



Vinyl Council Australia



PVC STEWARDSHIP

15 years of vinyl industry reporting in Australia

PVC STEWARDSHIP PROGRAM
PROGRESS REPORT 2017

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Summary of Key Commitments

Our Signatories commit to undertake and report on these actions:

Best Practice Manufacturing

1.1 Embed PVC Stewardship commitments in the Signatory company's business management system.	<ul style="list-style-type: none"> Show that the PVC Stewardship Program commitments are embedded in company's business management system (i.e. policies and procedures).
1.2 Environmental management systems (EMS)	<ul style="list-style-type: none"> Meet or exceed <i>PVC industry's Minimum Acceptable Standard for Environmental Management</i>.
1.3 Mercury avoidance	<ul style="list-style-type: none"> Verify via suppliers that the PVC resin contained in PVC product sold in Australia is sourced from mercury-free processes.
1.4 Suspension PVC (S-PVC)	<ul style="list-style-type: none"> VCM emissions from S-PVC manufacture are no greater than 43g/tonne S-PVC measured on a 12 month basis. Residual VCM in supplied S-PVC resin powder is not greater than 1ppm in 99 percent batches tested.
1.4.1 Vinyl Chloride Monomer (VCM) Emissions from manufacturing	
1.4.2 Residual Vinyl Chloride Monomer	
1.5 Emulsion PVC (E-PVC)	<ul style="list-style-type: none"> VCM emissions from E-PVC manufacture are no greater than 500g/tonne E-PVC measured on a 12 month basis. Residual VCM in supplied E-PVC resin is not greater than 1ppm in 99 percent batches tested.
1.5.1 Vinyl Chloride Monomer (VCM) Emissions from manufacturing	
1.5.2 Residual Vinyl Chloride Monomer	
1.6 Life Cycle Thinking (LCT)	<ul style="list-style-type: none"> Demonstrate that impacts have been considered and addressed in the development or introduction of new PVC products for the Australian market.

Safe and Sustainable use of Additives

2.1 Stabilisers and pigments	<ul style="list-style-type: none"> Avoid use of lead, cadmium and hexavalent chromium additives. New Signatories still using these additives will agree on specific phase out dates upon joining the Program. Any use of these additives shall be reported annually.
2.2 Recycling PVC containing legacy additives	<ul style="list-style-type: none"> Recycle responsibly end-of-life PVC products that contain legacy additives.
2.3 Plasticisers	<ul style="list-style-type: none"> Avoid the use of ortho-phthalate plasticisers in PVC food contact packaging film supplied to the Australian market; Report annually on the use and type of low molecular weight ortho-phthalates;

2.3 Plasticisers (cont)	<ul style="list-style-type: none"> Support regulatory authorities in measures that encourage the market to cease the use of low molecular weight phthalate plasticisers in applications where credible scientific authorities show evidence of unacceptable health or environmental impacts; Recommend inclusion of approaches for safe plasticiser use in relevant Australian Standards or revisions as appropriate.
2.4 Open Disclosure	<ul style="list-style-type: none"> Disclose information on additives used in PVC products to stakeholders upon request.

Energy and Greenhouse Gas Emissions

3.0 Energy Efficiency and Greenhouse Gas Emissions	<ul style="list-style-type: none"> Comply with the PVC industry's Charter on Energy and Greenhouse Gas Emissions to demonstrate a commitment to improving the energy and greenhouse gas emission profile of PVC products.
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Resource Efficiency

4.1 Post-industrial PVC product waste	<ul style="list-style-type: none"> Reduce post-industrial PVC waste sent to landfill to <2 percent of the total production of saleable PVC product.
4.2 recoPVC	<ul style="list-style-type: none"> Use recoPVC in the PVC products supplied to the Australian market (unless product standards and codes restrict the use of recycled materials).
4.3 Consumer Responsible Care	<ul style="list-style-type: none"> Publicly inform consumers on how to and where to reuse, recycle or dispose of the product safely at end-of-life.
4.4 Packaging waste	<ul style="list-style-type: none"> Recycle a minimum 70 percent of incoming recyclable packaging materials associated with the manufacture or supply of PVC products to the Australian market; Undertake actions to encourage the recycling of packaging materials leaving the Signatory's facility.

Transparency and Engagement

5.1 Public Reporting	<ul style="list-style-type: none"> Publish a performance report by 31 May every year. Publish an evaluation of the Program every five years.
5.2 Research Monitoring	<ul style="list-style-type: none"> Monitor national and international scientific research and share pertinent information with Signatories and stakeholders, including updates on pertinent issues and developments related to aspects of the PVC life cycle.
5.3 Stakeholder Engagement	<ul style="list-style-type: none"> A Technical Steering Group consisting of industry and non-industry stakeholders shall monitor and report on the implementation of the PVC Stewardship Program; Provide opportunities for stakeholders to offer feedback on the Program.

The PVC Stewardship Program (the Program) is an on-going, long term, voluntary undertaking by the Australian PVC (or vinyl) industry to recognise, and progressively address, relevant environmental, health and safety issues along the PVC product life cycle within responsible, deliverable timeframes.

Launched in 2002, the aim of the Program is to guide the continuous improvement and sustainable development of the Australian PVC industry. Shared responsibilities and goals enable raw material suppliers, product manufacturers and distributors to be joint stewards of the safe and beneficial production, use and disposal of PVC products in Australia. The Program brings industry together to measure the performance of signatory companies in relation to five key themes associated with the life cycle of PVC (Figure 1). Taken together, they reflect the coherent and robust intention of the Program Signatories to strive towards a circular economy for vinyl.

Each theme embeds a series of commitments which the Signatories are required to implement and report on annually. Given the varied nature of signatory businesses, the list of commitments applicable to each company varies depending on its activity and position in the supply chain.

As the Program evolves year to year with new or revised commitments, benchmarks or reporting requirements, the Program remains a constant challenge to improve performance and reduce the environmental footprint of vinyl products in the market here.

Through company-based annual self-assessment, reporting and independent audits, Signatories' compliance performance is measured and benchmarked, and the information collated to provide a measure of the industry's overall progress. This report details the 2017 performance of the industry and has been independently verified by Ernst and Young.

Since 2013, the Program's overall progress has been measured against two milestones:

- Signatories are to comply with at least 50 percent of relevant commitments (first year reporters excluded)
- 80 percent of Signatories are to achieve at least 80 percent compliance.

Companies achieving full compliance with relevant commitments are recognised with annual Excellence in PVC Stewardship awards.

PVC STEWARDSHIP



Figure 1: The five key areas of the Program

Each tick of the cycle represents a section of our Program. Taken together it reflects the coherent and robust intention of our Program as industry strives towards closed loop management.



Photo: Armstrong



Photo: Chemson



Photo: Tarkett

With the Program now in its 16th year, the performance of the Australian vinyl industry has been continually assessed, measured and reported for 15 years. The number of companies signed up to the Program has grown from 33 at its launch in 2002, to 44 in 2017.

The Program is...

'one of the longest standing product stewardship programs in Australia and one of the few with a full life cycle approach. The program is leading in many areas, including in its life cycle approach, specific and measurable commitments, transparency, and focus on continuous improvement'

Dr Helen Lewis

(Helen Lewis Research, consultant specialising in product stewardship and sustainable packaging)

Achievements to date:

Developing and implementing an industry strategy to advance PVC recycling practice in Australia

Adopting a charter to improve energy efficiency and reduce greenhouse gas emissions associated with PVC supply chains

Phasing out the use of cadmium stabilisers by Signatories by end 2004

Sourcing resins that avoid the use of mercury in upstream manufacturing processes

Encouraging adoption of environmental management systems that enable Signatories to identify environmental impacts resulting from activities and improve environmental performance across sites

Sourcing resins from plants with low VCM manufacturing emissions (less than 43g VCM per tonne)

Voluntarily strictly limiting the residual vinyl chloride content of resins used to less than 1 ppm

Encouraging minimization and recycling of PVC manufacturing waste and packaging wastes

Reducing total use of lead stabilisers and pigments by Signatories by 97.7% since 2002

Encouraging the use of pre- and post-consumer PVC recycle in new products

Fostering transparency through public reporting of annual progress reports with independent third-party verification



The PVC Stewardship Program has been fostering continuous improvement through the industry in Australia, for both locally made and imported products since 2002. The information and data collected through the program has helped inform industry and stakeholders, influence product design and ensure the Australian PVC industry continues to innovate. It has also been a vehicle for engaging stakeholders and understanding the opportunities and challenges that lay ahead for industry.

