Windows Sustainability Action Plan

October 2010

A contribution to delivering the targets in the joint Government and industry Strategy for Sustainable Construction.

defra
Department for Environment Food and Rural Affairs

© Queen's Printer and Controller of HMSO 2010

This publication is value added. If you wish to re-use this material, please apply for a Click-Use Licence for value added material at:

http://www.opsi.gov.uk/click-use/value-added-licence-information/index.htm.

Alternatively applications can be sent to Office of Public Sector Information, Information Policy Team, St Clements House, 2-16 Colegate, Norwich NR3 1BQ; Fax: +44 (0)1603 723000; email: hmsolicensing@cabinet-office.x.gsi.gov.uk

*

This Action Plan was commissioned and funded by Defra and compiled by Gilli Hobbs and Stuart Blofeld of BRE, with inputs from representatives of the windows industry and other parts of the supply chain. The views expressed do not necessarily reflect Defra policy or opinions.

Department for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London SW1P 3JR
Telephone: 020 7238 6000
Website: www.defra.gov.uk

This document is available on the Defra website:
http://www.defra.gov.uk/environment/business/products/roadmaps/index.htm

If you have any enquiries about this document, please contact:
products.policy@defra.gsi.gov.uk

For further information about the implementation of the Windows Sustainability Action Plan, please contact:
resourceplan@wrap.org.uk

Published by the Department for Environment, Food and Rural Affairs

Windows Sustainability Partnership

The following organisations contributed to the development of this Action Plan.

ORGANISATION	PARTICIPANT	WEBSITE
British Glass	Rebecca Cocking	www.britglass.org.uk
British Plastics Federation (BPF)	Paul Jervis Tim Marsden Dhrupal Joshi	www.bpf.co.uk
British Woodworking Federation (BWF)	John Fletcher Richard Lambert Kevin Underwood	www.bwf.org.uk
Building Research Establishment (BRE)	Stuart Blofeld Gillian Hobbs	www.bre.co.uk
Communities and Local Government (CLG)	Clover Summers	www.communities.gov.uk
Construction Products Association	Jane Thornback (Chair)	www.constructionproducts.org.uk
Council for Aluminium in Building (CAB)	Justin Ratcliffe	www.c-a-b.org.uk
Department for Business, Innovation & Skills (BIS)	John Newman	www.bis.gov.uk
Department for Environment, Food and Rural Affairs (Defra)	Alice Baverstock Bob Ryder Sean Smith	www.defra.gov.uk
Glass and Glazing Federation (GGF)	Micky Sulston	www.ggf.co.uk
INEOS ChlorVinyls	Jason Leadbitter	www.ineoschlor.com
Pilkington Glass	Sharon Williams	www.pilkington.com
WRAP (Waste & Resources Action Programme)	Mike Falconer Hall	www.wrap.org.uk

Foreword

I am delighted that sustained collaboration across the windows industry, with Government, has come to fruition in a robust Action Plan to improve the sustainability of windows across their life-cycle and supply chain.

Evidence relating to the key impacts of windows has been embraced by the Windows Sustainability Partnership as highlighting opportunities for further improvements, such as increasing durability and greater recycling of old windows.

This Action Plan will help us achieve the overarching objective of leading the world in sustainable construction, production and consumption, as stated in the joint industry and Government Strategy for Sustainable Construction.

Now begins the hard work of making these actions a reality, with the Action Plan providing a catalyst for multiple improvements, and a statement of intent against which future progress will be measured.

Lord Henley
(Parliamentary Under-Secretary)

As chair of the stakeholder group that produced the Windows Sustainability Action Plan, I have been delighted to see the extensive debate and collaboration that has taken place to produce the Plan – not only between Government and industry, but especially amongst industry sectors that compete extensively in the market place. There is an acknowledgment and an increasing willingness amongst industry to work collaboratively to find solutions that benefit all, and the Windows Sustainability Action Plan is a good example of this partnership.

The difficult part now begins with the implementation of the Action Plan. Although these are difficult economic times, we hope that the collaboration that has begun will continue.

Jane Thornback

EXECUTIVE SUMMARY

This *Windows Sustainability Action Plan* is a key output from Defra's roadmap process. It has been developed by members of the Windows Sustainability Partnership (WSP) which is made up of representatives from across the windows supply chain, as well as relevant Government departments, regulatory agencies and delivery bodies. This Action Plan is a contribution to delivery of the *Materials* target as detailed in Section 13 of the Strategy for Sustainable Construction.[1]

Prior to the development of this Action Plan, a comprehensive Evidence Study relating to the sustainability of windows was produced. The study report contained a number of recommendations for possible future activity, which were discussed in more detail by the Windows Sustainability Partnership. Consequently, they have been refined, and form the basis for setting out this agreed Action Plan.

The Evidence Study report captured the wealth of initiatives already underway to improve the sustainability of windows. Many of these will continue to grow in impact and range, so it is important to build upon these existing activities wherever possible, and only establish new responsible actions where there is an obvious gap.

The actions in this Plan have been grouped into five main areas that cover the key component parts of different window types; namely: Overarching Challenges, Glazing, PVC, Aluminium and Timber. Steel has been omitted from this Action Plan, however should suitable representatives of the steel window sector join the Windows Sustainability Partnership in the future, then revisions of the Plan can incorporate this. For each action, members of the WSP have either committed to taking direct action to achieve it, or will seek to influence and/or partner with other supply chain members to ensure an action is delivered.

Actions to arise from the development of this Action Plan include:

- **Responsible Sourcing Standard** – development and implementation of responsible sourcing schemes for individual windows components. These can then inform an overarching Responsible Sourcing Standard for Windows by 2015
- **Durability and service life** – raise awareness of durability of windows and differences between actual versus predicted service life of windows from 2010 onwards to reduce the impact of windows and buildings
- **Cost/benefit analysis** – undertake an objective assessment of the environmental costs and benefits of different glazing options by 2012
- **Improved thermal comfort of windows** – evaluate the effects of trickle vents on thermal comfort to provide evidence for a possible revision of Part F (ventilation) by 2013
- **PVC Carbon Footprinting and Sustainability Tool** – dissemination and awareness raising of this new tool which allows quick and easy assessments of environmental and economic sustainability of PVC products and processes along the whole supply chain from 2010 onwards

1 http://www.bis.gov.uk/files/file46535.pdf

- **Update and publicise aluminium's generic environmental profiles** – using data supplied by EAA and IAI
- **Resource efficiency in the timber windows sector** – progress against Joinery Wood Waste Resource Efficiency Plan targets and actions to be reporting on an annual basis

Moving forward a key element of this Windows Sustainability Action Plan will be its implementation, monitoring and review against progress made. This will be overseen by the Windows Sustainability Partnership whose governance and structure is set out in its constitution, as detailed in Chapter 10.

CONTENTS		Page
Foreword		3
Executive Summary		4
1	Introduction	7
2	About Windows	8
3	Environmental Impacts	11
4	Actions Already Being Taken	12
5	Overarching Challenges Across The Windows Sector	13
6	Optimised Glazing	18
7	PVC 2010 Onwards	23
8	Aluminium For Future Generations	26
9	Timber Resource Efficiency	30
10	Implementation, Monitoring And Review	33
Annex A: Supply Chain Diagrams		34

1. Introduction

This *Windows Sustainability Action Plan* is a key output from Defra's roadmap process. In 2007, the Department for Environment, Food and Rural Affairs (Defra) launched ten pilot product roadmaps, as part of its Sustainable Consumption and Production programme. The ten selected products were drawn from wider product groupings shown to have significant environmental impacts (food and drink, passenger transport, housing – including construction and appliances, and textiles).[2] The Action Plans created as a result of the roadmap process capture evidence on the impacts of each product type across their life-cycle, highlight existing initiatives, good practice and develop voluntary action plans to address any gaps.

In the construction area, windows were chosen for a roadmap because of their usage in virtually all buildings, significance in terms of energy and environmental performance of a building, and the strong record the industry has in identifying and implementing sustainability improvements. Most of the evidence and actions considered by the Windows Sustainability Partnership relate to domestic windows, though some are equally relevant to commercial windows (such as recycling of flat glass).

The Windows Sustainability Partnership is made up of representation from across the windows supply chain from manufacture through to disposal, with members principally being those trade associations representing aspects of the windows supply chain.

Prior to the development of this Action Plan, a comprehensive Evidence Study relating to the sustainability of windows was commissioned and funded by Defra (as part of the Roadmap process) and written by BRE, with inputs from representatives of the windows industry and other parts of the supply chain.[3] This Evidence Study brought together information from a number of sources to seek to set out the key environmental impacts of windows. The environmental impacts were compared to existing industry initiatives and Government policy to identify areas where there was scope for potential improvement. The study report contained a number of recommendations for possible future activity, which were discussed in more detail within the Windows Sustainability Partnership. They have been refined, and form the basis for this agreed Action Plan.

