pinfa

GLOBAL TRENDS & PERSPECTIVES
PIN FLAME RETARDANTS AT A GLANCE

Jonathan Crozier, pinfa EU Secretary General

pinfa Electromobility workshop, Tokyo,
01 July 2019

pinfa

PIN FLAME RETARDANTS

- 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)

pinfa

PINFA VISION

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

pinfa

WHO IS PINFA

31

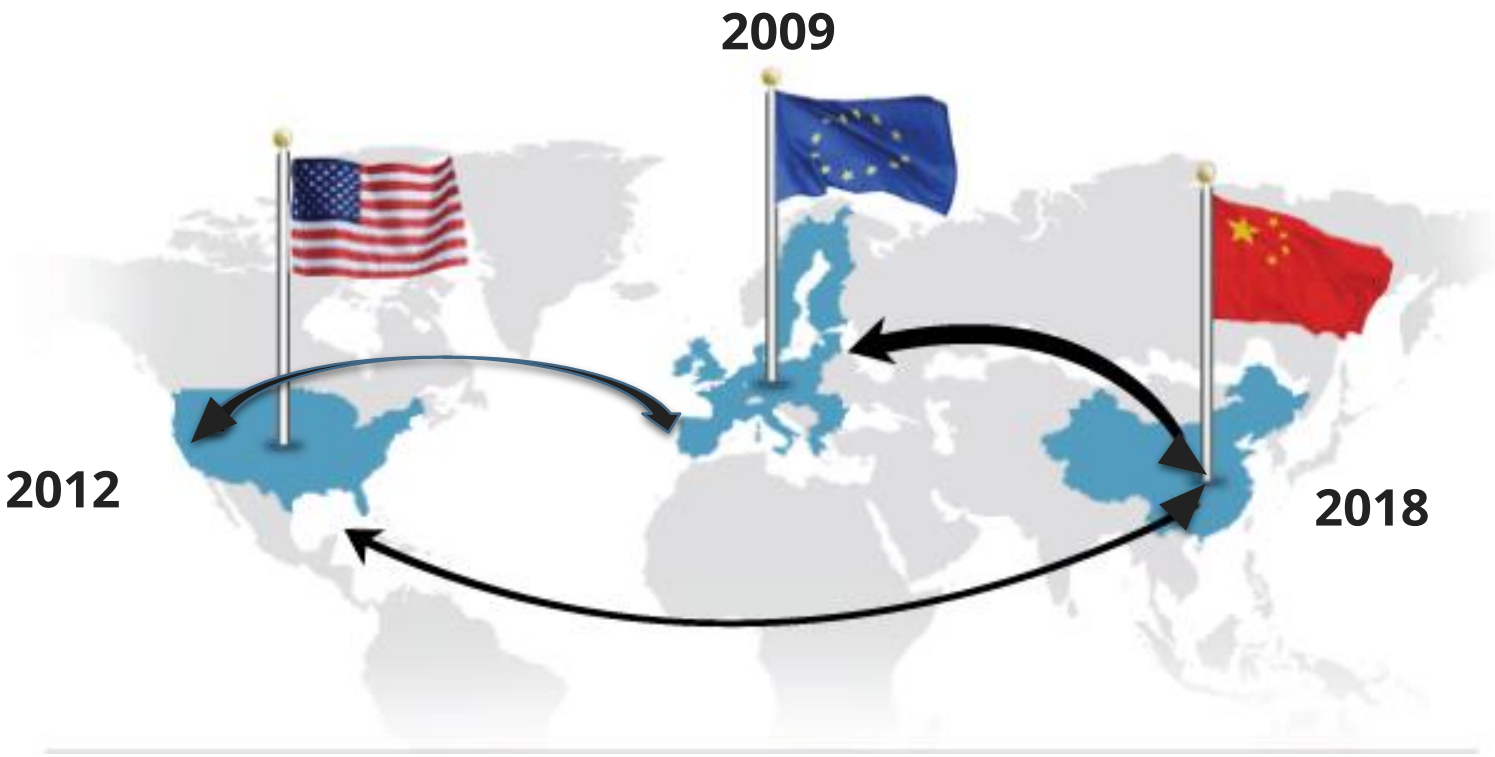
PIN flame retardant manufacturers & users

A sector group of

cefic

PINFA REMIT

32 Global companies with an international sales and distribution networrk



FIRE IN VEHICLES POSE A THREAT TO LIFE AND PROPERTY

- 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

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

THE MAIN RISK IS A BATTERY FIRE IN ELECTRIC VEHICLES

- Battery contains a high amount of chemical energy densily 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. LiPF6), also dangerous for fore fighters
- Re-ignition of an extinguished car is frequently observed.

