Global fire safety trends, flame retardants and chemicals' perception: a vital reconciliation

AMI Fire Resistance in Plastics
Cologne, December 2019

Marc Leifer
Global Technical Marketing Support

ICL Industrial Products

Topics

- **ICL overview**
- Fire
- Science and Life
- Chemicals and Chemophobia
- Fire safety and flame retardants
- What should we do

ICL is a leading global Fertilizers and specialty minerals company

$5.56bn sales in 2018

Manufacturing sites spread around the world

~13,000 Employees

5 R&D centers with 500 researchers

- 855 granted patents and 203 pending patent applications

Leading Positions in Our Markets

Market Leadership

Number 1 Market Positions

- #1 in Bromine capacity
- #1 in Bromine Iso-tank fleet
- #1 in Brominated biocides
- #1 in Phosphorus FRs
- #1 in Clear Brine Fluids
- #1 Self-extinguishing Hydraulic fluids

Leading Market Positions

- Flame Retardants
- Specialty Magnesia
- Magnesium Chloride

R&D Leadership

- R&D in Israel, USA
- Developing next-generation polymeric, reactive products
- New FR Product Pipeline: SaFRon®, TexFRon®, VeriQuel®, PolyQuel®
- ZnBr Energy Storage complexing agent for Energy storage Batteries
- Additional attractive bromine applications under R&D

Environmental Leadership

- Responsible Care
- VECAP® (Voluntary Emissions Control Action Program)
- Greenhouse gas reduction
- SAFR® – Scientific Assessment for Flame Retardants

Topics

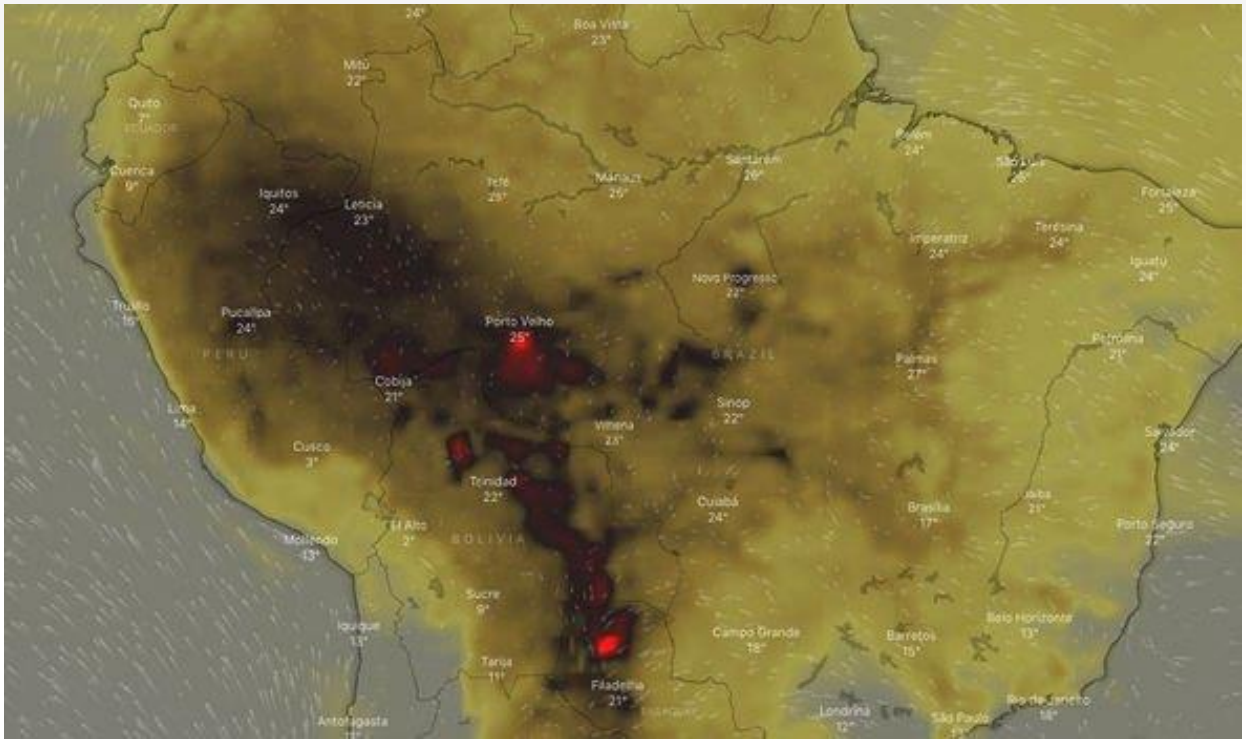
- ICL overview
- **Fire**
- Science and Life
- Chemicals and Chemophobia
- Fire safety and flame retardants
- What should we do