The final stages of the windows roadmap process will be to implement and evaluate the Action Plan, as illustrated in Figure 1. Implementation of the Action Plan will be coordinated by WRAP (Waste & Resources Action Programme). The evaluation will consider progress against the actions in this document, and the possible development of new or extended actions to further improve the sustainability of windows. This, in turn, should lead to updating of the evidence base and a process of continuous improvement through the Windows Sustainability Partnership.

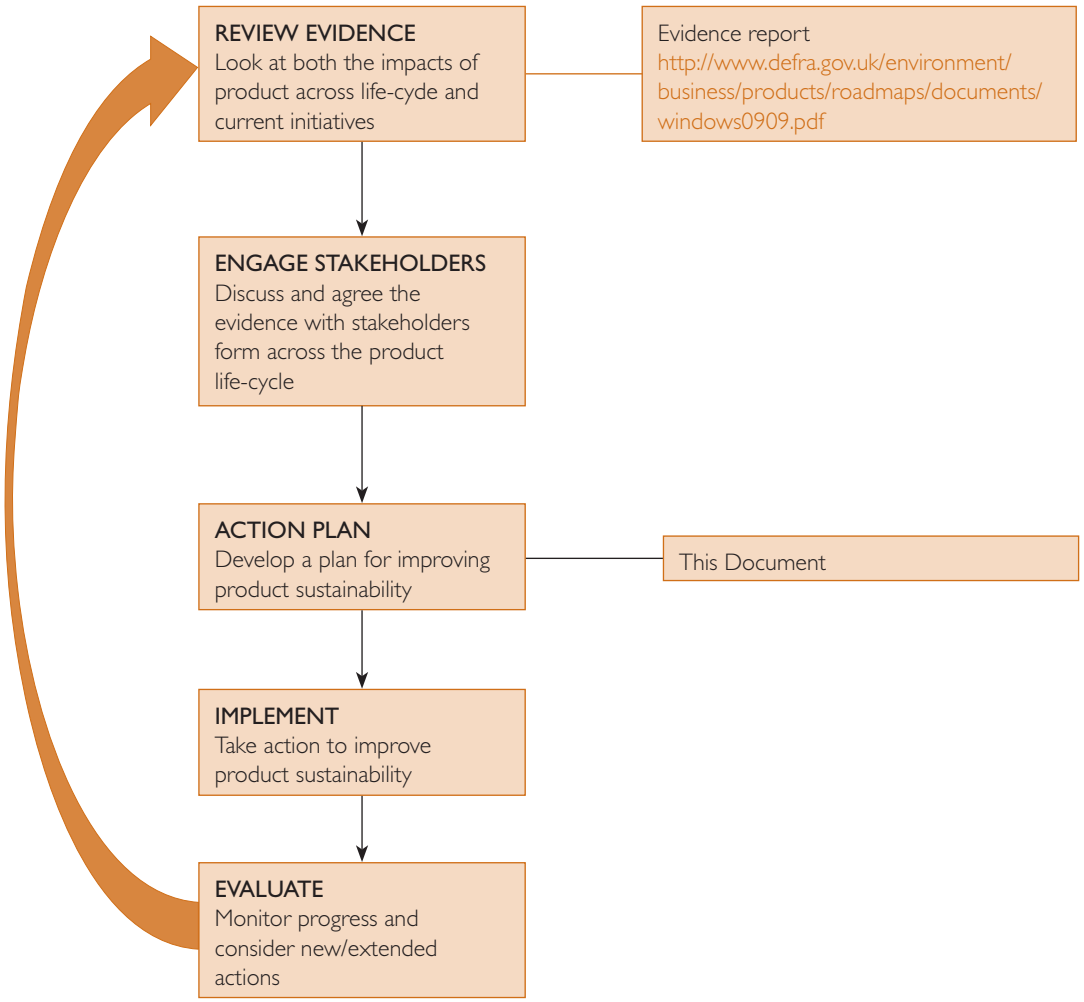
This Action Plan, and the previously published Evidence Study, will also be used to inform others in the construction sector and policy related areas of the windows supply chain and how those within it can influence and improve the sustainability of new and existing windows in the built environment. It can also help to inform debate and policy development currently being held at UK and European levels.

It is important that the improvements flagged in this Action Plan are consistent with future regulatory requirements set at an EU level.

2 The EU-25 study, 'The Environmental Impact of Products' (EIPRO). In this study, buildings, construction and appliances are said to account for 20-35% of all environmental impacts

3 3 Windows Evidence Study http://www.defra.gov.uk/environment/business/products/roadmaps/documents/windows0909.pdf

Figure 1: Roadmap stages



2. About Windows

The total stock of windows in the UK housing market is estimated at around 230 million units, increasing by around 1.5 million units a year.[4] Approximately 9 million windows are sold each year, with around 67% being supplied as replacement windows. By 2004, over 83% of homes had some degree of double glazing.[5]

Common to all windows are the glazing units and hardware (window locks etc). Framing materials typically used include PVC-U (Polyvinyl Chloride Unplasticised), hardwood, softwood, aluminium and steel. For the purposes of this Action Plan, the following framing materials are reported on: PVC-U, timber, and aluminium.

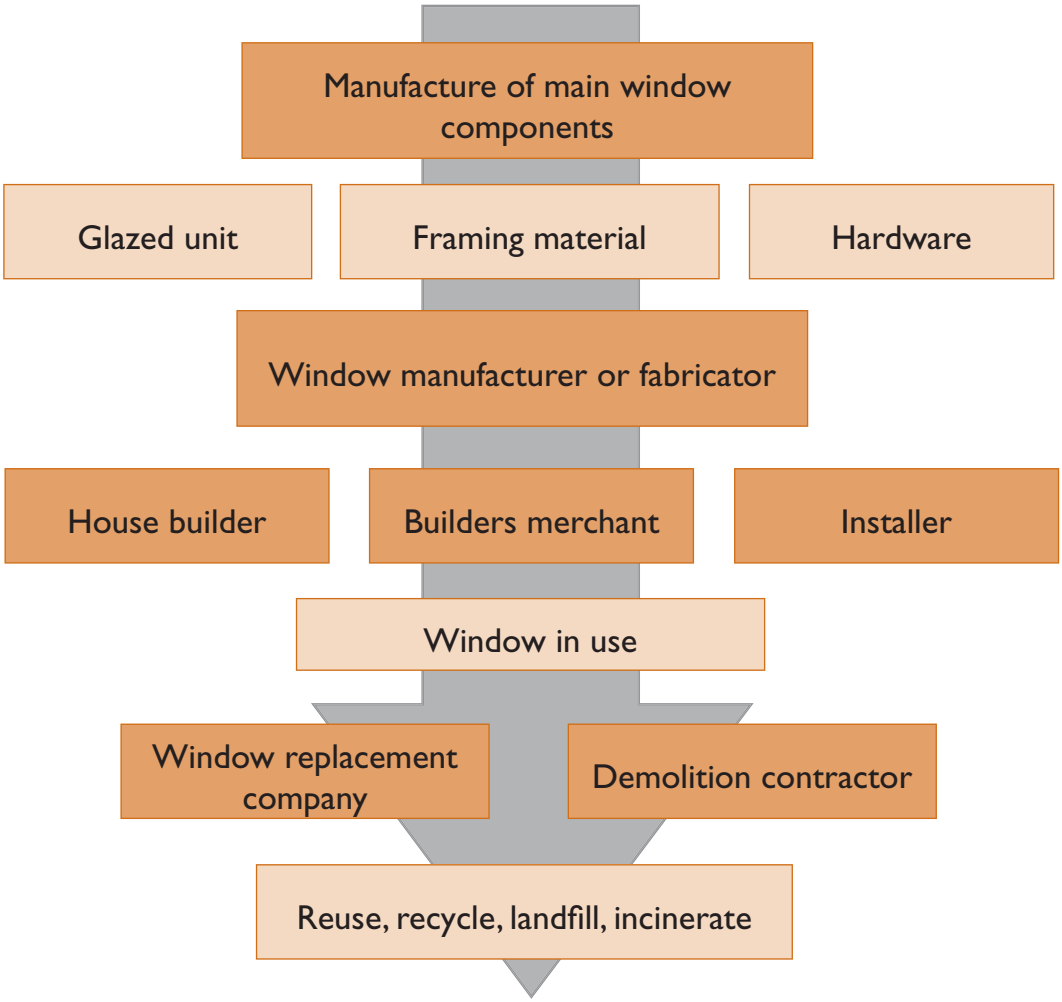
4 MTP Windows Briefing Note
5 Trade Sector Profile: Domestic Glazing June 2007, Purple Market research Ltd for Energy Savings Trust and Energy Efficiency Partnership for Homes

A key consideration in measuring the performance of windows relates to the energy efficiency of buildings. This has focused product innovation in recent years, especially in terms of the thermal efficiency of the glazed area. Triple glazing, special coatings, low-emissivity and vacuum glazing are all outputs of this activity. Research and development continues to thrive in this product area, further driven by policy commitments to build only zero carbon dwellings by 2016, and zero carbon buildings by 2019.

