

ICL-IP: Leading supplier of Flame Retardant solutions for the foam industry.

October 2019, ANPE 4th National Conference Rigid PU foam. Rome – Italy.

ICL Target

Ensure fire safety in building and construction for saving lives while innovating towards most sustainable flame retardants.



Our Value Proposition

- ✓ Long-term commitment to the FR market
- ✓ Reliable supply
- ✓ Innovation, R&D, in-depth understanding of applications and processes, analytical and applicative support
- ✓ Regulatory support
- ✓ Information and knowledge sharing
- ✓ High and stable quality performance

ICL Group

HISTORY

Establishing & growing operations in Israel 1920s - 1970s

Establishment of potash & bromine production at the Dead Sea

Establishment of Dead Sea Bromine and Negev Phosphates



Consolidating & expanding globally 1970s - 2014

Global M&A

Amfert -
Netherlands

BK Guilini -
Germany
Astaris -
US

Iberpotash -
Spain
Cleveland
Potash - UK

YPH JV -
China

Phosphates

Potash

Phosphates

Establishment of Rotem Amfert Negev & Bromine Compounds

Global expansion of bromine, phosphorous, magnesia and salts activities

The State of Israel issues 25% of ICL in the Tel Aviv Stock Exchange and sells 52% to Israel Corp

Listing of shares on the NYSE



Focusing on innovation and solidifying leadership 2000s -

Focus on value-added solutions

Growth of specialty fertilizers

Transformation of YPH JV into production of specialty phosphates

ICL UK transition to exclusive production of polysulphate

Creation of the Fertilizersplus platform

Enhancement of global leadership and creation of innovative solutions

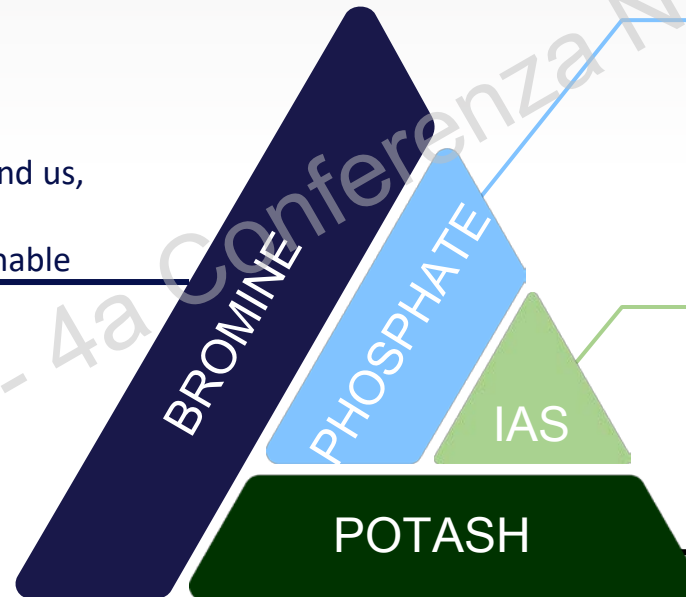


ICL Group

4 DIVISIONS

Industrial Products Division

ICL's bromine solutions are all around us, making consumer goods safer and production more efficient & sustainable