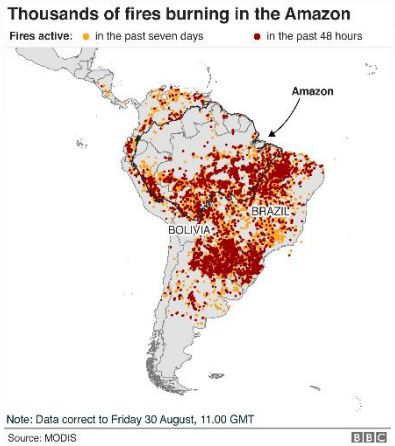
Fire

Natural occurring phenomenon….

Fire

……but not always….





Fire

….and men-made*

*Errare humanum est

Fire

A brief history of huge fires*

Robert, Hubert - Incendie à Rome

- 64 - Great fire of Rome
- 406 - A great fire burns down much of Constantinople
- 1041 – Fire destroys most of the old city of Bremen, Germany, including the cathedral
- 1135 – Great Medieval London Fire
- 1137 – A Great Fire in Hangzhou, China, destroyed 10,000 houses
- 1253 – Great Fire of Utrecht, the Netherlands, destroyed much of the city
- 1452 – Second Great Fire of Amsterdam, the Netherlands, destroys three-quarters of the city
- 1666 – Great Fire of London of 1666, destroyed much of the capital
- 1702 – Bergen, at the time the largest city in Norway, seven-eighths destroyed during a storm
- 1788 – First Great New Orleans Fire of 1788, 856 out of 1,100 structures burned
- 1845 – Great Fire of Pittsburgh destroyed over 1,000 buildings
- 1878 – The Great Fire of Hong Kong [destroyed 350 to 400 buildings across more than 40,000 m^2 of central HK
- 1906 – San Francisco earthquake and fire

***Non-exhaustive list, fires during wartime not included**

Fire

Present of huge fires

Great fire of London, unknown, 1666

Huge, devastating city-wide fires do not occur anymore nowadays, despite

- Electricity and electronic devices
- Mass-use of flammable materials
- Higher population density
- Efficient fire propagation means

Why ?

Topics

- ICL overview
- Fire
- **Science and Life**
- Chemicals and Chemophobia
- Fire safety and flame retardants
- What should we do

Science and life

	XX century	XXI century
- **Medicine**	Mass vaccinations	Prevention by life mode
- **Chemistry**	Synthesis	Safety and sustainability
- **Food**	Mass production	Safety, health and sustainability
- **Engineering**	Infrastructures	Safety and hygiene

Life expectancy at birth, in years

- Bronze age: 26
- Classical Greece: 26
- Classical Rome: 20-30
- Late medieval: 30 (Europe)
- 1800: 33-40 (Europe)
- 1900: 31 (World average)
- 1950: 48 (World average)
- 2017: 72 (World average)

ICL Industrial Products

Science and life

- Science has overall positive impact on mankind*
- Science contributes to health, lifespan
- Science contributes to progress, growth, welfare*

So what seems to be the problem ?