It was pleasing to see in 2017 a record number of companies from the vinyl value chain committed to the Program. Four new Signatories reported for the first time. At a time in Australia when there is increasing government and stakeholder focus on the need for appropriate product stewardship, and rising concern about management of end-of-life products and materials, embodied carbon and transition from fossil fuel consumption, we are proud to have an existing framework with which to engage and work with industry.

This year, in accordance with a commitment made from the start to review every five years the effectiveness of the Program in delivering its stated outcomes and in its implementation, a high-level review of the Program was conducted by an independent consultant with expertise in product stewardship. The report found the Program has established ambitious objectives and targets for its Signatories and high levels of performance are generally being achieved. It found the PVC Stewardship Program was leading in many areas, including in its life cycle approach; specific and measurable commitments; transparency and focus on continuous improvements. The program remains relevant and is achieving its stated objectives.

It was pleasing to note the reviewer also found the Program well managed with positive aspects of the Program's governance being a strong focus on stakeholder engagement and research monitoring to ensure that the Program addresses new or emerging issues for the PVC supply chain and transparency of outcomes including publication of audited annual reports, such as this one.

This year's independent verification process was completed by Ernst & Young (EY) and included verification of nine Signatory assessments at Signatory sites and one assessment completed over the phone, an increase on previous years given the increased number of Signatories, as well as verification of this written report. EY's verification statement is included at the end of the report.

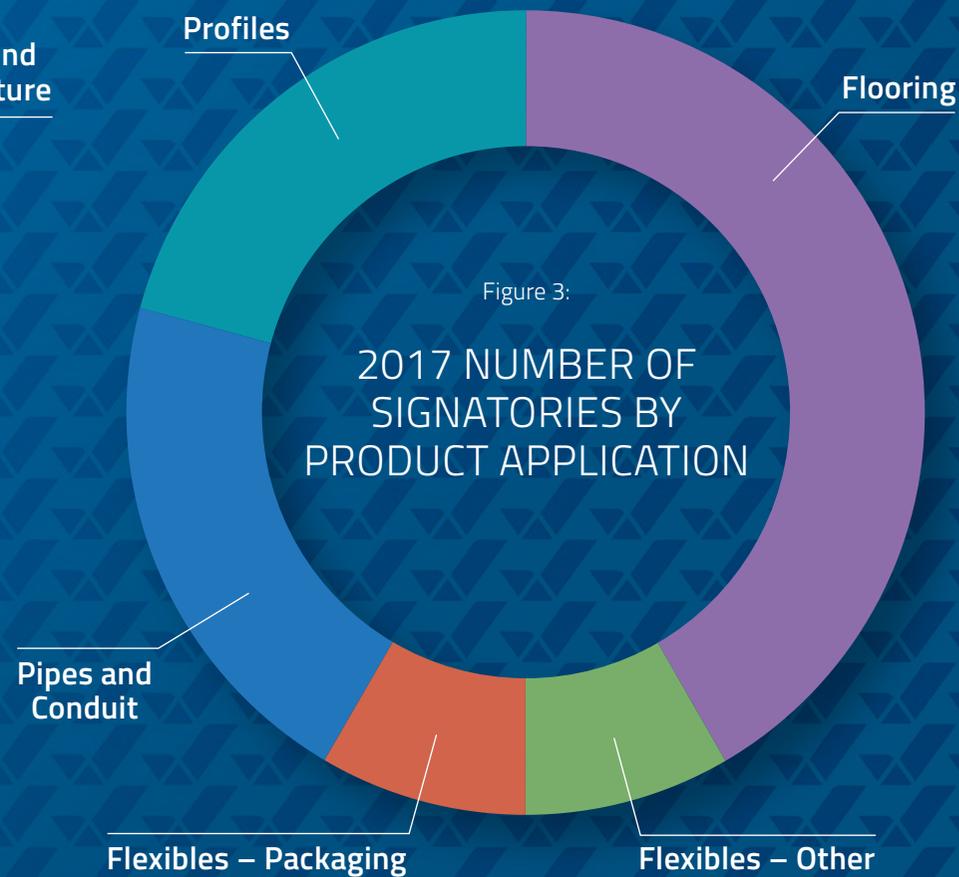
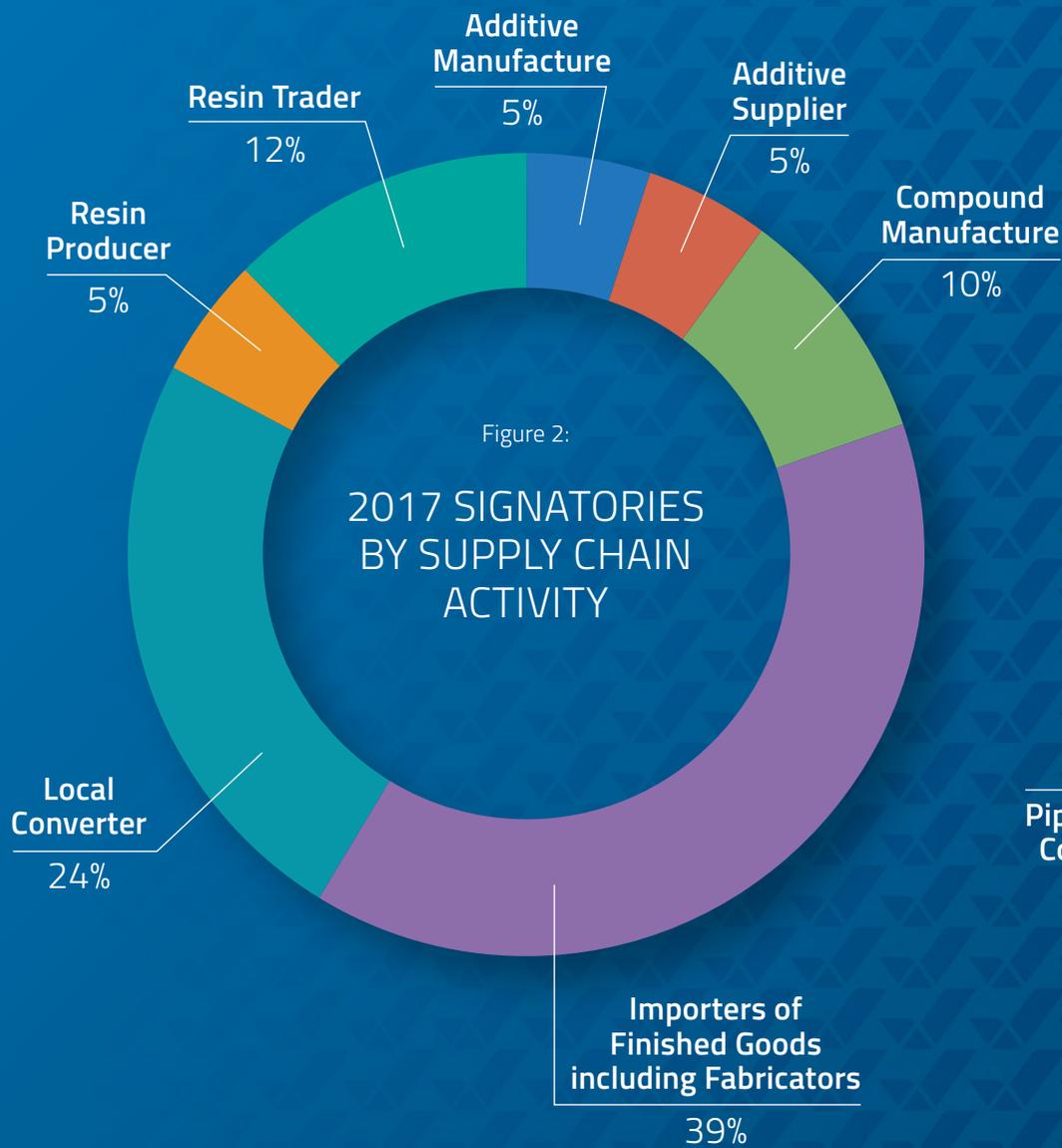
I would like to thank the Signatories for their continued commitment to the Program and particularly congratulate the ten founding Signatories who recently received a certificate from the Vinyl Council recognising and commending their unwavering engagement in the Program since its launch in 2002. Each Signatory puts in considerable work to source data from their supply chain and own operations for the annual reporting process.

