



PVC STEWARDSHIP

PVC STEWARDSHIP PROGRAM PROGRESS REPORT 2016



Vinyl Council Australia

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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)	
1.4.1 Vinyl Chloride Monomer (VCM) Emissions from manufacturing	<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.
1.4.2 Residual Vinyl Chloride Monomer	<ul style="list-style-type: none"> Residual VCM in supplied S-PVC resin powder is not greater than 1ppm in 99 percent batches tested.
1.5 Emulsion PVC (E-PVC)	
1.5.1 Vinyl Chloride Monomer (VCM) Emissions from manufacturing	<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.
1.5.2 Residual Vinyl Chloride Monomer	<ul style="list-style-type: none"> Residual VCM in supplied E-PVC resin is not greater than 1ppm in 99 percent batches tested.
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.
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.

At the Vinyl Council, we believe it is how a material is managed and used throughout its life cycle which determines its contribution to a more sustainable society and economy. The PVC Stewardship Program is an on-going, long-term, voluntary undertaking by the Australian PVC industry to recognise, and progressively address, all relevant environmental, health and safety issues along the PVC product life cycle within responsible and deliverable timeframes.

It is an approach that enables raw material suppliers, products manufacturers and distributors to be joint stewards of the safe and beneficial production, use and disposal of PVC products in Australia.

The PVC Stewardship Program measures the performance of its Signatories in relation to five key themes associated with the life cycle of PVC:

- 1. Best Practice Manufacturing**
- 2. Safe and Sustainable Use of Additives**
- 3. Energy and Greenhouse Gas Management**
- 4. Resource Efficiency**
- 5. Transparency and Engagement**



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.

Each theme includes a series of commitments which 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.

The key purpose of the PVC Stewardship Program is to seek the continuous improvement of the PVC industry. Through 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.

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

- All Signatories are to meet at least 50 percent compliance of relevant commitments by end 2016.
- 80 percent of Signatories are to achieve at least 80 percent compliance by end 2017.

This report details the 2016 performance of the Australian PVC industry PVC Stewardship Program, relative to the commitments made for the year.



As the PVC Stewardship Program heads towards its fifteenth year of reporting, one of the key outcomes from the journey has been collaborative learning.

Each year, our Signatories come together in a voluntary approach to report on the progress of the vinyl industry in Australia. The Program allows the Vinyl Council to present the evidence of the traceability of PVC throughout the life cycle, as well as demonstrate how the PVC Stewardship Program has contributed to the outcomes and impacts of PVC in Australia.

In early 2016, the Australian vinyl industry saw the closure of Australian Vinyls' manufacturing plant, marking the end of PVC resin manufacture in Australia. Signatories purchasing locally made resins from AV have had to source resins from overseas suppliers, increasing the complexity of the supply chains.

This structural change has led to a growth in membership of the Vinyl Council of Australia and introduced 13 new Signatories to the Program in 2016, including four overseas resin producers. Hence, by the end of the 2016 calendar year, the Program had a record number of 44 Signatories. Two Signatories failed to submit data for 2016, therefore this report outlines the results of data submitted by 42 Signatories. An audit process

completed by an independent organisation (Ernst & Young) verified a sample of nine Signatory submissions, together with this final report. EY's verification statement is included at the end of the report.

In 2016, nine Signatories were fully compliant with all the commitments relevant to their business, earning them the Vinyl Council's Excellence in PVC Stewardship Award. Four Signatories were awarded the Silver Commendation Award, a new award introduced this year to Signatories who demonstrated 'Silver' compliance' and 'best practice' in one or more commitment areas, by going beyond compliance requirements.

In terms of the first Program milestone: *all Signatories to have at least 50 percent compliance by end 2016*, 40 out of 44 Signatories achieved this. One Signatory with less than 50 percent compliance was reporting for first time; the other was unable to finalise reporting on relevant commitments in time. Two companies failed to submit any data for 2016, one was reporting for the first time, the other had submitted a data survey in 2015.

In respect of the second milestone: *80 percent of Signatories to be at or above 80 percent compliance by end 2017*, thirty-two Signatories (seventy three percent) achieved at or above 80 percent compliance in 2016, compared with 65 percent (n:21) of 2015 Signatories. This improvement may be a reflection of additional verification requirements requested for some commitments and the increase in the number of Signatories reporting. Almost one third of Signatories were first time reporters this year, seven of them achieved compliance rates of 80 percent or more.

Signatories reported improvements in compliance for three key areas of the Program: Mercury Avoidance, Energy and Greenhouse Gas Emissions and Environmental Management Systems.

Almost all Signatories reported that they or their supplier adhered to the PVC Industry Energy and Greenhouse Gas Emissions Charter. In addition to this, a record number of Signatories reported having an Environmental Management System for their operation or sourcing products from facilities with an EMS that meets or exceeds the Australian PVC industry's Minimum Acceptable Standard for Environmental Management of Manufacturing Operations.

I would like to thank the Technical Steering Group (TSG) and external stakeholders for the effort, input and feedback over the course of the year.

Finally, I would like to thank the 42 Signatories for providing their 2016 data and sharing information with the Vinyl Council. The PVC Stewardship Program has been active since 2002 and is well recognised amongst the PVC supply chain nationally and internationally, as well as amongst relevant government and key stakeholders in our market. It is a major undertaking for Signatory companies, many of whom are SMEs.

I encourage Signatories to continue to report their progress against the commitments of the PVC Stewardship Program in its 15th year and beyond.

The Program remains an important vehicle to demonstrate the industry's commitment to reducing the environmental footprint of PVC products in Australia.