Phosphate Solutions Division

ICL provides essential ingredients for various industrial and food applications

IAS - Innovative Ag Solutions

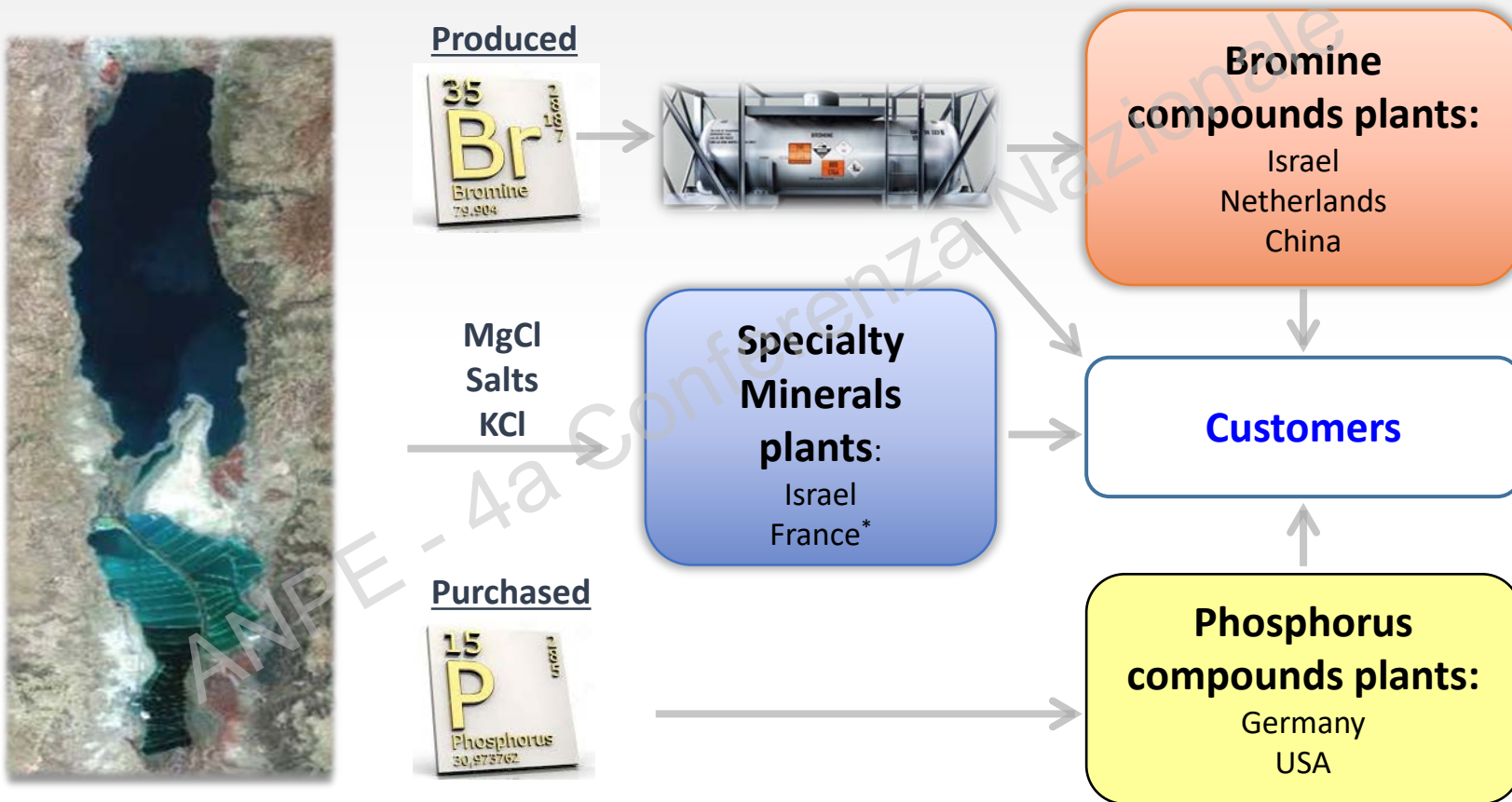
ICL specialty fertilizers provide growers with optimal plant nutrition solutions

Potash Division

ICL potash helps farmers increase yields and feed the world

ICL Industrial Products

SNAPSHOT



* RM sourced from 3rd parties

ICL Industrial Products

MAJOR END MARKETS & GLOBAL TRENDS



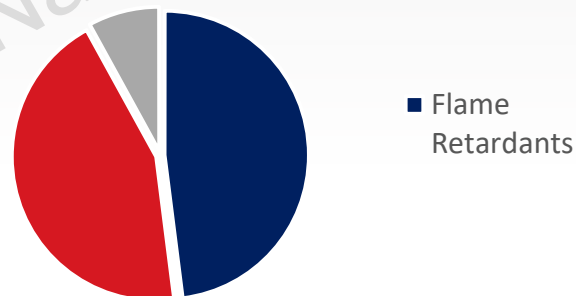
ICL Industrial Products

MARKET LEADERSHIP



in Flame Retardants
in Bromine capacity
in Bromine compounds plant
in Bromine Iso-tank fleet
in Brominated biocides
in Phosphorus FRs
in Clear Brine Fluids
in Self-extinguishing Hydraulic fluids
in Solid MgCl
in Magnesia for Nutraceutical market

Sales by Business Line



Flame Retardants

SUSTAINABILITY

- Corporate Responsibility Report (CSR) <http://www.icl-group.com/sustainability/ResponsibilityReports/Pages/default.aspx>
- VECAP (Voluntary Emissions Control Action Program) <http://www.vecap.info/>
- Other green initiatives <http://www.icl-group.com/sustainability/GreenInitiatives/Pages/default.aspx>

- Recycling projects

PS-Loop (recycling of post-construction EPS); Black Demon (recycling of flat panel displays); CloseWEEE; Plast2BCleaned; RecoPhos; ...