I would also like to thank the stakeholders who provide valuable input and feedback over the course of the year, especially those who participate in the Technical Steering Group meetings: our scientific and government representatives CSIRO and Department of Environment and Energy and our industry representatives Armstrong Flooring, Australian Vinyls Corporation, Australian Flooring Resilience Association, Baerlocher Malaysia, Baxter Healthcare, Breath Fresh Australia, Chemson Pacific Australia, Deceuninck, Gerflor Australasia, Iplex Pipelines Australia, Speciality Polymer Chemicals, SunAce Australia, Vinindex and Welvic Australia. Their insights have helped the PVC Stewardship Program to become well recognised amongst the PVC supply chain nationally and internationally, as well as amongst relevant government and stakeholders in our market.

Finally, I encourage anyone in the business of procuring PVC products in Australia to seek evidence of their suppliers' commitment to product stewardship. Signatories to this proven Program are entitled to display the PVC Stewardship trademark, and those that achieve full compliance receive an Excellence in PVC Stewardship mark as evidence of their commitment.

A handwritten signature in black ink, appearing to read 'I. Lilja'.

Ian Lilja
*Chairman, Technical Steering Group,
PVC Stewardship Program Director, Vinyl Council of Australia*



Number of Signatories
(at 31 Dec 17)

44

Number of New Signatories

4

Number of Signatories Assessed

41

Signatories Failing to Report

3 Reasons for failure to report:

- Organisational changes during reporting period
- One company has failed to report for 2 consecutive years and will be notified it will be de-listed as a Signatory.

Companies who fail to report are put on notice to demonstrate they are continuing to meet the commitments and make progress; they will be expected to report and may be independently audited next year.

Program Milestones

100%
of reporting Signatories had at least 50% compliance.

78%
of reporting Signatories achieved at least 80% compliance, just short of our target of 80% of Signatories.

Signatories achieving Excellence in PVC Stewardship Status

17

COMPARED TO 9 IN 2016

2012–17 Five Year Review Completed

It identified future challenges for the program and proposed recommendations for on-going program development.

Independent Verifications

9 site visits conducted in New South Wales, Victoria and Queensland,

1 telephone interview conducted with an overseas Signatory.

Elimination of Lead Stabiliser Use

2 Signatories reported use in 2017 (refer to page 14).

97.7%
less lead stabiliser used today by Signatories than in 2002.

Notable Compliance Improvement

Adoption and implementation of **Environmental Management Systems** rose to 88% compliance. Reporting for **E-PVC Emissions** rose from 85% to 90% compliance. 13 out of 14 relevant Signatories have minimised the quantity of **post-industrial PVC** waste requiring landfill disposal. More than half of Signatories (26) have signed up to the voluntary **Packaging Waste** commitment. The number of Signatories complying with the **Energy Efficiency and Greenhouse Gas Charter** improved to 93 percent in 2017 (90 percent in 2016, 69 percent in 2015).

Commitment Highlights

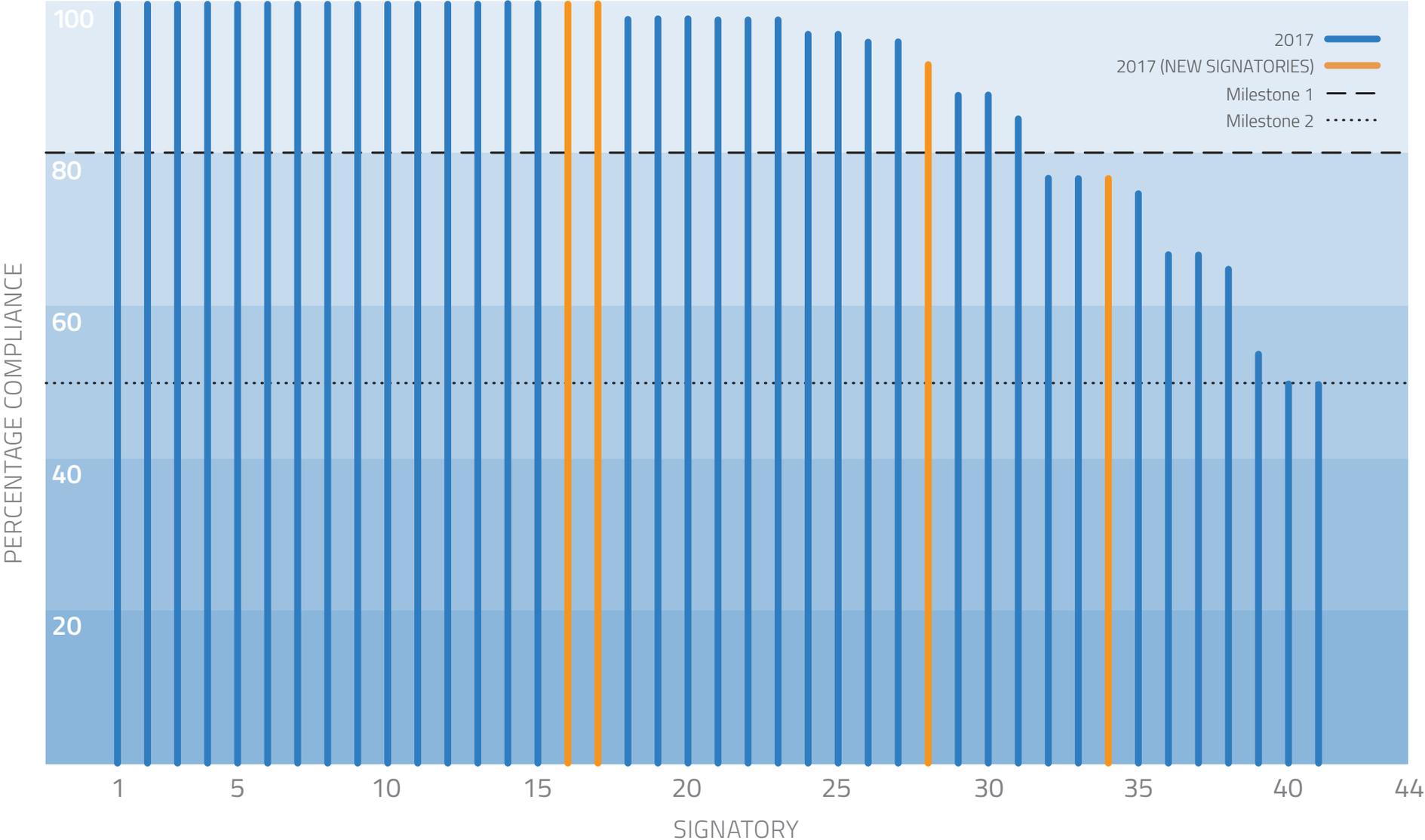
Full compliance was achieved, by relevant Signatories, in relation to three commitment areas:

- Adoption of Life Cycle Thinking in development of new products
- Adherence to the policy on use of Legacy Additives
- Adherence to the policy on use of Plasticisers.



Figure 4: Performance by Commitment 2016–2017 (percent)

Figure 5: 2017 Compliance rate achieved, by Signatory, and by program milestones.