PHOTO: ANDREAS SÆTER BØE, 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

CLARIANT

cefic

GLOBAL FR MARKET INSIGHT

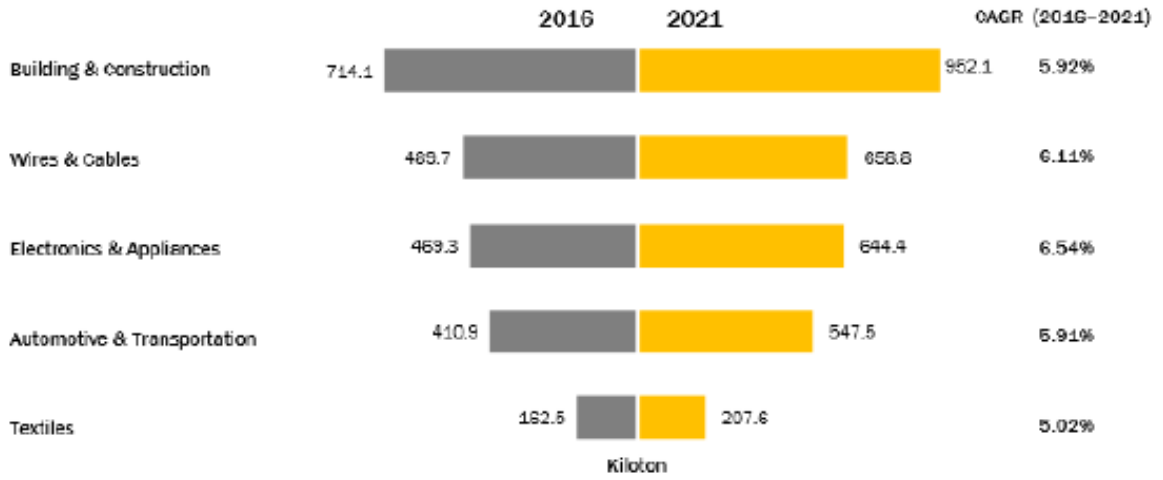
Sustained CAGR ca. 6%

2015: $8.7B | 2,36 Mt

2016: $9,38 | 2,49 Mt

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

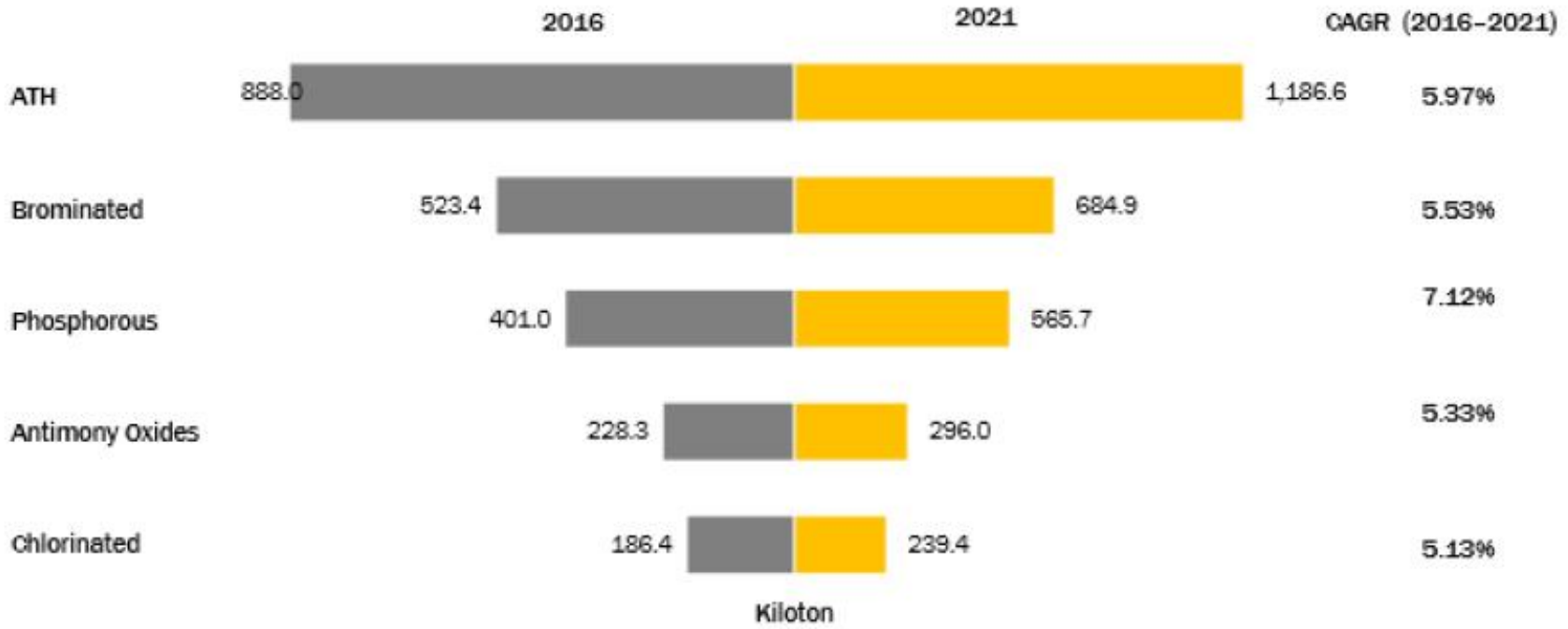
FLAME RETARDANTS: END-USE INDUSTRY SNAPSHOT (2016 VS. 2021)



