HP Green Chemistry Timeline

June 2019

HP aspires to a world where our products and operations use materials and chemicals that cause no harm. For more than two decades, HP has worked to shift the electronics industry away from chemicals of concern to less hazardous alternatives.

The HP materials and chemical management policy guides how we specify materials and chemicals for use in products, packaging, and manufacturing processes. This policy applies to all HP employees and businesses worldwide, and also extends to HP's suppliers. HP is a leader in reducing chemicals of concern, beginning our work in 1992 with the launch of the Design for the Environment program. See the Green Chemistry Timeline (Figure 1) for key milestones in this area. In addition to proactively restricting substances in HP's products (see Table 1. HP product proactive materials restriction/substitution timeline), we collaborated with many stakeholders to solve the difficult issues of finding safer alternatives. Notably, we worked with the Environmental Protection Agency and Clean Production Action (CPA) to advance a standardized method for evaluating the human health and environmental impacts of substances. HP was the first corporation to adopt GreenScreen® for Safer Chemicals and we collaborated with CPA in refining the method, designing the hazard summary table, and educating stakeholders in how to effectively use GreenScreen®. HP was a founding member of both the Green Chemistry & Commerce Council (GC3) and the BizNGO working group, which is a unique collaboration of business and NGO leaders who are creating a roadmap to the widespread use of safer chemicals and sustainable materials in our economy. Finding alternatives to Lead (Pb), Brominated Flame Retardants (BFRs), and Polyvinyl Chloride (PVC) proved challenging, but HP collaborated with organizations including the International Electronics Manufacturing Initiative (iNEMI), GC3, CPA, and BizNGO to succeed in this endeavor.

We have also contributed to standards, legislation, and improved approaches to materials use in the IT sector to ensure they align with environmental benefit, such as including a preference for safer alternatives in order to avoid regrettable substitutions. HP was the first in the IT industry to have employees trained as practitioners of the GreenScreen® methodology and we contributed to the development of the National Academy of Sciences Framework to Guide Selection of Chemical Alternatives, and aligned our alternative assessment process to it. In 2018, we worked with the Clean Electronics Production Network (CEPN) to streamline and refine our alternative materials assessment guide, which we are donating to the industry to help other companies find safer alternatives to process chemicals.

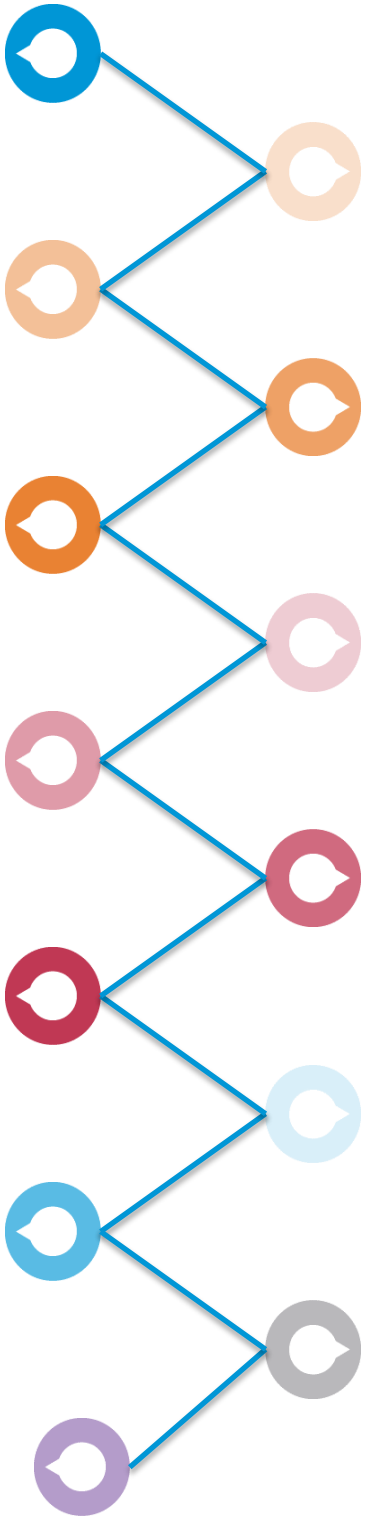
HP has advocated for legislation to restrict PVC, BFRs, and phthalates because, even though alternatives have been identified for most applications, barriers to adoption remain that include increased cost or limited availability. Without regulatory restriction, widespread adoption of the less hazardous alternatives will not be possible. Here are some key highlights of HP's advocacy work:

