient use of resources and sound waste management.

Development of the PVC Industry in Europe

The regular meetings of the European SSDC of the Chemical, Pharmaceutical, Rubber and Plastics Industries cover views on the EU legislative developments affecting the sectors concerned, including the PVC industry in Europe.
Together with experts from VinylPlus, ECEG and IndustriAll Europe will intensify their exchange on the issues at stake and the progress on decided actions and subsequent decisions to be taken in the SSDC with regard to the European PVC industry.

Health and Safety and Environmental Standards

In the EU, the production, use and recycling of PVC applications and their raw materials are governed by the respect of high safety and environmental standards. These high standards guarantee a safe production and use of PVC applications. Such high standards require continuous research and implementation of new scientific findings and a clear focus on health and safety as well as environmental issues.
At company level, appropriate and comprehensive information and training of the workforce are an important precondition for handling PVC and its raw materials safely.

The SSDC will together with VinylPlus discuss PVC R&D programmes and findings, with the objective to improve dissemination of information and training programmes in order to manage risk exposures safely.

One envisaged action is to discuss with the Consultative Commission on Industrial Change (CCMI[74]) the possibility of launching a study on industrial changes in the converting sector and/or in the recycling sector, which could deal with sectoral policies developments, evolution of R&D, innovation, digitalisation in the sector and the evolution of the requested competencies.

Specific Focus on Recycling Facilities

One needs to take into account that most of recyclers are SMEs and only a small part of the recyclers (10-20%) use SDS-R today. EuPC*/PRE have already taken some actions to substantially increase this figure. To support these activities in Europe the SSDC together with VinylPlus will work on implementing this project with the following objectives:

- preparation of a brochure providing a detailed overview of health and safety aspects in the plastics recycling sector, in order to make sure that the workers' protection is continuously ensured in the different steps of the recycling process. This brochure should be made available in several languages (minimum EN, FR, DE, ES and IT)
- organisation of workshops in several EU Member States with the objectives to cover large parts of the European plastics recycling sector to disseminate the findings and information.

Training and Lifelong Learning

High technological standards as well as a qualified, competent and motivated workforce are prerequisites for high environmental, health and safety standards in the PVC industry.

A high level of continuous training (throughout the working life) is essential for employment security within the PVC industry and also for the creation of employment opportunities in allied industries.
The SSDC together with VinylPlus will discuss the need to develop further specific training geared to the needs of the PVC industry. A particular attention will be paid to digital transformation and the development of job content in this respect.

The objective will be to facilitate the implementation of high-level standards in all EU Member States, taking into account their specific situations and traditions.

Bruxelles, 24 February 2017

EMMA ARGUTYA
Director General
ECEG

SYLVAIN LEFEBVRE
Deputy Secretary General
industriAll Europe

BRIGITTE DERO
General Manager
VinylPlus

[73] EMCEF: European Mine Chemical and Energy Workers Federation, now IndustriAll European Trade Union
[74] CCMI: Commission Consultative des Mutations Industrielles (Consultative Commission on Industrial Change)

* This commitment to intensify cooperation has been agreed by VinylPlus on behalf of ECVM, ESPA and European Plasticisers (former ECPI). Its fourth member, EuPC, will be involved at a later stage.

