

Case studies illustrating benefits of PVC cables and pitfalls of substitution

Roger Mottram

Group Environmental & Regulatory Affairs Manager

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Cable Case studies



- Apple (regrettable substitution of PVC)



- International Electronics Manufacturing Initiative (iNEMI)



- Dell



- US EPA – Electronics Recycling Challenge



- Hitachi



- Olympic Games (Sydney 2000 and London 2012)

2007 – pressure from Greenpeace to eliminate PVC



- 2007 – brochure from Greenpeace:
 - criticising Apple for using PVC cables

Full brochure follow link below:

<http://www.greenpeace.org/usa/en/media-center/reports/missed-call-the-iphone-s-haza/>

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2009 – Apple announces that it is the first consumer electronics company to eliminate PVC (Greenpeace highlights the news)



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Link: <http://www.greenpeace.org/usa/en/news-and-blogs/campaign-blog/apple-first-to-eliminate-toxic-pvc/blog/25775/>

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Apple power cables - new design and new materials.



2007: PVC cables and flexible collar



2009: "PVC-free"

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Apple cable problems become apparent



Why do Apple's proprietary cables break so often or so easily?

Apple generally makes good quality products, but every Apple cable (macbook power, iphone headphones, iphone usb, etc) has fallen apart in just a few months. They pull apart near the connectors and then the wires begin to fray. Why are Apple's cables/accessories such low quality?

And yes, these are Apple products (from the store), and not the cheap Chinese ones off Amazon (which ironically last longer than the Apple ones).



This one is just starting to die.

- New websites created to offer advice solving Apple cable problems (top tip: wrap the cables in PVC insulation tape)
- Apple do not reveal what materials are used in their new cables. Cables are described by Apple as “PVC-free” and “environmentally friendly” (Apple customers have some less flattering descriptions)

Link: <http://www.quora.com/Why-do-Apples-proprietary-cables-break-so-often-or-so-easily>

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Apple cable problems become apparent (2009 onwards)



It's no secret that the Apple lightning cable is one of [the worst](#) chargers ever made, but before you scream at an innocent Genius Bar staffer, The Wire has some suggestions to avoid spending \$20 on a new cord every month.

First of all, the lightning-to-USB cable that Apple makes is laughably bad. Out of [1,285 reviews](#) on the Apple website, it has a rating of just over one star and that is only because zero stars isn't an option. The help forum on the Apple website has almost [200,000 discussions](#) dedicated to how awful the cord is. The main complaint is that the cord just stops working unexpectedly; its lifespan is about four-to-twelve weeks. If you're extremely lucky, you'll reach the epic six-month mark, but at that point, you've probably lost the cord anyways.

Link: <http://www.thewire.com/technology/2014/05/your-guide-to-replacing-the-infuriating-apple-lightning-cord/361503/>



Class-Action Lawsuit Forces Apple To Replace Frayed MagSafe Power Cords

Posted Nov 10, 2011 by [Jordan Crook \(@jordanrcrook\)](#)



Any long-time Apple devotee has struggled through the charger situation. Those Mag-Safe T-shaped chargers fray pretty easily, at which point you have to twist and turn the cord to pull in a charge. It's a huge pain, to say the least. But it appears those struggles are coming to a close, as Apple has lost a lawsuit which will now **require the company to either replace MagSafe power cords or hand over a chunk of change.**

Link: <http://techcrunch.com/2011/11/10/class-action-lawsuit-forces-apple-to-replace-frayed-magsafe-power-cords/>



November 23, 2013

Class Action Lawsuit Filed Against Apple for Faulty Lighting Connector

PATENTLY LEGAL

A new Class Action lawsuit has been initiated by Rendell Roman against Apple on behalf of individuals who purchased devices from Apple that use the Lightning connector that is prone to fraying, breakage, failure and beyond. The complaint alleges that Apple possessed knowledge of the defect prior to distributing the Lightning connector.

The Official Preliminary Statement

This is a class action lawsuit brought by Plaintiff, and on behalf of a nationwide class of individuals who purchased an Apple product that came equipped with the Apple Lightning connector ("Lightning") from Defendant, Apple, Inc. ("Apple" or "Defendant"). To date, the Apple products that can be charged and connected to the computer exclusively by the Lightning include: the iPhone 5, iPad (fourth generation), iPad Mini, iPod Nano (seventh generation), and iPod Touch (fifth generation) (collectively "Apple devices").