Windows supply chain

It is difficult to provide a 'one size fits all' supply chain diagram to cover all windows. A simplified one is provided in Figure 2. More detailed supply chain diagrams for the main windows components are in the relevant sections or Annex A.

Figure 2: Simplified windows supply chain



To understand the interactions and improvement opportunities across the windows supply chain, the Windows Sustainability Partnership has representation from the following stages:

- Manufacture of window components
- Window manufacture and fabrication
- Installation and replacement of windows
- In use
- Recycling of window components

This is principally through the involvement of trade associations representing aspects of the windows supply chain, including:

British Glass (The British Glass Manufacturers' Confederation) represents the UK's glass industry, including all UK glass manufacturers. A key area of consideration is the impact of glazing and glass throughout its life-cycle, including the recycling of end-of-life flat glass.

British Plastics Federation (BPF) represents the UK Plastics Industry, encompassing the whole plastics supply chain including raw material suppliers, processors, machinery suppliers and recyclers. The Windows Group champions improvements in the PVC-U windows sector, such as the Voluntary Commitment to the European Commission: Vinyl 2010, which has targets for raw material manufacture and use of additives, and recycling post-consumer PVC (Polyvinyl Chloride) waste.

British Woodworking Federation (BWF) represents the woodworking and joinery manufacturing industry in the UK, including manufacturers, distributors and installers of timber windows, as well as suppliers to the industry. They also run the TWA (Timber Window Accreditation) Scheme, which promotes a higher standard of wood windows (by setting minimum performance criteria, including responsibly sourced timber, for its member's windows); and manages the Wood Window Alliance (a marketing campaign, which also sets out minimum performance criteria).

The Council for Aluminium in Building (CAB) supports the interests of the architectural aluminium industry by encouraging the increasing use of aluminium products in construction. Members of CAB are involved in all stages of construction, extrusion and design of systems, fabrication of products, finishing, production of associated products and final installation on site. This includes aluminium framed windows in domestic and commercial buildings, and windows hardware. CAB works very closely with the European Aluminium Association (EAA) and the International Aluminium Institute (IAI) to promote aluminium and sustainability.

Glass and Glazing Federation (GGF) is a trade association representing companies who make, supply or fit, glass and glass related products. This includes windows and their hardware. Windows are a major focus of GGF, including the British Fenestration Rating Council (BFRC), which runs the Windows Energy Rating Scheme; and the Fenestration Self-Assessment Scheme (FENSA), which issues certificates of compliance of replacement windows with the latest Building Regulations.[6]

Other stakeholders have key roles to play in the development of the Windows Evidence Study and the production and implementation of this Action Plan:

- Building Research Establishment (BRE – Secretariat)
- Construction Products Association (Chair)

6 N.B. in Scotland and Northern Ireland there is no requirement to notify Building Control when replacing windows and doors in existing dwellings. Therefore no requirement or need for a FENSA style scheme.

- Department for Environment, Food and Rural Affairs (Defra – policy lead for Product Roadmaps)
- Communities and Local Government (CLG – policy lead for Building Regulation in England and Wales. Note that separate regimes apply in Scotland and N Ireland and powers are currently due to be devolved to Wales on 31 December 2011)
- Department for Business, Innovation and Skills (BIS)
- INEOS ChlorVinyls (Major manufacturer of PVC)
- Pilkington (Major manufacturer of flat glass)
- Saint Gobain Building Distribution
- Timber Research and Development Association (TRADA)

Over time, it may be necessary to widen stakeholder engagement to help implement particular actions. This may include involvement from the Steel Windows Association, Wood Protection Association, those supplying paints and coatings for windows, and Government bodies working on specific aspects of environmental impact reduction.

3. Environmental Impacts

The environmental impacts have already been captured in the Windows Evidence Study, along with key initiatives already underway to mitigate these impacts. This Action Plan builds upon the Evidence Study and refers to it, rather than replicating its contents. The key impacts identified as having scope for further improvement are summarised in Table 1:

Table 1: Summary of environmental impacts from Windows Evidence Study[7]

Life cycle stage	Impacts
Raw Materials	Energy required to manufacture (Glass, Aluminium, Steel and PVC-U). Waste disposal of Bauxite Residue (Aluminium). Responsible sourcing (All)
Production	Waste and additional raw materials usage (Aluminium, Steel and PVC-U). Impact of powder coating (Aluminium/Steel). Kiln drying (Timber)
Use	Performance of the window in terms of heat loss, heat gain, daylighting and ventilation (All)
Maintenance	Coating replacement (Timber), durability of windows/ replacement cycle (All)
End-of-life	Methane from landfill disposal (Timber). Lost recycling & recovery opportunities (PVC-U, Glass, Timber).

The forward actions to reduce these impacts are summarised in the following sections:

a) Overarching challenges
b) Optimised glazing
c) PVC – 2010 onwards
d) Aluminium For Future Generations
e) Timber Resource Efficiency

7 Windows Evidence Study http://www.defra.gov.uk/environment/business/products/roadmaps/documents/windows0909.pdf

4. Actions Already Being Taken

It should be recognised that a great deal of activity is already underway. The Windows Evidence Study captured information on many of these existing initiatives that are improving aspects of sustainability.

Table 2: Summary of existing initiatives from Windows Evidence Study

Impacts	Initiative
Energy used in raw material production	• Umbrella Climate Change Agreements for Aluminium, Steel and Glass • EU Emissions trading scheme – capped allocation of CO_2e • Replacement of primary feedstock with recycled content
Other impacts of raw materials	• Responsible sourcing well developed for Timber, under development for other materials; responsible sourcing standards produced • Vinyl 2010 commitments to eliminate cadmium and lead stabilisers • Sustainable mining commitments • Supply of finger jointed and laminated timber sections • Bauxite Residue reuse project (ATF–06–03) – (http://www.asiapacificpartnership.org/english/pr_aluminium.aspx)
Production and fabrication impacts	• Chain of custody certification for timber windows. • Use of water-based treatments • Recycling and recovery of PVC off-cuts
In use impacts	• Windows designed, manufactured and installed in line with relevant product standards and accredited construction details (also improves durability) • Product innovation in glazing and coatings • Windows Energy Ratings, Building regulations Part L, Zero Carbon Buildings and Homes. Home Energy Improvement advice, Energy Performance Certificates, Decent Homes, Glazing Strategy Group
Maintenance and durability issues	• Improved material selection, design and paint adhesion; and Timber Window Accreditation Scheme. Self cleaning glass coatings • Research into durability of all window types
End-of-life impacts	• Recovinyl recycling scheme for PVC windows • Flat Glass Quality Protocol • Joinery Resource Efficiency Plan • High levels of Aluminium and Steel recycling • Bauxite residue & disposal database (BRaDD) – http://www.csiro.au/products/Bauxite-residue-database.html

This Windows Sustainability Action Plan seeks to reinforce those initiatives that are ongoing with continuous improvements planned into the future, along with newly developed and developing actions that have arisen through the development of the Windows Evidence Study and the discussions of the Windows Sustainability Partnership.

For each action, a stakeholder can: **commit** to an action; try to **influence** an action; or **partner** with other supply chain members to achieve an action.

5. Overarching Challenges Across The Windows Sector

There are several overarching challenges which relate to the sustainability of windows in general, regardless of their material composition. These are detailed below with corresponding actions that address the issues raised in Table 3. These actions will be taken forward by relevant members of the Windows Sustainability Partnership across the different window sectors.

Responsible sourcing

As the importance of green procurement strategies in the building and construction sectors grows, there is increasing demand for suppliers and contractors to improve their sustainability performance. Responsible sourcing schemes are a part of this activity. Responsible sourcing is the management of sustainable development in the provision or procurement of a product.

BS 8902:2009 – Responsible sourcing sector certification schemes for construction products. Specification provides a framework for the development of sector certification schemes for responsible sourcing of construction products. It gives requirements for the management, development, content and operation of sector certification schemes for responsible sourcing and supply of construction products.

Every main material used in windows will need to have a responsible sourcing scheme if there is to be a robust responsible sourcing for windows. Thus, all sectors represented in the Windows Sustainability Partnership including Glass, PVC-U, Aluminium and Timber recognise the need to establish responsible sourcing practices in their respective sectors through the development and implementation of a responsible sourcing scheme.

It is particularly important to be able to have confidence that the expectations surrounding responsible sourcing of materials (RSM) have been met throughout the supply chain, upstream and downstream. This can either be through a sector level scheme, where all UK Glass, PVC-U, aluminium and timber meets RSM standards. Alternatively it could operate on an individual manufacturer level, where each company demonstrates it has met RSM standards.