- Advocated for PVC and BFRs to be considered for inclusion in Reduction of Hazardous Substances (RoHS) legislation, with HP being one of the few companies that advocated for PVC restrictions.
- Worked heavily on the advocacy for the European Union (EU) methodology for future substance restrictions, with the result being a workable methodology for selection of substances. Application of this methodology resulted in PVC being selected as a third level priority for future RoHS restriction.
- Advocated for low halogen[1] materials to be reviewed for EU RoHS3.
- Advocated for and was successful to get Diisobutyl phthalate (DIBP) restricted along with Bis (2-ethylhexyl) phthalate (DEHP), Dibutyl phthalate (DBP), and Butyl benzyl phthalate (BBP) to avoid regrettable substitutions.

HP helped to develop and pilot the Chemical Footprint Project (CFP), starting in 2013. We have participated the last three years and are using the quantitative measurement of chemicals in our products to align internally on priorities and set goals. We also launched a supplier full material disclosure (FMD) program in 2017 for personal systems products. During 2018, we collected an inventory of more than 90% of substances by product weight for EPEAT 2019 registered personal systems products. We have been sharing information on the substances in products for many years via the IT ECO Declarations and also began providing information on the material content of typical HP personal systems and printer products in 2017.

[1] See Joint JEDEC/ECA Standard: Definition of "Low-Halogen" for Electronic Products.

Figure 1. Green Chemistry Timeline



1992 / 1993
- Design for Environment program begins
- HP begins proactively restricting substances of concern (starting with PBB and PBDE, then PVC in case plastics)*

1998
- HP's General Specification for the Environment is created

2001 / 2002
- Helped to create the IT Eco Declaration standard
- HP co-chairs the iNEMI Pb-Free consortium and is involved in many projects to investigate alternatives to Lead

2005 / 2006
- HP founding member of GC3
- HP Alternatives Assessment for PVC in wires/cables and BFRs in Printed Circuit Boards begins
- HP founding member of BizNGO Working Group

2007 / 2008
- Collaboration with EPA and Clean Production Action to advance standard methods for evaluating the human health and environmental impacts of substances
- BFR-free alternatives for Printed Circuit Boards identified*

2009
- HP is first corporation to adopt and use GreenScreen® Hazard Assessment method
- HP develops a Materials & Chemical Management Policy and adopts BizNGO Principles for Safer Chemicals

2010 / 2011
- PVC-free alternatives for wires/cables identified and assessed using the GreenScreen®, creating an approved material list of PVC-free solutions*
- HP Green Chemistry Supply Chain Strategy created

2012
- HP participates in GC3 Alternative Assessment for plasticizers
- HP creates procurement guidance documents for flame retardants and plasticizers to steer the supply chain to safer alternatives*

2013
- Circular Economy at HP is launched
- HP helps develop the Chemical Footprint Project (CFP)

2014
- HP becomes the first electronics company to have certified GreenScreen® practitioners
- HP contributes to the National Academies of Science Chemical Alternative Framework
- HP pilots the Chemical Footprint Project

2015 / 2016
- Successfully advocated to have TCO Certified include GreenScreen® assessments
- HP participates in the Chemical Footprint Project
- HP joins Green America's Clean Electronics Production Network with the goal of zero exposure of workers to toxic chemicals in the manufacturing process

2017
- HP's Materials & Chemical Management Policy is published
- HP provides extensive input to align the Swedish Chemical Tax with environmental benefit
- Supplier Full Material Disclosure program is launched
- GreenScreen® incorporated into EPEAT standard for PCs as a result of HP proposal.

2018 / 2019
- HP publicizes Chemical Footprint Project answers
- HP donates alternative assessment guide to the industry

*See the HP product proactive materials restriction/substitution timeline for more detail

HP was one of the first companies to proactively restrict substances of concern, starting in the early 1990s. See the HP product proactive materials restriction/substitution timeline (Table 1) for additional information. This timeline includes proactive restrictions for substances in products, however we have also proactively restricted manufacturing process substances, such as chlorinated organic solvents, benzene, and hexane. Our complete list of substance restrictions can be found in the HP General Specification for the Environment. HP was an important influencer in shifting the industry toward low halogen solutions, since we began including this requirement in our specifications before most IT companies.