Link: <http://www.patentlyapple.com/patently-apple/2013/11/class-action-lawsuit-filed-against-apple-for-faulty-lighting-connector.html>

Lawsuits – April 2014, Carlile law firm



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iPhone 5 causes burn injuries?

On behalf of Carlile Law Firm LLP posted in [Burn Injuries](#) on Friday, April 25, 2014.

Many Texans are addicted to Apple products. They own iPads, iPods and iPhones. Unfortunately, having the latest and greatest Apple gadgets may come with more than a premium; it may also carry a risk of [burn injuries](#). That is the takeaway from a recent story.

According to recent reports, the battery recharging cable of iPhone 5's may cause second- or third-degree burns to people who use a so-called "lightning cable," a wire that charges the phone in addition to transmitting data. The reports indicate that testing had shown that just 30 minutes of use was enough for the cable to burn the skin.

Categories

Burn Injuries (6)
Car Accidents (27)
Premises Liability (9)
Products Liability (14)
Truck Accidents (11)

Archives

Link: <http://www.carlilelawfirm.com/blog/2014/04/iphone-5-causes-burn-injuries.shtml>

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Apple I-Phone 5 "Lightning to USB Cable" (Charger Cable) Failing Prematurely Under Investigation

May 6, 2014

Seeger Weiss is investigating claims for a class action suit against Apple for I-Phone 5 charger cables that fail prematurely. The cables fail only a few months after purchase, and the consumer is left to front the bill for a new cable which costs \$20-\$40 and is also prone to failure.

When Apple launched the much-anticipated I-Phone 5, the company also released a new charger cable, thereby rendering the older I-Phone charger cable incompatible with the new I-Phone 5. Since then, consumers have voiced their frustration with the new cable.

Link: http://www.seegerweiss.com/news/apple_i_phone_5_lightning_to_usb_cable_charger_cable_failing_prematurely

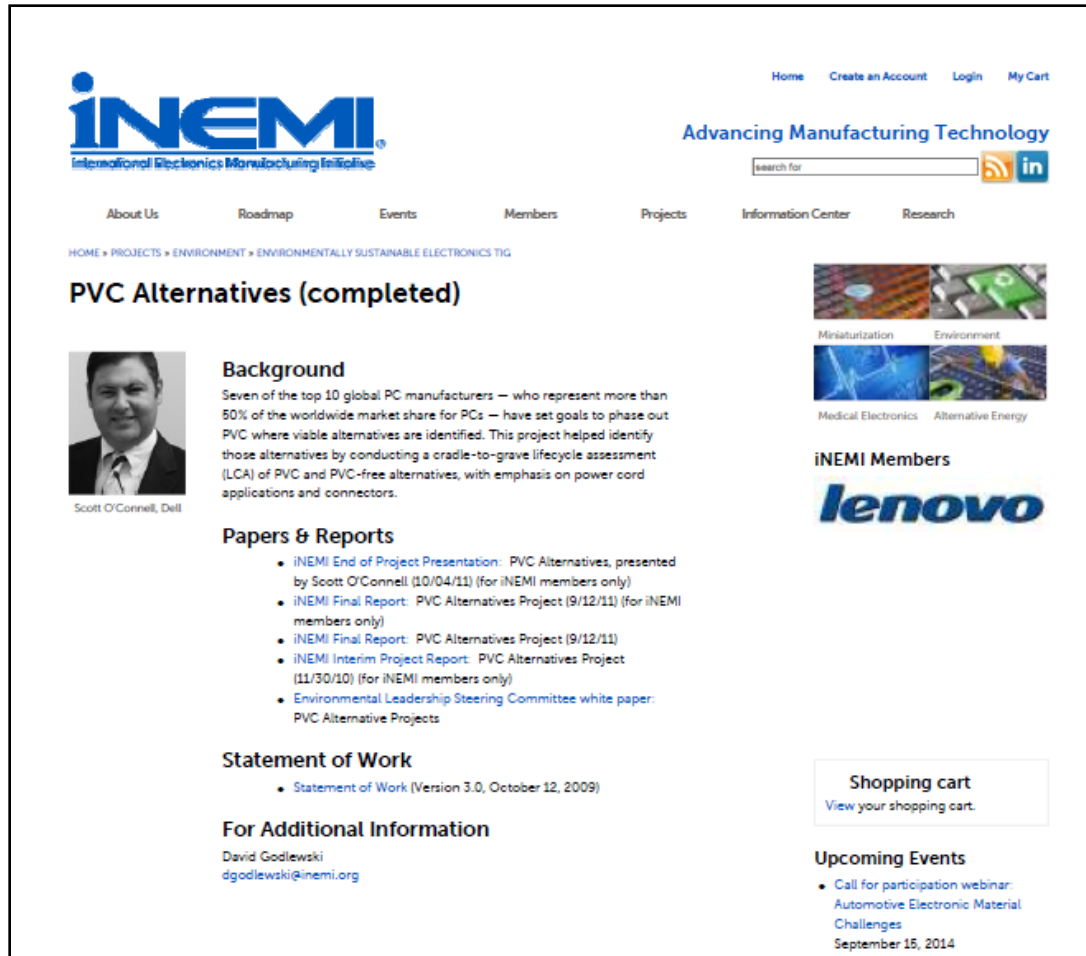
Viral video by frustrated Apple customer