- **Glass:** British Glass recognised the need for all main windows components to have responsible sources schemes in place before a Responsible Sourcing Standard for Windows is possible. British Glass will engage with UK Glass Manufacturers to gauge the level of interest in setting up a sector scheme for glass (Table 3, Action OC1).
- **PVC-U:** The British Plastics Federation will engage with industry and in partnership establish a responsible sourcing scheme for PVC-U materials in windows (Table 3, Action OC2).
- **Aluminium:** CAB is actively working with representatives of the worldwide aluminium sector towards a Responsible Aluminium scheme. This initiative, recognised by the industry and external stakeholders, seeks to minimise impact and improve performance throughout the aluminium value chain (Table 3, OC3).
- **Timber:** Owing to the high profile illegally logged timber has had historically, there are several well-established responsible sourcing standards for timber, that have very widespread take up. A survey undertaken by the Timber Trade Federation showed that in 2008 over 80% of wood and wooden products coming into the UK were certified.[8] All members of the Wood Window Alliance must have chain-of-custody certification, and members of the BWF Timber Window Accreditation Scheme must use certified timber. However, there is still a small amount of non-certified timber being used to manufacture windows. Therefore, work to ensure all timber used in window manufacture is sourced from certified sustainable sources will continue, led by the British Woodworking Federation (Table 3, Action OC4).

8 UK Timber Industry Certification. Timber Trade Federation 2008

Durability and service life of windows

The durability of windows will affect the overall environmental impact of a building over its lifetime. Also, linked to durability, is the actual service life of windows which can be far greater than their predicted service life. In terms of environmental impact, this only becomes an issue if windows are replaced more frequently than is strictly necessary, thus incurring all the impacts associated with producing a window more times than is necessary. This is particularly prevalent in the domestic sector with home-owners replacing windows for cosmetic reasons.

There is a need for stakeholders representing the different window types to undertake education and awareness-raising across the windows supply chain which will help prevent windows being replaced before their actual service life expires. At the same time ensuring through solid evidence based research and testing that predicted service life are revised to match the actual service life (Table 3, Action OC5).

- **PVC:** Durability of PVC windows has increased largely as a result of improved design and fabrication processes. However, it is difficult to prove improved durability without having the windows of today being present in the building stock for many more years. Further work and education of specifiers and users will help prevent PVC windows from being replaced simply due to adherence of predicted service life.
- **Aluminium:** Work is underway to prove the durability of aluminium windows through assessment and case study reporting of existing windows that have been in buildings for a long time, for example, in the Bodleian Library since 1937 and post-war prefabricated homes that are now listed buildings.
- **Timber:** Research has been recently undertaken into the durability of timber windows by Imperial College London on behalf of the Wood Window Alliance (WWA). This research examines the influence of modern substrate, design and coating systems on the service life and whole life cost of fully factory finished windows. The conclusions show windows fabricated in line with WWA standards will have an estimated service life of 60 years, rising to 87 years in sheltered locations with average maintenance levels.

Repair and refurbishment of windows

Another area of investigation which has the potential to decrease the lifetime impact of windows extending their useful life, and thus increasing the overall environmental impact of a building is the repair and refurbishment of windows instead of direct replacement.

BRE Global is piloting a new BREEAM (Building Research Establishment Environmental Assessment Method) scheme for domestic refurbishment which promotes the repair and refurbishment of dwellings.[9] Within the materials section of the standard there are credits available for the retention of existing building elements, including windows.

A key action is to undertake research that looks into the practicalities and economics of the repair and refurbishment of different window types instead of direct replacement (Table 3, Action OC6).

Green Public Procurement Standard

The aim of setting and using green or sustainable procurement standards is to encourage the take-up and development of sustainable products and technologies. By meeting this demand, the domestic industry could be well-placed to compete in the expanding global market for low-carbon, resource-efficient goods and services.

9 BREEAM Domestic Refurbishment – http://www.breeam.org/page.jsp?id=228

A new voluntary EU Green Public Procurement (GPP) standard was published by the European Commission in July 2010, following some consultation with Member State governments, industry and other stakeholders.[10]

The UK, like other Member States, has agreed to the EU's proposal that:

"…50% of all tendering procedures should be green, where "green" means "compliant with endorsed common "core" GPP criteria…".

Defra is now considering whether and how to revise the existing UK Government Buying Standard for windows to align with the new voluntary European standard. As a member of the Windows Sustainability Partnership, Defra will receive the full backing and support of other WSP members as part of any work to revise and update the UK Government Buying Standard – in a way which ensures any specifications are performance based and in line with the existing UK approach to building performance.[11]

10 Green Public Procurement (GPP) criteria for windows can be found at: http://ec.europa.eu/environment/gpp/second_set_en.htm
11 UK Government Buying Standards for windows can be found at: http://www.defra.gov.uk/sustainable/government/advice/public/buying/products/construction/glazing.htm

Table 3: Summary of sustainability actions for challenges across the windows sector

Scope	Action	Implementation	Lead Coordinator	Timeframe
Partner	**OC1** **Responsible Sourcing scheme for Glass**	Responsible Sourcing Standards for all main Windows components required before Responsible Sourcing Standard for Windows is possible. British Glass to discuss with UK Glass Manufacturers to gauge interest in setting up a sector scheme. Stakeholder members: British Glass, manufacturers	British Glass	Discussions by 2011
Commit	**OC2** **Responsible sourcing scheme for PVC**	Responsible Sourcing Standards for all main Windows components required before Responsible Sourcing Standard for Windows is possible. Agreement as to preferred approach: Stakeholder members: BPF, manufacturers	BPF	2010 – 2015
Partner	**OC3** **Responsible sourcing scheme for Aluminium**	Continue to work globally to develop and implement a Responsible Aluminium Scheme. Partners: CAB, Aluminium producers, NGOs, Customers and suppliers	CAB	2010 – 2015
Influence	**OC4** **Further increase in responsibly sourced timber**	Further promote the use of timber from independently certified sustainably managed sources, for example through recruiting more manufacturers to the TWA scheme and/or Wood Window Alliance. Stakeholder members: BWF, TTF	BWF	2010

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit	**OC5** **Durability and service life of windows**	Raise awareness of durability and actual service life of windows through the following methods, where relevant to WSP members: • Publicise conclusions of research into the durability of factory finished timber windows to encourage fabrication of more durable windows through the adoption of best practice • Awareness raising of actual service life of PVC-U windows fabricated in line with BPF Codes of Practice for Fabricators • Use of Green Guide to raise awareness, and provide evidence for update of service life predictions in BRE Green Guide for Specification • Issue of case study reports • Provide detailed technical document for use by specifiers, clients and consumers Stakeholder members: WSP members	WSP members	2010 onwards
Commit	**OC6** **Repair and refurbishment of windows**	Investigate the practicalities and economics of the repair and refurbishment of different window types instead of direct replacement. Stakeholder members: WSP members	WSP members	2011

KEY to SCOPE:

For each action a stakeholder can either:

Commit to delivering an action;
Influence others to aid delivery of an action;
Partner with other supply chain members to achieve an action.

6. Optimised Glazing

The energy performance of windows predominates in terms of reducing environmental impact generally. Design, engineering and quality of the window fabrication play important parts in producing an energy efficient window.

As indicated in Table 2, there is a great deal of work already underway to improve the operational performance of every installed window, and to upgrade the performance of existing windows. This includes:

- Windows Energy Rating (WER) Scheme, launched in 2004. The rating scheme is provided by the British Fenestration Rating Council (BFRC). WERs were included in guidance to the 2006 Part L1 Building Regulations (England and Wales). It should be noted however that WERs only relate to the installation of windows in existing buildings and extensions, and not new builds. In addition, a framework has been established for accrediting glazing products within the Energy Saving Recommended (ESR) scheme – easily recognised by consumers. ESR includes windows with a WER of C or higher.
- Targets to achieve Zero Carbon Homes (2016) and Buildings (2019) are starting to influence design and procurement decisions. Achieving the Zero Carbon level 6 of the Code for Sustainable Homes demands very low levels of heat loss, which in turn requires very efficient windows.
- Building Regulations Part L 2010 (applies from 1 October 2010). The Approved Documents were published in Spring 2010 and provide guidance on ways to meet the new Part L requirements. Approved Document L1B (existing dwellings), includes minimum performance requirements for replacement windows equivalent to a Windows Energy Rating of C or higher, or a U value of 1.6 W/m².K or lower.[12]

Being such a high priority for windows, the Glazing Strategy Group was established in 2000 to prioritise activities in energy efficiency.[13] Figure 3 summarises the Group's composition and its latest three year plan.

