

# Bromine flame retardants – life-savers or eco villains? The Latest Position



SCI Fire and Materials Group Autumn Meeting  
Glasgow, 5 November 2015  
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**EFRA**

European Flame Retardants Association

[www.flameretardants.eu](http://www.flameretardants.eu)



# EFRA

- Sector group of **CEFIC** (the European Chemical Industry Council)
- **Brings together** the leading companies manufacturing, marketing and using flame retardants in Europe
- **Seeks to enhance fire safety** and understanding of flame retardants
- **Supports all flame retardant technologies** - based on bromine, chlorine, phosphorus, nitrogen and inorganic compounds
- **Addresses common** regulatory and scientific challenges
- Is a **solution driven, reliable and trusted voice** of the flame retardant industry in Europe
- **4 Application Forums:**
  - **Transport**
  - **Upholstery, Furniture, Textiles**
  - **Electrical & Electronic Devices**
  - **Building & Construction**

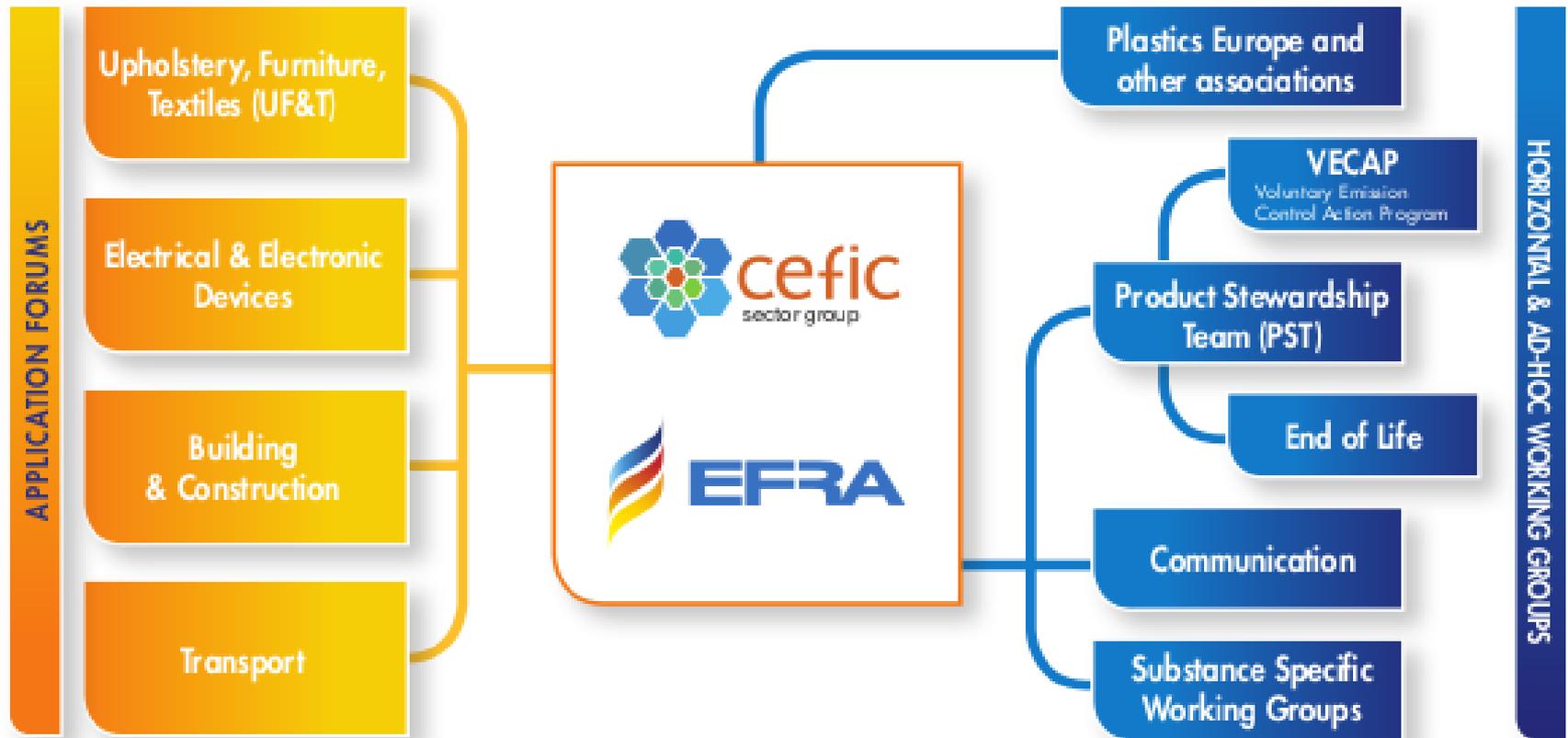
For more information: [www.flameretardants.eu](http://www.flameretardants.eu)