Ian Lilja
Chairman, Technical Steering Group
PVC Stewardship Program

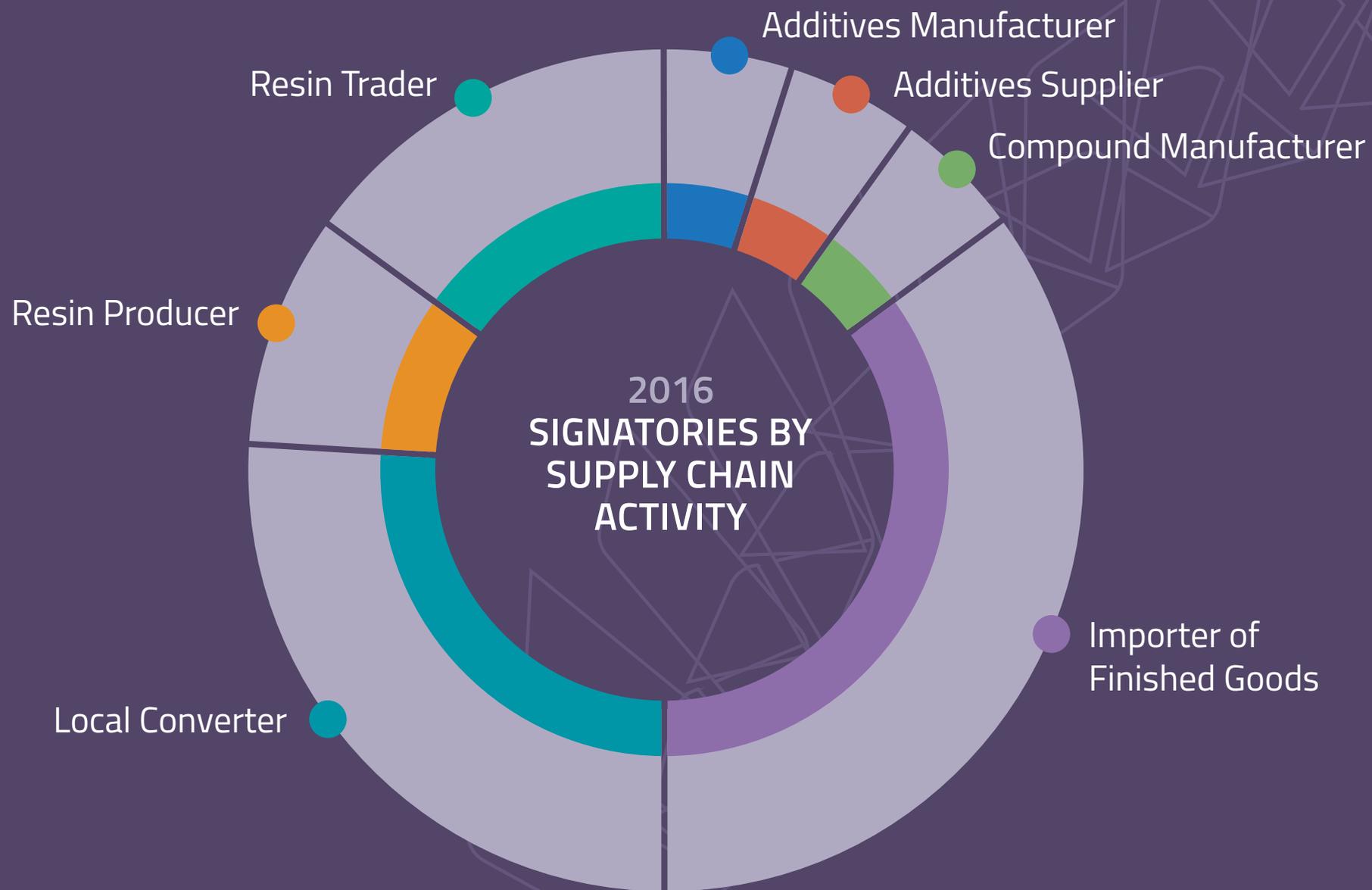


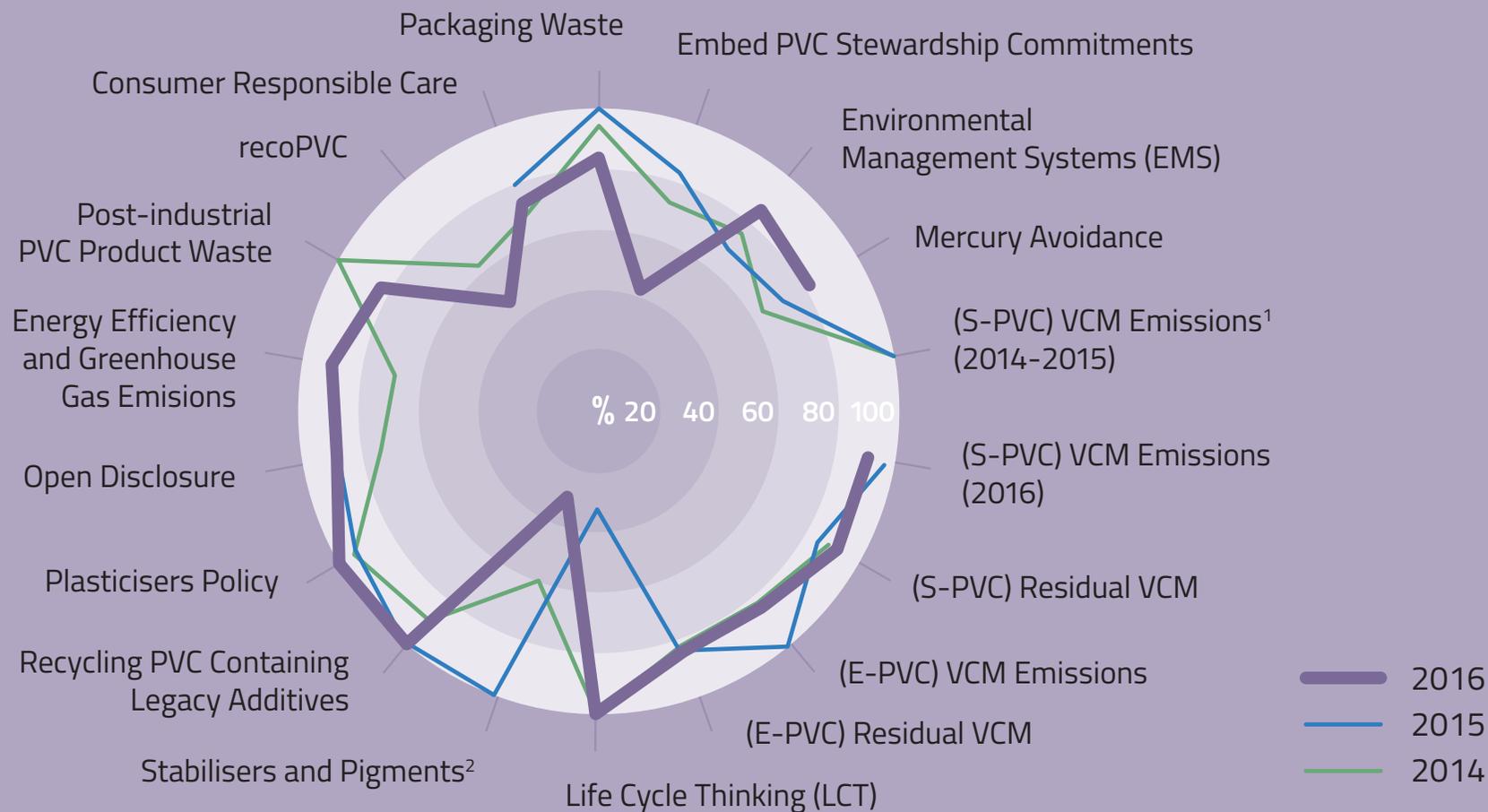
Figure 2: 2016 Signatories by supply chain activity

Number of Signatories	44	Signatories assessed	42
Signatories failing to report	2	New Signatories	13
Verification site audits conducted	9		
Signatory Status	Nine Signatories achieved full compliance with all relevant commitments for their business, receiving Excellence Awards (see page 19).		
Program Milestones	<p><i>All Signatories to be at or above 50 percent compliance by end 2016.</i> Forty (90 percent) achieved at least 50 percent compliance. Those whose compliance is less than 50 percent will be requested to develop improvement plans in 2017.</p> <p><i>80 percent of Signatories to be at or above 80 percent compliance by end 2017.</i> Thirty two Signatories (73 percent) achieved at or above 80 percent compliance in 2016.</p>		
New and updated commitments	<p>Two commitments were modified to align with Best Practice PVC¹ requirements and the changes to the resin supply chain in Australia.</p> <p>Under the Best Practice Manufacturing commitment:</p> <ul style="list-style-type: none"> A limit on VCM emissions related to manufacturing S-PVC sourced by Signatories was introduced at 43g VCM/tonne PVC produced replacing the limit which had applied only to the local Australian-manufacturer of resin. The VCM emissions limit in respect of E-PVC manufacturing was reduced from 1000g VCM/tonne E-PVC to 500g VCM/tonne. <p>Under Safe and Sustainable Additives Use:</p> <p>An additional commitment was included in respect of Plasticisers to avoid the use of ortho-phthalate plasticisers in PVC food contact packaging film supplied to the Australian market.</p>		
Commitment Highlights	<p>Full compliance was achieved in relation to three commitments:</p> <ul style="list-style-type: none"> 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. 		
Notable compliance improvement	<ul style="list-style-type: none"> Compliance with the commitment to avoid mercury in manufacturing production processes rose from 64 percent compliance in 2015 to 82 percent in 2016. Only one Signatory was unable to provide confirmation of avoidance from their suppliers. Reporting for E-PVC Emissions improved in 2016 to 85 percent (83 percent in 2015) with two Signatories unable to provide confirmation of emissions from suppliers. The number of Signatories complying with the Energy Efficiency and Greenhouse Gas Charter improved to 90 percent in 2016 (69 percent in 2015). Our PVC Recycling in Hospitals program was recognised as a Finalist in the Health category of the Victorian Premier's Sustainability Awards 2016. 		