Appendix 3

GLOSSARY

ATBC Acetyl tri-butyl citrate
BBP Butyl benzyl phthalate
B&C Building and construction
Ca Calcium
CLP European Regulation on Classification, Labelling and Packaging of chemical substances and mixtures. The legislation introduced throughout the EU a new system for classifying and labelling chemicals, based on the United Nations' Globally Harmonised System (UN GHS)
DBP Di-n-butyl phthalate
DCHP Di-cyclohexyl phthalate
DEHP Di(2-ethylhexyl) phthalate
DEHTP Di(2-ethylhexyl) terephthalate
DIBP Di-isobutyl phthalate
DIDP Di-isodecyl phthalate
DiOP Di-isooctyl phthalate
DINCH Di-isononyl cyclohexane dicarboxylate
DINP Di-isononyl phthalate
DnHP Di-n-hexyl phthalate
DOTP Di-octyl terephthalate
DPHP Di(2-propyl heptyl) phthalate
EC European Commission
ECHA European Chemicals Agency (http://echa.europa.eu)
ECVM The European Council of Vinyl Manufacturers (www.pvc.org)
ECVM 2010 The ECVM's formal legal entity, registered in Belgium
EDC Ethylene dichloride or 1,2-dichlorethane
EPA Environmental Protection Agency
EPCOAT IVK Europe PVC Coated Fabrics Sector Project
EPD Environmental Product Declaration
EPFLOOR European PVC Floor Manufacturers, an EuPC sector group (www.epfloor.eu)
EPPA European PVC Window Profile and Related Building Products Association, an EuPC sectoral association (www.eppa-profiles.eu)
E-PVC Emulsion polyvinyl chloride
ERPA European Rigid PVC Film Association, an EuPC sectoral association (www.pvc-films.org)
ERFMI European Resilient Flooring Manufacturers' Institute (www.erfmi.com)
ESPA The European Stabiliser Producers Association (www.stabilisers.eu)
ESWA European Single Ply Waterproofing Association, an EuPC sectoral association (www.eswa.be)
EUPC European Plastics Converters (www.plasticsconverters.eu)
EUROPEAN PLASTICISERS Former ECPI, European Council for Plasticisers and Intermediates, (www.europeanplasticisers.eu)
GHS Globally Harmonised System of Classification and Labelling of Chemicals
GIP Green Industry Platform (www.greenindustryplatform.org)
HMW PHTHALATES High Molecular Weight phthalates
INDUSTRY CHARTERS ECVM Industry Charters for the Production of VCM and S-PVC (1995) and for the Production of E-PVC (1998)
IVK EUROPE Industrieverband Kunstoffbahnen e.V. (Association of Coated Fabrics and Films – www.ivk-europe.com)
KPMG KPMG is a global network of professional firms providing audit, tax and advisory services (www.kpmg.com)
LCA Life Cycle Assessment
LMW PHTHALATES Low Molecular Weight phthalates
NaCL Sodium Chloride
Pb Lead
PEF Product Environmental Footprint
PLASTICISERSPLUS European Plasticisers' legal entity, based in Brussels, Belgium
POP Persistent Organic Pollutants
ppm Part per million (also equivalent to 1 mg per kg)
PRE Plastics Recyclers Europe (www.plasticsrecyclers.eu)
PVC Polyvinyl chloride
P-PVC Plasticised PVC
RAC Risk Assessment Committee
REACH Registration, Evaluation, Authorisation and Restriction of Chemicals
RoHS EU legislation restricting the use of hazardous substances in electrical and electronic equipment (RoHS Directive 2002/95/EC)
RoHS 2 The recast RoHS Directive 2011/65/EU (RoHS 2) entered into force on 21 July 2011
R-PVC Recycled PVC
SDGs Sustainable Development Goals
SDS Safety Data Sheet
SDS-R Safety Data Sheet for Recyclates
SGS Société Générale de Surveillance, the world's leading testing and verification organisation (www.sgs.com)
S-PVC Suspension polyvinyl chloride
SSDC Sectoral Social Dialogue Committee
SVHC Substances of Very High Concern
TEPPFA The European Plastic Pipes and Fittings Association, an EuPC sectoral association (www.teppfa.eu)
TNS The Natural Step (www.thenaturalstep.org), a sustainability NGO acting as critical friend and sustainability advisor to VinylPlus
TXIB 2,2,4-trimethyl-1,3-pentanediol di-isobutyrate
UN United Nations
UNEP United Nations Environment Programme
UNIDO United Nations Industrial Development Organization
VCM Vinyl chloride monomer
VINYL 2010 the first 10-year Voluntary Commitment of the European PVC industry, signed in 2000
WUPPI Danish company set up to collect and recycle rigid PVC (www.wuppi.dk)

The European PVC Industry

Polyvinyl chloride, or PVC, is one of the most widely used polymers in the world. Because it is so versatile, PVC is used extensively in a broad range of industrial, technical and everyday applications.

PVC is an intrinsically low-carbon plastic: 57% of its molecular weight is accounted for by chlorine derived from common salt; 5% is hydrogen; and 38% is carbon. It is recyclable and is increasingly being recycled. The European PVC industry has been working hard to boost collection and improve recycling technologies.

Several recent eco-efficiency and LCA studies of major PVC applications have shown that in terms of energy use and GWP (Global Warming Potential), the performance of PVC is comparable to that of alternative products. In many cases, PVC applications showed advantages in terms of both lower total energy consumption and lower CO_2 emissions.

Due to its light weight, durability and stability, PVC can offer energy, cost and material efficiency gains for sectors such as building and construction, water distribution, health and transportation.

At the European level, the PVC value chain is represented by four associations:

The European Council of Vinyl Manufacturers,

representing six leading European producers of PVC resin, which account for around 75% of the EU-28 PVC resin production. These businesses operate around 40 different plants spread over 23 sites, and employ approximately 7,000 people. **www.pvc.org**

European Plastics Converters,

an association representing close to 50,000 companies in Europe, which produce over 45 million tonnes a year of plastic products of various types. They employ approximately 1.3 million people. **www.plasticsconverters.eu**

The European Stabiliser Producers Association,

representing 10 companies that produce more than 95% of the stabilisers sold in Europe. They directly employ more than 2,000 people in the EU. **www.stabilisers.eu**

European Plasticisers,

formerly ECPI (The European Council for Plasticisers and Intermediates), representing the eight major European producers of plasticisers and intermediates. They employ approximately 1,200 people in plasticiser production. **www.europeanplasticisers.eu**

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