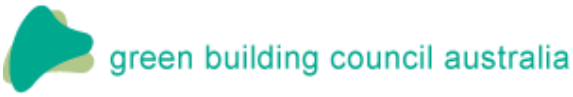

Background and Outcomes of the Green Star PVC Minimisation Credit Review

07.04.10

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1.0 Executive Summary

Since the Green Building Council of Australia (GBCA) introduced Green Star in 2003, the suite of environmental rating tools has historically contained a 'Polyvinyl Chloride (PVC) Minimisation' credit to encourage the minimisation of PVC in base building and interior fitout applications. The 'PVC Minimisation' credit was included in the first Green Star rating tool, Green Star – Office Design v1, and has featured in all subsequent tools.

The GBCA's rationale for including the credit in Green Star tools was based upon concerns and international actions over the environmental and human health impacts of the PVC life cycle.

Green Star's voluntary minimisation approach to PVC was effective in driving improvements in some PVC industry practices. However, the substitution of PVC did not necessarily deliver an improved environmental outcome for the built environment, as the use of some non-PVC alternative materials did not always guarantee a better environmental outcome.

In late 2007, the GBCA commenced an extensive stakeholder engagement process to review the PVC minimisation credit, which included a review of independent literature and data, as well as the involvement of an Expert Reference Panel (ERP).

A series of ERP meetings, site visits, discussions with key stakeholders, and examination of international studies found that the lifecycle of PVC, from raw materials and production through use to end-of-life, recycling and disposal had changed considerably in the past five years.

A rigorous PVC literature review revealed that where international opposition to PVC remained it was based on historical industry practices which had led to unacceptable health risks and/or environmental impacts. These concerns did not take into account the significant achievements within the PVC industry in recent years, particularly in Australia and Europe, to reduce the environmental and human health risks previously associated with PVC building materials. In addition, these concerns did not reflect the findings of independent scientific assessments, as well as comparative risk and impact studies, between PVC and non-PVC alternative materials.

The PVC literature review also found that, while there are still some challenges to be addressed, PVC performs as well as, or better than, the alternatives in most product categories. Furthermore, it found that environmental and human health risks associated with PVC can be minimised by using best practices in the manufacturing and end-of-life management phases of the PVC life cycle.

As part of the credit review, the ERP developed the Best Practice Guidelines for PVC in the Built Environment, which identify the opportunities for environmental impact and health risk reductions in the PVC life cycle. These guidelines also recognise some world-leading achievements of PVC manufacturers, particularly in the areas of resin, pipe, conduit and flooring.

The primary outcome of the credit review is a proposed revision to the 'PVC Minimisation' credit. This proposal recommends retaining a 'PVC' credit; however the revised credit aims to encourage the development and use of best practice PVC material in Australia.

Under the revised credit, projects will be able to claim two points towards their Green Star rating if the project's flooring, cable, pipe and conduit – which together account for the majority of PVC use in buildings – meet the GBCA's Best Practice Guidelines.

While the PVC credit, as applied over the past five years, encouraged the minimisation of all PVC use in green buildings, the GBCA believes the new credit revisions will stimulate demand for best practice, responsibly-produced PVC products in Australia and act as a driver for positive change within the PVC industry.

Future work by the GBCA may involve a life cycle analysis approach to the Green Star Materials Category which compares the health and environmental impacts of all building materials. Until that time, the revised PVC credit will adopt a new rewards-based approach that is expected to yield a greater uptake of best practice in the PVC industry.

2.0 Foreword

The outcomes of the PVC Minimisation credit review are not based on full Life Cycle Assessment (LCA) comparisons of PVC products to non-PVC alternatives. There is significant merit in assessing the relative environmental impacts of products and materials by conducting full LCAs of each major PVC product category (e.g. flooring, pipe, conduit, cable insulation) against their non-PVC product alternatives. However, the time and resources required to undertake such detailed comparisons, and then to use the findings to establish specific criteria for a revised PVC credit in Green Star rating tools, exceeds those available for this credit review project.