¹ – In 2010, Green Building Council of Australia developed guidelines for Best Practice manufacturing of PVC products, recognised in its building rating tool, Green Star

Figure 3: Performance by Commitments 2014 – 2016



Notes:

¹ S-PVC VCM Emissions limit was modified 2016 to replace the previous commitment which applied only to the Australian resin manufacturer and to align with the Best Practice Guidelines for PVC in the Built Environment set by the Green Building Council Australia (GBCA) in 2010.

² Stabilisers and Pigments commitment relating to phase out of lead additive use was only relevant to three companies one of which was compliant. The other two were partially compliant. Refer to P.13.

Figure 4: 2016 Compliance rate achieved, by Signatory, compared to Program milestones.

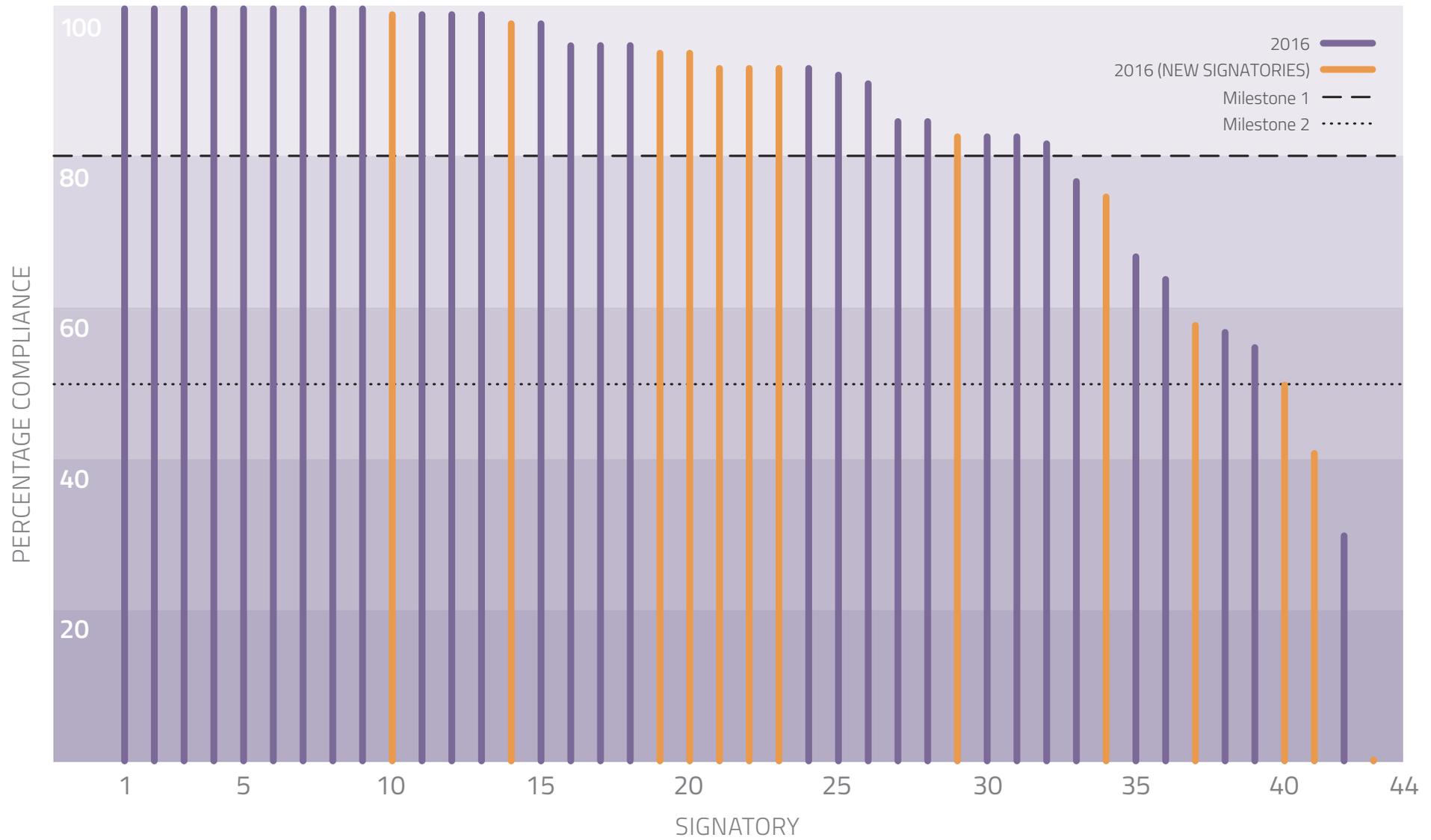
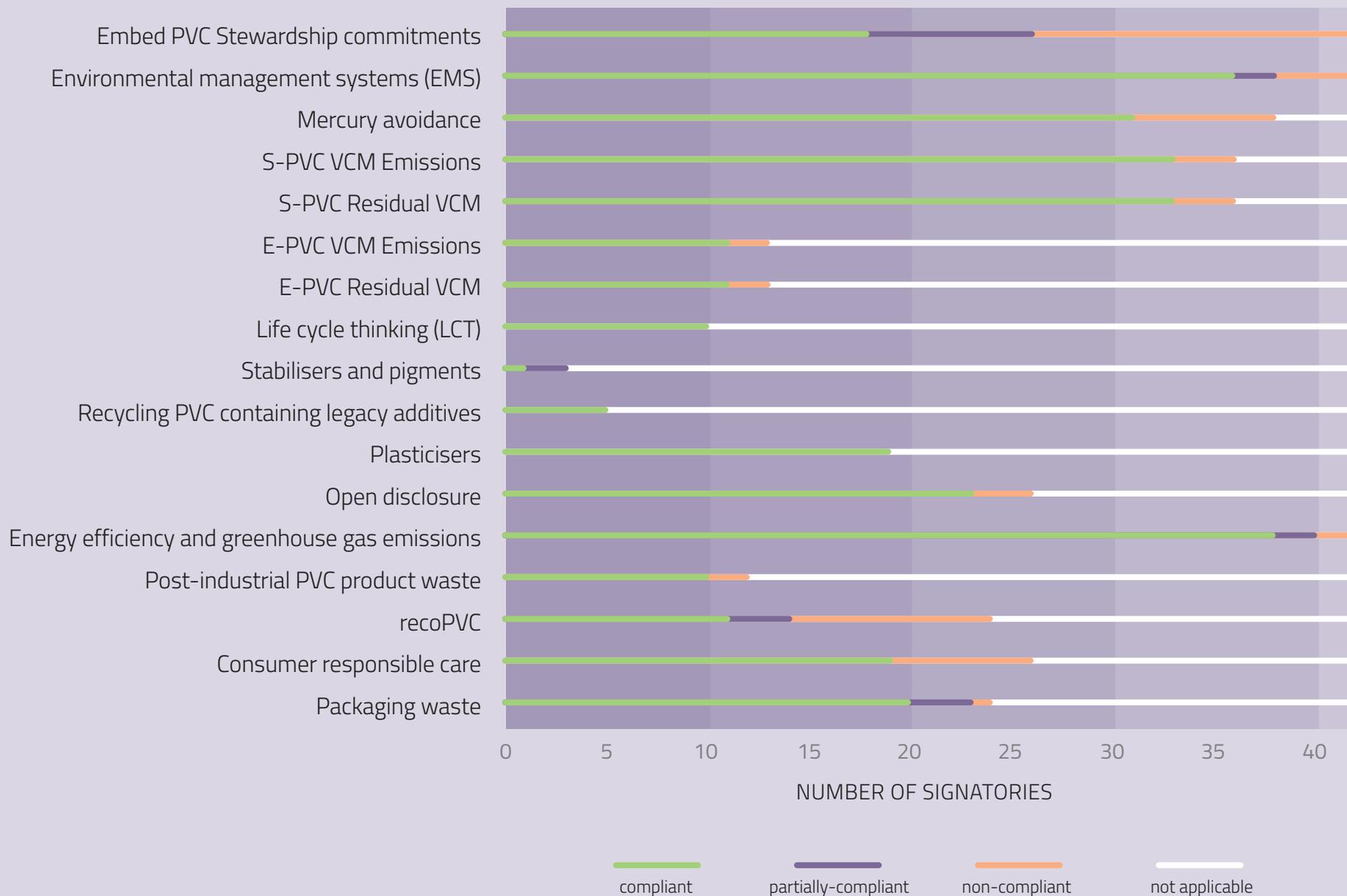