Figure 3: Glazing Strategy Group membership and latest three year plan (2008 – 2011)

Membership
British Fenestration Rating Council
British Plastics Federation Windows Group
British Woodworking Federation
Council for Aluminium in Building
Glass & Glazing Federation
Network VEKA
Steel Window Association
Pilkington
Edgetech
Defra
Energy Savings Trust
BRE

Workstream
Continuing trade, specifier and consumer awareness raising and invigoration of Windows Energy Ratings (WER)
Encourage top 10 window manufacturers to actively promote WERs and to gain Energy Saving Recommended (ESR) for all appropriate products
Agree and bring on stream at least one CERT (Carbon Emissions Reduction Target – obligation on energy suppliers) scheme i.e. subsidise glazing
Encourage development of a data capture scheme to measure installation of energy efficient windows
Continue to engage with policy makers in government to promote energy efficient glazing

12 http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL1B_2010.pdf

13 The Glazing Strategy Group brings together manufacturers, trade associations, the British Fenestration Ratings Council, Government and its agencies. Glazing Strategy Plan 2008 -2011 www.eeph.org.uk/sector/swg.cfm?group_id=5

Rather than duplicate the work of the Glazing Strategy Group, the Windows Sustainability Partnership has looked in more detail at other aspects of optimised glazing; mainly the impacts of increasing the amount of glass used to achieve higher levels of thermal performance in buildings. The resulting actions are described below and summarised in Table 4.

Embodied impacts of the materials and processes required to make energy efficient windows should not be ignored. As shown in the Evidence Study, the impacts of glass production and coatings for glass can be up to 55% of the overall impacts of the window (excluding operational energy of buildings). Because the 'embodied' impacts tend to be considered separately from 'operational' impacts, it has not been established whether an increase in 'embodied' impact is matched or exceeded by a reduction in 'operational' impact. This is particularly true of more recently introduced glazing systems, such as triple glazing. Therefore, there is a need to undertake an independent and scientifically robust study of the environmental costs and benefits relating to energy efficient double glazing compared with triple glazing and other new technologies which are emerging to help achieve zero carbon buildings (Table 4; Action OG1).

For Part F the requirement for existing dwellings is for replacement windows to have trickle vents fitted when the window being removed has them fitted. For new dwellings the requirement is for background ventilation to be provided of certain sizes depending on dwelling type and type of room without specifying how it is provided. However, the continuing requirement for trickle vents on windows (otherwise designed to keep in as much heat as possible), may not represent the most effective or efficient way to maintain adequate levels of ventilation. Therefore, there is a need to assess the impact of trickle vents in windows on thermal comfort of the occupants and evaluate their suitability in light of alternatives that could be more efficient, for example, passive ventilation design, heat recovery systems etc. (Table 4, Action OG2).

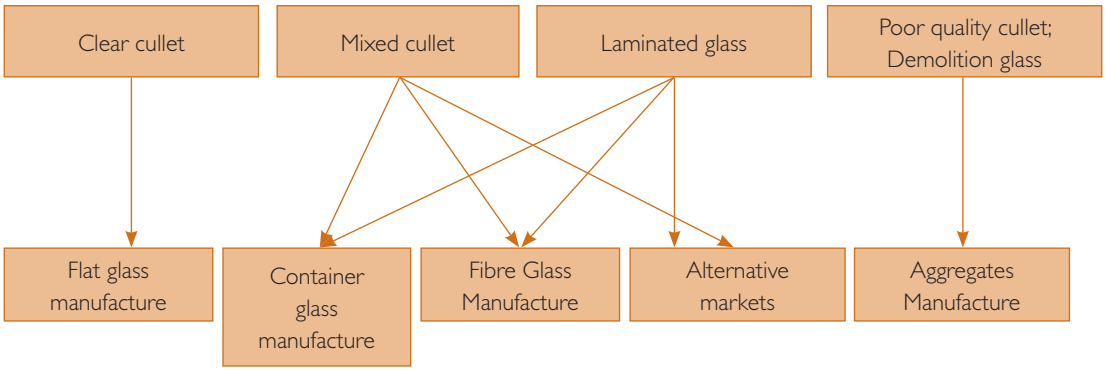
Energy performance is measured through the U value (heat loss indicator) and the g value (solar gain indicator). It is currently difficult to know if claimed U and g values have been met in new buildings, for example by a building control officer or a BREEAM (Building Research Establishment Environmental Assessment Method) assessor. Therefore, a simple site based tool to measure U and g values would be a valuable asset in ensuring designed levels of efficiency have been met in practice (Table 4, Action OG3).

Secondly, windows already offer carbon benefits through solar (heat) gain and natural lighting, but there is scope to further exploit benefits through photovoltaic technology.

Recycling rates of flat glass are relatively low, given the energy benefits of substituting recycled glass for primary glass in a variety of applications. Re-melting glass waste (cullet) uses 25% less energy than making glass from raw materials and also saves 1.2 tonnes of raw material for every tonne recycled.[14] However, not all cullet is suitable for use back into flat glass manufacture. Typically, only manufacturer and fabricator damaged and off-cut glass can be recycled back into flat glass. The Flat Glass Protocol provides a framework and criteria for acceptable uses for differing qualities of cullet. Compliance with these criteria is considered sufficient to ensure the product is fully recovered. Figure 4 summarises the likely end markets suited to differing qualities of cullet.[15]

14 Glass: Society and the Environment. British Glass Manufacturers' Confederation 2007
15 The Quality Protocol for the production of processed cullet from waste flat glass. WRAP & EA, June 2008

Figure 4: Likely end markets for flat glass



The Flat Glass Quality Protocol is due to be reviewed in 2011 which will provide an opportunity to consider more widespread recycling of flat glass using this document as a support and communication vehicle. There is also ongoing activity in relation to the Protocol and the harmonisation of End of Waste criteria for Flat Glass across the EU. Any review of the Protocol would therefore need to take EU End of Waste criteria into consideration which should form a key part of this action going forward (Table 3, Action OG5).

The 2008 joint industry and Government Strategy for Sustainable Construction set a target to reduce the amount of construction packaging waste by 20% by 2012.[16] This is currently being taken forward in the form of a Packaging Waste Resource Efficiency Plan, focusing on three main areas in the first phase: wooden pallet repatriation, recycling plastic packaging, and optimisation of secondary and tertiary packaging.

Of relevance to this Windows Action Plan is the adoption of relevant actions that have come from the repatriation of wooden pallets project. These should be actioned and promoted by window suppliers, and other organisations involved in the windows supply chain (Table 4, Action OG6).

The potential for solar control glass to cut CO_2 emissions from buildings has been analysed by the Dutch scientific institute TNO, in a study undertaken for Glass for Europe.[17] The study concludes that between 15 and 80 million tonnes of CO_2 emissions annually – roughly between 5% and 25% of the EU's target – could be saved by the year 2020 by optimal use of solar control glass. As well as totals for the whole EU, the report provides corresponding figures that highlight the huge potential in the UK.

Building on this work, further research should be undertaken to assess how glazing can be optimised for light transmittance, g value and U value, specifically for a UK climate in order to maximise energy savings and CO_2 emissions reductions to reduce the need for air-conditioned buildings, particularly those with large glazed areas (Table 4, Action OG7).

16 http://www.BIS.gov.uk/policies/business-sectors/construction/sustainable-construction/strategy-for-sustainable-construction
17 Impact of Solar Control Glazing on energy and CO_2 savings in Europe (TNO Report 2007-D-R0576/B by TNO Built Environment and Geosciences, Delft, The Netherlands)

Table 4: Summary of sustainability actions for optimised glazing

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit	**OG1** **Environmental costs and benefits of different glazing options**	To prepare an outline project proposal to undertake an objective assessment of the environmental costs and benefits of different glazing options. To include: LCA comparison of double versus triple glazing; review of specifications used in Europe compared to climatic assumptions; and review of new technologies/products and optimal application in buildings. Stakeholder members: GGF, British Glass, BWF, BPF, CAB, glazing manufacturers, BRE	BRE	2010 Project implementation by 2012
Commit / Influence	**OG2** **Improved thermal comfort of windows**	Evaluate the effects of trickle vents on thermal comfort to provide evidence for a possible revision of Part F (ventilation) by 2013. Stakeholder members: GGF, BPF, BRE, BWF, CAB	GGF	2013
Commit	**OG3** **In situ assessment of window performance**	Develop site based test to assess the U & G value of windows as installed, for use by building control officers and CSH/BREEAM assessment. BRE to talk to Ian Chisholm or Giles Wilson (+ BG/ Construction Product Association) Stakeholder members: GGF, BRE	GGF / BRE	2013
Commit	**OG4** **Potential to exploit solar gain**	To identify suitable research bodies that can lead on work to explore different mechanisms that could store energy from solar gain in a building e.g. turn floors and walls into storage radiators, that has been captured through potential future advances in glazing technologies which harvest the energy from 'solar gain'. Stakeholder members: WSP members	WSP	2011

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit / Partner	**OG5** **Recycling of Flat Glass across the supply chain and at end-of-life**	Provide information on recycling, maintaining quality and where to send glass for recycling. This will include the communication and dissemination of the Good Practice Guide, as well as the Flat Glass Quality Protocol (once revised in 2011) which will need to consider ongoing activity in relation to the harmonisation of End of Waste criteria for Flat Glass across the EU. Stakeholder members: British Glass, WRAP, EA, GGF, FENSA, WMC, glass collectors	WRAP	2010 onwards
Commit	**OG6** **Pallet Repatriation Action Plan**	A Pallet Repatriation Action Plan has been developed as part of the Construction Product Association Packaging Resource Efficiency Plan. The relevant actions from the Pallet Repatriation Action Plan should be adopted and promoted by window suppliers to improve the repatriation of wooden pallets for reuse. Stakeholder members: WRAP, Window Suppliers	WRAP	2010 onwards
Influence	**OG7** **Optimised glazing for light transmittance**	Research to assess how glazing can be optimised for light transmittance, g value and U value, specifically for a UK climate in order to maximise energy savings and CO_2 emissions reductions to reduce the need for air-conditioned buildings. Stakeholder members: British Glass and Glass and Glazing Federation	British Glass and Glass and Glazing Federation	2011 onwards

KEY to SCOPE:

For each action a stakeholder can either:

Commit to delivering an action;
Influence others to aid delivery of an action;
Partner with other supply chain members to achieve an action.