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

GLOBAL FR MARKET INSIGHT

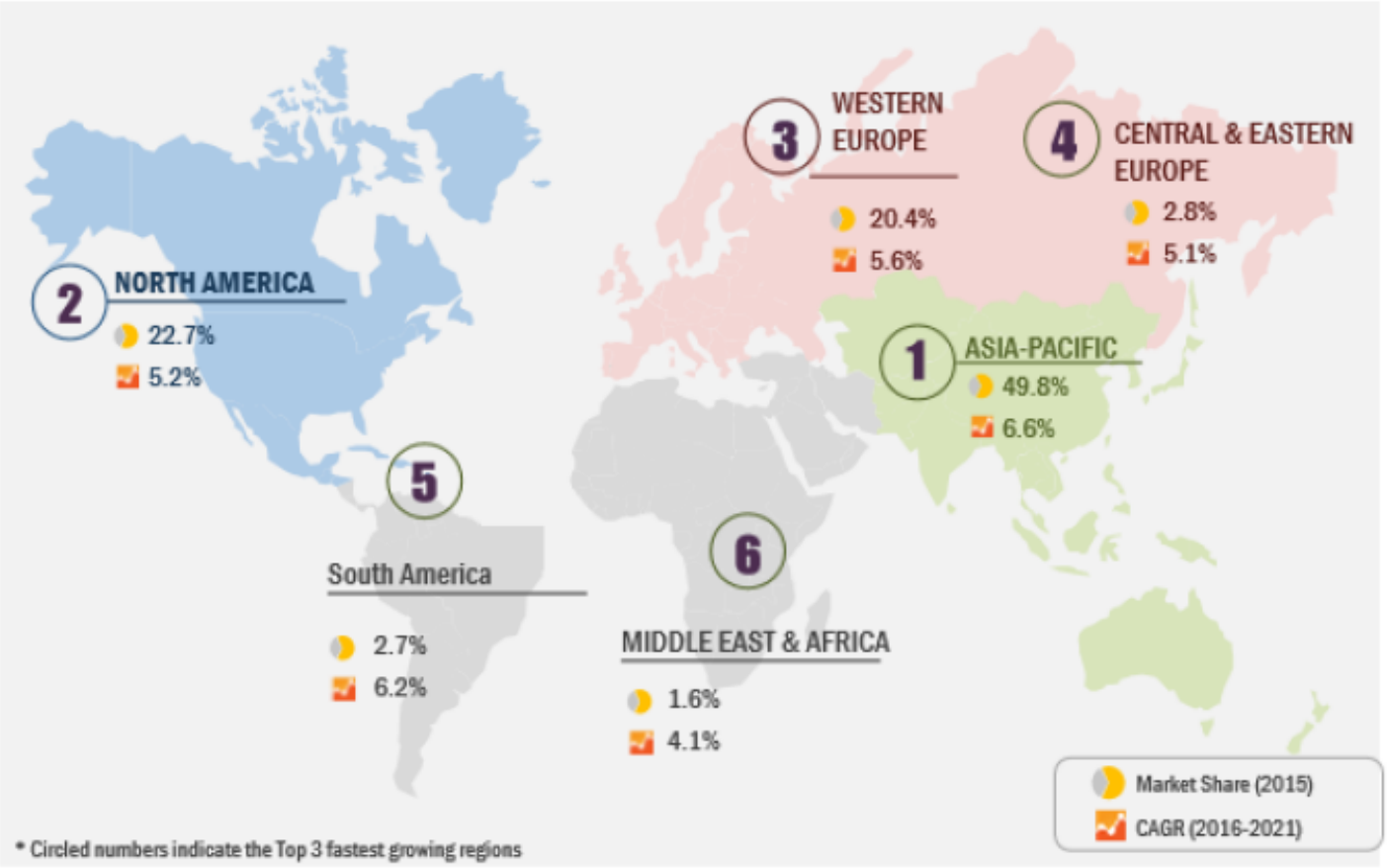
FLAME RETARDANTS MARKET, BY TYPE, SNAPSHOT (2016 VS. 2021)