- Ecovadis ICL ranked among 7% top global suppliers for sustainability



www.SAFRworks.com



ICL IP R&D Centers

Beer Sheva, Israel

- Main R&D for **Bromine** FR
- Main R&D for **Inorganic** FR (Magnesium Hydroxide)
- Application and technical support for
 - ✓ Thermoplastics
 - ✓ Textiles
- Formulation
- Analytical

Tarrytown, USA

- Main R&D for **Phosphorus** FR
- Application and technical support for
 - ✓ PU Foams
 - ✓ Thermoplastics
 - ✓ Textiles
 - ✓ Thermosets/PWB
 - ✓ Functional Fluids
- Analytical

Haifa, Israel

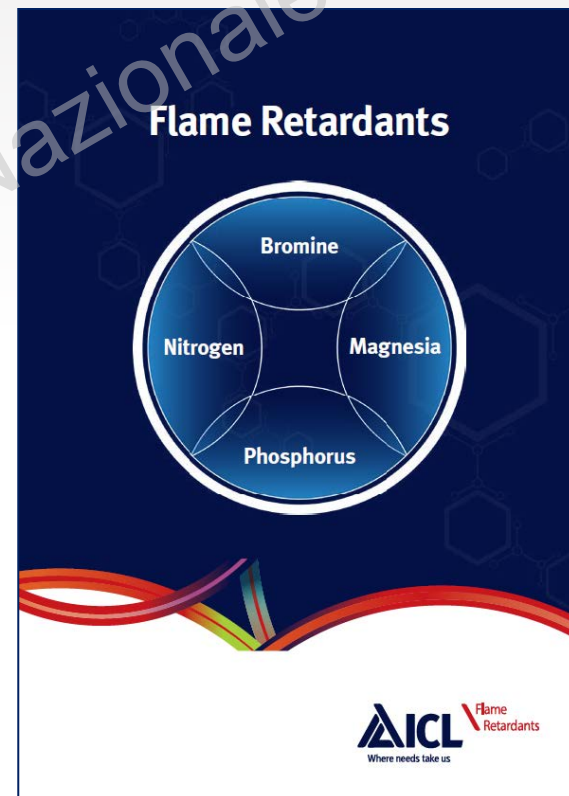
- Chemical & Process Engineering Services
- Chemical Development
- Application and technical support for Flame Retardancy.
- Analytical



Flame Retardants

PRODUCT PORTFOLIO

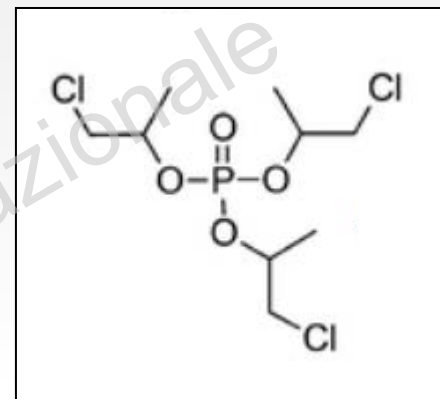
- Fyrol™: PFRs, mainly for PU foam (rigid and flexible)
- Fyrolflex™: RDP and SolDP (PC/ABS and PPO/HIPS)
- Phosflex™: Plasticizers (mainly PVC, but also in coatings)
- Brominated FRs (FR-xxxx)
 - Low molecular weight
 - Polymeric
 - Brominated Epoxies (various MWs)
 - F-2000 series
 - F-3000 series (end-capped)
- Magnesium Hydroxide (FR-20)
 - Various Particle Sizes/Surface Areas: S5, S7, S10
 - Various surface treatments: stearic acid; vinyl silane, aminosilane, polymeric
- Innovative FRs
 - PolyQuel™ for PCBs
 - VeriQuel™ for PU foams



Commonly used FRs in PU foams

TCPP

- Flame retardants are added in PU foams to meet appropriate fire safety standards.
- Most widely FR used PU foams are TCPP – Tris(1-chloroisopropyl)phosphate.
- Growing concerns about chemical exposure and its migration into the environment.
- Challenges for TCPP:
 - Ubiquity claim; found in breast milk, fish, household dust, indoor and surface water.
 - Placed in CoRAP list by Denmark based on a read across TDCP; concerns addresses: Reprotoxicity, Endocrine Disruption, Carcinogenicity.
- ICL still believes TCPP to be safe and plans to continue produce it.
- Nevertheless, there is a push towards more sustainable new products with improved HSE profile and minimal potential for migration out of the matrix.



VeriQuel™ R100

Stronger, safer and more efficient than TCPP

- Halogen Free
- Reactive → no emissions or migrations
- Similar processability to TCPP → minor changes in formulations
- Same fire spread performance
- Less smoke production
- Same thermal performance
- Improved mechanical performances of the foam



VeriQuel™ R100

Negative publicity and potential deselection of PU foams products can be avoided by choosing the sustainable alternative FR's now

INTRODUCING
THE NEXT
GENERATION
OF SUSTAINABLE
FLAME RETARDANTS



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