Figure 5: Percentage of Signatories compliant with each PVC Stewardship Program Commitment



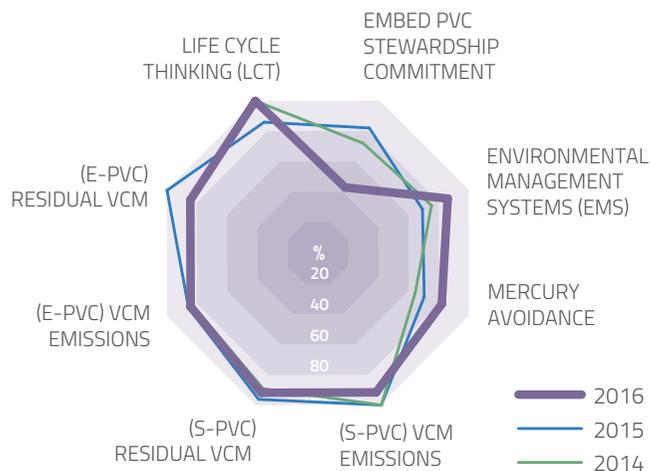


Figure 6: Compliance achieved – Commitment 1

While progress has been made to meet the commitments to avoid mercury in the supply chain and to implement environmental management systems in production plants, some of the Signatories continue to struggle to embed the relevant commitments within their business policies and procedures. In 2016, the data survey required each signatory to provide specific evidence of how companies are embedding the commitments into management systems. As a result of this and the number of new Signatories, we have seen a drop in the compliance performance rate of this commitment to just 40 percent.

The intention of this commitment is to ensure that the PVC Stewardship Program is clearly recognised and adopted across the organisation such as via formalised policies, procedures and practices to ensure that employees understand what is expected in day to day management.

Signatories who achieved full compliance for this commitment referred to specific reference to the Program in their environmental management documentation, company business policy or environmental policy. One example of embedding the PVC Stewardship Program and commitments, is described below:

As a Signatory to the Australian PVC Industry's Product Stewardship Commitment, administered by the Vinyl Council of Australia, (SIGNATORY) adheres to the principles and commitments of the Stewardship Program as an integral part of this Environmental Policy.

Vinyl Council will work with Signatories in 2017 to help them understand how to embed the PVC Stewardship Program and its commitments into day to day business practices.

Mercury Avoidance

In Australia, Signatories have committed to ensure that the chlorine and VCM derivatives used in their PVC is free of mercury.

In 2016, 82 percent (31 out of 38) Signatories reported that Vinyl Chloride Monomer (VCM) and PVC resin used in the manufacture of goods sold in Australia by Signatories are derived from mercury free production processes. This was an improvement on the previous reporting year where Signatories had reported 64 percent compliance.

A major share of PVC manufacturing in China uses a process that starts with coal as the feedstock². In this process, mercury is used as a catalyst to spark the chemical reaction among ingredients. Approximately 80 percent of Chinese PVC capacity is accounted for by this process. Acetylene carbide production plants are also found in facilities in India, Russia and North Korea³.

In Europe and North America, there are three electrolysis technologies for producing chlorine and caustic soda: membrane, mercury and diaphragm. The EU signed the Minamata Convention on mercury (an international agreement aiming to protect human health and the environment from anthropogenic emissions and release of mercury and mercury compounds) in October 2013 and thereby committed to ensure its ratification and implementation across the Union.

The European chlor-alkali industry committed voluntarily to close or convert its mercury based plants by 2020. However, under the Industrial Emissions Directive, the BAT conclusions (Best Available Technology) have become legally binding, therefore this date has subsequently been brought forward to 11 December 2017. Consequently, the European chlor-alkali producers using the mercury technology must convert or dismantle these production plant by then⁴.

2 – Chemical Market Associates Inc, World Vinyls Analysis's 2010.

3 – Word of Chemicals: The chlor-alkali Industry in Europe - <http://www.eurochlor.org/the-chlorine-universe/the-chlor-alkali-industry-in-europe.aspx>

4 – Chemical World 11 January 2016

Thanks to the gradual shift away from the mercury cell technology, it now only accounts for approximately 20 percent of the total installed capacity in 2015 in Europe, 18 plants⁵. The more energy-efficient membrane technology accounts today for about 64 percent of European chlorine capacity. Mercury-based production still accounting for nearly 20 percent and the third one, diaphragm technology, nearly 14 percent⁶.

Five of the seven Signatories yet to comply with the Program commitment, receive product from European suppliers. Four Signatories provided improvement statements noting that their suppliers intend on phasing out mercury in line with the European chlor-alkali industry commitment.

In 2016, the Vinyl Council prepared a Supplier Questionnaire which was trialled by several Signatories. The questionnaire was developed to assist Signatories with obtaining information and written verification from upstream suppliers.

The questionnaire proved helpful in assisting Signatories obtaining written verification and will be rolled out to all Signatories during the next reporting year.

INTERNATIONAL DEVELOPMENTS

As the largest carbide PVC producing country, China is under growing pressure to address mercury pollution. A gold-based catalyst has been developed to replace the mercury compound used in making VCM under the acetylene carbide route. Production of this catalyst commenced in Shanghai in 2015. This new technology aims to help reduce the environmental impact of China's PVC industry. Production of this catalyst commenced in Shanghai in 2015.

US resin manufacturers rely on chlorine produced using either diaphragm technology or membrane-cell technology process, which eliminates their reliance on mercury⁷.

The US vinyl industry has responded to a claim regarding chlorine produced at some 15 chlor-alkali plants using modified asbestos diaphragm production processes. The US vinyl industry uses an estimated 20 percent of the overall output of all US chlor-alkali production. Eighty percent of US chlor-alkali production is used to support a wide array of non-PVC products

including pharmaceuticals, water treatment, food additives and other building material products. This includes aluminium processing, ore flotation for metals production, wood pulp processing, rubber additives, textiles, and many plastics⁸.

Asbestos use by the chlor-alkali industry is diminishing in the US and asbestos is not an ingredient in any PVC products⁵.

Resin Compliance

Securing information from suppliers remains a key challenge for Signatories, particularly importers of PVC products. Deciphering the information from multiple suppliers to meet the commitments of the data survey is also highly complex.

As part of the 2016 commitment and verification process, the Vinyl Council asked all Signatories to map its supply chain to understand or check:

- The percentage of the product received from each supplier;
- Commitment relevance;
- Details of the supply of PVC resin and its constituents (VCM and chlorine) in the supply chain;
- That the supply chain meets the evidence of declaration provided by the supplier.

Compliance is only awarded if all of a Signatory's resin, from all suppliers, meets the Program's commitments.

Ninety two percent of Signatories sourcing S-PVC resin and 85 percent of Signatories sourcing E-PVC resin confirmed that their suppliers manufacturing emissions were compliant with the relevant best practice manufacturing standard.

Life Cycle Thinking

Ten Signatories developed or introduced new products in 2016, and all implemented life cycle thinking requirements, including product durability, raw material sustainability, recycled content and manufacturing waste management.

Compliant Signatories commonly reported Life Cycle Analysis (LCA's) tools and Environmental Product Designs (EPDs) as the process or analysis used to assess the product life cycle.



Photo: Polyflor

Two Signatories reported that life cycle thinking was used in the development of stabilisers. The type of manufacturing process, recyclability at the end of life and energy efficiency processes were used to assess the product life cycle.

Vinyl Council will continue to encourage Signatories to promote the use of EPDs.

Actions for 2017

Vinyl Council will explore ways to ensure Signatories are embedding the PSP into organisational culture.

