



Flame Retardants in IT Products

- industry overview -

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AGENDA

Policy Instruments

Flame Retardant Restrictions

IT Industry Response

Substitution Challenges

Identified good alternatives

Business Impact

Summary



Policy Instruments

Policy Instrument	Important	Comment
Legislation	REACH	Applies to EU, substance and mixtu-res. For substances in articles, candi-date list reporting obligation!
	RoHS	Also applies to imported EE products.
Voluntary / market access	<u>Eco labels:</u> - TCO - EPEAT - Blue Angel - Nordic Swan - (EU).	These are closely related as eco label criteria, under certain conditions, can be used in public procurement pur-chase specifications.
	<u>Green Public Procurement</u> - EU GPP - Denmark - Germany - Italy - Sweden	



VOLUNTARY POLICY INSTRUMENTS

- FLAME RETARDANT RESTRICTIONS -

Eco label	Flame Retardant Restrictions	Since
Blue Angel	Plastic parts above 25g shall not contain organic halogenated FRs.	Early 90s.
TCO	Plastic parts above 25g shall not contain FRs with Bromine or Chlorine.	Early 90s
Nordic Swan	Plastic parts above 25g shall not contain organic halogenated FRs.	Early 90s
US EPEAT	External plastic casing parts above 25g shall not FRs with Bromine or Chlorine.	2006
EU eco label	Plastic parts above 25g shall not contain organic halogenated FRs.	2001

Industry Initiative	Flame Retardant Restrictions	Since
IT Eco Declaration	All product covers/housing parts above 25g are halogenfree.	1996

VOLUNTARY POLICY INSTRUMENTS

- FLAME RETARDANT RESTRICTIONS -

Eco label	Number of certified IT products	Comment
Blue Angel	1.000	98% Imaging Equipment
TCO	900	90% displays
Nordic Swan	80	Copiers and printers, no computers
US EPEAT	3.400	Computers, displays and Imaging Equipment.
EU eco label	Zero	Computers, displays and Imaging Equipment.

Industry Initiative	Number of declared IT products	Comment
IT Eco Declaration	Several thousand.	All IT product categories

IT market overview - January 2016

Manufacturer	EPEAT	IT Eco	TCO	Blue Angel	Nordic Swan	EU eco label
Acer	X	-	X	-	-	<p>No certified IT products since 2011.</p> <p>Chemical substance requirements cannot be met by anyone.</p>
Apple	X	(X)	-	-	-	
Brother	X	X	-	X	X	
Canon	X	X	-	X	-	
Dell	X	(X)	X	X	-	
Fujitsu	X	X	X	X	-	
HP	X	X	X	X	-	
Kyocera	X	X	-	X	-	
Lenovo	X	X	X	X	-	
LexMark	X	X	-	X	-	
Ricoh	X	X	-	X	-	
Samsung	X	X	-	X	-	
Xerox	X	X	-	X	-	

The Substitution Challenge

Avoid Regrettable Substitutions



How we assess the alternatives

Since 2008, HP uses the Green Screen™ for safer chemicals assessment methodology.

As per today, we have assessed more than 160 substances, including all commercially available

- non-halogenated flame retardants and
- phthalate replacements.

Green Screen™ Hazard endpoints

Chemical Hazard

Persistence	Neurotoxicity
Bioaccumulation	Acute Toxicity
Acute Aquatic	Corrosion/Irritation of the
Chronic Aquatic	Skin or Eye
Carcinogenicity	Sensitization of the Skin or Respiratory System
Mutagenicity / Genotoxicity	Immune System Effects
Reproductive toxicity	Systemic Toxicity/Organ Effects
Developmental toxicity	Explosive
Endocrine Disruption	Flammability

HP's Green Screen assessments

GS Benchmark	Action	Non-halogenated flame retardants	Plasticisers
4	Prefer	1	3
3	Use, still opportunity for improvements	15	12
2	Use, but search for safer alternatives	14	
1	Avoid	15	12

NOTE

15 non-halogenated FR:s have undesirable environmental properties or major data gaps.

Almost all of these are accepted in 'green' public tenders and by most eco label organizations as 'greener' alternatives!

Identified 'safer' alternatives

Substance name	CAS	Benchmark	Assessment date (expires 3 years)	Sunset date	Report public
Aluminum diethylphosphinate	225789-38-8	2	Feb 9, 2014	-	Yes
Aluminum Hydroxide	21645-51-2	2	Feb 9, 2014	-	Yes
Melamine Polyphosphate	15541-60-3	2	Feb 9, 2014	-	Yes
Poly[phosphonate-co-carbonate]	77226-90-5	2	Feb 9, 2014	-	Yes
Resorcinol Bis-Diphenylphosphate	125997-21-9	2	Feb 9, 2014	-	Yes
Red Phosphorus	7723-14-0	2	Feb 9, 2014	-	Yes
Substituted Amine Phosphate mixture	66034-17-1	2	Feb 9, 2014	-	Yes
Triphenyl Phosphate	115-86-6	2	Feb 9, 2014	-	Yes
Tetrakis (2,6-dimethylphenyl)-m-phenylene biphosphate	139189-30-3	2	Jan 12, 2015	-	-
Siloxanes and silicones, di-Me, di-Ph, polymers with Ph silsesquioxanes	68648-59-9	2	Jan 18, 2016	-	-
Ammonium Polyphosphate	68333-79-9	3	Feb 9, 2014	-	Yes
Magnesium Hydroxide	1309-42-8	3	Feb 9, 2014	-	Yes
Polyphosphonate	68664-06-2	3	Feb 9, 2014	-	Yes

FLAME RETARDANTS IN IT PRODUCTS

Business Impact



BUSINESS IMPACT

EMEA	2012	2013	2014	2015 *
Number of 'green' tenders	560	690	700	863
Estimated contract value million \$	12.700	7.000	13.200	7.170

* HP Inc. data only.