In addition, and especially within the Australian context, there are two fundamental challenges that must be overcome before LCA-based decisions are incorporated into rating tools such as Green Star. These are:

1. Generating sufficient Australian-specific life cycle inventory (LCI) data to support the LCA tools. For example, LCA reporting and data collection that is in accordance with an agreed national methodology, which is already happening in many European countries, must become common practice in Australia. Such reporting and collection must become common practice for all industries involved in the manufacture of building and fitout materials in order to sustain an Australian LCI.
2. Collating this data into an Australian LCI database which can be readily and equitably accessed by the developers of LCA tools.

The Australian Life Cycle Inventory (Aus LCI) project is currently underway and aims to develop agreed national methodologies and manage a national LCI database to meet the above challenges. The GBCA is a stakeholder in this project.

Any future consideration of recognising the use of LCA tools in Green Star will require assurance that an equitable and consistent methodology is being followed by the LCA tool development stakeholders in Australia. These areas of assurance specifically include tool assessment methodologies, data collection and manipulation requirements, as well as LCI database ownership.

The GBCA encourages the development and use of LCA Tools and is currently exploring ways to provide manufacturers and suppliers with incentives to contribute their LCA data to the (Aus LCI) database. Tool development organisations that are undertaking work in this complex field are encouraged to pursue the development of LCA tools that draw on the life cycle data in the Aus LCI and, in particular, the data contributed by the Building Products Innovation Council (BPIC) and Industry Cooperative Innovation Program (ICIP) project.

The BPIC ICIP project is developing:

- An extensive database of LCI data for major Australian building products and construction materials.
- A set of rules on how to conduct LCA and how to use LCI data in LCA tools.
- A rigorous science-based methodology for whole-of-life building assessment.

Future work by the GBCA may involve the application of Life Cycle Analysis to compare the health and environmental impacts of materials.

3.0 History of the 'PVC Minimisation' Credit

Green Star rating tools have historically contained a 'PVC Minimisation' credit that encourages the minimisation of PVC in base building and interior fitout applications. The rationale for the introduction of the credit in 2003 was based upon concerns and international actions over the environmental and human health impacts of the PVC life cycle. The context of these concerns and actions are briefly summarised as follows:

1970s – Numerous lawsuits filed against PVC manufacturers over the increased incidence of a rare form of liver cancer amongst workers at PVC manufacturing plants internationally.

1980s – Greenpeace campaign targeted PVC over toxicity and other concerns.

1994 – Sydney Olympics bid included 'Green Guidelines' proposed by Greenpeace, including encouragement for the reduction of PVC for the Sydney 2000 Olympic Games.

1998-2000 – Some national governments and cities around the world, including the UK, Netherlands, Spain, San Francisco, and Seattle, proposed policies to go 'PVC free'.

2000 – European Union Green Paper on PVC recognised areas of concern that the PVC industry must address in order to improve PVC life cycle risks and impacts.

2001 – Melbourne Docklands Environmentally Sustainable Development Guide rewarded projects for minimising the use of PVC.

2003 onwards – Green Star's approach to PVC was both supported and criticised by stakeholders since the introduction of the 'PVC Minimisation' credit. Stakeholders have produced evidence and substantiated arguments which challenge the human health and environmental concerns that underpin the credit.

2006 – The Vinyl Council of Australia (VCA) and Plastics Industry Pipe Association (PIPA) gave a presentation to the GBCA Technical Assurance Committee (TAC) detailing progress that the PVC industry had made on environmental issues.

2008 – Stakeholder criticism of the approach to this credit resulted in the GBCA undertaking the PVC credit review.

A summary of the historic 'PVC Minimisation' credit is as follows:

Aim of Credit

To encourage and recognise the reduction in use of polyvinyl chloride (PVC) products in buildings

Credit Criteria

Up to two points are awarded as follows:

- **One point is awarded where:**

30% of the total cost of PVC content was reduced through replacement with alternative materials.

• **Two points are awarded where:**
60% of the total cost of PVC content was reduced through replacement with alternative materials.

The full 'PVC Minimisation' credit can be downloaded from the PVC Credit Review webpage which is accessible from the materials category section of the GBCA website (www.gbca.org.au).

4.0 The Revised 'PVC' Credit

Note: Full details of the revised 'PVC' credit are provided in the *Green Star PVC Credit* document available from the GBCA website. The Aim and Credit Criteria of the revised credit are as follows:

Aim of Credit

To reduce the environmental and health impacts of Polyvinyl Chloride (PVC) by encouraging the use of PVC material which adheres to best practice guidelines.