Vinyl Council will work with its members to help them successfully introduce or update EMS and ISO 14001 systems.

5 – EuroChlor 17 <http://www.eurochlor.org/chlorine-industry-issues/phasing-out-mercury-based-production-technology-where-do-we-stand.aspx>

6 – Word of Chemicals: The chlor-alkali Industry in Europe – <http://www.eurochlor.org/the-chlorine-universe/the-chlor-alkali-industry-in-europe.aspx>

7 – Vinyl Info: The U.S. Vinyl Industry's Sustainability Initiative Is Rooted in Past Innovations

8 – Vinyl Institute 24 March 2017

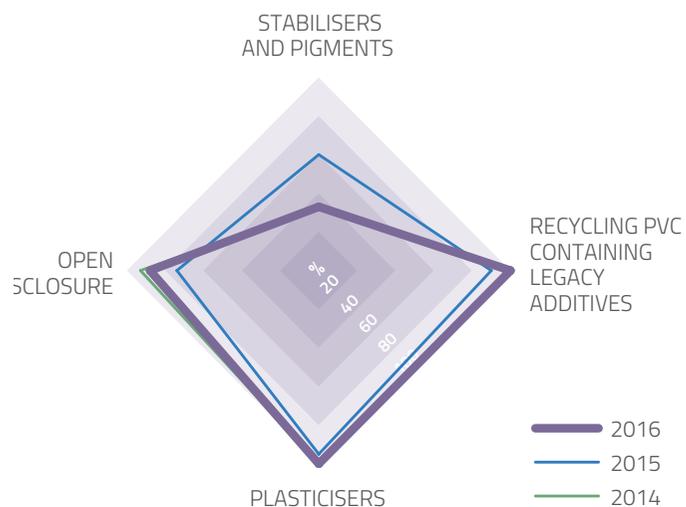


Figure 7: Compliance achieved – Commitment 2

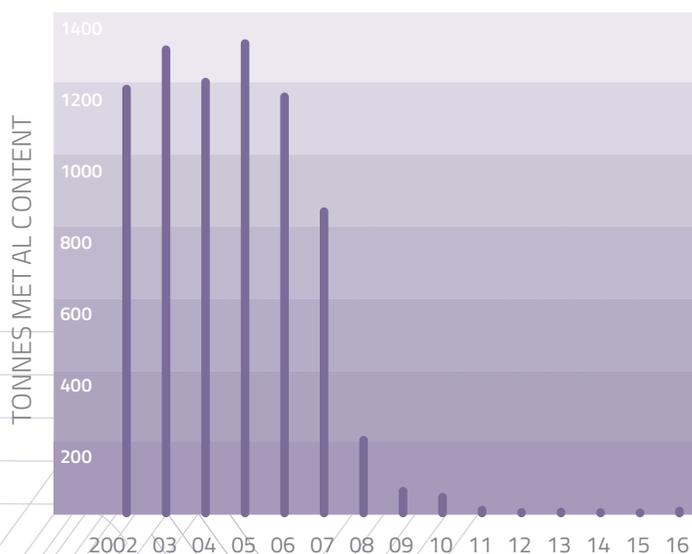


Figure 8: Lead Additive Use 2002–2016

Stabilisers and Pigment

Signatories remain committed to phase out the use of lead-based stabilisers and pigments in PVC processing – a commitment that was to be completed by end 2012. However, as new Signatories have joined the Program, these companies have had to commence plans to achieve this. This commitment is relevant if lead stabilisers are, or have been used in PVC products, or supplied to the local PVC industry in the last three years. In 2016, this commitment was relevant to just three Signatories, two of which reported having used lead-based additives during 2016. These Signatories both receive partial-compliance for this commitment as they were working within the timelines they had set to find technically feasible alternatives to these additives by the end of 2016 and 1 July 2017 respectively.

For lead based stabilisers and pigments, over 99.45% of use has been phased out since 2002. This was an increase from 2015 due to the inclusion of a new signatory in 2015 who provided an estimated amount. The signatory reported the actual amount used in 2016.

INTERNATIONAL DEVELOPMENTS

- Signatories to the European PVC industry's Program, VinylPlus, have confirmed they have signed an official letter confirming that their companies no longer place any lead-based stabiliser on the EU-28 market for use in PVC as of 31 December 2015⁹.
- The South African Vinyl Association's Product Stewardship Program aimed to phase out the use of lead stabiliser by 1 January 2016¹⁰.
- The US vinyl industry eliminated the need for stabilizers that contain metals such as lead or cadmium, three decades ago¹¹.



Photo: Chemson

Recycling legacy additives

PVC Stewardship Signatories are committed to recycle responsibly end-of-life PVC products that contain 'legacy additives'¹² by meeting relevant regulatory health and safety obligations to workers and customers, avoiding use in sensitive end-use applications and ensuring products meet relevant performance requirements.

In 2016, relevant Signatories reported full compliance with this commitment.

⁹ – Vinyl Plus Progress Report 2017

¹⁰ – South African Vinyls Association, Members letter, Re: Product Stewardship Program – lead phase out compliance. http://www.savinyls.co.za/files/files/SAVA_LeadPhaseOut-SunsetDate_2015.pdf

¹¹ – Vinyl Info: The U.S. Vinyl Industry's Sustainability Initiative Is Rooted in Past Innovations

¹² – 'Legacy additives' are substances whose use in PVC products has been discontinued but which may be found in recycled PVC materials

Plasticiser Policy

Signatories commit to ensuring safe use of plasticisers in flexible PVC products in Australia, and monitoring scientific and regulatory developments locally and overseas.

The two Signatories supplying packaging products to the Australian market confirmed compliance to the new commitment to avoid the use of Low Molecular Weight (LMW) ortho-phthalates in food contact films.

Of the 19 Signatories in total reporting use of plasticisers in their products, four used classified LMW phthalates such as DEHP.

In 2017, the Vinyl Council will form a working group to review the use of these classified plasticisers in flexible PVC in Australia.

OVERSEAS REGULATORY DEVELOPMENT

European Plasticisers (former ECPI) has confirmed increased use in Europe of High Molecular Weight (HMW) ortho-phthalates, cyclohexanoates, terephthalates and other plasticisers, accompanied by a progressive decline in the use of LMW ortho-phthalates¹³.

The European Commission in April 2016 granted Authorisation under REACH regulations for the use of DEHP in recycled soft PVC up to certain thresholds and by specific applicant companies, thus allowing recycling of flexible vinyl to continue¹⁴.

Four low molecular ortho-phthalates – DEHP, DIBP, DBP and BBP, all already listed as Substances of Very High Concern (SVHCs) based on environmental concerns – have been identified as endocrine disrupting chemicals (EDCs) for human health¹⁵.

An 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 and these substances are considered safe for use¹⁶.

Actions for 2017

Ensure the complete phase out of lead additives by Vinyl Council members. Vinyl Council to ask all relevant Signatories to sign an official letter confirming that their company no longer places any lead-based stabilisers for use in PVC products for the Australian market (excludes recycle).

Review the use of LMW phthalates in flexible PVC.

Close the gap to reach 100 percent compliance with open disclosure.

13 – Vinyl Plus Progress Report 2017

14 – Plastics New Europe: <http://www.plasticsnewseurope.com/article/20160429/PNE/160429802/commission-authorises-dehp-use-for-recycled-soft-pvc>.

15 – European Chemical Agency: ECHA Weekly 13 April 2016

16 – Vinyl Plus Progress Report 2017

Photo: Chemson



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.

In 2016, Signatories were required to confirm particular measures were in place to demonstrate their commitment to improving energy efficiency and reducing greenhouse gas emissions. Ninety percent of the relevant Signatories were fully compliant, with many demonstrating best practice initiatives defined under the Program.

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 supplier-manufacturers’ energy management and efforts to reduce the carbon footprint of products supplied to the Australian market.



Photo: Plustech

Signatories received non-compliance for not submitting information from suppliers, or reporting that the manufacturer did not comply with any of the energy and greenhouse gas emission requirements.

