

**pinfa**

**GLOBAL TRENDS & PERSPECTIVES  
PIN FLAME RETARDANTS AT A GLANCE**

**Jonathan Crozier, pinfa EU Secretary General**

pinfa Electromobility workshop, Tokyo,  
01 July 2019

- Halogen-free
- REACH-registered chemicals
- Better for environmental protections: non-POPs
- Based on 3 families of chemicals: Phosphorus, Inorganics & Nitrogen

## **For electromobility applications**

Plastic additives (reactive MoA), intumescent coatings (additive MoA)

EU competition law  
compliance

Commitment to  
transparency

Set to improve interactions  
with civil society

Continuously improving the  
environmental and health profile of their  
flame retardant products, offering  
innovative solutions for  
sustainable fire safety

# 31

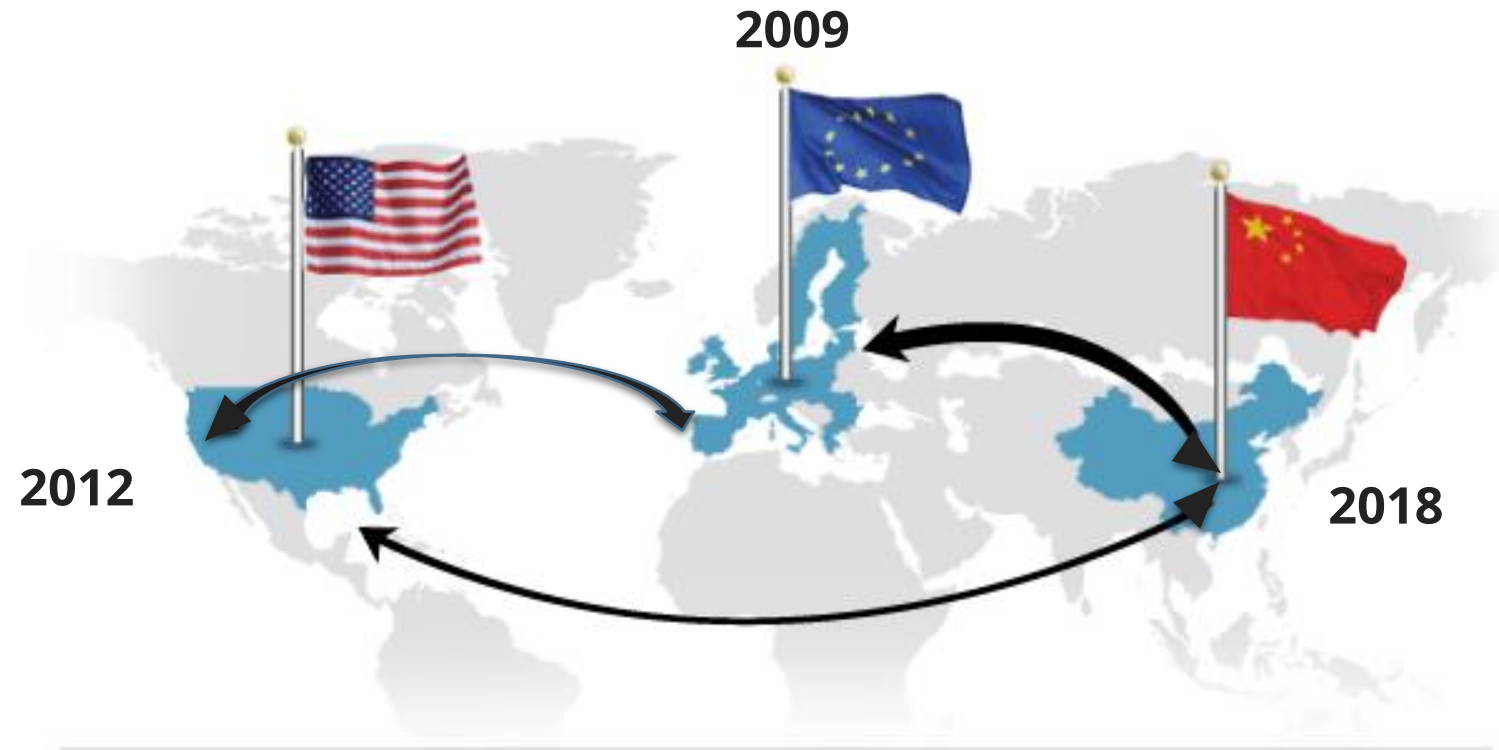
PIN flame retardant manufacturers & users