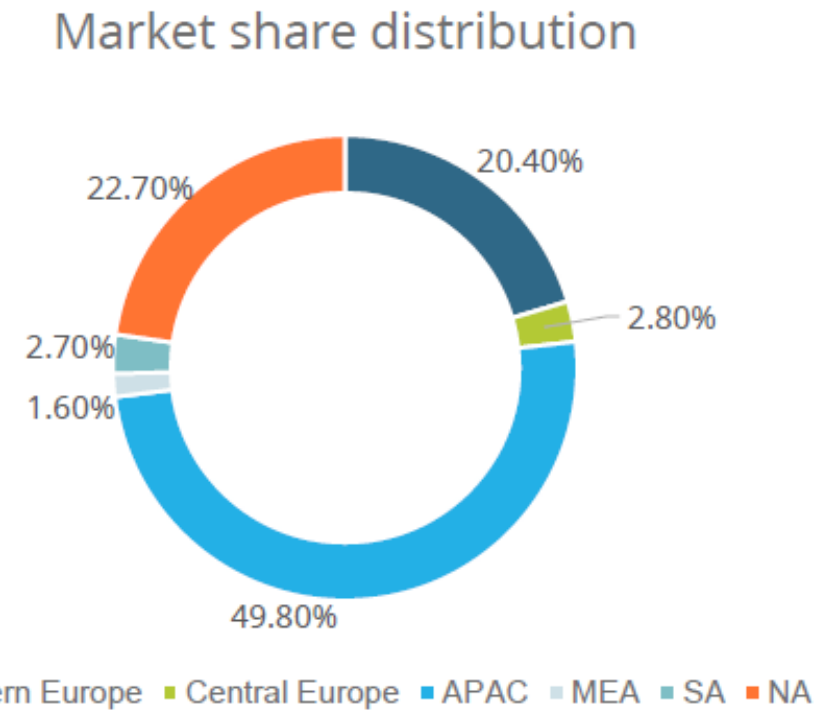


Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

GLOBAL FR MARKET INSIGHT

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



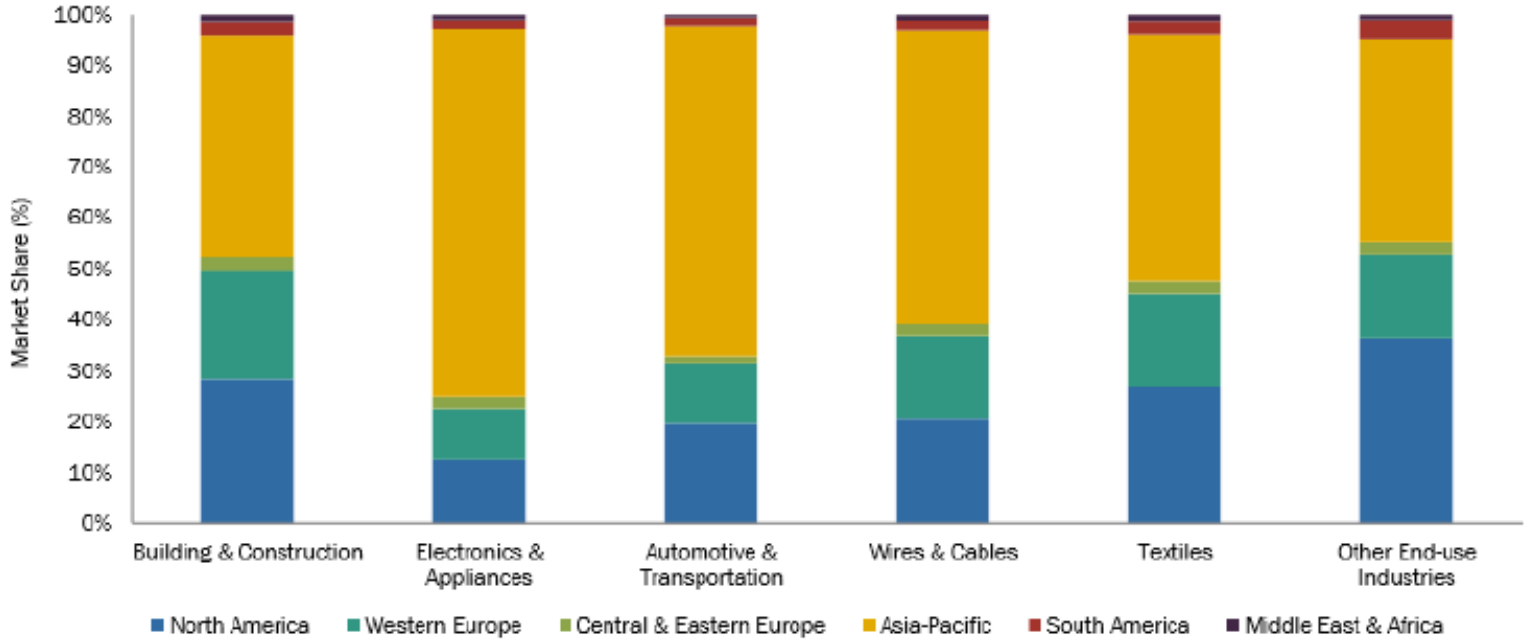


Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

GLOBAL FR MARKET INSIGHT: APPLICATION

FLAME RETARDANTS MARKET SHARE, BY APPLICATION

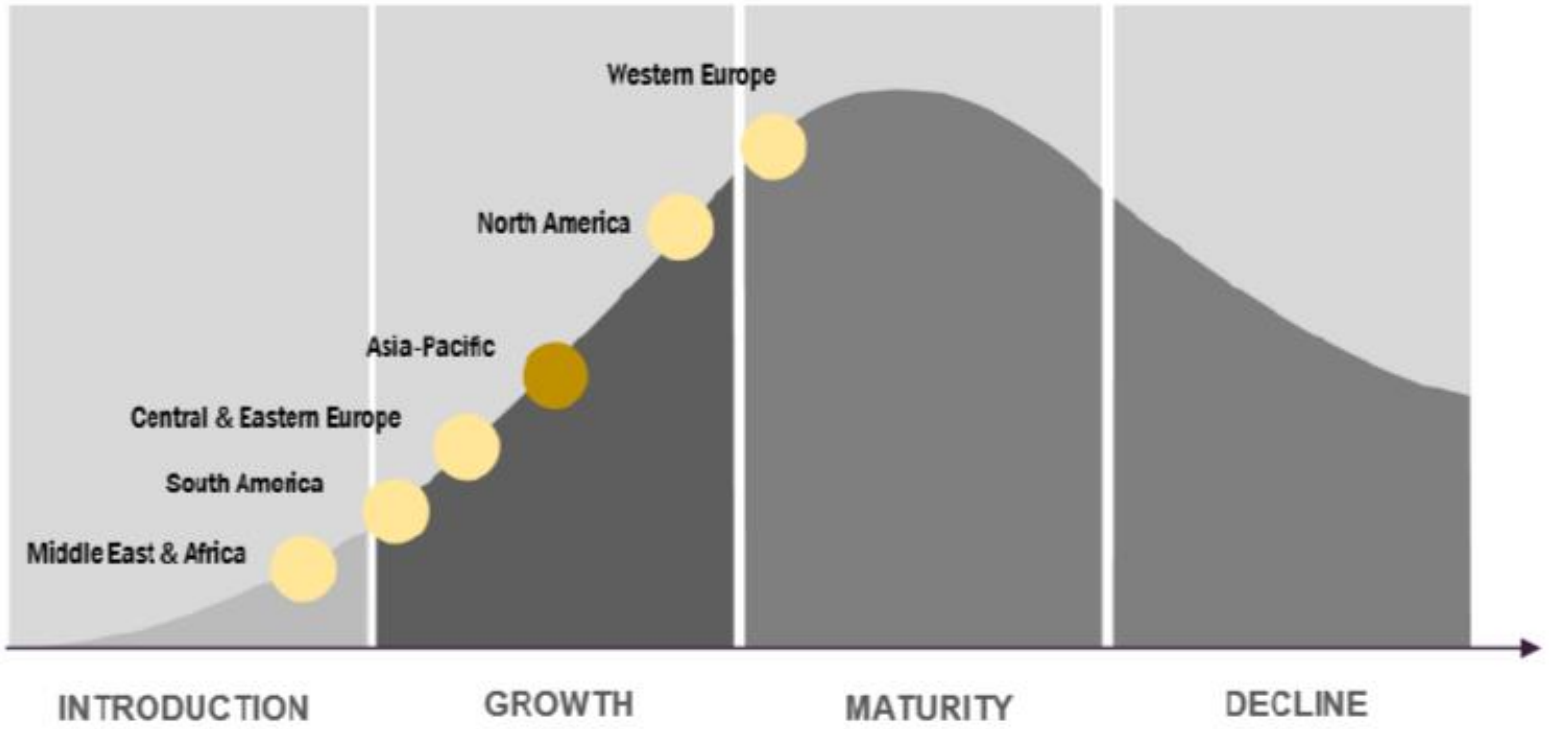