**** Not a philosophical debate***

Topics

- ICL overview
- Fire
- Science and Life
- **Chemicals and Chemophobia**
- Fire safety and flame retardants
- What should we do

Chemicals and Chemophobia

“Chemical” definition:

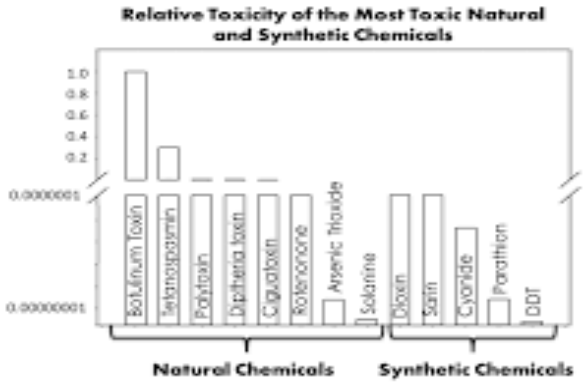
Any basic substance that is used in or produced by a reaction involving changes to atoms or molecules ***(Cambridge dictionary)***

Natural chemicals versus synthetic chemicals*

Natural chemicals are produced by nature without any human intervention. Synthetic chemicals are made by humans using methods different than those nature uses, and these chemical structures may or may not be found in nature. This definition means a synthetic chemical can be made from a natural product (i.e. naturally derived)

Misconception: Synthetic chemicals are more toxic than natural chemicals*

The two most toxic chemicals for humans, that we know of, are botulinum toxin and tetanospasmin. Botulism is caused by botulinum toxin, which is a protein and neurotoxin produced by bacteria spores. Tetanospasmin is a neurotoxin produced by bacteria that causes Tetanus.