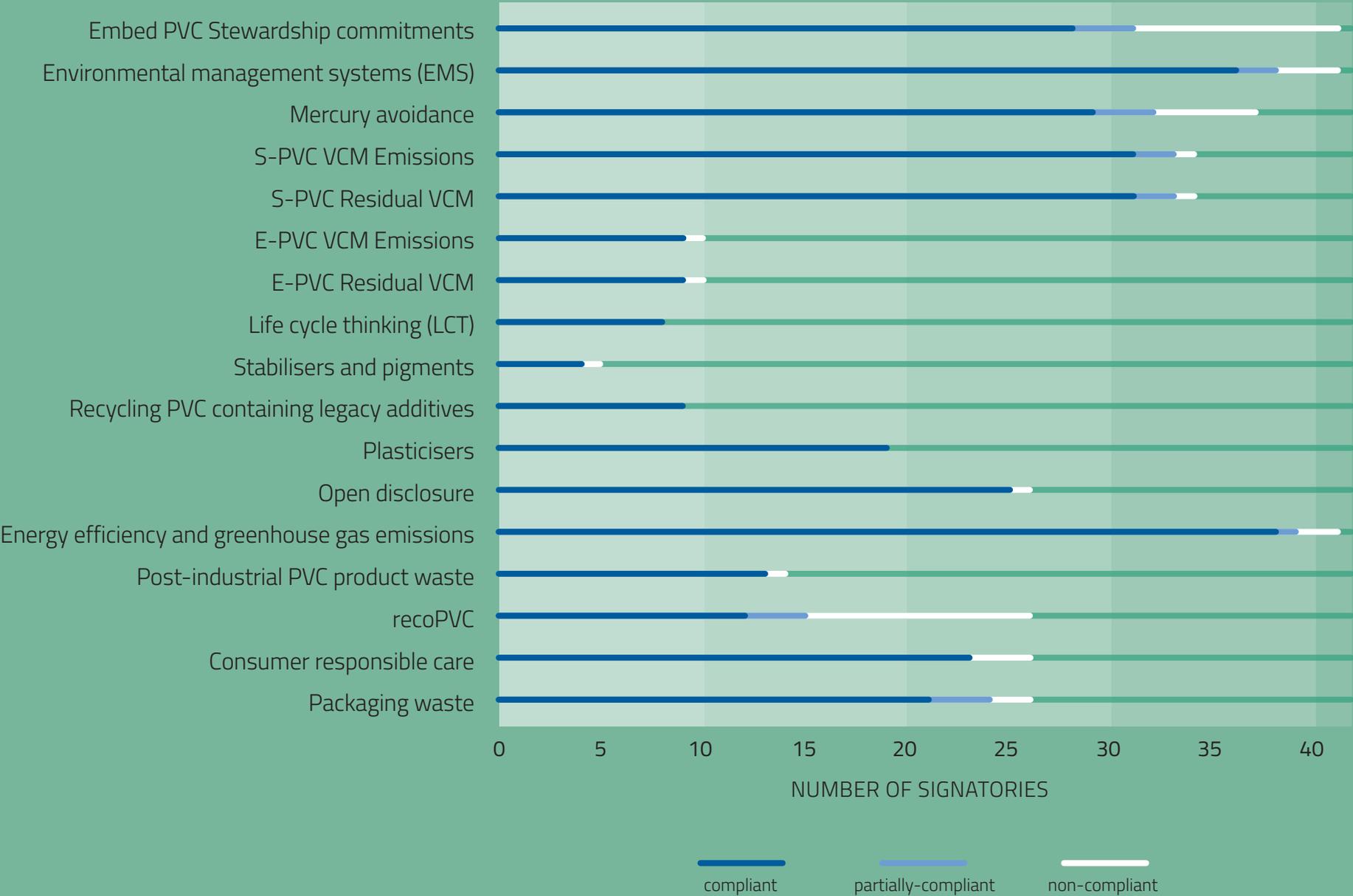


Figure 6: Number of Signatories compliant with each Commitment relevant to them

As a requirement of the program, relevant Signatories need to understand the impacts of and report on the environmental practices of not just their own operations, but also the supply chain for their product.

This year, Signatories were provided with a Supplier Questionnaire template as part of their 2017 Reporting Package to assist them in obtaining information from upstream suppliers regarding activities relating to the Program commitments. The questionnaire enabled the Signatories to position themselves to measure and address their supplier business more accurately.

The number of Signatories explicitly embedding their commitment to the Program into their business management increased to 68 percent in 2017 from 43 percent. The intention of this commitment is to ensure that the PVC Stewardship Program is clearly recognised and adopted across the Signatory's organisation such as via formalised policies,

procedures, publications and practices to ensure that employees understand what is expected in day to day management.

Companies who achieved full compliance were able to demonstrate publicly their commitment to the PVC Stewardship Program and acknowledgment of the Program commitments within management systems such as company environmental and/or procurement policies.

Action

In 2018, the Program's Technical Steering Group will review ISO 20400:2017 for any initiatives that will improve the ability of Signatories to work effectively with suppliers. ISO 20400 defines the principles of sustainable procurement, including accountability, transparency, respect for human rights and ethical behaviour, and highlights key considerations such as risk management and priority setting.

Environmental Management Systems

In 2017, Signatories continued to improve in this commitment area despite more stringent reporting criteria being placed upon the Signatory. The PVC industry's Minimum Acceptable Standard for Environmental Management (commitment 1.2) was revised in 2017 to specifically recognise the need to reduce plastic pollution in the marine environment. Signatories with overseas or Australian manufacturing sites were required to report if their EMS has safeguards to minimise plastic pellet loss.

The number of Signatories complying with the EMS standard rose to 88 percent in 2017. Two Signatories were partially compliant, two Signatories were not able to demonstrate compliance of offshore plants and one audited Signatory could not demonstrate compliance due to insufficient evidence.

Figure 7: Best Practice Manufacturing Compliance achieved by commitment 2016–2017 (percent)

Figure 8: Best Practice Manufacturing: Number of Signatories compliant in 2017

Mercury Avoidance

In Australia, Signatories have committed to ensure that the processes to manufacture chlorine and vinyl chloride monomer (VCM) used to manufacture the PVC resin they source avoids the use of mercury. In 2017, Signatories noted that their supply chains continued to make investments into transitioning away from mercury-cell use in production of chlorine. By the end of 2017, it was reported by the European industry that almost all mercury cell chlorine plants had closed or transitioned to membrane cell technology following the Industrial Emissions Directive, in which the Best Available Technology had become legally binding for chlorine plants to phase out mercury cells by 11 December 2017¹.

Seventy eight percent of relevant Program Signatories reported that they or their supply chains avoided mercury in the manufacturing production process, a slight decrease from the previous reporting year (82%, 2016). Five Signatories were not compliant as they could not confirm their supply chain was wholly mercury free.

One partially compliant Signatory has Best Environmental Practice PVC (BEP PVC) certification for 50% of product sold in Australia and the other partially compliant Signatory, also audited, could verify that 81% of product was derived from mercury free plants in 2017, and improvement plans are in place to phase out mercury by 2018. A third partially compliant Signatory did not obtain the required written verification from their upstream supplier, only noting that their Supplier was a Signatory to the program and is known to be compliant with this commitment.

INTERNATIONAL DEVELOPMENTS

In accordance with European legislation, several chlor-alkali mercury-based plants closed down in Europe in 2017. Of the 21 mercury technology plants that were operating at the start of 2017, seven have closed and 14 have been converted to the safer membrane technology. One producer was granted an extension of time for conversion until May 2018.² The seven closed plants had a combined capacity of 665,000 tonnes per year of chlorine, or 5.5% of Europe's chlorine production capacity. The 14 plants being converted have a combined capacity of 1.4 million tonnes per year of chlorine.³

China has published its timetable for introducing restrictions on mercury after it officially put into effect the Minamata Convention on 16 August 2017. By 2020 the amount of mercury used in the production process of existing vinyl chloride monomer (using acetylene carbide) must be 50% below 2010 levels. New vinyl chloride monomer plants shall not use mercury catalysts. The use of mercury or its compounds to produce chlorine and caustic soda is already prohibited.⁴

In China, operating rates at chlor-alkali units have continued to be affected by the inspection programme for environmental protection.⁵ In 2017, 40% of China's total manufacturing capacity was temporarily closed and 80,000 factories were charged with breaching emissions levels.⁶

Resin Compliance

In 2017, 91% percent of Signatories sourcing S-PVC resin and 90% of Signatories sourcing E-PVC resin confirmed that their suppliers' manufacturing emissions were compliant with the relevant best practice manufacturing standard (≤ 43 g/tonne of S-PVC produced and ≤ 500 g / tonne of E-PVC produced measured on a 12-month basis). The two non-compliant Signatories were unable to verify their suppliers were compliant. E-PVC and S-PVC resins sourced in 2017 were confirmed compliant against the residual VCM target of ≤ 1 part per million in 99% batches tested. These benchmarks for PVC resin are the most stringent reported in the industry globally.