Credit Criteria

Up to two points are awarded when a percentage of a project's flooring, cable, pipe and conduit - which together account for the majority of PVC use in buildings and which are referred to as 'common uses of PVC' in this credit – meet the Best Practice Guidelines for PVC in the built environment. For further information on the Best Practice Guidelines see the Additional Guidance section of this credit.

Points are awarded as follows:

- One point where at least 60% of the common uses of PVC products in buildings (by cost) complies; and

If the cost of PVC products in common uses of PVC represents less than 0.05% of the project's total contract value, or there are no PVC products present in the project for any of the common uses of PVC, this credit is 'Not Applicable' and is excluded from the points available used to calculate the Materials Category Score.

Compliance Requirements

Common uses of PVC

This credit addresses the common uses of PVC in buildings. This refers only to:

- Pipes, conduit and associated fittings;
- Wire and cable insulation; and
- Flooring* and resilient wall covering products that contain PVC.

*Flooring refers to vinyl flooring or a carpet containing PVC backing.

Common uses of PVC products that are re-used are excluded from this credit. Any PVC product not included in common uses of PVC is not addressed by this credit (for example PVC windows) and is neither positively nor negatively treated by the credit.

5.0 The PVC Credit Review Process

In late 2007 the GBCA began stakeholder engagement to review the minimisation approach adopted in the credit. The process involved engagement with a GBCA Board Materials Advisory Group, GBCA members and Green Star users, the Australian PVC industry, NSW Department of Environment and Climate Change (DECC) and an Expert Reference Panel (ERP). The GBCA also undertook a literature review of independent literature and data during this period of engagement, in order to support the process and to provide a focal point for work with the ERP.

This section provides details on the background and process of the stakeholder engagement, the PVC ERP and literature review elements of the PVC credit review.

5.1 Stakeholder Engagement

In an effort to better understand the science and complexities of the PVC life cycle, the GBCA undertook an extensive engagement process involving analysis of feedback from Green Star users including dialogue regarding the challenges, opportunities and suitability of the credit. A review of historical and current concerns raised in the public domain by Environmental Non-Government Organisations (ENGOs) with regards to the impact and risks associated with the use of PVC was undertaken, as was a review of independent scientific literature.

The Plastics Industry Pipe Association (PIPA), The Vinyl Council of Australia (VCA), DECC, the City of Sydney, ARUP and BRANZ Australia are a few of the organisations with whom the GBCA communicated during the engagement process. The engagement period has taken place over an 18 month period, and involved a variety of initiatives including forums, working groups, regular meetings and PVC-related factory site tours. The process has provided the GBCA with a better understanding of the environmental and health risks associated with PVC use in buildings, and identified a number of opportunities for improving environmental and health-risk management practices within the PVC life cycle.

5.2 PVC Expert Reference Panel

Convening the PVC Expert Reference Panel (ERP) represented an additional commitment to meaningful stakeholder engagement. The ERP comprised an independent chair and seven participants representing a diverse range of expertise relevant to the topics under review.

Nominations for appointment to the panel were sought from GBCA members and Industry Reference Group (IRG) stakeholders.

Participants in the ERP were selected based on their expertise in the following areas:

- Toxicology;
- Plastics;
- Life Cycle Assessment (LCA);
- Waste management / recycling (with emphasis on plastics and/or construction and demolition waste);
- Building design and/or product specification (particularly for flooring and pipe);
- Manufacturing of PVC or PVC component products;
- Australian Standards and Building Code of Australia (BCA) in relation to PVC and plastics use;
- Federal, State and Local Government Department representation from building/plumbing/public works, product procurement, waste management and recycling, health and environment; and
- Health and Environmental Non Government Organisations.

The panel was appointed in February 2009. A total of six ERP meetings was held between February and September 2009.

The ERP was engaged to:

- Advise the GBCA on opportunities to use a Green Star PVC credit more effectively to:
  - Reduce environmental and human health impacts from PVC building and fitout materials industries; and
  - Differentiate between PVC products from sources that conform to best practice standards and PVC products that may be produced through poor or unverified practices;
- Examine the environmental and human health impacts of PVC in the context of non-PVC alternative materials with similar functional uses.