Actions for 2017

Close the gap on full compliance.

Identify and promote government Programs that support energy efficiency in industry.

Develop case-studies to educate Signatories on energy efficiency opportunities based on other Signatories’ experiences.

Table 1: Expected PVC Industry Energy and Greenhouse Gas Emissions Charter Measures

FOR SIGNATORIES WITH LOCAL MANUFACTURING

A policy addressing energy and greenhouse gas management.

Measurement of annual energy use.

Energy efficiency and greenhouse gas improvement plans and targets for improving and/or reviewing efficiency.

Measurement of the carbon footprint of / greenhouse gas emissions associated with the PVC products e.g. through life cycle assessments or development of Environmental Product Declarations.

Assessment of the energy efficiency of key parts of Signatories supply chain e.g. transportation, raw materials manufacture.

Use of recoPVC in the manufacturing of new products to reduce the carbon footprint of your PVC products.

FOR SIGNATORIES SUPPLYING IMPORTED PVC PRODUCTS, RAW MATERIALS AND/OR INTERMEDIATES TO THE AUSTRALIAN MARKET

Evidence from major supplier(s) of a formal policy/procedure on energy efficiency and greenhouse gas emissions management for the manufacturing of the PVC-related products you source.

Evidence from major supplier(s) that annual energy usage related to the manufacturing of products supplied to you is measured and energy efficiency and greenhouse gas improvement plans are in place.

Evidence from your major supplier(s) of the measurement of the carbon footprint of the product(s) supplied, such as Environmental Product Declarations published in the past three years. (EPD may be company specific, or an industry EPD that the manufacturer has been party to).

Evidence that the sourced product(s) contain recycled post-consumer PVC.

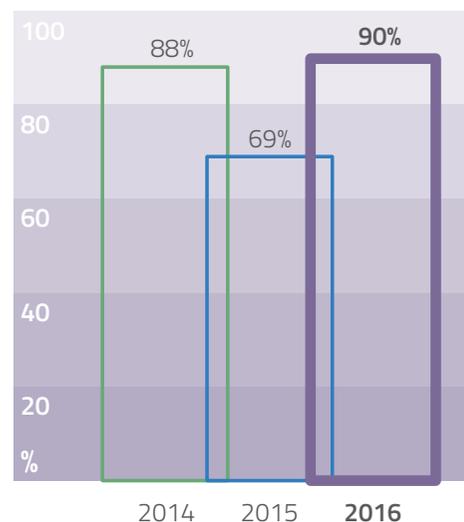


Figure 9: Compliance achieved – Commitment 3

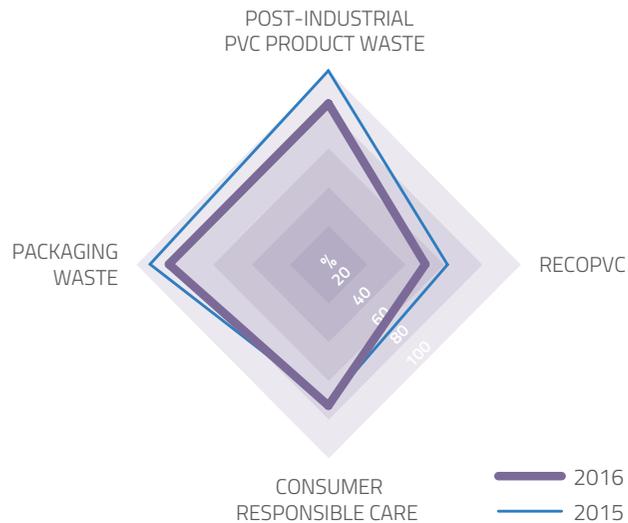


Figure 10: Compliance achieved – Commitment 4

Overall compliance under this Commitment contracted slightly in 2016 due to a number of new Signatories lacking procedures or processes to effectively record or report activities under this commitment.

The average amount of post-industrial PVC product waste Signatories send to landfill is 1.2 percent of total production. This is usually material such as floor sweepings which cannot readily be recycled because of contamination.

Two Signatories were not complying with the requirement to send less than two percent of their saleable production to landfill but both have plans in place for 2017.

RecoPVC

The purpose of this commitment is to encourage the take-up of recoPVC¹⁷ in order to support PVC recycling markets. Signatories that fail to use recoPVC in the PVC products they supply to the Australian market are not compliant unless Australian Standards or regulations prohibit the use of recycled material, or it is not technically feasible to integrate recoPVC into their products.

In 2016, three Signatories demonstrated best practice compliance by:

- Using recoPVC in the product supplied to the Australian Market;
- Reporting the quantity of recoPVC consumed; and
- Using the notion of design for recyclability in new product design.

Three Signatories reported that Australian Standards, codes or regulations prohibit the use of recycled material in the products supplied to the Australian market. One signatory,

- Offered contractual agreements to customers to take back products at the end of life for reprocessing and had the capacity to implement such take back arrangements now; and
- Had contractual agreements with recycling/waste transport service providers in at least two capital cities to facilitate recovery and reprocessing of the product at end of life.

The recoPVC commitment is relevant to more than half of the Signatories, resulting in 6,292,609 kilograms of recoPVC being returned back into new product. As Signatories develop more robust networks and systems, the amount of recoPVC reported should continue to increase, creating demand for waste PVC collectors and reprocessors.

The Vinyl Council would like to see the non-compliant Signatories close the loop, use PVC waste recovered from external sources in new products and prevent material from

being landfilled. In 2017, the Vinyl Council will continue to work with Signatories to recover PVC through the supply chain.

Four Signatories, all importers of finished goods, shared information on design for recyclability. The Vinyl Council will work closely with Signatories to learn more about their approaches regarding product design aspects.

Packaging Waste Management

This voluntary initiative was introduced in 2015. Signatories aim to achieve a 70 percent recycling rate of incoming recyclable packaging connected to the manufacture or supply of PVC products, and to undertake actions to favour the recycling of packaging material that leaves their facility.

In 2016, 24 Signatories reported in this commitment up from 14 in 2015. Twelve Signatories received a best practice score by reporting that:

- more than 70 percent of incoming packaging waste at their business site is recycled;
- they have procedures, processes or policies in place to record or measure how different waste streams are managed at the site/s;
- they undertake one or more of the following:
 - Design change to packaging to improve recyclability;
 - Labelling of packaging materials e.g. polymer code;
 - Down gauging packaging for material efficiency;
 - Offering a packaging take-back Program.

¹⁷ – 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.

Vinyl Industry Recycling Strategy

Following its second ReSource Summit in 2015, the Vinyl Council updated the Vinyl Industry Recycling Strategy in 2016. The strategy affirms the determination of the industry 'to facilitate growth in sustainable PVC recycling practice in Australia.'

A key focus to foster growth of PVC recycling is to use a collaborative approach and develop local end markets. The Vinyl Council is aware that there is no recycling if there is no end market, and that a major impediment to recycling PVC in various states of Australia is the availability of local reprocessors and effective supply chains. This is a shared issue and responsibility requiring strategy and action.

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

Recycling Results in Priority Areas

PVC ADVERTISING BANNER RECYCLING PROJECT

The Vinyl Council was successful in obtaining funding from the NSW Environment Trust to identify ways to reprocess advertising billboard skins and find potential end markets for the recyclate. Currently around 500 tonnes of this material are disposed to landfill each year, as well as larger quantities of grain covers and truck tarpaulins totalling around 5,000 tonnes per year.

A series of workshops and forums with the Outdoor Media industry, Monash University, UNSW and manufacturers have delivered excellent results:

- Interdisciplinary collaboration between industry associations, manufacturers, industrial designers and chemical engineers to find solutions;
- A new reprocessing method has been identified (proceeding to international patent);
- A low-cost reprocessing method has been identified for some suitable product, leading to 2 tonnes recycled/ month; and
- Six product concept designs developed for use of recycled material.