This Apple customer has some very strong criticisms of the Apple power cables. The video went viral on YouTube and Facebook but all traces on the internet have been removed:



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The screenshot shows the iNEMI website with the following content:

- Header:** iNEMI International Electronics Manufacturing Initiative. Navigation links: Home, Create an Account, Login, My Cart. Slogan: Advancing Manufacturing Technology. Search bar and social media icons (RSS, LinkedIn).
- Menu:** About Us, Roadmap, Events, Members, Projects, Information Center, Research.
- Breadcrumbs:** HOME » PROJECTS » ENVIRONMENT » ENVIRONMENTALLY SUSTAINABLE ELECTRONICS TIG
- Section Title:** PVC Alternatives (completed)
- Image:** Portrait of Scott O'Connell, Dell.
- Background:** Seven of the top 10 global PC manufacturers — who represent more than 80% of the worldwide market share for PCs — have set goals to phase out PVC where viable alternatives are identified. This project helped identify those alternatives by conducting a cradle-to-grave lifecycle assessment (LCA) of PVC and PVC-free alternatives, with emphasis on power cord applications and connectors.
- Papers & Reports:**
 - iNEMI End of Project Presentation: PVC Alternatives, presented by Scott O'Connell (10/04/11) (for iNEMI members only)
 - iNEMI Final Report: PVC Alternatives Project (9/12/11) (for iNEMI members only)
 - iNEMI Final Report: PVC Alternatives Project (9/12/11)
 - iNEMI Interim Project Report: PVC Alternatives Project (11/30/10) (for iNEMI members only)
 - Environmental Leadership Steering Committee white paper: PVC Alternative Projects
- Statement of Work:**
 - Statement of Work (Version 3.0, October 12, 2009)
- For Additional Information:** David Godlewski, dgodlewski@inemi.org
- Shopping cart:** View your shopping cart.
- Upcoming Events:**
 - Call for participation webinar: Automotive Electronic Material Challenges, September 15, 2014
- Visuals:** Four small images representing Miniaturization, Environment, Medical Electronics, and Alternative Energy.
- Members:** iNEMI Members, with the Lenovo logo prominently displayed.

- Electronics companies working together — ‘PVC alternatives’ project:

- Dell
- IBM
- Lenovo
- Cisco
- Alcatel
- IST

- The iNEMI study included a ‘cradle-to-grave’ LCA (completed September 2011) comparing PVC cables with alternatives:
 - “..alternative materials to PVC have a 3X greenhouse gas performance that is worse than PVC materials.”
 - “Additionally, alternatives are not typically available today in volumes and at price points that support the market demands of the PC and laptop business.”
 - “...the environmental impact of PVC versus the alternatives, overall, is very small.”

Link: <http://www.inemi.org/project-page/pvc-alternatives-completed>

Green Gadgets: Designing the future

The path
to greener
electronics

September 2014

GREENPEACE

- *“...Apple is the only company that has eliminated the use of PVC and BFRs in all PC components, including external cables. Other PC makers continue to use PVC in cables and other external components.”*

Above quote from Greenpeace report, September 2014

Link:

<http://www.greenpeace.org/international/en/publications/Campaign-reports/Toxics-reports/Green-Gadgets/>

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Halogen-free cables pose electrical, mechanical, and performance challenges

Albert Tsang, Dell - November 19, 2012

“The combination of physical performance, fire safety, transmission characteristics, processability, colour, appearance, touch, feel, flexibility, and cost are all extremely difficult to balance to achieve halogen-free designed to replace PVC.

Halogen-free compounds are based on a variety of resin systems that can be flammable and generate smoke. To suppress these characteristics, they must be highly filled with bulky flame retardants and smoke suppressants to meet safety performance requirements.”