# Members



# Organisation



European Flame Retardants Association : Integral to Fire Safety

# Increasing fire risks for consumers

- The use of traditional materials such as wood, metal & animal hair or hides have been replaced by the use of new materials such as plastics, composites, foams & fire-based fillings
- Increasing power, plus miniaturisation of electronics (dependency on cooling fans), widespread use of standby functions
- Increasing use of textiles, furnishings, foams
- Integration of electronics into furnishings, toys, decorations ...

An LCD TV contains an average of 8,4kg of plastic which without the application of FRs would be equivalent to roughly

**6 litres of gasoline in terms of potential heat release!!**



# Flame retardants and modern homes

1960s



TELEVISIONS  
EXTERNAL CASINGS

UPHOLSTERED  
FURNITURE FILLINGS

INSULATION

2010



TELEVISIONS  
EXTERNAL CASINGS

UPHOLSTERED  
FURNITURE FILLINGS

INSULATION



# Flame retardants at a glance

Not a single class of chemicals!

140

Substances used as FLAME RETARDANTS

The term “flame retardant” merely describes the function of a substance and not its chemical nature and structure which determines the properties of the substance.

70

BROMINATED FLAME RETARDANTS

70

Non BROMINATED FLAME RETARDANTS

7

FAMILIES

Chemical substances derived from different families are used as flame retardants: bromine, chlorine, phosphorus, aluminium, magnesium, boron, nitrogen

No ‘one-size-fits-all’ solution: most flame retardants are « tailor made »



# Benefits of Flame Retardants

- Reduce the impact fires have on people, property and the environment
- FRs significantly delay ignition in the early stages and therefore:
  - **Allow for longer escape and response times**
  - **Provide increased survival chances**
  - **Provide additional time for the fire brigade to reach the fire**
- Flame retardants are added to different materials or applied as a treatment to materials such as textiles and plastics
- The European Commission has estimated a 20% reduction of fire deaths as a result of the use of flame retardants \*
- Disparity of standard for domestic fire safety standards in Europe



\* DG Environment Video 2000, cited by AEA technology, January 2001.

# Characteristics of brominated flame retardants



- Cost effective technology for flame retarding a wide range of different polymers
- Strictly vapor phase to inhibit combustion
- Organo-bromine provides good properties for modern polymers
- Often used in combination with  $Sb_2O_3$  acting as synergist
- Very effective in plastics and textile applications
- Newer approaches with halogenated FRs focusing on easily recycled versions of polymeric additives and reactive FRs (in styrenics, acrylates, urethanes and epoxies)



# Flame retardants and public spaces



- Modern polymeric materials can be far more flammable than natural based materials (wood, cotton)
- E&E devices contain 1-9kg of plastic materials which in terms of fuel load would be the equivalent of 0.6-6 liters of gasoline
- Domestic fires still account for 80% of injuries and deaths; so fire safety in modern homes and public spaces is vital
- Flame retardants technologies become an important component in products to slow down the spread and reduce the incidence of fire in modern homes and public spaces
- Increased use of insulating material to ensure energy conservation



# FR role as a tool to meet fire safety standards



- Flame retardants are a well-proven tool to stop to prevent fires from starting, or spreading. They can significantly delay ignition in the early stages of a fire when it can still be extinguished, or occupants of a building can escape
- The 2009 Greenstreet Berman study, carried out for the UK government, showed that in the period between 2002 and 2007, after the UK Furniture and Furnishings Fire Safety Regulations, there were:
  - **54** fewer deaths per year
  - **780** fewer non-fatal casualties per year
  - **1065** fewer fires each year following the introduction of the UK furniture safety regulations
- Flame retardants make ignition less likely and limit the rate of fire growth
- Materials and products which need to be rendered fire-safe differ widely in their nature, their composition – and indeed their application
- Flame retardants help producers meet these application specific flammability requirements



# BFRs: Life savers or Eco-villains



## [Flame retardants debate sparked by IEC flammability specification](#)

September 04, 2015 - Chemical Watch

Proposals to increase flammability requirements in international electronics standards have sparked concern that their adoption could increase consumer exposure to flame retardants.