STRATEGIC OBJECTIVE

2016 OUTCOMES

Data and Information: to be able to measure PVC recycling more accurately	<p>Creation of a database listing PVC reprocessors by PVC product type, market size and recycling practice;</p> <p>Discussions with state governments re absence of reprocessors and impact.</p>
Collaboration: to facilitate and support the work of those keen to recycle and establish systemic change	<p>Promoted member reprocessors and other recycling champions;</p> <p>Supported development of PVC collections and granulating/ reprocessing in Vic, NSW, SA and WA;</p> <p>Provided referrals to member reprocessors of both supply and demand opportunities equating to >10,000 tonnes PVC.</p>
End markets: to develop market pull for recoPVC by growing end user demand	<p>Undertaking two R&D projects with UNSW and Monash University and partners in flooring and coated fabric supply chains, funded by NSW Environment Trust, to develop end markets for reprocessed flooring, coated fabric and cable.</p>
Innovation and trials: to form recycling projects that are replicable and scalable for easy growth	<p>Through funded R&D projects and collaborations, undertaken lab tests, trials and developed concept designs for prototypes using reprocessed materials (flooring, coated fabric and cable);</p> <p>Consolidated the medical PVC recycling Program in Victoria and expanded collections & reprocessing to other States.</p>
Reprocessing infrastructure: to increase number of reprocessors and improve viability of PVC recycling	<p>Education of state governments on PVC reprocessing capacity and requirements;</p> <p>Advised members of availability of grants;</p> <p>Government investment in Victorian reprocessing of PVC.</p>
Design and composition: to encourage Design for Recycling (DfR) and advocate for quality recyclate and recycling practices	<p>Through Stewardship Program commitments, encouraging packaging DfR.</p>



Photo: Polyflor

COMMERCIAL VINYL FLOORING RECYCLING PROJECT

The Vinyl Council in partnership with the Australian Resilient Flooring Association was successful in obtaining funding from the NSW Environment Trust to identify potential end markets, reprocessing methods and collection systems for commercial vinyl flooring. Currently around 15,000 tonnes of this flooring is disposed to landfill nationally each year.

In 2016, the project's preliminary results were:

- Identification of a potential use for up to 10,000 tonnes per year;
- An interdisciplinary collaborative approach between industry associations, manufacturers and chemical engineers to find solutions;
- Identification of a pilot geographic area (regional NSW) for collection of material.

Both projects are funded through the NSW EPA's Waste Less, Recycle More initiative via the landfill levy. Each investigation will be concluded with a report in 2017. These important foundation projects enable the Vinyl Council to extend its earlier research, strengthen networks further, encourage market pull, support reprocessors and encourage design for recycling.



Photo: Vinyl Council of Australia

MEDICAL PVC RECYCLING

Initiated by the Vinyl Council and Western Health in 2009, the PVC Recycling in Hospitals program has continued to grow. By the end of 2016, the number of participating hospitals across Australia was 67. The quantity of material recovered for recycling in Australia rose to 16,000kg /month.

A highlight of the year was the PVC Recycling in Hospitals program being nominated a Finalist of the health category in the Victorian Premier's Sustainability Awards 2016. This helped to build profile and garner state government recognition of the program.

A key objective for the year was to build hospital participation to increase quantities recovered and so improve commercial viability for recyclers. Accordingly, the Vinyl Council coordinated a forum in Melbourne on recycling in healthcare with key speakers and over 50 attendees.

The program continued to be supported by Council members and Stewardship Program Signatories, Welvic Australia, the recycler and Baxter Healthcare, who helped coordinate collections in WA, SA and Qld in 2016.



Photo: Monash University

In 2016, the Vinyl Council received over 70 registration enquiries about the program from hospitals and healthcare facilities, up from 40 in 2015. In 2017 the Vinyl Council aims to widen the engagement in this product stewardship program with organisations such as medical product manufacturers, government, training institutions, peak bodies and hospitals. The target is to recover over 2,000 tonnes of PVC medical waste when fully operational.

Actions for 2017

The Vinyl Council will work with Signatories in 2017 to encourage waste contractors to provide relevant waste data and waste reporting systems.

Continue to encourage Signatories to reduce PVC production waste being sent to landfill.

Continue actions that create market pull for recycled end of life material through implementation of the Vinyl Industry Recycling Strategy.

Annual Progress Report

The 2015 annual report was published significantly behind schedule in November 2016 following several delays in completing data collection from Signatories, review and report writing and third party verification audits.

One Signatory in 2015 failed to submit a finalised data survey for independent audit and the issue was considered by the Technical Steering Group (TSG). In order to ensure the credibility of the Program is not compromised by companies failing to undergo audit, the TSG agreed that companies who fail to submit a data survey must undergo an audit the following year and contribute to the cost of the audit.

For the 2016 reporting year, the Signatory mentioned above, complied with this and was audited.

For this 2016 report, we thoroughly reviewed the process and data survey, providing clearer information on compliance evidence for each commitment. Third party audits of nine Signatories were conducted on schedule.

Program and Report Verification

A limited assurance and verification statement has been prepared by Ernst & Young (EY) for the performance of the Program in 2016 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 conduct nine site visits 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.

Research Monitoring

There are a number of forums of communication for industry providing the opportunity to monitor national and international developments in scientific research relevant to the potential health and environmental impacts of the PVC product life cycle, including TSG meetings, Vinyl Council member meetings and events, conferences and seminars, regular emailed news briefings, website etc. These were used to advise members of scientific developments, particularly on the subjects of phthalate plasticisers, plasticisers derived from renewable materials, REACH and other regulatory developments, NICNAS' assessment of chemicals, and the phase out of mercury.

Technical Steering Group

The Technical Steering Group consists of members from the Australian PVC industry, the Office of Environment & Heritage, Sustainability Victoria, 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 2016, attended by an average of fourteen participants.

Changes to Signatories

One Signatory left the Program in 2016 and thirteen companies joined it.

Stakeholder engagement

The Vinyl Council aims to hold stakeholder engagement meetings every two to three years following the publication of its Progress Report to discuss the progress of the PVC industry and effectiveness of the PVC Stewardship Program. The last engagement forum was conducted in 2014. Round-tables will be held in 2017 to improve industry understanding of stakeholder concerns and expectations.



Photo: Vinyl Council of Australia

Other stakeholder engagement in 2016 included presentations to several conferences such as Society of Plastic Engineers, PVC Australia 2016, Global Vinyl Council, Asia Pacific Vinyl Network, and Melbourne Metropolitan Waste and Resource Recovery Group Forum.

Actions

The Vinyl Council will conduct Round-tables to provide stakeholders with the progress of the PVC Product Stewardship Progress and seek stakeholder feedback and input on the Program's direction.

Five Year Evaluation Review report.



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Independent Limited Assurance Statement to the Board of Directors of the Vinyl Council of Australia

The Vinyl Council of Australia (the 'VCA') has commissioned Ernst and Young ('EY') to provide limited assurance over the extraction of 52 selected statements and inclusion in the 2016 PVC Stewardship Program Progress Report (the 'PSP Report'), for the year ended 31 December 2016.

Subject Matter

The Subject Matter for our assurance engagement is limited to the 52 selected statements presenting data and activities which indicate performance of the VCA – as set out in Appendix A.

Criteria

The VCA has set out the Criteria for reporting against the Subject Matter for each commitment as part of the Australian PVC industry's PVC Stewardship Program in the form of a 'Commitment and Verification Guide'.

The Responsibility of Management

The management of the VCA is responsible for the preparation and presentation of the Subject Matter in the PSP Report, including the selection of appropriate criteria. No conclusion is expressed as to whether the selected methods used are appropriate for the purpose described in the report. Further, the VCA's management is responsible for establishing and maintaining internal controls relevant to the preparation and presentation of the Subject Matter that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate criteria; maintaining adequate records and making estimates that are reasonable in the circumstances.