1 – EuroChlor17: Chlorine Industry Issues, 11 Dec 17

2 – Innovyn: <https://www.inovyn.com/news/update-on-cellroom-conversion-project-at-stenungsund-site/> 7 Sept 2017

3 – C&EN News: <https://cen.acs.org/articles/95/web/2017/12/EUs-chlorine-makers-end-mercury.html>, Dec 12, 2017

4 – Chemical Watch Asia Hub: <https://chemicalwatch.com/asiahub/58274/china-announces-mercury-timetable-applying-minamata-convention>

5 – Orbichem Blog: <https://orbichem.wordpress.com/2018/02/02/whats-in-store-for-the-chlor-alkali-market-in-2018/>, Feb 2, 2018

6 – ICIS: <https://www.icis.com/resources/news/2018/01/11/10182191/china-chemical-closures-send-ripples-around-the-world/?redirect=english> 11 Jan 2018

Life Cycle Thinking

Eight Signatories developed or introduced new products in 2017, and all reported implementing life cycle thinking, such as considering product durability, end of life cycle management, BEP PVC compliance, energy efficiency in use. Evidence was provided by sight of a full life cycle assessment, brochures and business plans that included analysis or life cycle or literature review.

The Vinyl Council will continue to promote the use of life cycle assessments and Environmental Product Declarations which can aid Signatories in communicating with downstream users and in identifying and driving sustainability improvement of their products.

Action

Continue to encourage the use of Supply Chain Questionnaires to source and confirm pertinent information on raw materials.



Photo: Tarkett

Stabilisers and Pigments

Companies who sign up to the Program are committed to phase out the use of lead, cadmium and hexavalent chrome stabilisers and pigments in PVC processing. Use of cadmium and hexavalent chrome has been voluntarily phased out with no use reported since 2004.

The use of lead stabilisers by Signatories had largely ceased in 2010 when all major PVC applications had confirmed its phase out. However, we have seen use of a very small amount of lead stabiliser continue in minor applications where substitution has been more technically and or commercially challenging and or when new Signatories using lead stabilisers join the program.

In 2017, there was a notable increase in the amount reported in use. This was due to a new Signatory joining the Program mid-year, which reported use of lead stabilisers, but which had ceased their use in April 2017, prior to joining the Program. Another existing Signatory reported lead stabiliser use in 2017, beyond the phase out date of December 2016 it had previously set when it joined the Program. The amount used by this Signatory was higher than in 2016 and was due to difficulty converting

a specific application to an alternative stabiliser system. As a result of these reported uses the amount of lead based stabilisers and pigments used increased from 0.5% to 2.3% of the baseline 2002 figure (when the voluntary phase out commenced) from 2016 to 2017 reporting years.

Action

Work with all Signatories to ensure use of lead-based stabilisers by Signatory companies ceases.

Plasticiser Policy

In 2017, of the 19 Signatories reporting use of plasticisers in their products, five reported use of classified Low Molecular Weight (LMW) phthalates such as Diethylhexyl phthalate (DEHP). Others reported use of non-classified plasticisers such as Diisodecyl phthalate (DIDP), Diisononyl phthalate (DINP), Dipropylheptyl phthalate (DPHP), Tris (2-ethylhexyl) trimellitate (TOTM), Tris (2-ethylhexyl) trimellitate (TOTM), Epoxidized Soy Bean Oil (ESBO), citrates and adipates and cyclohexanoates. The use of high molecular weight (HMW) ortho-phthalates, terephthalates and non-phthalate plasticisers continues to

grow. Under the Program, Signatories who manufacture food contact packaging film have complied with the commitment to avoid the use of ortho-phthalate plasticisers in their products.

In Australia, the use of LMW phthalates in applications other than toys, childcare articles and cosmetics, is not restricted. Nevertheless, in 2017, given continued community concern about these substances, the Vinyl Council worked with a user group of Signatories to review their ongoing use in flexible PVC products in Australia. The group has proposed a modification to the plasticisers commitment in the Program, that Signatories commence a voluntary phase out of LMW ortho-phthalates DEHP, Dioctyl phthalate (DOP), Butyl Benzyl phthalate (BBP), and Dibutyl phthalate (DBP) in all PVC applications in Australia over the next five years. Signatories will make practical endeavours to achieve this within the constraints of technical and commercial feasibility.

Action

Commence phase out of LMW phthalates in all applications. The VCA will start monitoring LMW phthalate use for the relevant Signatories.

Figure 9: Safe and Sustainable Additives Compliance achieved by commitment 2016–2017 (percent)

Figure 10: Safe and Sustainable Additives Compliance achieved by commitment

Figure 11: Lead stabiliser used by the Program Signatories 2002–2017 (tonnes lead metal content)

International Regulatory and Scientific Developments

AUSTRALIA & NEW ZEALAND

Food Standards ANZ conducted a comprehensive survey investigating the levels of DEHP and DINP and five additional plasticisers in a wide range of Australian foods. Results found that estimated dietary exposures are below the tolerable daily intakes for these substances and do not pose a public health concern.

An additional survey of packaging chemicals including phthalates, printing inks and photo-initiators in New Zealand foods also found that estimated dietary exposures to these chemicals are low and not of concern for human health.

FSANZ has been assessing the public health and safety risk of chemicals which may migrate from packaging materials into food, to identify and manage any risks. It consulted widely with a broad range of stakeholders, and overall, concluded that sufficient control measures are in place to control chemical migration from packaging for food. FSANZ's assessment was that a graduated risk management approach – which the Vinyl Council supported in its submission – offered the most advantages in terms of protection of public health and safety and cost effectiveness.

Researchers from the University of Adelaide and the South Australian Health and Medical Research Institute (SAHMRI) reported finding that diseases such as type-2 diabetes, high blood pressure and cardiovascular disease, could be linked to phthalates. They had tested 1,500 South Australian men and detected phthalates in the urine of 99.6% of those over 35. The researchers observed a positive association between total phthalates and cardiovascular disease, type-2-diabetes, hypertension and increased levels of chronic low-grade inflammatory biomarkers in urban-dwelling Australian men.

The senior author of the study reported the exact reasons why phthalates are independently linked to disease was unknown, however age and western diets are directly associated with higher concentrations of phthalates. Previous research found that men who frequently ate processed foods, drank sodas, and consumed fewer fruits and vegetables showed higher levels of phthalates.

EUROPE

A Danish government tax introduced 17 years ago on certain phthalate-containing PVC products will be scrapped with effect from 1 January 2019. The purpose of the tax, which covers

tape, binders, gloves, aprons, rainwear and protective suits, was to encourage the substitution of phthalates and to reduce the amount of PVC that is incinerated or landfilled. However, the Danish government is reported as finding that the tax is no longer considered to have any significant behavioural effect on health or the environment because of the declining use of phthalates driven by European Union regulation.⁷

Four phthalates – DEHP, BBP, DBP and DIBP – were identified by the European Chemical Agency (ECHA) as substances of very high concern (SVHCs) due to their classification as toxic for reproduction and added to the REACH Candidate List in 2008 and 2010. Following ECHA's recommendations, these substances were included in the Authorisation List (Annex XIV) in 2011 and 2012 meaning authorisation has to be granted for any specific use.

In July 2017, the four phthalates were identified as SVHCs in accordance with Article 57(f) of REACH due to their endocrine disrupting properties for human health. The Candidate List was updated accordingly.⁸

7 – Chemical Watch: <http://vinyl.org.au/members/member-communication/global-news/entry/ngo-unhappy-denmark-will-scrap-tax-on-pvc-and-phthalates>

8 – <https://www.echa.europa.eu/en/web/guest/update-annex-xiv-entries-four-phthalates-public-consultation>



Photo: Tarkett



Photo: VCA



Photo: Armstrong

TITANIUM DIOXIDE

In 2014, The ECHA's Committee for Risk Assessment (RAC) gave a proposal that Titanium Dioxide (TiO_2) be classified as a category 2 carcinogen through inhalation under REACH regulations. In September 2017, RAC concluded that the available scientific evidence meets the criteria in the Classification, Labelling and Packaging Regulation to classify TiO_2 as a substance suspected of causing cancer through the inhalation route.⁹ The toxic effect is specific to the inhalation of small TiO_2 particles. In its opinion, the RAC describes it as "particle carcinogenicity".¹⁰

The RAC found that there was insufficient evidence to classify TiO_2 in the more severe category for carcinogenicity (category 1B) as was originally proposed by the dossier submitter, France. This more severe category refers to a substance which is presumed to cause cancer.¹¹

TiO_2 is commonly used as an additive in many outdoor applications to protect against weathering and impart brightness. In PVC (as in most other plastics) it is used in applications such as pipes to absorb most of the incident UV and visible radiation, thereby protecting the PVC molecules from breaking down.¹²

ASIA

Food samples tested in a risk assessment study related to phthalates conducted by Hong Kong's Centre for Food Safety showed that although phthalates were detected, the levels of phthalates found in the food samples would not cause adverse health effects under usual consumption.¹³

NORTH AMERICA

The U.S. Consumer Product Safety Commission proposed a rule to restrict an additional five types of phthalates – DINP, DIBP, DPENP, DHEXP and DCHP – from plastic used in children's toys and child care articles such as teething rings. DINP had, until then, been the subject of an interim ban in toys that can be placed in the mouth. The rule will lift interim bans on two other phthalates, DNOP and DIDP, which the commission staff concluded have not been shown to have the antiandrogenic effects that the rule addresses.