More information on the composition of the PVC Expert Reference Panel can be viewed the PVC Credit Review webpage which is accessible from the Materials category section of the GBCA website www.gbca.org.au.

5.3 Literature Review

A simple internet search for subjects such as 'PVC' and 'health risks', 'landfill fires', 'human health impact' or 'recycling', reveals thousands of seemingly relevant articles. However, upon closer examination the majority are opinions rather than peer reviewed and scientifically sound resources. Only sources that are considered by the GBCA to be based on good science, and which are provided by credible organisations, have been used in the literature review.

The literature review that was undertaken as part of the PVC credit review is summarised in the document *Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products* which is available to be downloaded from the PVC Credit Review webpage on the GBCA website.

5.4 Credit Review Aims and Objectives

The PVC credit review project seeks to deliver the following desired outcomes:

- Appropriateness – Review the Appropriateness of the credit (i.e. retaining a 'PVC' credit in Green Star at all, or providing rationale for current or different approaches).
- Engagement – Facilitate a PVC Expert Reference Panel to receive technical and factual recommendations that inform the credit review.
- Benchmarking – Identify benchmarks for best practice in the PVC life cycle.
- Guidance – Provide clear guidance to product manufacturers and suppliers on what is required to comply with best practice PVC life cycle management.
- Reward Best Practice – Send a clear message to the market by rewarding international best environmental practice manufacturing processes and end of life PVC product management.

6.0 Conclusions of the PVC Credit Review

There is a range of work in the field of life cycle assessment (LCA) which has assessed and compared the environmental and human health risks of PVC products and their alternatives. For example, well over 100 life cycle assessments related to PVC have been undertaken.

The *Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products* provides an overview of three important PVC life cycle assessments that have been released in the past decade and which provide detailed comparisons between PVC and non-PVC alternative building products relevant to this review. These are:

- USGBC TSAC 2007 (produced to explore the merit of a new LEED rating tool credit to reward the avoidance of PVC in building products);
- TSAC Adaption by BRANZ 2009 (an adaption of the USGBC TSAC report which specifically addresses the impacts of Australian-made PVC pipe);
- European Commission 2004 (a collation of findings from over 100 life cycle assessments related to PVC, including end product use comparisons from 30 of these LCAs).

The three studies above reveal that the production process of virgin PVC, including material extraction, manufacture and use of additives, plays a significant role in the health and environmental impacts associated with PVC. The BRANZ report, despite concentrating on pipe, reveals that impacts associated with incineration of PVC waste may not be as severe in Australia as in the US.

The studies indicate that the environmental impacts arising from the PVC life cycle are in many cases either similar to, or equal to, that of alternative materials. These reports suggest that substitution of PVC with other material alternatives may not produce substantial, if any, environmental benefit.

The health risks arising from PVC can be minimised through the avoidance of certain substances (e.g. heavy metals) and through manufacturing practices that minimise potential impacts and risks. Furthermore, there is a clear rationale for favouring PVC products that are manufactured and reclaimed through best practice production and end of life product management processes. Best practice in the life cycle of PVC building products, and the rationale for why such practices are so important, are defined in the *Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products.*

The GBCA conclusions and best practice definitions are informed by independent reports produced from:

- Australian Department of Environment, Water Heritage and the Arts (DEWHA)
- Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- World Health Organisation (WHO)
- US Green Building Council (USGBC)
- European Union (EU)
- California Environmental Protection Authority (CA EPA).

The literature review also further confirmed the GBCA's recognition of PVC as a major material source for products used in the built environment, most notably in the following applications:

- Pipe and Conduit
- Flooring
- Cable and Wire Insulation.

Overall the literature review undertaken by the GBCA revealed that the majority of the remaining international opposition to PVC use is based on historical industry practices that led to unacceptable health risks and/or environmental impacts. These historical concerns do not take into account the significant achievements by the PVC industry in recent years, particularly in Australia and Europe, to reduce the environmental impacts and health risks associated with the PVC life cycle. They also do not reflect the findings of independent scientific assessments and comparative risk and impact studies between PVC and non-PVC alternative materials.