Assurance Practitioner's Responsibility

Our responsibility is to express a limited assurance conclusion on the extraction of data presented in the PSP Report based on our assurance engagement, in accordance with ASAE3000 'Assurance Engagements other than Audits or Reviews of Historical Financial Information' and in accordance with the terms of reference for this engagement as agreed with the VCA.

Summary of Procedures Undertaken

Our procedures, undertaken between February to June 2017 included, but were not limited to:

- ▶ Checking the factual accuracy of the information presented in the PSP Report by examining the data and information contributing to the 52 statements (covering all commitments presented in the Criteria) and checking that it has been extracted correctly from the VCA's internal systems
- ▶ Reading the PSP Report for any significant anomalies, particularly in relation to VCA's activities and trends in data
- ▶ Obtaining an understanding of the VCA's key systems and processes used for managing, analysing and reporting Signatory performance information
- ▶ Interviews with key personnel responsible for collating and writing sections of the PSP Report to understand the reporting process.

In addition, as part of our engagement we conducted site visits and agreed information submitted by the following nine Signatories to supporting sample documentation:

- ▶ Australian Plastic Profiles Pty. Ltd.
- ▶ APN Compounding Pty. Ltd.
- ▶ Brenntag Australia Pty. Ltd.
- ▶ Chemiplas Pty. Ltd.
- ▶ Gerflor Pty. Ltd.
- ▶ Kenbrock Pty. Ltd.
- ▶ Rojo Pacific Pty. Ltd.
- ▶ Sun Ace Pty. Ltd.
- ▶ Vinidex Pty. Ltd.

Use of our Report

Our limited assurance report has been prepared for distribution to the management and directors of the VCA. We disclaim any assumption of responsibility for any reliance on this assurance statement or on the Subject Matter to which it relates, to any person other than management and directors of the VCA, or for any purpose other than that for which it was prepared.



Independence, Competence and Experience

In conducting this assurance engagement, EY has met the requirements of our Independence Policy. EY confirms that we are not aware of any issues that could impair our objectivity in relation to this assurance engagement. EY has not had any part in collecting and calculating data, or in preparing any part of the Report.

Limitations

The scope of work covered the Subject Matter referred to above as included in the Report. EY did not provide assurance over the data. Specifically excluded from our scope was source data presented to the VCA from Signatories, other than for those Signatories listed above, which were assessed by undertaking site visits and documentation reviews, on a limited basis.

Matters Relating to Electronic Presentation of Information

Our limited assurance engagement included web-based information that was available via web links as of the date of this statement. We provide no assurance over changes to the content of this web-based information after the date of this limited assurance statement.

Conclusion

Based on our limited assurance procedures, nothing has come to our attention to indicate that the 52 selected statements have not been extracted and fairly presented in the PSP Report, in all material respects.

Recommendations

Based on our limited assurance engagement a number of recommendations are highlighted below for VCA Executive's benefit:

- ▶ Recommendation one: Continue progress in clarifying the reporting requirements and scoring system for commitments in the Commitment and Verification Guide.
- ▶ Recommendation two: Continue to undertake internal quality check procedures for data submitted by Signatories to improve accuracy and reliability of reporting.
- ▶ Recommendation Three: Continue progress in developing new commitments and reporting requirements.
- ▶ Recommendation four: Continue to strengthen engagement between VCA and Signatories for better understanding of evidence requirements, and awareness of templates and resources available to achieve compliance

Ernst & Young
Melbourne, Australia
12th July 2017

2016 Signatory List

Gold Excellence: 100 percent	
Australian Plastic Profiles Pty Ltd	www.app.net.au/
Australian Vinyls Corporation Pty Ltd	www.av.com.au/
Chemson Pacific Pty Ltd	www.chemson.com/
Deceuninck Pty Ltd	www.deceuninck.com.au/
Karndean Flooring Pty Ltd	www.karndean.com.au/
Pipemakers Pty Ltd	www.pipemakers.com.au/
Sun Ace Australia Pty Ltd	www.sunace.com.au/
Tarkett Australia Pty Ltd	www.tarkett.com.au/
Vinidex Pty Ltd	www.vinidex.com.au/
Silver Commendation: 99 percent	
Baxter Healthcare Pty Ltd	www.baxterhealthcare.com.au/
Iplex Pipelines Australia Pty Ltd	www.iplx.com.au/
Plustec Pty Ltd	www.plustec.com.au/
Vinythai PLC *	www.vinythai.co.th/
Silver: 80–98 percent	
APN Compounding Pty Ltd	www.apncompounding.com/
Armstrong Flooring Pty Ltd	www.armstrong-aust.com.au/
Berry Plastics Australia Pty Ltd	www.berryplastics.com.au/
Chemiplas Australia Pty Ltd *	www.chemiplas.com.a
CMS Electracom Pty Ltd	www.cmselectra.com/anz/
Formosa Plastics Corporation (FPC)Tawain *	www.fph.com.tw
Integrated Packaging Pty Ltd	www.ipstretch.com/
Pegulan Floorcovering Pty Ltd	www.pegulan.com.au
Polyflor Australia Pty Ltd *	www.polyflor.com.au
Primaplas Pty Ltd	www.primaplas.com.au/
Profine International Profile Group	www.profine-group.com/en/
PT Asahimas Chemical *	www.asc.co.id/
Redox Chemicals Pty Ltd *	www.redox.com
Rojo Pacific Pty Ltd	www.rojopacific.com.au/
Speciality Polymer and Chemicals Pty Ltd *	www.spcast.com.au
Stormtech Pty Ltd	www.stormtech.com.au/
Techplas Extrusions Pty Ltd	www.techplas.com.au/
Thai Plastic and Chemical (TPC) Pty Ltd *	www.scgchemicals.com
Welvic Australia Pty Ltd	www.welvic.com/

Bronze: 50–79 percent	
Altro Flooring – APAC Pty Ltd	www.asf.com.au/
Baerlocher Malaysia SND BHD *	www.baerlocher.com/
Brenntag Australia Pty Ltd *	www.brenntag.com/
Gerflor Australasia Pty Ltd	www.gerflor.com.au/
Kenbrock Pty Ltd *	www.kenbrock.com.au/
Plastral Pty Ltd	www.plastral.com.au/
Signature Floorcoverings Pty Ltd	www.signaturefloors.com.au/
The Andrews Group (Australia) Pty Ltd *	www.theandrewsgroup.com.au
Compliance: < 50 percent	
AFS Wall Systems Pty Ltd *	www.afswall.com.au
Veka Plastics (Singapore) Pte Ltd	www.vekainc.com/
Failed to Report	
Polymer Direct Pty Ltd *	www.polymerdirect.com.au/
Rehau Pty Ltd	www.rehau.com/au-en/

* First year reporting as a Signatory to the PSP

AWARD	AWARD ASSESSMENT	DATA SURVEY ASSESSMENT SCORE	DATA SURVEY ASSESSMENT SCORE PLUS BEST PRACTICE POINTS
Gold Excellence	Signatories who scored full compliance in all relevant commitment areas.	100%	100%
Silver Commendation	Signatories who scored silver status but were awarded bonus points for demonstrating best practice 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%

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.

DfR	Design for Recycling
DEHP	Diethylhexyl phthalate
ECHA	European Chemical Agency
EMS	Environmental Management System
EPD	Environmental Product Declaration
GBCA	Green Building Council of Australia
GHG Emissions	Greenhouse Gas emissions
LCI / LCA	Life Cycle Inventory / Life Cycle Assessment
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.
NICNAS	National Industrial Chemicals Notification and Assessment Scheme, the Australian Government regulator of industrial chemicals.
The Program	The Product Stewardship Program, signed by members of the Australian PVC industry
PSP	Product Stewardship Program
PVC (Vinyl)	Polyvinyl chloride
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (European Legislation)
SAVA	South African Vinyl Association
Signatories	The members of the Australian PVC industry who have signed the Program as an indication of their Commitment to product stewardship.
SME	Small Medium Enterprise
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.
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.
VIRS	Vinyl Industry Recycling Strategy