*Dorea Reeser, April 10, 2013 in: www.blogs.scientificamerican.com

Chemicals and Chemophobia

Natural versus synthetic chemicals: the philosophical perspective

Natural Chemical

Hemlock, or ***Conium maculatum,*** an alkaloid toxin

Chemicals and Chemophobia

"Chemophobia" d

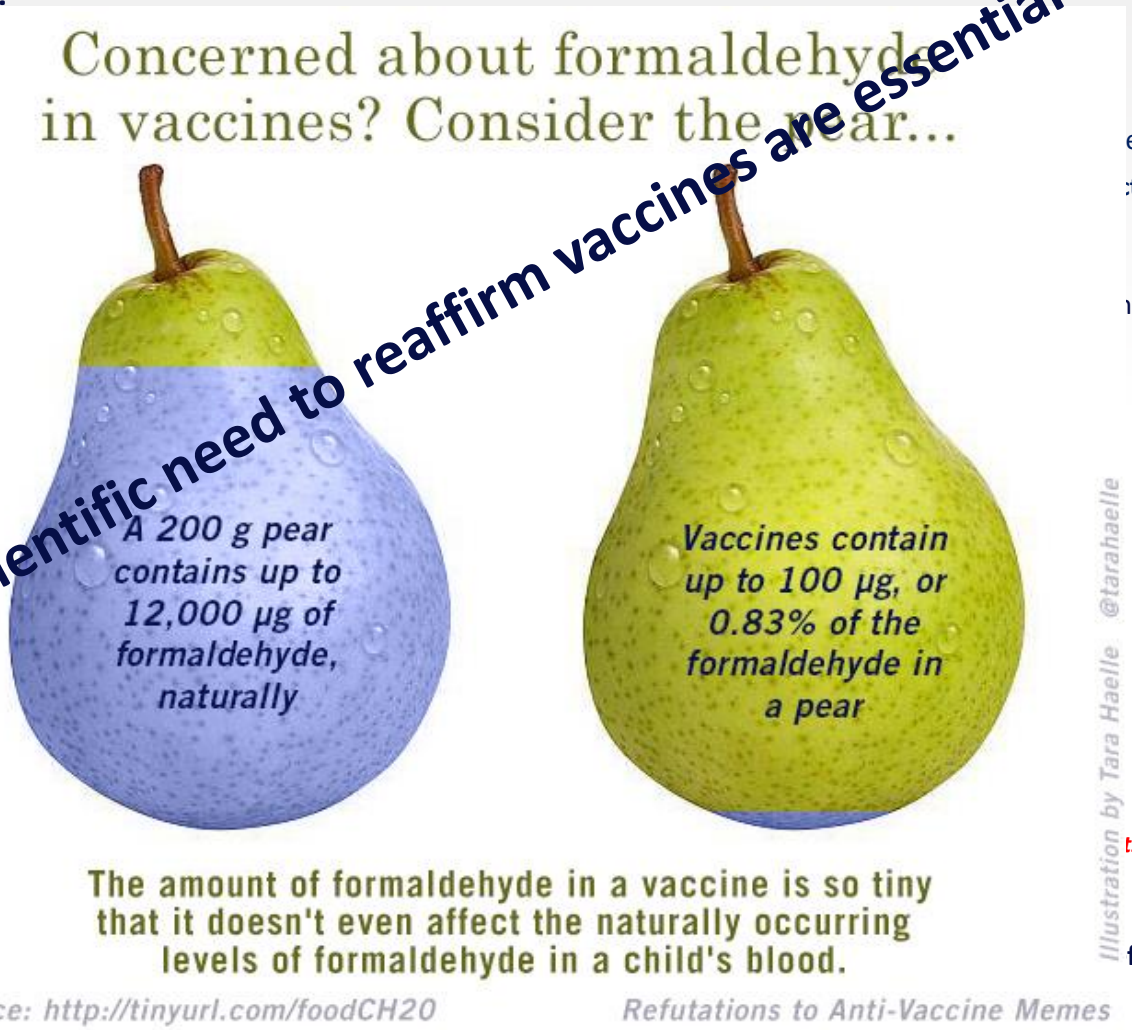
Abnormal or excessi

Chemophobia, the unre exposure to various environmental t. 1997

Louis Pasteur, the Fr ntion of diseases and the development o

This 1802 e ts.

Similarly, we for.



Is there any scientific need to reaffirm vaccines are essential today ?

Chemicals and Chemophobia

1. **What is behind (or in front of) chemophobia:**

- Ignorance (“Science is just another opinion)
- Fear (emotional amplification of the previous one)
- Illusion of being in-control (“I can take care for myself”)
- Superficiality of debates over social media

2. **What is in front (or behind) of political chemophobia**:

- Notoriety chasing
- Frustration
- $$$$$$$$$$$$$$

Chemicals free

Aggregating 1 and 2 is powerful

Chemicals and Chemophobia

According to British sociologist Zygmunt Bauman, liquid modernity is a state of our shapeless society. It has created diffuse, confuse, floating and unassignable fears, generated by:

- **Uncertainty: "did I made the right choices and for how long are these valid"**
- **Public insecurity: "for how long will my social status last"**
- **Personal insecurity: "what are the hazards, known and unknown, I am exposed to"**

Personal security becomes over-evaluated and generated anxiety seek desperately for targets

The free / less/ without syndrome

Topics

- ICL overview
- Fire
- Science and Life
- Chemicals and Chemophobia
- **Fire safety and flame retardants**
- What should we do

Fire Safety

Fire safety components:

	Preventing (ignition)	Detecting (small fire)	Fighting (developed fire)
Active	Safe-by design structures	Smoke detectors	Sprinklers, flame retardants*, firefighters
Passive	Flame retardants*	Heat, smoke generation	Fire barriers