“If the industry were to transition to halogen-free today, it would necessitate reducing the flame-retardancy and physical requirements”

“In fact, due to flame retardancy requirements and physical and electrical specifications based on PVC characteristics, drop-in replacements may not be possible.”

“.....we don’t anticipate being able to meet all of the PVC-based requirements with the new materials.”

Albert Tsang, Dell, 19th November 2012

For full story follow link below:

<http://www.edn.com/design/components-and-packaging/4401743/Halogen-free-cables-pose-electrical--mechanical--and-performance-challenges>



EPA Recognizes Manufacturing, Retail Leaders in Electronics Recycling Challenge

WASHINGTON – Today, the U.S. Environmental Protection Agency recognized leading electronics manufacturers and retailers for their outstanding achievements in used electronics stewardship under the Sustainable Materials Management (SMM) Electronics Challenge. Leaders from Best Buy, Dell, LG Electronics, Panasonic, Samsung, Sony, Sprint and Staples gathered in Washington, D.C. to celebrate their environmental achievements, which include diverting more than 220,000 metric tons of used electronics to third party certified recyclers in 2013.

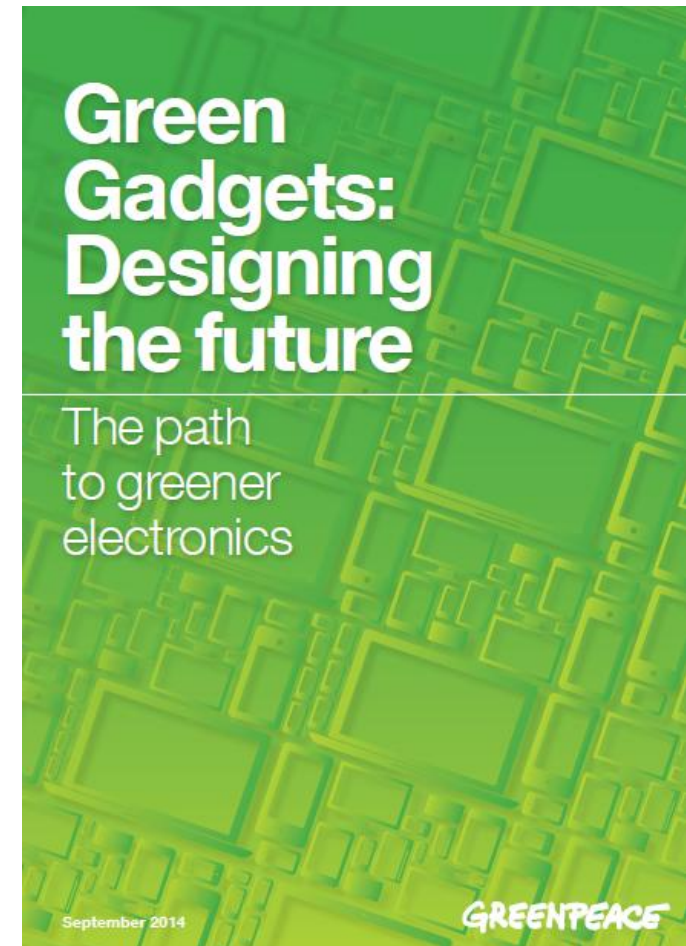
US Environmental Protection Agency press release, 24th September 2014

See link for full details: <http://www.epa.gov/waste/conserve/smm/electronics/index.htm>

Contrast: US EPA and Greenpeace

Ironically the companies now winning awards from the US EPA receive the heaviest criticism from Greenpeace:

- Sony, Panasonic and Samsung are categorised by Greenpeace as *“Laggards”* as they *“have no credible PVC phase-out plan”*
- Dell and LG are categorised as *“Followers”* as they *“still use PVC in cables”*
- Apple are categorised as an *“Early mover”* but are not on the US EPA list for an award.
- We know from the VinylPlus programme experience that PVC cable insulation can be recycled by melt processing (over 100, 000 tonnes p.a. of PVC cables recycled in EU). Melt processing is not possible with cross-linked insulation materials used as PVC substitutes.



- **Hitachi Cables Manchester (HCM), USA:**
 - Producer of copper and fibre-based data communication, industrial ethernet, robot and signal, and control cables
 - Produces PVC insulated cables as well as a wide range of non-halogen cables.
 - Aware of “environmental controversy” regarding PVC cables, so decided to conduct study to examine the issues.