A sector group of



## PINFA REMIT

32 Global companies with an international sales and distribution network



- About 1% of busses catch fire every year (according to statistics for Germany and USA).
- In the USA, vehicle fires account for 14% of reported fires and 16% of fire fatalities.
- No evidence of increased frequency of fire event in current EV fleet by comparison to ICE car fleet
- EV fires can occur during charging, post crash (most frequent, 50%) or at rest / while driving
- Pictures: car dropped  
20 m vertically → hitting ground at 70 km/h

CLARIANT 



Figure 4 Test 1 – The photo is taken 2 min after the drop, and large amount of smoke are produced from the battery

Boe A.S. (2017) Full Scale EV Fire Test, Brandposten #55, p. 8 - 10



- Battery contains a high amount of chemical energy densely stored in a confined space. The combustion energy is about 5 to 20 times the electrical energy stored in the battery.
- Also the electrical installations and peripherals need to be well protected against fire risks from higher voltages and currents than in combustion engine cars.
- Smoke release before the actual thermal runaway (often with some delay), with white smoke and
- potential emission of highly toxic hydrogen fluoride (HF) from the decomposition of the electrolyte (e.g. LiPF<sub>6</sub>), also dangerous for fire fighters
- Re-ignition of an extinguished car is frequently observed.

PHOTO: ANDREAS SÆTER BOE, SP FIRE RESEARCH AS



**Figure 5 Test 1 – The photo is taken 8 minutes after the drop. At this point the car has started to burn vigorously.**

Boe A.S. (2017) Full Scale EV Fire Test, Brandposten #55, p. 8 - 10

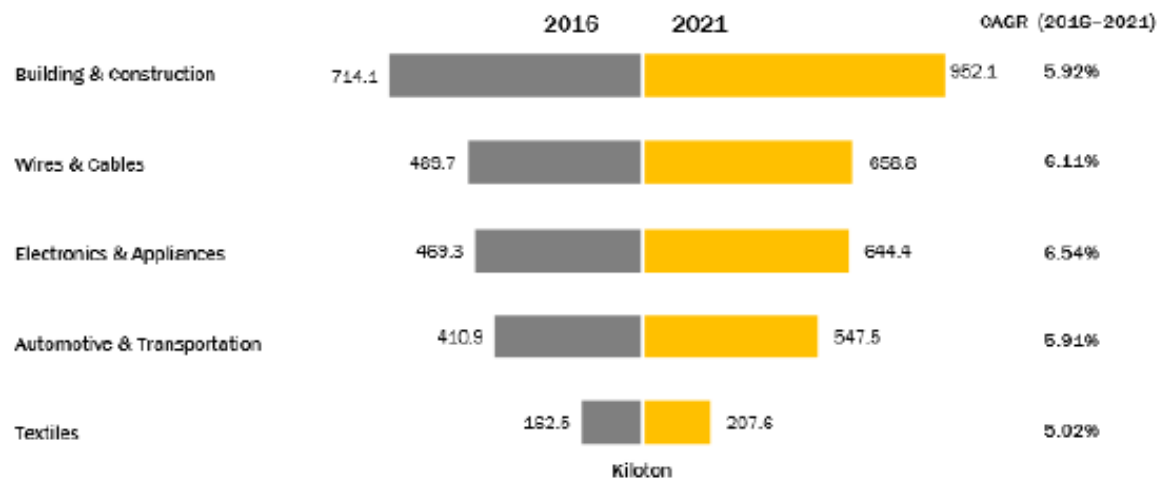
## Sustained CAGR ca. 6%

2015: \$8.7B | 2,36 Mt

2016: \$9,38 | 2,49 Mt

Projection for 2025: \$13B | 3,5Mt

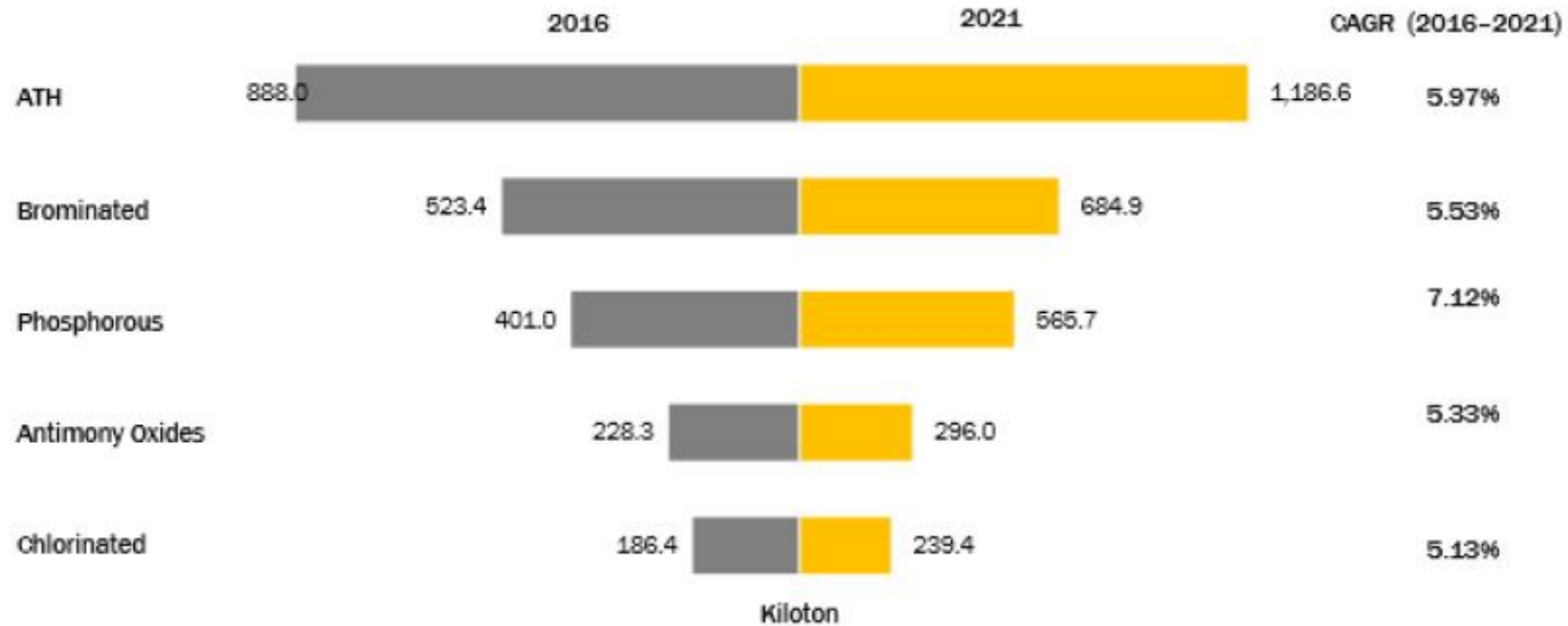
FLAME RETARDANTS: END-USE INDUSTRY SNAPSHOT (2016 VS. 2021)



Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

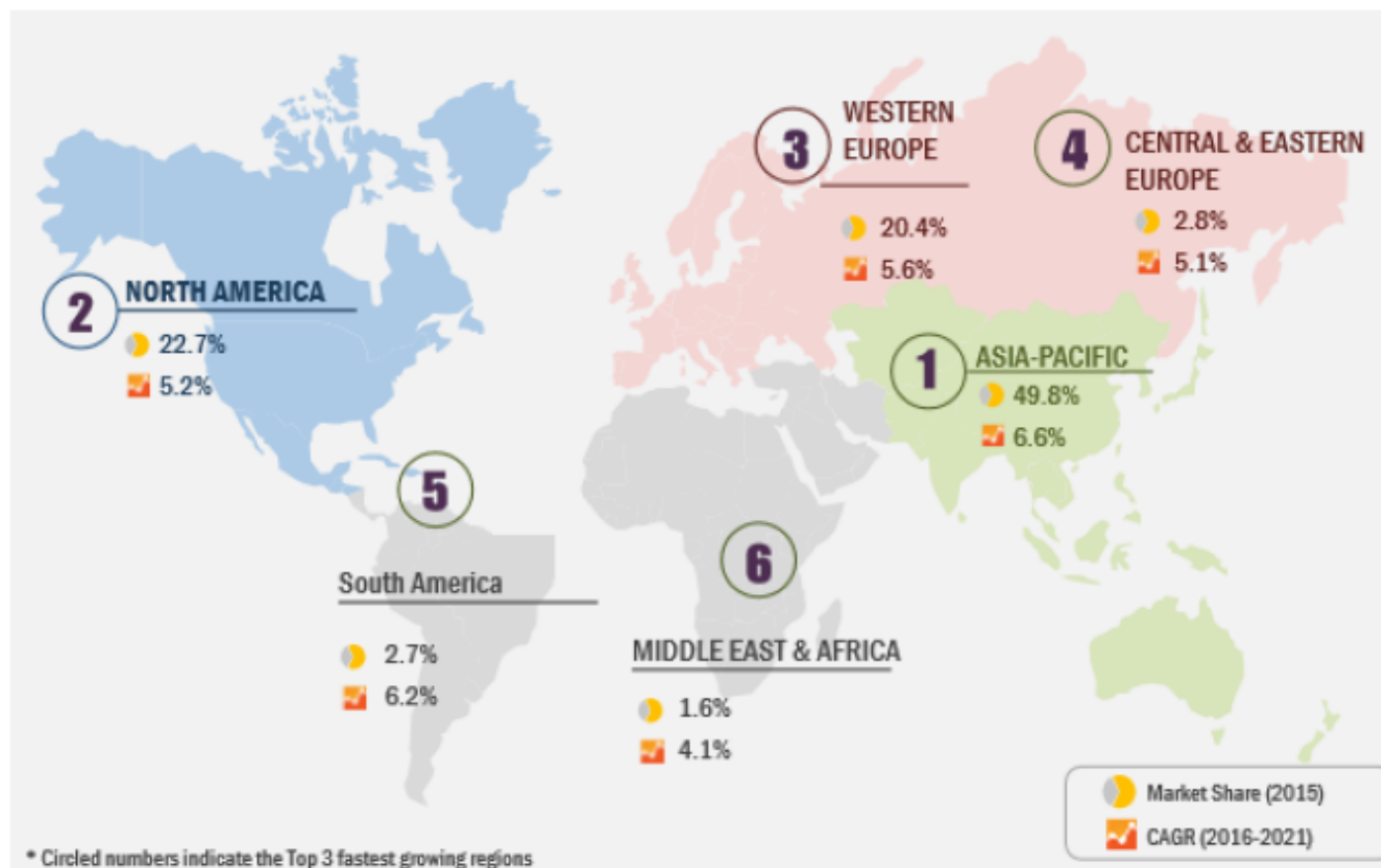


## FLAME RETARDANTS MARKET, BY TYPE, SNAPSHOT (2016 VS. 2021)

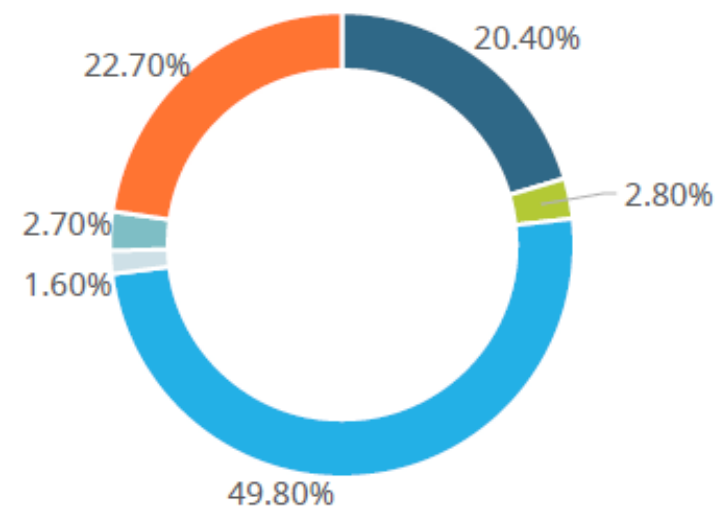


Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

## FLAME RETARDANTS MARKET SHARE (VOLUME), BY REGION, 2015



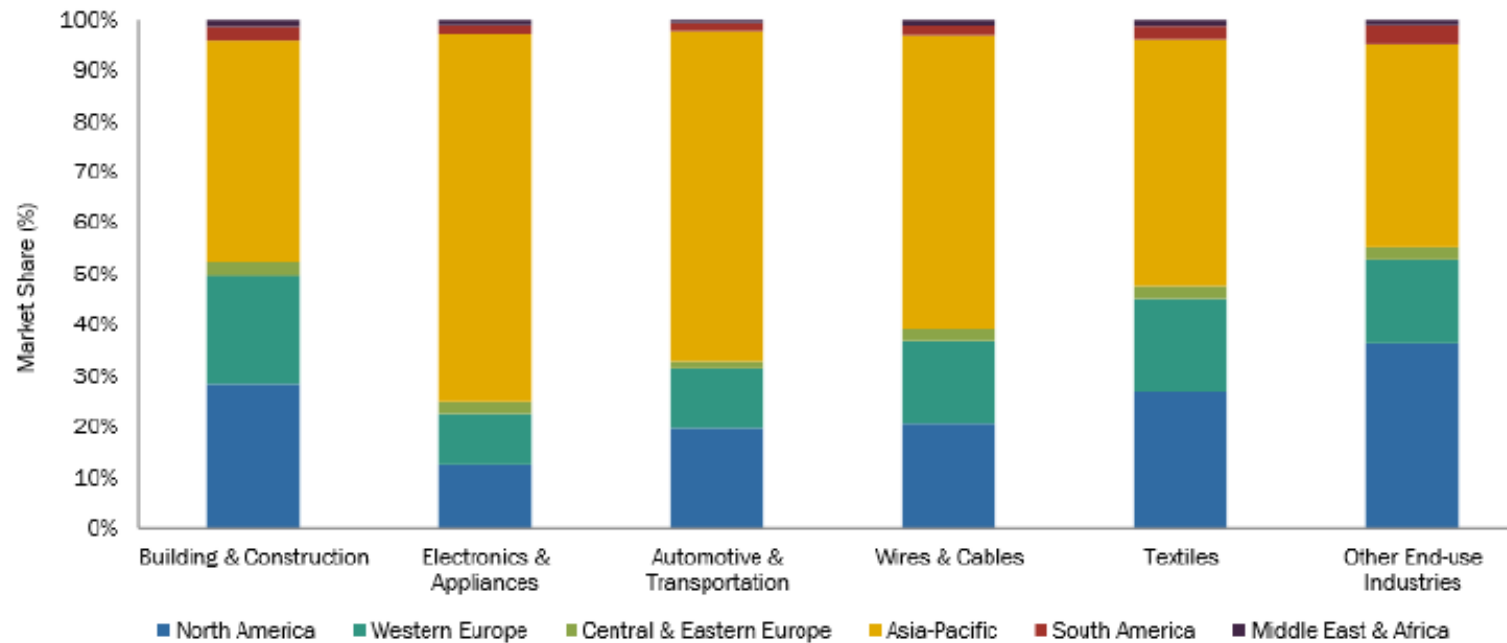
## Market share distribution



■ Western Europe ■ Central Europe ■ APAC ■ MEA ■ SA ■ NA

## FLAME RETARDANTS MARKET SHARE, BY APPLICATION

### REGION-WISE BREAK-UP OF FLAME RETARDANTS MARKET WITH RESPECT TO APPLICATIONS



# GLOBAL FR MARKET INSIGHT: MATURITY

## LIFE CYCLE ANALYSIS, BY REGION

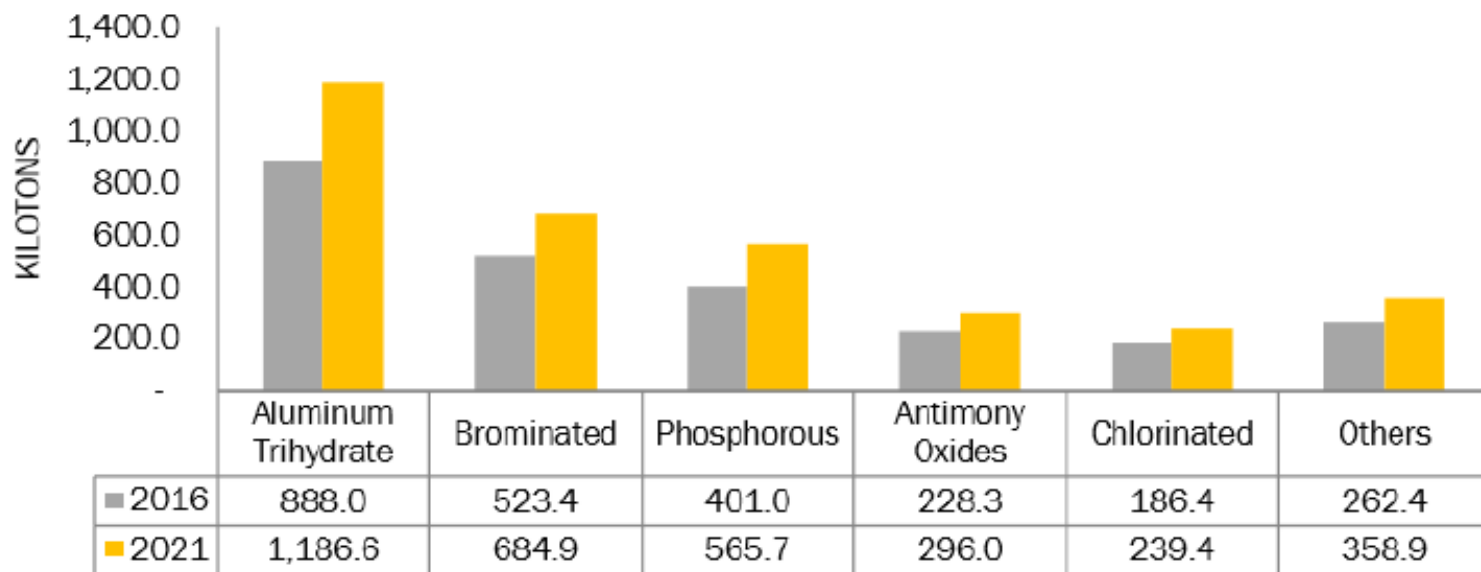
ASIA-PACIFIC IS FASTEST-GROWING MARKET DURING THE FORECAST PERIOD



Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

# GLOBAL FR MARKET DEMAND

ATH TO ACCOUNT FOR MAXIMUM MARKET SHARE DURING THE PERIOD  
2016 TO 2021



Note: The others segment includes major compounds such as zinc sulfide, zinc oxide, boron containing compounds, magnesium hydroxide, and nitrogen containing flame retardants.

Source: Secondary Research, Expert Interviews, and MarketsandMarkets Analysis

## JAPAN: FLAME RETARDANTS MARKET SIZE, BY END-USE INDUSTRY, 2014-2021 (KILOTON)

End-use industry	2014	2015	2016	2021	CAGR (2016-2021)
Building & Construction	49.0	51.4	53.8	71.4	5.8%
Electronics & Appliances	65.7	69.1	72.8	99.4	6.4%
Automotive & Transportation	54.7	57.5	60.4	81.1	6.1%
Wires & Cables	51.4	54.0	56.8	76.7	6.2%
Textiles	12.6	13.4	14.2	17.8	4.7%
Other End-use Industries	18.5	19.2	19.9	24.8	4.5%
<b>Total</b>	<b>251.9</b>	<b>264.6</b>	<b>277.8</b>	<b>371.3</b>	<b>6.0%</b>

Source: Secondary Research, Company Websites, Press Releases, Magazines, Expert Interviews, and MarketsandMarkets Analysis

## **Value chain growth**

End use industries growth (polymers industry)

Efficiency of XEV driven by weight : polymers replacing metal parts

## **Standardization**

Higher standards for fire safety of vehicles & appliances

## **Substitution**

Phasing out of FR legacy formulations

Increasing pressure from civil society for environmental-friendly FR



**pinfa**

Phosphorus, Inorganic & Nitrogen Flame Retardants Association

# E-Mobility Workshop

Fire Safety Challenges in Automotive Plastics

01 July 2019, Tokyo Westin Hotel



[jcr@cefic.be](mailto:jcr@cefic.be)