May be too late

**Different mechanisms*

Fire Safety

Fire safety standards, regulations and trends

➢ **Rationalization**

Incorporation of national standards into consolidated regulations in the EU

- EN-45545
- CPR
- Euroclass classification

➢ **Risk acknowledging**

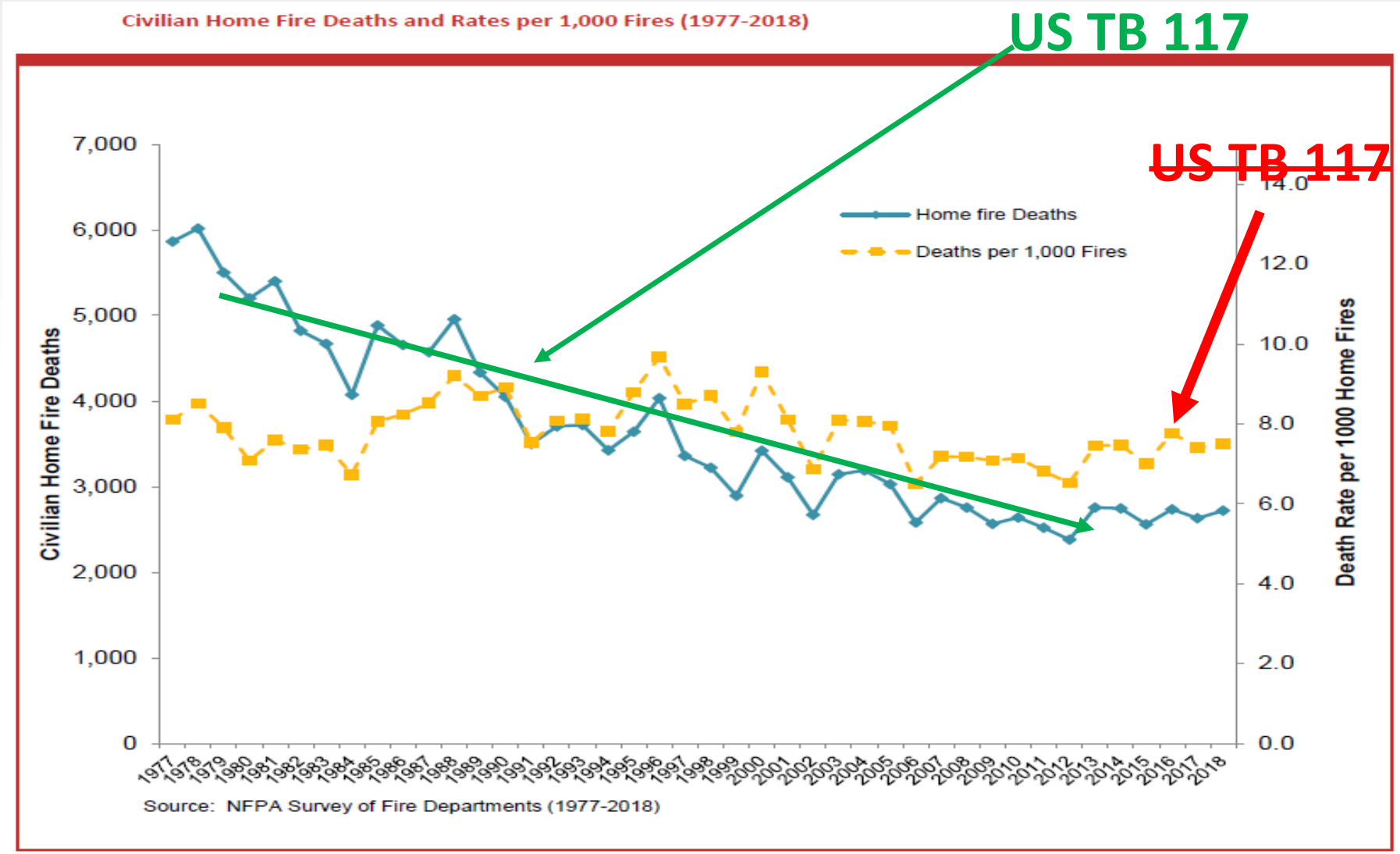
- Smoke opacity and smoke toxicity

➢ **Innovative technologies**

- NEVs applications: harsh service life environment, high CTI, UL-94 5V, high GWIT
- 5G technology: Improved dielectrics, increasing Tg, keeping fire safety UL-94-V0