## [How Chemicals Affect Ecosystems](#)

September 08, 2015 - The UC Santa Barbara Current

It will use the funding to develop a model to better understand biological and ecological consequences of exposure to metals, nanoparticles and certain flame retardants in industrial and consumer products.

## [Modern Homes Are Killing Firefighters](#)

September 15, 2015 - Newser

Plastics, flame retardants, TVs, furniture, cleaning materials, and more create abundant smoke filled with cancer-creating toxins.

## [EU Chemicals Agency Moves on Flame Retardant Restriction](#)

September 17, 2015 - BNA Daily Environment Report

A wide-ranging European Union restriction on the use of the flame retardant decabromodiphenyl ether (decaBDE) has moved a step closer with the finalization of an opinion in favor of the restriction by the European Chemical Agency's Socio-Economic Analysis

## [Legislators engage in spirited debate over chemicals in consumer goods](#)

October 01, 2015 - Sentinel and Enterprise News

"You can't manage what you can't measure," said Elizabeth Saunders, Massachusetts director for Clean Water Action. "We may have the next DDT or asbestos or lead sitting in our homes, and we probably do, in the form of flame retardants in our furniture or additives to plastic."

## [It was actually easier to be slimmer in the 80s](#)

October 02, 2015 - Dispatch Times

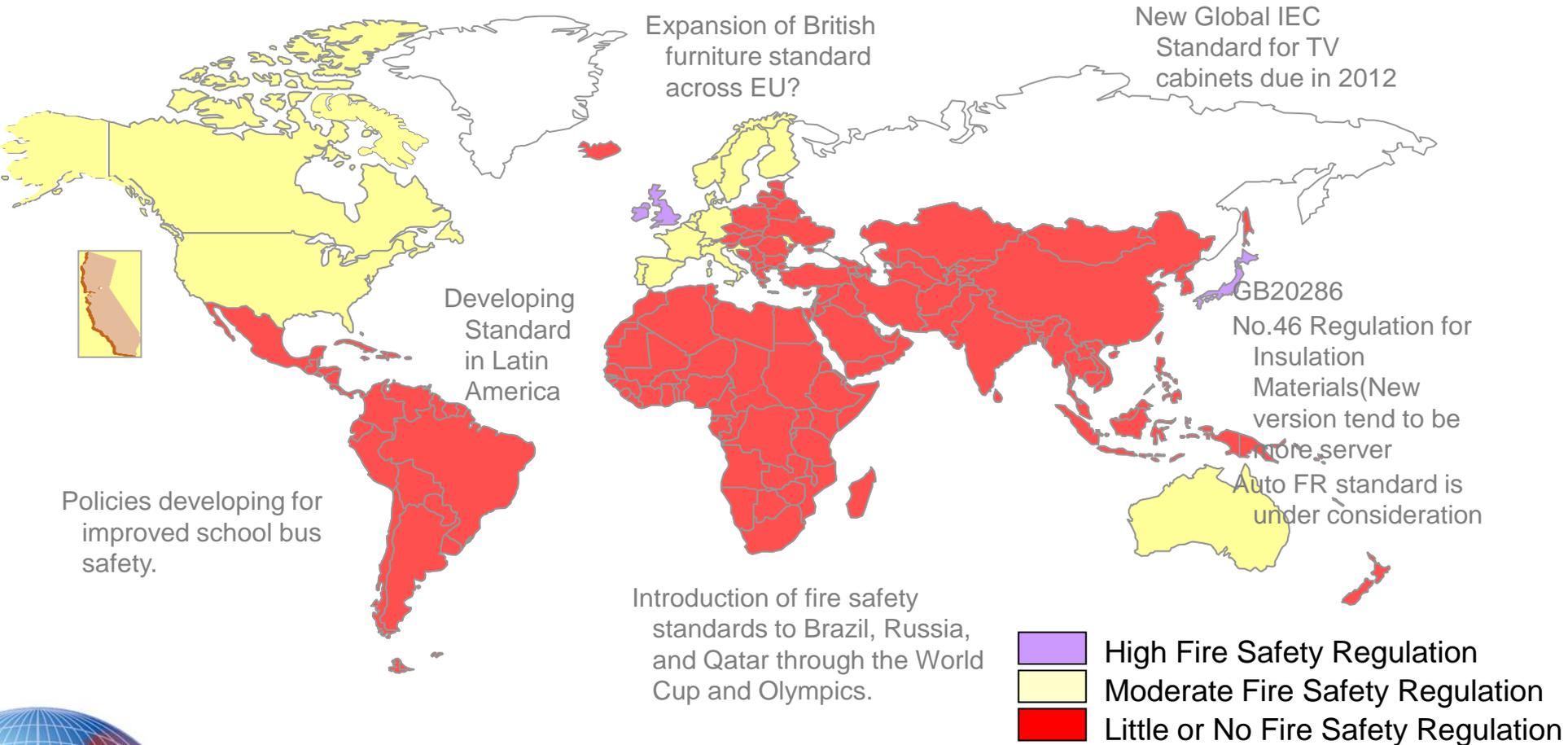
Everything from pesticides and flame retardants to BPA and phthalates are suspected of altering our hormonal processes and confusing the way we gain and maintain weight.

