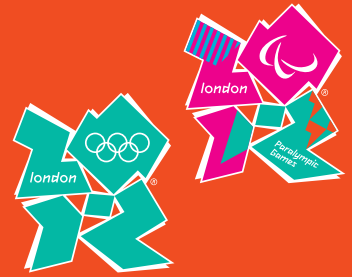


Learning legacy



Lessons learned from the London 2012 Games construction project

Implementation of the PVC policy

In 2009, London 2012 published a policy on the use of Polyvinyl chloride (PVC). The policy set out parameters for using PVC on the London 2012 project including requirements to be considered in the manufacture and disposal of the material.

The policy stimulated the supply chain to innovate a non-phthalate PVC. This was used in a number of the building wraps, but also provided feedback from industry as to other alternative engineering solutions that could also provide long-term environmental benefits especially to the whole life cycle of the product.

Introduction

PVC is one of the most used plastic materials in the world. At global level, demand for PVC exceeds 35 million tonnes per annum¹ and it is in constant growth, with higher growth rates in the developing countries².

In 2007, the Commission for Sustainable London 2012 highlighted the need for London 2012 to adopt a policy on its use of PVC.

Recognising the potential scale of PVC required by London 2012 – from membrane wraps to flooring, cabling and pipework – the London 2012 Sustainability Group published its policy in early 2009.

Policy on the use of PVC for the London 2012 Olympic and Paralympic Games

The main purpose of the policy was to challenge the use of PVC on the Olympic Park and encourage other materials to be adopted. The policy also recognised that there was certain functional requirements for which PVC is the most appropriate material (eg cabling). In these circumstances the Olympic Delivery Authority (ODA) challenged its contractors to show that the product met certain mitigation requirements including:

- The PVC had been manufactured in accordance with the European

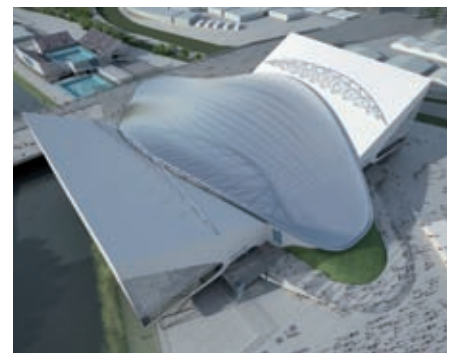
Council of Vinyl Manufacturers (ECVM) Industry Charter.

- The PVC did not result in effluent discharges or vent gases exceeding European Union (EU) standards.
- The PVC production prevents fugitive emissions and protects employees.
- The non-recycled content of PVC must not contain lead, mercury or cadmium stabilizers.
- Reasonable endeavours made to procure PVC with a recycled content of at least 30 per cent unless precluded by the performance requirements.
- Reasonable endeavours must be used to procure PVC using non-phthalate plasticisers.
- All plastics used in the manufacture of PVC must be registered or pre-registered for use under the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) regulations.
- Where the PVC was for temporary usage or where permanent usage is not assured, consider a take back scheme which offers closed loop reuse or recycling.

If a PVC based material was to be adopted a justification report was required setting out how the material was meeting the mitigation requirements above.



Phthalate-free PVC was used on the temporary shooting ranges at the London 2012 Shooting Venue



Phthalate-free PVC was used on the temporary wings used in Games time on the Aquatics Centre



PVC containing phthalate plasticisers used on the Basketball Arena, as the material was procured before issuing the PVC Policy

PVC use in the Park venues

With membrane wraps, ODA contractors approached the supply chain to procure a solution which met the policy requirements. In response, the supply chain actively sought to develop new products that attempted to meet all of the requirements.

For membrane wraps, the requirement that the PVC had 30 per cent recycled content was difficult to be met by any supplier due to the need to maintain certain performance criteria. In most cases this was to ensure there was a waterproof membrane. However, one supplier developed a PVC wrap with a non-phthalate plasticizer thereby meeting the specification for some of the Venues. This achievement led to the adoption of the non-phthalate plasticizer based wrap on the venues including Water Polo Arena, Aquatics Centre, Eton Manor and the Royal Artillery Barracks.

A total of 98,038 square metres of phthalate free membrane wrap has been installed on the Park out of a potential 142,538m².

For some products, alternatives to PVC are not available for the performance requirements like much of the cabling used on the Park.

Lessons learned

In developing and implementing the London 2012 PVC policy, the ODA identified several lessons learned:

- The phthalate free fabric developed currently has a 15 per cent uplift than the alternative material. Hence, there are costs to the implementation of the policy.
- Take back and reuse proved to be not that feasible when dealing with the Olympic Stadium roof, which is a bespoke design and therefore not easily reused.
- Options are available for unique configurations to be re-engineered in part and in the case of later designs such as the Water Polo Arena wrap, built-in sections have

been designed which can be folded and reused.

- The PVC policy has focused attention on the use of PVC across the project and highlighted that the functional properties of PVC make it the most appropriate material in certain circumstances. Indeed, high molecular phthalates play a role in creating a longer lifespan to certain products. This includes lift shaft cables, where there is no better alternative product and therefore the longevity of the PVC should be recognised.
- There are cases where for Health and Safety reasons the only solution is a PVC based material.
- Despite initial concerns about the policy, the plastics industry broadly welcomed the approach. The policy recognised the industry's voluntary code, Vinyl 2010, and thereby validated products which were meeting this code.
- The policy was fairly stark in its treatment of phthalates. The industry has consistently advised that there are a range of different Phthalates with variable properties and therefore have different environmental and health effects. This should have been recognised in the policy.
- Finally, the policy did not recognise the potential wider environmental effects of using certain products. Certain products had higher whole life costs and impacts when considering the manufacturing, shipping, fabrication, and installation costs and impacts. It is these additional criteria that have an equal, if not greater impact overall.

Recommendations for future projects and programmes

The whole life cycle of the products needs to be considered. Some PVC based components are more suitable for installation than non-pvc. More attention needs to be applied to the reengineering option, which should be considered before returning the product to source for chemical recycling.

Phthalate free	M ²
The Royal Artillery Barracks internal	14,540
The Royal Artillery Barracks external	9,200
The Royal Artillery Barracks ballistic screen	26,250
Water Polo Arena internal	17,500
Water Polo Arena external	2,500
Eton Manor	7,200
Aquatics Centre	19,000
Velodrome	1,848
Total	98,038
Phthalate containing	
Olympic Stadium	24,500
Basketball Arena	20,000
Total	44,500
Total both types	142,538
Phthalate per cent of total	31.22
Or Non-Phthalate per cent of total	68.78

Sources

- ¹ www.forumforthefuture.org/greenfutures/articles/place-pvc-sustainable-world
- ² www.pvc.org/en/p/how-is-pvc-used

Project

Sustainable Development

Authors

Richard Jackson – Principal Sustainable development & Regeneration Manager, ODA

Mike Scott – Project Assurance Manager, Government Olympic Executive



LOTTERY FUNDED



department for culture, media and sport



MAYOR OF LONDON

© 2011 Olympic Delivery Authority. The official Emblems of the London 2012 Games are © London Organising Committee of the Olympic Games and Paralympic Games Limited (LOCOG) 2007. All rights reserved.

The construction of the venues and infrastructure of the London 2012 Games is funded by the National Lottery through the Olympic Lottery Distributor, the Department for Culture, Media and Sport, the Mayor of London and the London Development Agency.