More stringent requirements

Fire Safety: flame retardants save lives



Fire Safety: flame retardants save lives

BUT

No scientific reciprocity:

While it has been statistically proven flame retardants save lives, there is no epidemiologic research as per flame retardants impact on human health

Fewer retardant are available nowadays

as a result of systematic phasing out

Topics

- ICL overview
- Fire
- Science and Life
- Chemicals and Chemophobia
- Fire safety and flame retardants
- **What should we do**

What should we do

Where do we stand today ?

Contra *snoitcid*

- **Fear and mistrust about chemicals**
  - ***Public expectations for better safety***
- **Significant decrease in mass scale fires due to regulation**
  - ***But trends of concern regarding regulation amendments***
- **Additional safety requirements due to new technologies**
  - ***Fewer available flame retardants***

What should we do

- Fear and mistrust about chemicals
  - *Public expectations for better safety*
- *Address public perception about chemicals*
- Significant decrease in mass scale fires due to regulation
  - *But trends of concern regarding regulation amendments*
- *Address regulators' perception about flame retardants*
- Additional safety requirements due to new technologies
  - *Fewer available flame retardants*
- *Address value chain perception about flame retardants*

What should we do

Address emotions and tell our narrative

Why do we do what we do ?

How do we take care of your vital concerns ?

What do we do in that respect ?

What should we do

Educate:

Modern and commercial flame retardants are

- **Sustainable**
- **Safe for use**
- **Efficient**
- **Part of modern life overall risk prevention**
- **Comply with life saving fire safety standards**
- **The only plastic additives group used to comply with safety regulations**
- **Enablers in keeping overall polymers' properties**

What should we do

- Tailor our communication to a specific audience and for a specific purpose
- Help audiences understand and remember through storytelling and analogies

PREVENTION

What should we do

No Ignition, no fire

https://www.youtube.com/watch?v=pPakvDIaa_E

Acknowledgements

- European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC)
  - Olivier de Matos
- ICL-IP
  - Yaniv Kabalek
  - Andy Baker
  - Sergei Levchik

Disclaimer

- Copy or use of this presentation or any part thereof is forbidden, without the prior written consent of ICL. ICL retains all intellectual property interests associated with this presentation, including but not limited to trade names and marks.
- ICL makes no claim, promise or guarantee of any kind regarding the accuracy, adequacy or completeness of the content of the information presented and expressly disclaims all liability for any errors or omissions in such content. ICL does not warrant that the information contained herein is true, up-to-date, or non-misleading.
- ICL makes no warranties hereunder whether express or implied, including, but not limited to, warranties of merchantability and fitness for a particular purpose. ICL shall not be held liable for any damages, whether compensatory, direct, indirect, incidental, special, or consequential, arising out of, in connection with or based on the content of this presentation and accepts no liability for the consequences of any actions taken on the basis of the information provided.
- The information herein is not intended to constitute advice or a recommendation, whether scientific, regarding hazardous materials, chemical exposure or otherwise, and should not be relied upon in lieu of consultation with appropriate scientific advisors.
- ICL is a publicly traded company. The information herein may reflect the ICL's current views with respect to future events or financial performance, which may change. You may not rely on this presentation as providing an analysis of the ICL's financial position or trading prospects. This presentation does not constitute an offer or invitation to purchase any securities, and no part of it shall form the basis of any investment decision in relation thereto.

ICL Where needs take us

SAFR SYSTEMATIC ASSESSMENT FOR FLAME RETARDANTS

ICL Industrial Products

THANK YOU

Visit us at www.icl-group.com