**Just a few quotes from many!**



# Fire Safety Standards

## Trend - More Regions & Higher Standards



# Legend BFRs

- Brominated Tris (1974)
- PBBs (late -90's)
- Penta- and OctaBDE (2004)



# EU Regulatory status on BFRs



- TBBPA
  - RoHS : TBBPA and BFRs not singled out for new substance restrictions, but TBBPA prioritised for evaluation under RoHS
  - REACH: currently being Evaluated by Denmark
- HBCD
  - In May 2013 UNEP listed HBCD in Annex A (elimination) with exemptions for production & use in PS foams in buildings
  - In the EU: sunset date is 21<sup>st</sup> August 2015 under REACH without Authorisation
- Deca BDE
  - Nomination by Norway to list under Stockholm convention as a POP
  - Currently listed as SVHC
- EBP
  - On CoRAP list, Evaluation commenced 2012, draft decision taken, awaiting appeal
- TCPP
  - On CoRAP list for Evaluation



# UN POP Listing & Waste



- End of life guidelines adopted at UN level (Basel Convention) providing countries with recommended management for POPs waste
- A low POP limit is provisionally recommended: any waste containing POP substance above that limit has to be treated such that the POP substance is destroyed in an environmentally sound manner
  - Content above low POP limit does not automatically equal hazardous waste
  - No recycling allowed above low POP limit. Current options being discussed:
    - POP BDEs: 50ppm or 1,000ppm for all listed congeners as a sum
    - HBCD: either 100ppm or 1,000ppm
  - **Municipal Solid Waste Incineration** an appropriate method for the destruction of polystyrene foam containing HBCD above the low POP limit. Hazardous waste incineration an appropriate method for other waste containing POP BDEs and HBCD.



# Debunking the myths

- Myth#1:** Flame retardants are a single class of chemicals
- Fact:** Flame retardants belong to several widely divergent classes of chemicals
- Myth #2:** Flame retardants do not work
- Fact:** Flame retardants have been proven to work effectively in many different applications
- Myth #3:** Plastics with flame retardants cannot be recycled
- Fact:** Flame retarded plastics can be recycled
- Myth #4:** Flame retardants release toxins in a fire
- Fact:** Toxins are released in any uncontrolled fire



# Flame retardants are safe and essential



- All chemical substances on the European market over 1 tonne per annum will be regulated under REACH meaning that potential environmental and human risks will have been thoroughly assessed by scientists and regulators
- More than 90% of all commercial flame retardants fall into the volume band of >100mt annually and have been duly registered under REACH
- There more than 140 different substances that provide flame retardant properties - only a limited number of these substances have been restricted in 35 years
- Full cooperation with the European Commission, ECHA and other stakeholders to create a safe environment for consumers
- Environmental values are low, there is a reasonable certainty of no harm



- **Eco-villains?**

- **BFRs that are in common use vary widely in their toxicity**
- **Most are not very acutely toxic to humans**
- **Some confirmed as being toxic to aquatic environment**
- **Exposure of the general population to BFRs is very low**
- **Concerns for humans and environment have been identified, but need to be balanced against the proven benefits**



- **Live-Savers!**

- Increased use of flammable plastics
- Stringent fire safety standards must be met
- Use of (B)FRs has grown dramatically over the past 30 years
- FRs reduce or prevent the chances of ignition
- Reduce the rate of combustion if ignited
- Increase escape and response time
- FRs save lives
- Prevent injuries and economical damage

[www.rsc.org](http://www.rsc.org): Why do we worry about Brominated Flame Retardants?



- **Live-Savers!**
- Based on current knowledge, in many cases the benefits are likely to outweigh the risks.
- There are also uncertainties in the hazards posed by some of the alternatives.



# Fire Safety Standards

- **Live-Savers!**

- What do the experts say on fire safety standards

- [EFRA Video on fire safety standards](#)



EFRA\_FSS\_05.mp4



## The Voluntary Emissions Control Action Programme



## ABOUT THE PROGRAMME

The voluntary emissions control action programme is a pioneering product stewardship scheme for the responsible management of chemicals in the supply chain: run under the principles of Responsible Care®.