7. PVC 2010 Onwards

Vinyl 2010 is the 10-year plan to improve PVC (Polyvinyl Chloride) production processes and products, invest in technology, minimise emissions, reduce waste and boost collection and recycling.[18]

Table 5: Summary of EU targets in Vinyl 2010[19]

Target	Progress
50% reduction target of use of lead stabilisers by 2010	Achieved and working towards 100% phase out of lead stabilisers in all EU-25 Member states by 2015
End of sales of cadmium stabilisers in all EU-25 member States by 2006	Achieved
Risk assessments of all of the major Phthalates	Achieved
240,000 tonnes of collected and recycled post-consumer PVC in 2010	190,324 tonnes in 2009

Vinyl 2010 has been successful in delivering the targets set out over 10 years ago. "Vinyl 2020" will be its successor which is currently being devised (Table 6, P1).

Recovinyl provides financial incentives to support the collection of PVC waste from the non-regulated PVC waste streams, such as windows. Its aim is to ensure a steady supply of post-consumer PVC waste for recycling in Europe. In the UK, 42,730 tonnes of used PVC construction products were recycled in 2008.

From the manufacturer perspective, BPF have launched 'Operation Clean Sweep: Plastic Pellet Loss prevention', along with a manual on best practice in ensuring zero pellet loss into the environment. The Operation Clean Sweep (OCS) programme and manual contains guidelines to help plastics industry operations managers reduce the loss of pellets to the environment, a particular problem in the marine environment.

A new PVC carbon footprinting and sustainability tool for window fabricators as well as other suppliers of PVC in the supply chain has been developed to allow quick and easy assessments of environmental and economic sustainability of PVC products and processes along the whole supply chain. The tool enables estimation of the following life cycle environmental impacts:

- Carbon footprint (global warming potential)
- Acidification potential
- Eutrophication potential
- Ozone layer depletion potential
- Photochemical (summer) smog
- Human toxicity potential

18 Vinyl 2010, The Voluntary Commitment of the PVC industry, Update May 2006. www.vinyl2010.org/images/stories/2006/Vol%20Com%202006%20Eng.pdf
19 Vinyl 2010 progress report – http://www.vinyl2010.org/highlights/2009-progress-report.html

Economic sustainability assessment can be carried out through value added analysis. The user can input information on their raw materials, processing, transport, storage, waste management, energy use and packaging to see what is causing the most impact. The PVC Carbon Footprinting and Sustainability Tool[20] has been developed as part of a Vinyl Sustainability Network known as VinylSUM.[21] This was a research study supported by the Engineering and Physical Sciences Research Council (EPSRC), on behalf of the PVC industry including both industry and academia, led by The University of Manchester with project partners; Ineos Chlor Vinyls, Loughborough University, ECOPLAS and Polyflor. The tool is publicly available and free to use. It can be downloaded from the following website: http://ccalc.org.uk/pvcsustainability.php. Now that the tool is publicly available the next step is to publicise the tool to the many fabricators who can make use of it (Table 6, Action P2). Publicity started in May 2010 with a demonstration of the tool to over 100 PVC industry delegates who attended the PVC General Assembly in London, as well as a workshop held at the Royal Society of Chemistry.

20 http://ccalc.org.uk/pvcsustainability.php
21 www.vinylsum.org

Table 6: Summary of sustainability actions for PVC 2010 onwards

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit	**P1** **Post Vinyl 2010 – Vinyl 2020**	A new voluntary commitment process, Vinyl 2020 has started and details will be published during 2010. Stakeholders: British Plastics Federation members	British Plastics Federation (BPF)	2010
Commit / Partner	**P2** **Dissemination of PVC Carbon Footprinting and Sustainability Tool**	Final testing of the tool is underway which will be followed by a roll-out across the industry. There will also need to be associated training on LCA, e.g. e-learning webinars. Stakeholders: PVC supply chain including raw material manufacturers, profile producers, fabricators etc	BPF	2010 onwards

KEY to SCOPE:

For each action a stakeholder can either:

Commit to delivering an action;
Influence others to aid delivery of an action;
Partner with other supply chain members to achieve an action.

8. Aluminium For Future Generations

Ensuring the sustainability of the aluminium industry and its products requires international collaboration due to the global nature of the aluminium value chain. The key organisations involved in the work include the Council for Aluminium in Building (CAB), the European Aluminium Association (EAA) and the International Aluminium Institute (IAI).

In order to manage environmental impacts, there is a need to measure and report them accurately. Hence the IAI produces an annual global sustainability report and five-yearly lifecycle inventory report, detailing latest performance data.[22] At the regional level, the EAA has produced its latest 'Environmental Profile Report' which presents the development of robust European Life Cycle Inventory (LCI) datasets for the production of primary and recycled aluminium ingots and for the transformation of aluminium ingots into semi-finished products, i.e. sheet, foil and extruded products.[23] Further development of global and European LCI data for aluminium, and their use in accessible and transparent Life Cycle Assessment (LCA) modelling is a priority for this sector (Table 8, Action A1).

The global aluminium industry, through the IAI, has established a number of global sustainability objectives (including energy and greenhouse gas emissions reduction), summarised in Table 7.[24]

Progress relating to the global objectives is reported annually and will be disseminated widely to those in the aluminium windows supply chain (Table 8, Action A2).

Table 7: Aluminium sector sustainable development objectives and initiatives

Impact	IAI Objective	Latest performance	Other IAI and non-IAI initiatives
Energy used in raw material production	IAI Objectives: 10% reduction in smelter electrical energy per tonne aluminium by 2010, from 1990	4% by 2008	
	10% reduction in energy use per tonne of alumina by 2020, from 2006	5% by 2008	
Other impacts of raw material	Elimination of perfluorocarbon (PFC) emissions in the long term; 50% per tonne reduction on 2006 baseline by 2020	86% reduction in 2008, compared to 1990 (0.7 tCO_2e/tonne Al); 15% compared to 2006 Equivalent to over 75% total reduction despite doubling in Al production	Annual Anode Effect Survey Report[25] Asia Pacific Partnership Projects[26]

22 http://world-aluminium.org/cache/fl0000166.pdf
23 http://eaa.net/en/environment-health-safety/lca/environmental-profile-report
24 Aluminium for Future Generations Initiative – a programme of continuous improvement on the part of the global aluminium industry. 2009 Update. http://world-aluminium.org/cache/fl0000336.pdf
25 http://world-aluminium.org/cache/fl0000336.pdf
26 http://www.asiapacificpartnership.org/english/tf_aluminium.aspx

Impact	IAI Objective	Latest performance	Other IAI and non-IAI initiatives
	At least 33% reduction in fluoride emissions per tonne aluminium by 2010, from 1990	Fluoride emissions reduced by 36% by 2008	
	Reduction of fresh water consumption per tonne of aluminium produced	Further data collection and analysis needed	
	Reduction of fresh water consumption per tonne of alumina produced	Further data collection and analysis needed	
	Increase the proportion of bauxite mining land rehabilitated annually	Annual rehabilitation area of existing bauxite mining areas is equal to the average annual area being opened up. In this steady state environment, bauxite mining is "land area footprint neutral" and sustainable	Bauxite Mine Rehabilitation Survey every 3 years[27] Bauxite Residue (Red Mud) Management Sustainability metrics have been defined and IAI is beginning data collection Asia Pacific Partnership Bx Residue reuse project (ATF–06–03):[28] In this project, participating countries (Australia, China, and India) focus on developing technically and economically sound options for bauxite residue in various end uses, including applications in the steel and cement industries.[29] CSIRO (Australia) Bx residue & disposal database (BRaDD): a web-based data platform that enables users to identify and evaluate current practices worldwide in bauxite residue processing and storage.[30]

27 http://world-aluminium.org/cache/fl0000292.pdf
28 http://www.asiapacificpartnership.org/english/pr_aluminium.aspx
29 http://www.asiapacificpartnership.org/english/pr_aluminium.aspx
30 http://www.csiro.au/products/Bauxite-residue-database.html

Impact	IAI Objective	Latest performance	Other IAI and non-IAI initiatives
	Recycling of spent potlinings (SPL), storage of SPL to prevent noxious gas build up	34% recycled in 2008, into cement, mineral wool and steel production	
In use impacts	Monitoring of aluminium used in the transport sector to improve carbon emissions of transport through lightweighting of vehicles	22% increase in sales from 2003 to 2008. Estimated greenhouse savings possible by 2020 = 500 MT CO_2 annually.	
End of life impacts	Report regularly on global recycling performance	9.9 MT recovered globally in 2008.	
	Recycling of aluminium cans to reach 75% by 2015	69% in 2007	

Around 75% of all aluminium ever produced is still in productive use, as a result of high recycling rates, e.g. between 92 and 98% for architectural aluminium. Recycling aluminium requires only 5% of the energy needed to produce aluminium from bauxite which leads to its high value as a recyclate. This high value should ensure similarly high recycling rates are maintained into the future.