6.1 Summary of Conclusions from the 'PVC' Credit Review

The GBCA has used the Green Star principle of encouraging best practice to inform the pathway for the PVC credit review outcomes. Following the review of independent scientific literature, as well as engagement with the ERP and other stakeholders, the GBCA concludes that a blanket minimisation approach to PVC in Green Star is not an optimal pathway for encouraging best practice in the PVC industry or for material use in the built environment.

The following conclusions have guided the GBCA's revised position on PVC:

1) The findings of life cycle assessments provided by credible national and international scientific organisations have substantiated the claims that the environmental impact indicators of PVC products' life cycles are comparable with alternative materials when compared on a product category basis (e.g. flooring, pipe, conduit, cable insulation).
2) Whilst PVC itself is not a major material itself in buildings, it does represent a major material flow within the product applications addressed by the credit (i.e. flooring, pipe, conduit, cable insulation). This supports the rationale for Green Star rating tools to continue to address opportunities for reduced impact through a specific PVC credit.
3) The Australian PVC Industry is supportive of the uptake of international best practice performance criteria for PVC manufacturing and end of life product management. Increasing the uptake of such practices will reduce the overall impact arising from the use of PVC products in the built environment. Wider uptake of such practices will be realised faster if supported in a Green Star credit.

7.0 Credit Review Outcomes

The Best Practice Guidelines for PVC in the Built Environment (Guidelines) have been developed by the GBCA as part of the 'PVC Minimisation' credit review. The Guidelines cover environmental impacts and health risks associated with the manufacture and end of life management of the dominant PVC products used in buildings. Full details of the Guidelines are provided in the *Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products* available on the GBCA website.

Manufacturers and suppliers of PVC flooring, pipe, conduit and fittings, cable and wire insulation products must obtain independent third-party verification to demonstrate that their products fully comply with the Guidelines.

Independent verification of compliance with the Guidelines is intended to provide the market with tools by which to demand, and be assured of receiving, PVC products that have been manufactured, sold, tracked and will be potentially reclaimed according to best practice environmental and health impact minimisation criteria.

Documenting compliance of a PVC product to the Guidelines may be demonstrated using any of the following pathways:

1) Environmental Management System (EMS): Inclusion of the Best Practice Guidelines for PVC in the manufacturer or supplier's independently audited ISO 14001, Environmental

Management Systems (EMS). Audits must be conducted by a JAS-ANZ (or equivalent) accredited certification body on a biannual basis. The compliance certificate issued by the auditor must provide written assurance of compliance to the guidelines and serves as the documentation needed to establish compliance with the credit via the EMS option; or

2) Product Declaration: Manufacturer or supplier product declaration that the producer-specific and product performance-specific criteria of the Best Practice Guidelines for PVC have been met for a specific product. The product declaration must be independently audited on a biannual basis by either an accredited auditor registered by RABQSA or another equivalent national or international auditor, or a JAS-ANZ (or equivalent) accredited certification body. A copy of the compliance certificate issued to the manufacturer/supplier by the auditor must be included in the Green Star submission along with a copy of the product declaration. These two items serve as the documentation required to establish compliance with the credit via the Product Declaration option; or

3) Product Certification: Independent accreditation program(s) or product certification schemes that integrate the producer-specific and product performance-specific criteria of the Guidelines into standard(s) or certification criteria (e.g. Type 5 ISO product certification, and eco labels). Independent accreditation programs and product certification schemes must either be JAS-ANZ accredited or pre-qualify for GBCA recognition by demonstrating full compliance with Part I, Section A – Governance and Transparency of the GBCA Assessment Framework for Product Certification Schemes. Evidence of independent accreditation of the product(s)(e.g. to an ISO Type 5 certification such as an Australian Standard or to a GBCA-recognised eco label) must be provided to Green Star project teams for inclusion in Green Star submissions and serves as the documentation needed to establish compliance with the credit via the Product Certification option.

Note: A guidance document detailing how the criteria of the Best Practice Guidelines for PVC in the Built Environment will be verified will be available from the GBCA website. The guidance document is to be incorporated in technical standards (e.g. Australian Standards applicable to PVC pipe) or eco labels and applied by all auditors undertaking assessment of products against the Best Practice Guidelines. The GBCA will list relevant standards or eco labels as these become available on the GBCA website.