VECAP aims to reduce the potential for emissions of flame retardants during the manufacturing stage by promoting environmental good practice among producers and downstream users.

The programme reduces emissions to the environment by:

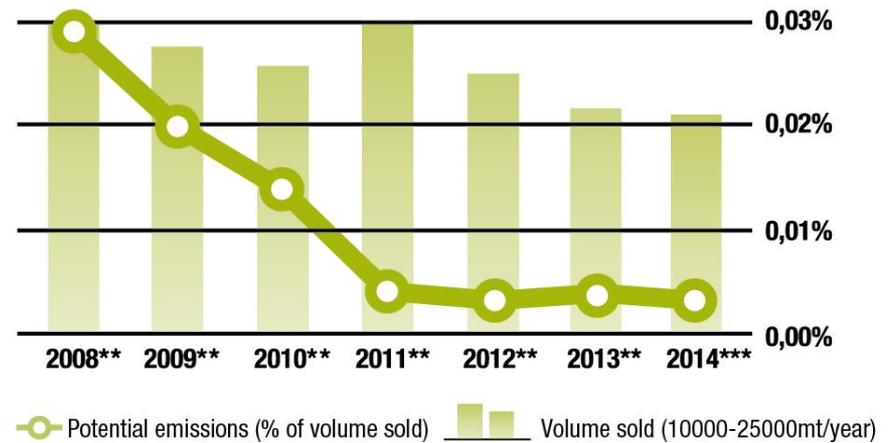
- Increasing understanding of chemicals management in the value chain
- Promoting and facilitating open and constructive dialogue with the industry, regulators and other stakeholders
- Raising awareness among all those involved throughout the process, from site personnel to company top management
- Applying and promoting best practices identified through the programme

# Measuring progress

## VECAP 10 YEARS AT A GLANCE

- Operating in Europe, North America and Canada, as well as being promoted in Mexico, China, Japan, South Korea and Taiwan;
- More than 100 professionals involved in the operating regions including sales operators, trained distributors, customers and industry representatives;
- 180 downstream user sites involved;
- Training schemes and communication material available in 13 languages;
- 11 certified sites worldwide.
- Major reduction of potential emissions of brominated flame retardants reported since 2008.

Summary of BFR\* potential emissions reduction in Europe

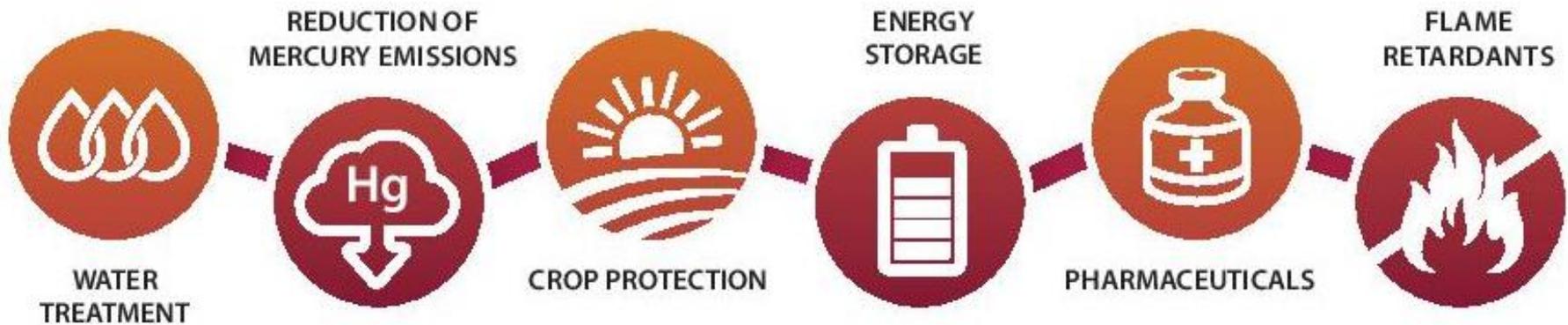


\* Deca-BDE, HBCD, TBBPA, EBP \*\* Year reported \*\*\* 2014 also includes sales of EBP

# Benefits of Bromine

## APPLICATIONS

Since bromine was discovered, various bromine compounds have been used in important fields such as



# Thank you!

## Questions?

For more Information please visit the EFRA website at:

[www.flameretardants.eu](http://www.flameretardants.eu)

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