In order to meet the steel and aluminium carbon targets, industry is pursuing two main strategies: process efficiency and decarbonisation. WellMet2050, a major interdisciplinary programme based in the Department of Engineering at the University of Cambridge aims to explore the full potential and expand upon these strategies through research into three novel options: novel fabrication, demand reduction and non-destructive recycling.[31] Whatever strategies and options are implemented, the transition from current practice to a low-carbon industry will not be simple.

WellMet2050 will identify potential options for change and evaluate the barriers, drivers and pathways that will influence the feasibility of each option. The five-year project is backed by £1.5m of Government funding through the EPSRC Leadership Fellowship scheme and a consortium of more than twenty companies, partner universities and leading academics which will help focus research activities to deliver information that is of immediate value to industry and policy–makers. CAB will be disseminating information from the project.

31 www.lcmp.eng.cam.ac.uk/wellmet2/introduction

Table 8: Summary of sustainability actions for aluminium for future generations

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit (to update and publicise)	**A1** **Update and publicise Aluminium's generic Environmental Profiles**	Update Aluminium"s generic environmental profile (BRE), using data supplied by EAA and IAI. **Partners:** IAI, BRE, Alfed, EAA	Council for Aluminium in Building (CAB)	12 months (2011)
Commit (to update Defra)	**A2** **Update Defra on progress in global sustainable development commitments & global and European LCI data**	Report on progress of global actions to meet energy, waste and greenhouse gas emission reduction objectives in the Sustainable Development Indicator report produced by IAI every year. Raise awareness in the UK (CAB). **Partners:** IAI, EAA	CAB	Updated annually LCI updated every 5 years

KEY to SCOPE:

For each action a stakeholder can either:

Commit to delivering an action;
Influence others to aid delivery of an action;
Partner with other supply chain members to achieve an action.

9. Timber Resource Efficiency

For timber windows, the most pressing area requiring improvement relates to the efficient use of timber, through reducing waste and diverting wood waste from landfill. This is an issue that affects the whole joinery sector, leading to the development of a Joinery Resource Efficiency Plan by the BWF with many other stakeholders, and support from Defra, Construction Products Association, WRAP (Waste & Resources Action Programme) and the BRE Trust. Certain actions developed in this plan are applicable to timber window manufacture and the recovery of old timber windows. These actions are summarised in Table 9.

Table 9: Summary of actions for joinery resource efficiency plan

No.	Recommendation/Objective	Actions needed
1	Agree a Timber Joinery Industry Accord, signed by suppliers, merchants and manufacturers	Establish Timber Resource Efficiency Partnership (TREP) – BWF, Timber Trade Federation (TTF), Wood Window Alliance and others, 2010
2	Deliver training course and material relating to improved timber waste management	BWF June 2010 onwards
3	Improved understanding of joinery procurement practices	Baseline survey in 2010 by TREP
4	Deliver an awareness campaign and procurement advice to SMEs	Case studies and cost benefits 2010/11 by TREP
5	By 2011, merchants to have developed and adopted a range of standard material stock sizes	Need to finalise stock range for products, such as windows, BWF, Timber Trade Federation (TTF) and Builders Merchant Federation (BMF)
6	By 2013, to have set up a sustainable collection system for joinery wood waste	Funding, development and evaluation of pilot projects required
7	Better understanding of the markets for wood waste	TREP and Wood Recycling Association to hold regular dialogue
8	Clearer policy guidance on compliance issues and burning of wood waste as biomass	Clarify and raise awareness via the Wood Waste Quality Protocol (WRAP and Environment Agency)
9	Collect data on wood waste arisings from the joinery sector	BWF & TTF to survey their members and TREP to use results to determine future data collation
10	Improve understanding of regulatory requirements for the reuse, recycle and disposal of wood waste	BWF to produce appropriate guidance material for their members
11	Develop waste management monitoring systems to measure wood waste flows through the industry	TREP to establish waste management programme
12	Introduce component systems for product groups such as windows	Develop timber window system to meet Approved Document Part L, October 2010
13	Improved understanding of requirements for bio-security of wood waste used in the agricultural sector	End use requirements for poultry litter and other animal bedding, and to produce guidance

Progress against this action plan and how it relates to product groups, such as windows, will be important to capture and publicise in future years (Table 10, Action T1).

Several specific actions relating to timber windows and resource efficiency have been further developed within the Windows Roadmap Stakeholder Group. These include:

- Efficient use of timber through an increase the use of finger jointing and laminated sections, computer aided cutting and material optimisation (Table 10, T2).
- Reducing impacts from empty paint containers which are often classed as hazardous and non-returnable, through working in partnership with paint suppliers (Table 10, Action T3).

Table 10: Summary of sustainability actions for timber windows

Scope	Action	Implementation	Lead Coordinator	Timeframe
Commit	**T1** **Progress against Joinery Wood Waste Resource Efficiency Plan targets and actions**	Progress reporting linked to the joinery sector and windows will help steer and improve timber resource efficiency in the timber windows sector. Stakeholder members: Timber Resource Efficiency Partnership (TREP)	British Woodworking Federation (BWF)	Annual updates
Commit	**T2** **Efficient use of timber**	Further increase the use of finger jointing and laminated sections, computer aided cutting and material optimisation. Key elements could include: • Working group established to steer work • Cost benefit analysis and case study development • Capacity Building and awareness raising • Training and mentoring business support Stakeholder members: TREP	BWF	2010 onwards
Influence	**T3** **Reduce hazardous and non-recyclable paint packaging waste**	Window manufacturers should be advised by BWF to use water based paints and coatings. Also, develop methodology and scheme to reduce the impact of contaminated and/or non returnable packaging of paint. First stage is to determine current practices with window manufacturers and paint suppliers, and to see what is possible in terms of best practice. Stakeholder members: BWF, WWA, Wood Protection Association, paint suppliers to window manufacturers	BWF	2011

KEY to SCOPE:

For each action a stakeholder can either:

Commit to delivering an action;
Influence others to aid delivery of an action;
Partner with other supply chain members to achieve an action.

10. Implementation, Monitoring And Review

Implementation, monitoring and review of this Windows Sustainability Action Plan will be overseen by the Windows Sustainability Partnership (formally the Windows Roadmap Stakeholder Group). A full members list of the Windows Sustainability Partnership (WSP) is detailed in the front of this Action Plan.

The governance and structure of the WSP is set out in its constitution below:

Windows Sustainability Partnership: Constitution

Purpose

The purpose of the Windows Sustainability Partnership (WSP) is to improve the sustainability of windows through both practical action, and through influencing and partnering with other members within the supply chain both upstream and downstream.

The WSP recognises the critical role that windows can play in reducing the overall environmental impact of buildings throughout their lifetime, as well as the sustainability of windows themselves. The WSP will use their combined knowledge to develop and implement practical and coordinated strategies for sustainability. This includes economic and social as well as environmental impacts.

Membership

Membership of the WSP is open to any company or trade association involved in the production, distribution, installation and disposal of windows as well as the relevant government departments, regulatory agencies and delivery bodies.

Chair and Deputy Chair

The Partnership will appoint a Chair and Deputy Chair. The post of Chair and Deputy Chair will be for one year only and will alternate between industry and government/regulators.