- *“PVC cables have a number of benefits. They provide strong electrical and insulation properties over a wide temperature range. They are inherently fire retardant, and possess excellent durability and long life expectancy. They are cost effective, easy to process and recyclable. They are also highly resistant to degradation by ultraviolet light.”*

Lynne Humenik, Executive Vice President at Hitachi

- *“Multiple life-cycle assessments on PVC have been conducted in the EU as well as in the US, and they’ve shown that PVC’s impact on the environment is comparable to or lower than most alternatives”*

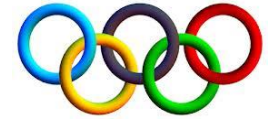
Mike Patel, Industry Manager at Teknor Apex

- *“Through various studies on PVC, the global scientific community has arrived at the conclusion that modern PVCs are no more harmful than any other plastics currently in use. HCM will build cables for customers using the safe plastics they desire – whether they use PVC or other materials.”*

“The Outlook” section, “PVC controversy” case study, Hitachi Cables Manchester, July 2011

Link: http://www.hitachi.us/case_studies/case_003/outlook.html

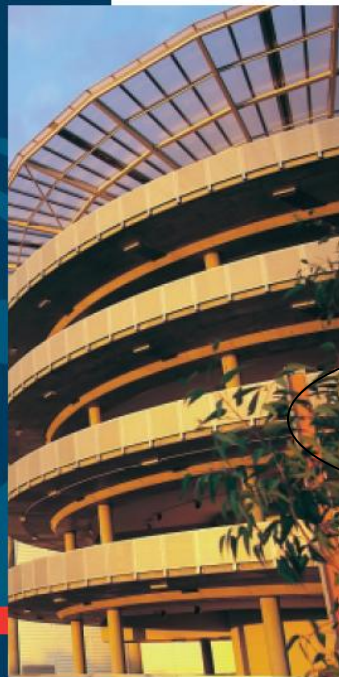
Sydney 2000 Olympics, “PVC-free” policy



Reducing waste ... more than 90% of construction waste was recycled.



All materials for use in construction
underwent a life-cycle analysis



Reducing waste

Reusing buildings

Where feasible, existing buildings have been used and refitted for the Sydney Olympic Games. Around one-third of sporting competitions (nine out of 28) will be held in existing venues, which avoids the environmental impact of new construction. Many non-competition venues are also in existing venues. The Sydney Olympic Games headquarters is in a building that once housed a newspaper, the media village in an old hospital, the technical officials village is a university and the international broadcast centre is a converted warehouse.

Recycling construction waste

The reuse and recycling of construction material has led to some impressive figures for waste minimisation. For example:

- 220,000 cubic metres of concrete and rubble from the demolished Homebush abattoir was recycled and used onsite
- 40,000 cubic metres of earth excavated during construction was reused to create embankments at the Athletic Centre
- 94.67 % of construction waste at the Sydney Showground was recycled.

Building materials

Life-cycle analysis

All materials for use in construction underwent a life-cycle analysis. This assesses the environmental impact of a material over its entire life, from manufacture through use to disposal. Materials with the least impact were chosen for Olympic venues.

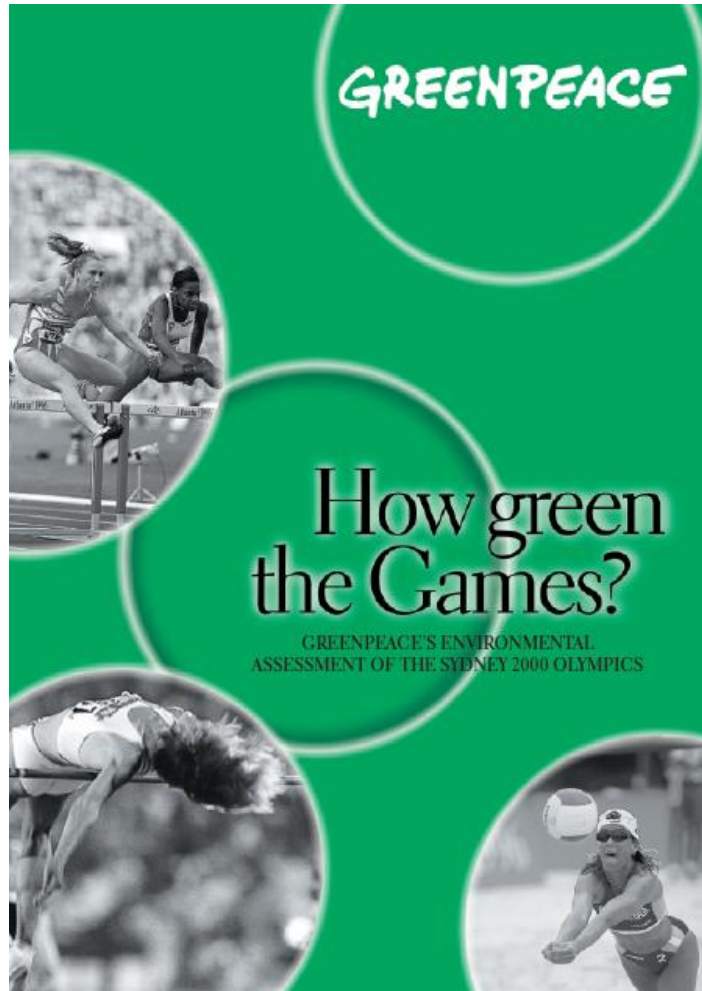
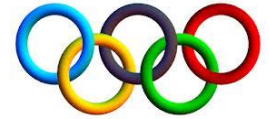
PVC reduction