The Canadian government has concluded in a draft assessment that 13 of 14 phthalates are not sufficiently harmful to human health or the environment to merit action under the Canadian Environmental Protection Act. Only substances in Grouping B79P (1,2-Benzenedicarboxylic acid, benzyl C7-9-branched and linear alkyl esters), was found to

pose a danger to the environment; as a result, the assessment proposes adding it to Schedule 1 of the Domestic Substances List. Separately, the draft also finds that DEHP presents an environmental risk.

The assessment concluded that no action should be taken on the other 13 phthalates under active consideration. The report noted, however, that there may be concern for human health or the environment if use patterns of certain phthalates were to increase in Canada. A final assessment is planned for publishing in July 2018.

Separate regulations under Canada's Consumer Product Safety Act stipulate maximum concentrations of DEHP, DBP and BBP in vinyl childcare articles and toys, and similar restrictions on DINP, DIDP or DNOP in products that "in a reasonably foreseeable manner" could be placed in the mouth of a child under the age of four.

9 – ECHA News 16 Oct 17

10 – Chemical Watch News 27 November 2018

11 – ECHA News 16 Oct 17

12 – PIPA Technical Information: weathering of PVC Pipes and Fittings April 2010

13 – The 7th Space: <http://7thspace.com> 5 February 2018



Photo: VCA



Photo: VCA

In 2017, an improvement in compliance was observed in this area of the program. The purpose of this commitment is to demonstrate industry's commitment to energy efficiency and greenhouse gas emission reduction measures, while leaving the specific action to achieve these up to individual companies given the diversity of businesses reflected by the Signatories. Signatories directly engaged in manufacturing activity were required to report for their own operations. Those supplying PVC products to the market were required to report on their manufacturing supplier's energy management and efforts to reduce the carbon footprint of products supplied to the Australian market.

The number of Signatories complying the Energy Efficiency and Greenhouse Gas Charter improved to 93% in 2017 (38 out of 41 Signatories). Twenty-six Signatories could demonstrate beyond compliance initiatives defined under the program as meeting more than two requirements of the Charter.

PVC is an intrinsically low-carbon plastic.¹⁴ When compared with metal or glass products of the same application PVC is proven as a material with minimal environmental load in terms of CO₂ emission.¹⁵ Recycling end-of life PVC products provides some opportunities to reduce the carbon footprint of PVC products; however, by applying life cycling thinking across the supply chain, Signatories may improve the carbon footprint of PVC throughout its lifecycle, from product design and production to consumption and disposal.

14 – Vinylplus Progress Report 2018
 15 – www.pvc.org.au/en/p/sustainability

Figure 12: Energy and Greenhouse Gas Management Compliance achieved by commitment 2016–2017 (percent)

Photo: Armstrong



Figure 13: Energy and Greenhouse Gas Management: Number of Signatories compliant in 2017

Overall compliance under Resource Efficiency improved in the areas of post-industrial PVC product waste and Consumer Responsible Care but decreased slightly in 2017 in the areas of recoPVC and Packaging Waste.

Post Industrial PVC Product Waste

In 2017, all but one Signatory where this commitment was relevant succeeded in minimising PVC production waste sent to landfill; the non-compliant company has an improvement plan in place for 2018. On average, the amount of post-industrial PVC product waste Signatories send to landfill is 0.91% of total production. This is usually material such as floor sweepings which cannot readily be recycled because of contamination.

RecoPVC

The purpose of this commitment is to encourage the take-up of recoPVC¹⁶ in order to support PVC recycling markets. Signatories are encouraged to use recoPVC in the PVC products they supply to the Australian market unless Australian Standards or regulations prohibit the use of recycled material, or it is not technically feasible to integrate recoPVC into their products. The Vinyl Council is working to facilitate growth in sustainable PVC recycling practices in Australia and to develop a market pull for recoPVC by growing end user demand.

Where Australian Standards, codes or regulations restrict the use of recycled material in products for reasons of safety and fitness for purpose, Signatories are encouraged to offer contractual agreements to customers to take back products at the end of use for third party reprocessing, or to have contractual agreements with third party recycling/waste transport service providers in at least two capital cities to facilitate recovery and reprocessing of the product at end of use.

Signatories are also encouraged to apply the concept of design for recyclability in new product design.



Photo: Chemsom

In 2017, 633,682 kilograms of recoPVC were returned into new product sold by locally manufacturing Signatories in Australia, up from 365,609 kilograms the previous year.

This year, some Signatories importing finished PVC products had trouble confirming the amount of recoPVC procured and placed back into product sold in Australia.

The recoPVC commitment is relevant to more than half of the signatories including both local manufacturers and importers of finished products.

In 2018, the Vinyl Council will work with Signatories to improve sourcing recoPVC data ensuring that it is reliable, verifiable and based only on product consumed in Australia.

Action

- Consider developing growth targets going forward.
- Support product suppliers to engage with their manufacturers to encourage the use of recoPVC in their products.
- Work with Signatories on the quality of data for recoPVC consumed in Australia.

Figure 14: Resource Efficiency Compliance achieved by commitment 2016–2017 (percent)

Figure 15: Resource Efficiency Compliance: Percentage of Signatories compliant in 2017

¹⁶ – recoPVC, or recovered PVC, is any PVC waste recovered from external sources for reuse / recycling by local converters or suppliers of imported PVC products to the Australian market, including PVC waste arising from manufacturing, fabrication, installation, repair, maintenance and end-of-life.

Encouraging Consumer Responsible Care

The Program expects Signatories to provide information that can be accessed by end consumers on the safe management of their products at the end of use, such as where and how the product might be recycled. In 2017, 88% of relevant Signatories confirmed doing this via websites, marketing literature or customer advice.

Packaging Waste Management

An additional voluntary commitment within the Program aims at diverting packaging waste generated in Signatory operations from landfill. Signatories can opt to sign up to this commitment and a growing number of them have done so since it was introduced in 2015. Compliance with the commitment requires the company to divert at least 70 percent of their incoming packaging materials to recycling or reuse.

In 2017, 81% of reporting Signatories were compliant, with 19 of them reporting beyond compliant practices including procedures/processes to record, measure and manage waste streams on site. These Signatories are also undertaking one or more of the following actions to facilitate recovery and recycling of packaging:

- Design change to packaging to improve recyclability
- Labelling of packaging materials e.g. with polymer codes
- Offering a packaging take back program

Vinyl Industry Recycling Strategy

The Vinyl Industry Recycling Strategy aims to facilitate growth in sustainable PVC recycling practice in Australia and has a strong focus on developing local end markets for recycle via innovation and product development. The strategy also facilitates the development of local reprocessing capability through supply chain collaboration.

Accordingly, the Vinyl Council is pleased to report the following action and results:

STRATEGIC OBJECTIVE

Data and Information: to be able to measure PVC recycling more accurately

Collaboration: to facilitate and support the work of those keen to recycle and establish systemic change

End markets: to develop market pull for recoPVC by growing end user demand

Innovation and trials: to form recycling projects that are replicable and scalable for easy growth

Reprocessing infrastructure: to increase number of reprocessors and improve viability of PVC recycling

Design and composition: to encourage Design for Recycling and advocate for quality recycle and recycling practices

2017 OUTCOMES

- Tracking and measurement of PVC Recycling in Hospitals in place.
- Measurement of the use of recoPVC by Signatories in new products supplied to market.
- Continued expansion of the number of hospitals participating in PVC Recycling in Hospitals and expansion of the program to South Australia, SA, Qld and WA in collaboration with members and the healthcare sector.
- Coordinated research projects with industry and academia.
- Conducted two R&D projects with UNSW and Monash University and industry supply chain partners, funded by NSW Environment Trust, to identify potential end uses for recycled flooring and PVC-coated fabric material and explore waste recovery and reprocessing systems in both sectors.
- Product concepts for recycled coated fabrics will proceed to prototype development in 2018.
- \$720,000 investment in Vinyl Council member Welvic Australia's recycling plant increasing capacity by up to 4,000 tonnes pa.
- Through PVC Stewardship Program commitments (Life Cycle Thinking and Packaging Waste), design for recycling is encouraged.
- Resources for training and information on PVC separation in hospitals.