Secretariat

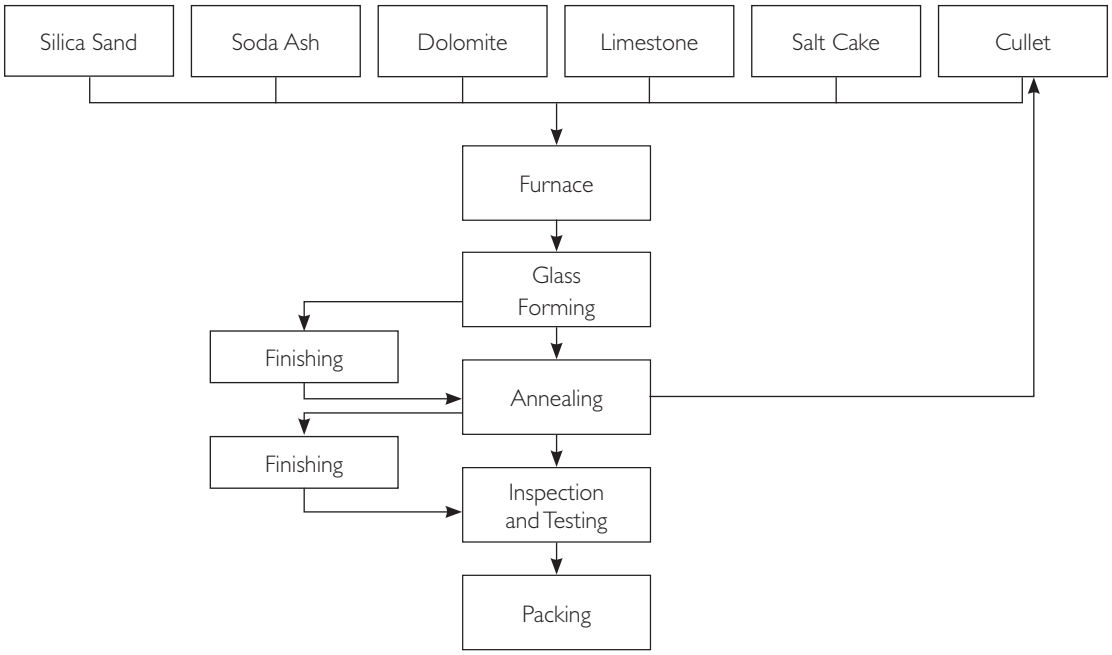
The Secretariat will be responsible for maintaining the list of WSP members and their contact details, of liaising with the Chair to decide the agenda of meetings, for circulating relevant papers and minutes of meetings.

Communications

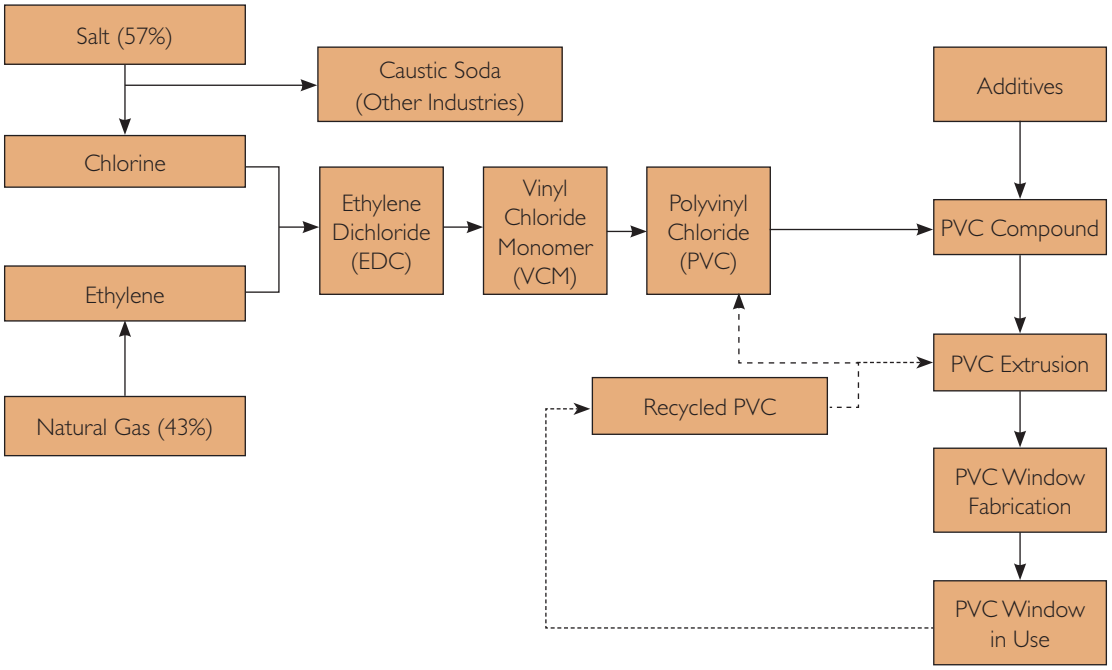
The Partnership will meet at minimum twice a year to discuss relevant sustainability issues relating to windows, and the implementation, monitoring and review of this Windows Sustainability Action Plan. At least one meeting per year will be dedicated to a 'Review of the Action Plan' to capture not only progress but the need for actions to be added or amended. This will benefit from work in advance of the review meeting to update evidence and provide a quantification of progress, as applicable, for each action.

Annex A: Supply Chain Diagrams

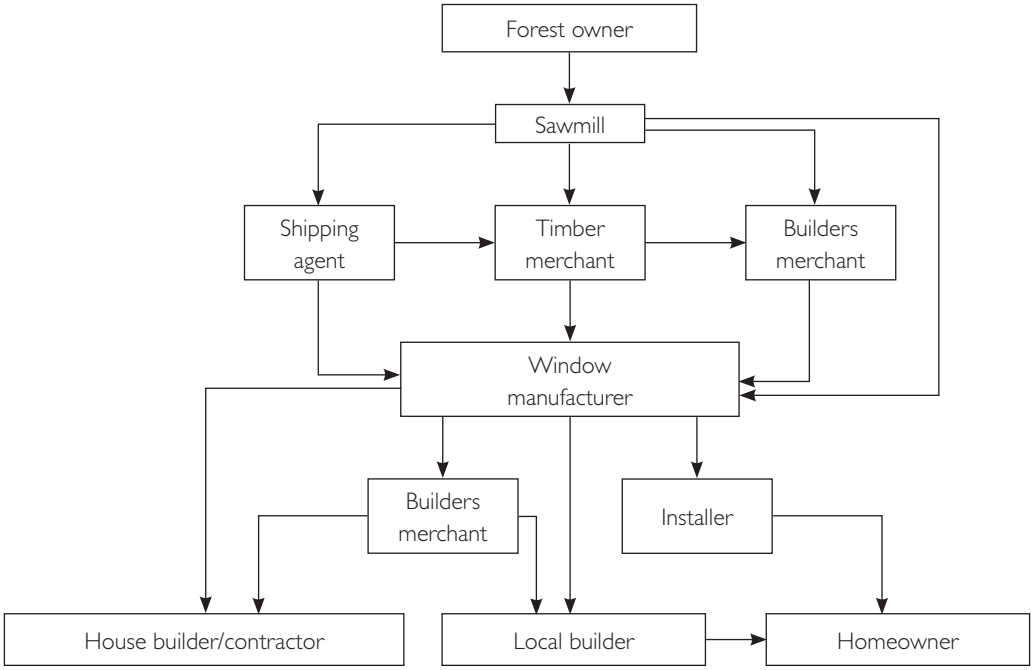
Flat Glass Production



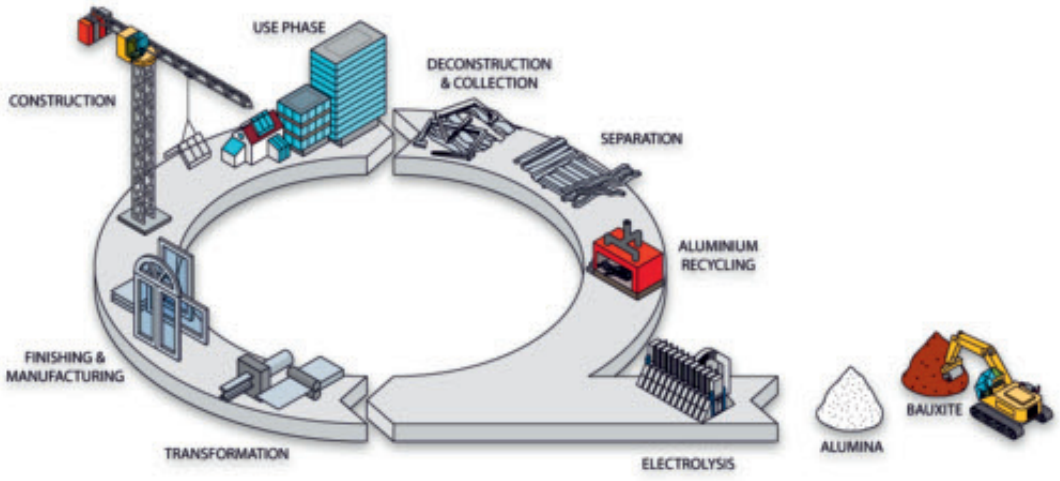
PVC Supply Chain



Timber Supply Chain



The Aluminium Product Lifecycle



Source: European Aluminium Association

Published by the Department for Environment, Food and Rural Affairs.
© Crown Copyright 2010.

Printed on material that contains a minimum of 100% recycled fibre for uncoated paper and 75% recycled fibre for coated paper.

Nobel House, 17 Smith Square
London SW1P 3JR

www.defra.gov.uk

PB13438 October 2010

defra
Department for Environment
Food and Rural Affairs