The Environmental Guidelines committed Sydney to minimise and avoid the use of PVC. Olympic Sponsor Olex was instrumental in helping achieve this aim with its PVC-free cabling, which was used throughout the venues. PVC-free seating is used at venues and most subsurface pipes are non-PVC.

Steel

Steel supplied by BHP was one of the main construction materials used in Olympic venues. An important feature is its ability to be recycled.

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- *“In the area of electrical cabling, efforts to replace PVC were not as effective as for piping.”*
- *“Unfortunately, PVC sheathed electrical and telecommunications cable was used at the Archery Centre, Equestrian Centre, Hockey Centre, Shooting Centre, Regatta Centre, Aquilina Reserve and Sailing Shore Base”*

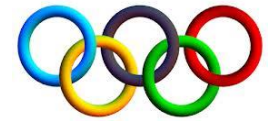
Above quotes from Greenpeace report, 09/2000

Link:

<http://www.inov8.au.com/design/How%20green%20the%20Games.pdf>

- Some cross-linked PE cables were used – especially in Athlete's Village

London 2012 Olympics – great success for PVC



- *“There are cases where for Health and Safety reasons the only solution is a PVC based material”*
- *“For some products, alternatives to PVC are not available for the performance requirements like much of the cabling used on the Park”*
- *“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.....this includes lift shaft cables where there is no better alternative product.....”*

Above quotes from ‘Learning Legacy’ 2012

Link:

<http://learninglegacy.independent.gov.uk/documents/pdfs/design-and-engineering-innovation/221-implementation-of-pvc-policy.pdf>

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 annum and it is in constant growth, with higher growth rates in the developing countries.

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 stabilisers.
- 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

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

Phthalate-free PVC was used on the Basketball Arena, as the material was procured before issuing the PVC Policy

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
Don Manor	7,500
Aquatics Centre	110,000
Indozone	1,848
Total	98,038
Phthalate containing	
Cygnus Stadium	24,500
Soccerball Arena	20,000
Total	44,500
Total both types	142,538
Phthalate per cent of total	31.22
% Non-Phthalate per cent of total	68.78

Authors
Richard Jackson – Principal Sustainable Development & Regeneration Manager, ODA
Mike Scott – Project Assurance Manager, Government Olympic Security

Project
Sustainable Development

Logos: LOTTERY FUNDED, dcm, LONDON 2012 OLYMPIC AND PARALYMPIC GAMES, MAYOR OF LONDON

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For more information visit: london2012.com/learninglegacy

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Summary

- The following lessons can be learned from these case studies:
 - In many circumstances it may not be possible to substitute PVC cables without seriously compromising product safety
 - Substitution comes with a heavy price tag and can also result in damage to company reputation (e.g. Apple case study)
 - Life cycle studies indicate that alternatives to PVC are not more “environmentally friendly” and might in some cases have higher environmental impacts.
 - PVC is a thermoplastic and is recycled in huge quantities by melt processing – alternatives using cross-linked polymers cannot be recycled by melt processing.
 - PVC cables have been the preferred choice for recent high profile projects with impressive sustainability credentials (e.g. London 2012 Olympics).
- Is it acceptable that some eNGOs are putting extreme pressure on companies to eliminate PVC cables when there is strong evidence that substitution could seriously compromise safety, whilst also potentially increasing some environmental impacts?
 - Scientific assessment and product safety should trump material prejudice