Recycling Research Projects:

PVC ADVERTISING BANNER RECYCLING PROJECT

During 2017, the Vinyl Council competed the project funded by the NSW Environment Trust to identify suitable techniques to reprocess advertising billboard skins made from PVC-coated polyester fabric, and to find potential end markets for the recyclate. The research commenced in 2016. The NSW Environment Trust provided a total of \$68,833, largely to employ research assistants at the University of NSW and Monash University.

Currently 1.2 million square metres of billboard skins are disposed to landfill each year, as well as larger quantities of grain covers and truck tarpaulins potentially totalling between 10–12 million m² per year.

The final outcomes included:

- a revolutionary reprocessing method to separate the PVC from the polyester, branded 'PVC Separation' now under patent
- a compression moulding technique to reuse the composite material
- design concepts for a number of potential new products that could reuse or absorb the recyclate including injection-moulded safety mat flooring and a compression moulded high volume building product and a pallet slider sheet.

The project and its outcomes were shared through media articles, a final report *REMAKE: Advertising Billboard Skins Recycling Project 2015–2017* and a public display at the Melbourne Waste Expo. Further work has been planned for Proof of Concept research of the building product concept.

COMMERCIAL VINYL FLOORING RECYCLING PROJECT

The Vinyl Council in partnership with the Australian Resilient Flooring Association completed a second project funded by the NSW Environment Trust to identify ways to source and reprocess vinyl flooring in Australia and find potential end markets for the recyclate. This research commenced in 2016, with the NSW Environment Trust providing a total of \$59,500 used to fund research students to characterise the recyclate and test its properties, and to conduct market research within the floor laying sector to identify waste sources, understand



Photo: Interface

current disposal practices and costs, and gauge willingness to participate in recycling.

Currently around 15,000 tonnes of commercial flooring is disposed to landfill nationally each year.

The project produced the following specific results:

- identified that up to 400 tonnes p/a of homogeneous vinyl flooring could substitute material in specific masonry products
- confirmed typical waste and recycling processes used by flooring retailers/contractors, their current costs, motivations and capacity to participate in a scheme
- identified reprocessing parameters.

Pertinent results were published in several industry articles and a final report is available from the Vinyl Council.

RECYCLING PVC MEDICAL WASTE

Initiated by the Vinyl Council and Western Health in 2009, the PVC Recycling in Hospitals program has continued to grow. A key objective for the year was to build hospital participation to increase quantities recovered and so improve commercial viability for recyclers. By the end of 2017, there were 129 healthcare facilities in the program across Australia and New Zealand, plus 800 home patients that Baxter organises waste collection from, recovering approx 16,000 kg of PVC in total a month. This is equivalent to almost half a million IV bags consumed. This is reported as the same as 2016's, despite a marked increase in participating hospitals, due to an improvement in reporting accuracy. In 2017, reporting procedures were improved to ensure that the weight of pallets and boxes are not included in the total amount of recovered

PVC, as may have been in previous years. The Vinyl Council and Baxter will continue to work with hospitals to ensure that contamination of the PVC collected from healthcare facilities is negligible to improve recyclate quality.

While word of mouth within the healthcare sector has been a key contributor to the program's expansion, promotion by the Vinyl Council and Baxter Healthcare has also supported the growth. The Council coordinated a second forum in Melbourne on recycling in healthcare with expert speakers and around 50 attendees, issued a newsletter and developed a fact sheet with the Victorian Government and generated media coverage of the program.

A highlight of the year was the PVC Recycling in Hospitals program gaining recognition as a Finalist in the Circular Economy category of the national Banksia Sustainability Awards 2017.

The program continued to be supported by Council members and Stewardship Program Signatories: Welvic Australia, the recycler and Baxter Healthcare, whose logistics expertise helped expand the program to Western Australia, South Australia and Queensland in 2017.

In 2017, the Vinyl Council received over 212 registration enquiries about the program from healthcare facilities, up from 70 in 2016. In 2018, the Vinyl Council aims to widen the engagement in this product stewardship program in New South Wales and Queensland. The target is to recover over 2,000 tonnes of PVC medical waste per annum when fully operational.

Actions

- *Establish a PVC Circularity Taskforce comprising industry and independent representatives to provide leadership and guidance on enhancing recovery and recycling of PVC in Australia*
- *Develop an agreed metric and methodology to measure PVC recycling more accurately in Australia*
- *Expand the PVC Recycling in Hospitals in NSW and Queensland*
- *Undertake further work supporting recycling initiatives with coated fabric and vinyl flooring in collaboration with industry and government*

Annual Progress Report

The 2016 annual report was published in July 2016 following third party verification of the report and eight Signatory company audits. The Council shared the report with stakeholders and issued media regarding the report and the Program's results.

Each Signatory company's performance is benchmarked among the industry participants and feedback is provided to the company on potential improvements that can be made in the following year. Resources are provided to Signatories, such as supply chain questionnaires to help improve accuracy and completeness of reporting.

In 2017, third party audits of nine Signatory companies were conducted in New South Wales, Victoria and Queensland and one overseas Signatory was audited over the phone.

PROGRAM AND REPORT VERIFICATION

A limited assurance and verification statement has been prepared by Ernst & Young (EY) for the performance of the Program in 2017 and the report. The purpose of the verification process is to provide an independent opinion on the accuracy of the data and statements made in the report. EY conducted nine site visits and one telephone interview and verified the information submitted by these Signatories and contained in this report.

A copy of Ernst & Young's Verification Audit Statement is shown in Appendix A.

Five Year Review

The latest five-year review of the program was published in January 2018 and covered the period 2012 – 2017. The review was undertaken by an external consultant with expertise in product stewardship to provide an independent assessment of the program.

The review found that Signatories have made effective and measurable progress in meeting the Program's stated objectives

over the past five years. The review found that objectives and commitments are still relevant and the Program is effective in its implementation; however the Vinyl Council and Signatories could consider future updates to address recent trends including:

- changes in the energy market, including a rapid shift to renewable energy and storage
- the United Nations Sustainable Development Goals and circular economy principles
- Sustainable Procurement Standard ISO 20400:2017
- the new framework and reporting requirements for the Australian Packaging Covenant, the Australian Recycling Label and design tool for packaging
- the Chinese ban on selected waste imports.

Based on these trends, the report outlined future potential challenges and provided recommendations for ongoing program development. A number of these recommendations have been considered in the future priority actions identified in this report. A copy of the report is available from the Council.

The next Program review will be undertaken in 2022.

Research Monitoring

The Vinyl Council monitors national and international developments in scientific research relevant to the potential health and environmental impacts of the PVC product life cycle, and keeps members, Program Signatories and stakeholders informed through Technical Steering Group meetings, member meetings and events, conferences and seminars, regular emailed news briefings, operations reports, website etc. The Vinyl Council is a member of the Global Vinyl Council and the Asia Pacific Vinyl Network, both of which are forums for sharing information on the health and safety of PVC products and industry initiatives to advance the sustainability of the industry.

Technical Steering Group

The Technical Steering Group (TSG) consists of representatives from the Australian PVC industry, the federal Department of

the Environment and Energy and CSIRO. The Green Building Council of Australia has observer status on the TSG. Four meetings were organised in 2017, attended by an average of seventeen participants.

Changes to Signatories

Four Signatories: Pegulan Floorcovering, Redox Chemicals P/L, Thai Plastic and Chemical, Vinythai, left the program during the year. One Signatory company, Rehau, failed to submit a report for the second year in a row and will be delisted from the Program in 2018.

Four new Signatories joined the program RBM Plastics Extrusions P/L, Cryo Grind (Aust) P/L, Sekisui Rib Loc Australia P/L and Sergi Ferrari.