EMEA - MOST IMPORTANT ATTRIBUTES

Priority	2012	2013	2014	2015
1	Energy efficiency			
2	Chemical substances			
3	Acoustic noise	Recycled content		Supply chain responsibility
4	Recycled content	Acoustic noise	Supply chain responsibility	Recycled content



Business Impact of Green Procurement

2012 – 2015 most important eco labels / self declaration

Rank	2012	2013	2014	2015
1	Energy Star	Energy Star	EPEAT	Energy Star
2	IT Eco Declaration	IT Eco Declaration	Energy Star	IT Eco Declaration
3	EPEAT	TCO	IT Eco Declaration	Blue Angel
4	TCO	EPEAT	Blue Angel	EPEAT
5	Blue Angel	Blue Angel	TCO	Nordic Swan



A close-up photograph of a green leaf, showing a dense network of veins. The veins are light green and form a complex, interconnected pattern against the darker green background of the leaf. The central vein is particularly prominent, running diagonally from the bottom left towards the top right. The overall texture is intricate and organic.

Summary

SUMMARY

Brominated / chlorinated / halogenated flame retardants

Since more than 15 years, the absolute majority of the known brand IT companies have eliminated these from product plastic parts >25g.

*

Since 2013, a few IT companies have also eliminated these from product printed wiring board material.

*

This information can be found in the IT Eco Declarations (ECMA-370 standard) used by almost 20 International IT companies and is also covered by a large number of eco labels.

Thank You!



SUMMARY

Non-halogenated flame retardants

The majority of IT companies have replaced Brominated and Chlorinated flame retardants (FR) mainly with phosphate based FRs.

Unfortunately, this transition has been supported by eco label organizations who have had poor requirements on used alternatives. Recent studies show that 15 of 45, i.e. 1/3 of these alternatives are not suitable replacements, because of data gaps and undesirable hazard properties.

The US EPA Design for Environment project on flame retardant alternatives decaBDE, identified 18 non-halogenate FRs. All of these were assessed using Green Screen™. 11 of these have been identified as being good alternatives.

After 3 years of discussions, the TCO eco label has now adopted Green Screen™

and have published the EPA list of 11 good alternatives as their 1st white list.

Legislation

- flame Retardant restrictions -

Legislation		Details	IT Industry
RoHS	PBBs PBDEs	Restricted in EE products since July 1st 2006.	Phased out by most companies in the mid 90s.
	HBCDD	Restricted in EE products from July 2019	
REACH	HBCDD	Stockholm PoPs convention since 2008. REACH Candidate list since October 2008 REACH authorization list sunset date August 2015.	Phased out by most companies in 2013-15.

EPA DfE project

Green Screen assessed non-halogenated FRs

Green Screen Benchmark 4 - Preferred

Substance	CAS No	Number of HP assessed alternatives
DOPO; 9,10-Dihydro-9-oxa-10-phosphaphenanthren-10-oxide	35948-25-5; 134767-33-2; 99208-51-2; 62281-13-4	1

Green Screen Benchmark 3

Use, still opportunity for improvements

Substance	CAS No	Number of HP assessed alternatives
Ammonium Polyphosphate, APP	68333-79-9	14
Magnesium Hydroxide, MDH	1309-42-8	
Polyphosphonate	68664-06-2	

From 2016, the non-halogenated FRs with Green Screen benchmark 2 or better, these will be on the TCO eco label list of accepted flame retardants.

EPA DfE project

Green Screen assessed non-halogenated FRs

Green Screen Benchmark 2
Use, but search for safer alternatives.

Substance	CAS No	Number of HP assessed alternatives
Aluminum diethylphosphinate	225789-38-8	15
Aluminum Hydroxide	21645-51-2	
Melamine Polyphosphate	218768-84-4 15541-60-3	
Poly[phosphonate-co-carbonate]	77226-90-5	
Red Phosphorus	7723-14-0	
Substituted A-mine Phosphate mixture	66034-17-1	
Resorcinol Bis-Diphenylphosphate RDP	57583-54-7	
Triphenyl Phosphate, TPP	115-86-6	

EPA DfE project

Green Screen assessed non-halogenated FRs

U = insufficient data.

Green Screen Benchmark 1 = Do not use.

Substance /	CAS No	Number of HP assessed alternatives
Bisphenol A	181028-79-5 5945-33-5	---
Phosphoric acid, mixed esters with [1,1'-bisphenyl-4,4'-diol]	1003300-73-9	
Antimon Trioxide	1309-64-4	15
Melamine cyanoacurate	37640-57-6	
N-alkoxy Hindered Amine Reaction products	191680-81-6	
Phosphate Oligomer	68664-06-2	
Zink Borate	138265-88-0 12767-90-7	

Green Screen assessed phthalate replacements

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Substance	CAS No	Green Screen Benchmark	Number of HP assessed alternatives
TOTM	3319-31-1	U	0
DOZ	103-24-2	U	0
DINP	68515-48-0	1	12
DINCH	474919-59-0	2	8
DEHT/DITP	6422-86-2	3	3
		0	3

*GC3: www.greenchemistryandcommerce.org