REGION-WISE BREAK-UP OF FLAME RETARDANTS MARKET WITH RESPECT TO APPLICATIONS



GLOBAL FR MARKET INSIGHT: MATURITY

LIFE CYCLE ANALYSIS, BY REGION

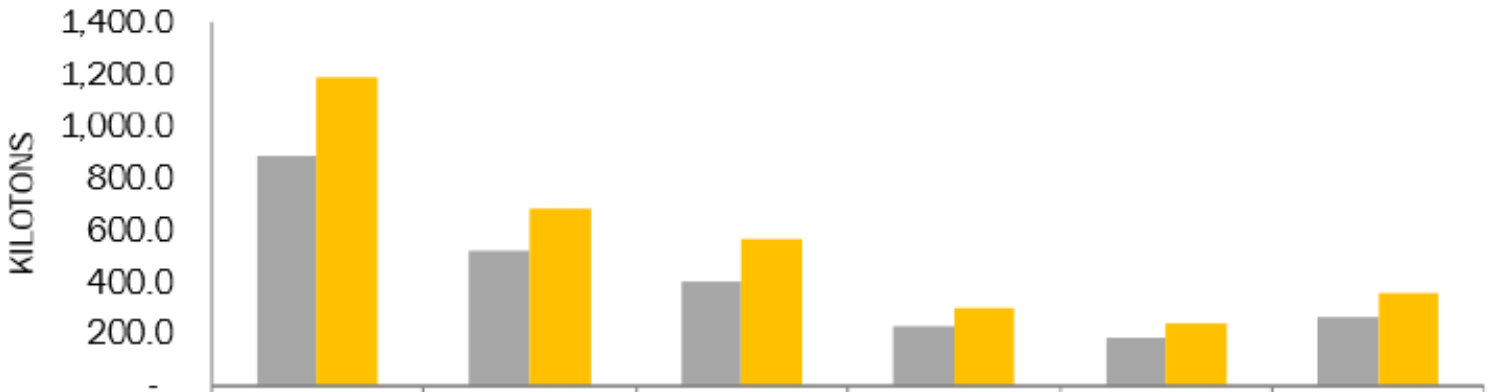
ASIA-PACIFIC IS FASTEST-GROWING MARKET DURING THE FORECAST PERIOD



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



	Aluminum Trihydrate	Brominated	Phosphorous	Antimony Oxides	Chlorinated	Others
2016	888.0	523.4	401.0	228.3	186.4	262.4
2021	1,186.6	684.9	565.7	296.0	239.4	358.9

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

pinfa

THE JAPANESE FR MARKET

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%
Total	**251.9**	**264.6**	**277.8**	**371.3**	**6.0%**

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

GROWTH FACTORS OF PIN FR

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