Stakeholder engagement

The Vinyl Council engages with stakeholders continuously, sharing information and seeking feedback and insights for development of the Program. It aims to consult more formally with stakeholders specifically to discuss the progress of the PVC industry and effectiveness of the PVC Stewardship Program. The last engagement forum was conducted in 2015. Roundtables will be held in 2018 to improve industry understanding of stakeholder concerns and expectations.

Other stakeholder engagement in 2017 included presentations to vinyl industry forums in Europe, the US and Indonesia to share information about the Program and the Australian industry's activities and learn about other regions' initiatives.

Sixteen Signatory companies attended the PVC Stewardship Program 'Aiming for Excellence' seminar in October 2017, held in conjunction with the Waste Expo in Melbourne. The seminar was designed to assist Signatories with the reporting and evidence requirements for the 2017 reporting year.

Action:

Conduct stakeholder forums to seek stakeholder feedback and input on the Program's direction.



Photo: VCA

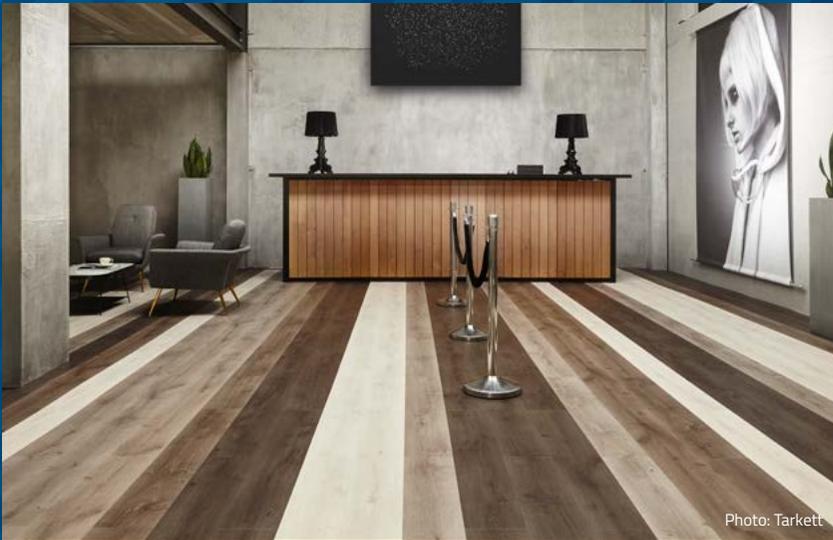


Photo: Tarkett

Excellence in PVC Stewardship (Gold): 100 percent

Australian Plastic Profiles P/L	www.app.net.au/
Australian Vinyls Corporation P/L	www.av.com.au/
Baxter Healthcare P/L	www.baxterhealthcare.com.au/
Chemiplas Australia P/L	www.chemiplas.com.a
Chemson Pacific P/L	www.chemson.com/
Formosa Plastics Corporation (FPC)Taiwan	www.fph.com.tw
Iplex Pipelines Australia P/L	www.iplax.com.au/
Pipemakers P/L	www.pipemakers.com.au/
Primaplas Australia	www.primaplas.com.au/
PT Asahimas Chemical	www.asc.co.id/
RBM Plastics Extrusions P/L ⁽¹⁾	www.rbmplastics.com.au
Serge Ferrari P/L ⁽¹⁾	www.sergeferrari.com
Sun Ace Australia P/L	www.sunace.com.au/
Speciality Polymer and Chemicals P/L	www.spmcaust.com.au
Tarkett Australia P/L	www.tarkett.com.au/
Techplas Extrusions P/L	www.techplas.com.au/
Vinidex P/L	www.vinidex.com.au/

Silver: 80–98 percent

AFS Systems P/L	www.afswall.com.au
APN Compounding P/L	www.apncompounding.com/
Armstrong Flooring P/L	www.armstrong-aust.com.au/
Breathe Fresh Australia P/L	www.berryplastics.com.au
CMS Electracom P/L	www.cmselectra.com/anz/
Deceuninck P/L	www.deceuninck.com.au/
Gerflor Australasia P/L	www.gerflor.com.au/
Karndean Flooring P/L	www.karndean.com.au/
Plustec P/L	www.plustec.com.au/
Polymer Direct P/L	www.polymerdirect.com.au
Sekisui Rib Loc Australia ⁽¹⁾	www.sekisuicheical.com
Stormtech P/L	www.stormtech.com.au/
The Andrews Group (Australia) P/L	www.theandrewsgroup.com.au
Welvic Australia P/L	www.welvic.com/

⁽¹⁾ First year reporting as a Signatory to the Program.

Bronze: 50–79 percent

Altro Flooring – APAC P/L	www.asf.com.au/
Baerlocher (M) SND BHD	www.baerlocher.com/
Brenntag Australia P/L	www.brenntag.com/
Cryo Grind (Aust) P/L ⁽¹⁾	www.cryogrind.com.au
Kenbrock P/L	www.kenbrock.com.au/
Plastral P/L	www.plastral.com.au/
Polyflor Australia P/L	www.polyflor.com.au
Rojo Pacific P/L	www.rojopacific.com.au/
Signature Floorcoverings P/L	www.signaturefloors.com.au/
Veka Plastics Singapore P/L	www.vekainc.com/

Compliance: < 50 percent

None

Failed to Report

Integrated Packaging P/L	www.ipstretch.com/
Profine International Profile Group	www.profine-group.com/en/
Rehau P/L	www.rehau.com/au-en/

Resigned

Pegulan Floorcovering P/L
Redox Chemicals P/L
Thai Plastic and Chemical (TPC) P/L
Vinythai PLC

The Australian vinyl industry's PVC Stewardship Program is one of the longest standing product stewardship schemes in Australia, with the specificity to have a whole-of-lifecycle focus. From its outset, it was deliberately designed to be a dynamic, evolving Program to drive best practice and continual improvement in the manufacture and supply of PVC products in Australia.

AWARD	AWARD ASSESSMENT	DATA SURVEY ASSESSMENT SCORE	DATA SURVEY ASSESSMENT SCORE PLUS BEYOND COMPLIANCE POINTS
Excellence in PVC Stewardship (Gold)	Signatories who scored full compliance in all commitment areas.	100%	100%
Silver Commendation*	Signatories who scored silver status but were awarded bonus points for demonstrating beyond compliance in one or more commitment area and received no more than one partial compliance.	90–99%	99%
Silver Award	One or more non-compliance.		80–98%
Bronze Award			50–79%

* No Silver Commendations were awarded this year.

BBP	Butyl Benzyl Phthalate
BEP PVC	Best Environmental Practice PVC
DBP	Dibutyl phthalate
DEHP	Diethylhexyl phthalate
DOTP	Diethyl terephthalate
DOP	Diethyl phthalate
ECHA	European Chemical Agency
EMS	Environmental Management System
ESBO	Epoxidized Soy Bean Oil
EY	Ernst and Young
Phthalates: High molecular weight (HMW)	A group of chemicals used as plasticisers with more than 6 carbon atoms in their backbones. They include DINP (diisononyl phthalate), DIDP (diisodecyl phthalate), DnOP (Di(n-octyl) phthalate, etc.
Phthalates: Low molecular weight (LMW)	A group of chemicals used as plasticisers with 3 to 6 carbon atoms in their backbones. They include DBP (di-n-butyl phthalate), DEHP (Diethylhexyl phthalate), DIBP (diisobutyl phthalate), DMP (dimethyl phthalate), etc.
Plasticisers	Chemical substances used to soften PVC, and provide flexibility to end products.
The Program	The PVC Stewardship Program signed by members of the Australian PVC industry
PVC (Vinyl)	Polyvinyl chloride
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (European Legislation)
Signatories	The members of the Australian PVC industry who have signed the Program as an indication of their Commitment to product stewardship.

Stabiliser	A compound used to improve the thermal stability during processing and the heat and/or UV stability of the end-use product.
Stakeholders	The PVC industry, its employees, suppliers and customers, the local and wider communities, consumers, government and regulators, and any other groups significantly impacted by the industry.
SVHC	Substances of Very High Concern
TiO²	Titanium dioxide
TOTM	Tris (2-ethylhexyl) trimellitate
TSG	Technical Steering Group
VCA	Vinyl Council of Australia
VCM	Vinyl Chloride Monomer
VinylPlus	The VinylPlus Program represents the voluntary commitment of the European PVC industry. It establishes a long-term framework for the sustainable development of the industry by tackling a number of critical challenges in the industry in the EU-28, Norway and Switzerland.