HP has been working for many years to phase out chemicals of concern. Highlights from 2018 include: 75% of personal systems product series are low halogen; 100% of HP desktop PC external power supplies are low halogen; and Beryllium has been restricted for all HP personal systems products that will ship in 2019 and beyond. HP has also reduced PVC usage by shortening power cords and, depending on the product, we can provide PVC-free power cords in many countries. HP will continue to advance these product improvements for our personal systems and printers, as well as evaluate substances we are monitoring for future restrictions (see Table 2. Monitored substances).

Table 1. HP product proactive materials restriction/substitution timeline

Substance / Material	Scope	Date[2]
Antimony	Bleached paper[3]	2012
Antimony Trioxide	Low halogen products[3]	2011
Arsenic / Arsenic compounds	All products	2009
Beryllium / Beryllium compounds	All products (with exemptions)	2010
	Personal Computing (PC) products (without exemptions)	2019
Bis(2-methoxyethyl) ether (DEGDME)	All products	2017
Bisphenol-A	Thermal paper	2011
	External plastics	2016
Cadmium	All products (with exemptions)	1996
	All products (only exemption for industrial printers)	2016
Chlorinated paraffins, medium chain (MCCPs)	Low halogen products[3]	2013
Chlorinated paraffins, short chain (SCCPs)	All products	2002
Chlorine	Bleached paper[3]	2012
Cobalt dichloride	Desiccants and humidity indicators	2012
Flame retardants, polybrominated biphenyls (PBB) / polybrominated diphenyl ethers (PBDE) (including DecaBDE)	All products	1991
Flame Retardants, Chlorinated (CFRs)	External case plastics	2007
Flame Retardants, Brominated (BFRs)	External case plastics	2007
	PC products	2009
	Desktop & All-in-One PC external power supplies[4]	2017
	Notebook PC & Tablet external power supplies[4]	2019
Hexabromocyclododecane (HBCDD)	All products	2012
Hexavalent Chromium	All products	2004
Lead / Lead compounds	External Cables	2003
	All products	2004
Mercury / Mercury compounds	All products (except bulbs)	1998
	Notebook PCs	2008
N,N-dimethylacetamide (DMAC)	All products	2018
Nonylphenol Ethoxylates (NPEs)	Commercial PC products	2015
Ozone Depleting Substances (ODS)	All products and manufacturing processes	1993
Phthalates	Cables (DEHP, DBP, BBP, DIBP)	2010
	Non-EEE products (DEHP, DBP, BBP, DIDP, DnHP)	2011
	Commercial PC products (DEHP, DBP, BBP, DIBP)	2012
	Packaging (DEHP, DBP, BBP, DIBP)	2013
	Commercial PC products (DINP, DIDP, DnOP, DnPP, DnHP, DMEP, DPHP)	2014
	Inkjet printers (DEHP, DBP, BBP, DIBP)	2016
Polycyclic aromatic hydrocarbons (PAH)	External rubber or plastics	2008
Polyvinyl Chloride (PVC)	External case plastics	1993
	Packaging	2006
	PC products	2008

[2] Dates refer to when proactively adopted materials restrictions were first introduced on a HP product, ahead of regulatory requirements. For a comprehensive list of HP's materials restrictions, including numerous materials restricted by HP on a worldwide basis in response to regional regulations, refer to HP's General Specification for the Environment.
[3] These requirements apply only when designated by specific HP business units.
[4] Includes printed circuit boards (PCBs) and enclosures

Table 2. Monitored substances[5]

Substance / Material
Remaining uses of Antimony
Remaining uses of Beryllium
Remaining uses of Bisphenol-A
Remaining uses of MCCPs
Remaining uses of BFRs
Mercury (in bulbs)
Nonylphenol
Other perfluorinated chemicals
Remaining uses of certain phthalates
Remaining uses of PVC
Selenium
Proposition 65 list of chemicals
REACH Candidate List of SVHCs

[5] Materials have been identified by stakeholders as potential materials of concern. Future possible restriction of those materials depends, in part, on the qualification of acceptable alternative materials.