SUMMARY SLIDE DECK

MINERAL RECYCLING FORUM 2018

Radisson Blu Hotel, Cologne, 15-16 March 2018

Horn & Co. Group

euragglo shaping the industry

Iron & Steel Today

Refractories Window www.refwin.com Global Refractories E-Business Platform

refractories WORLDFORUM

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Salt Partners Turning salt into gold

IMFORMED Industrial Mineral Forums & Research Ltd

IMFORMED *welcomes you to Cologne and to Mineral Recycling Forum 2018*

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Why “Mineral Recycling”?

What are “Secondary Raw Materials”?

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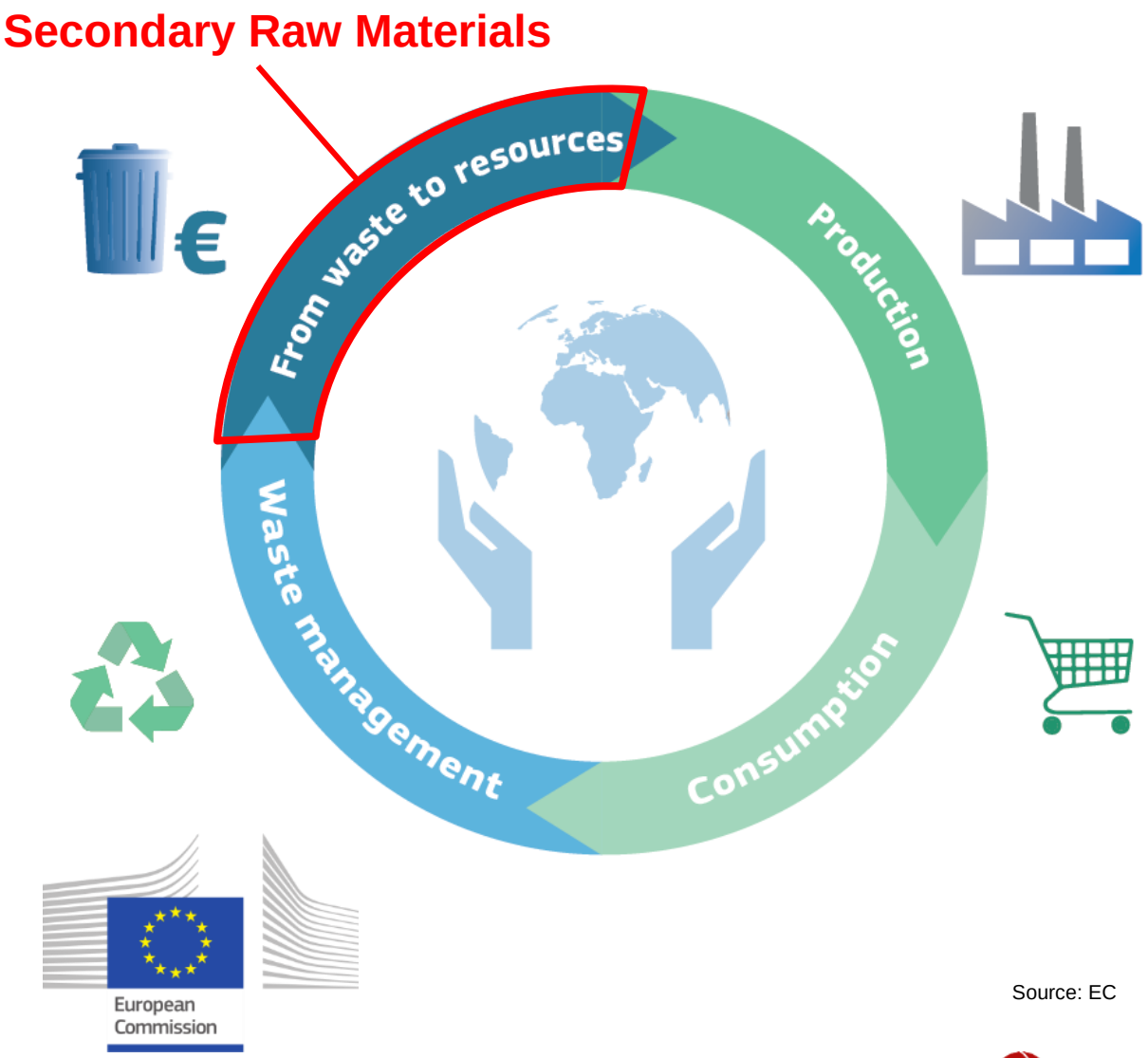
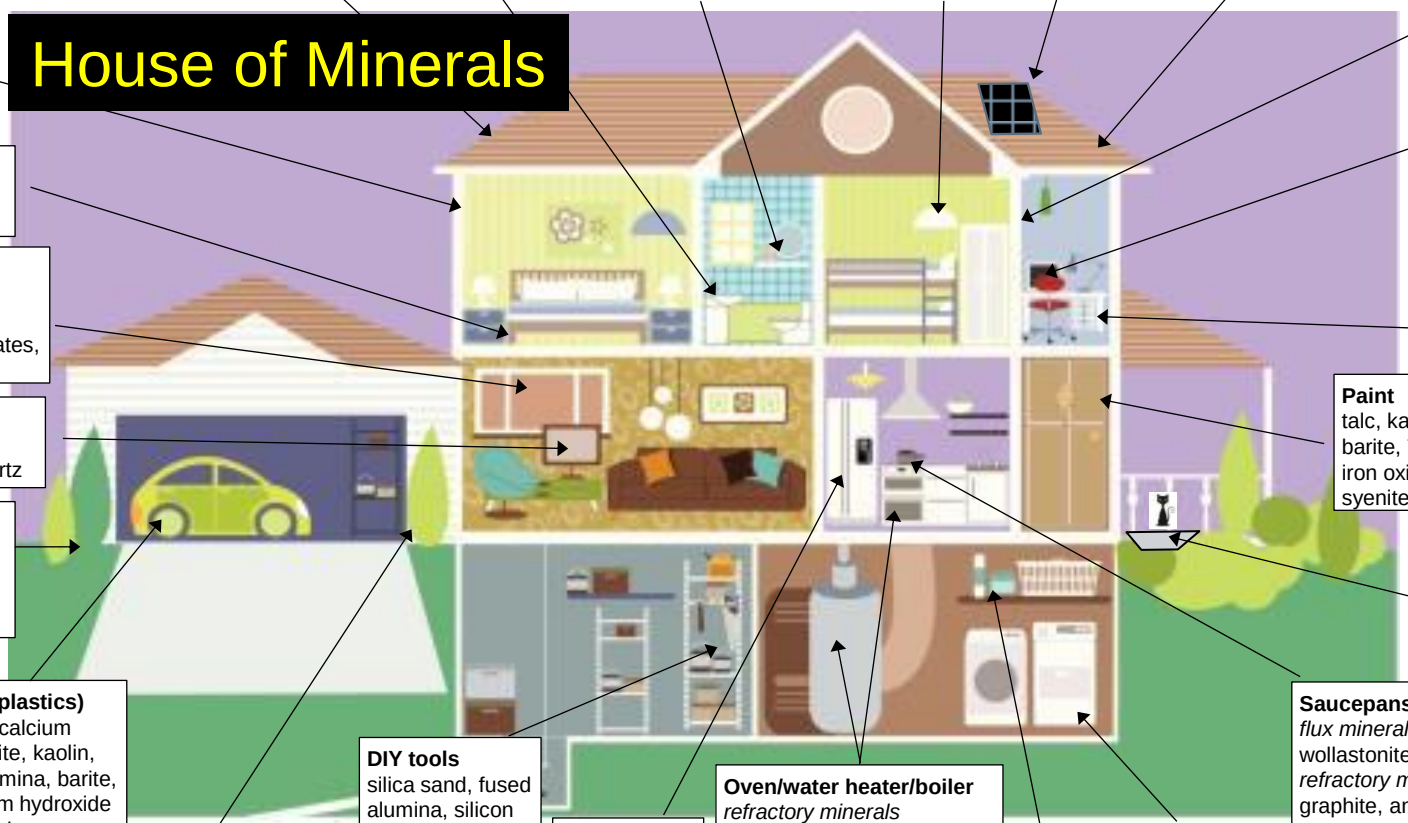
Moving towards a circular economy – “Closing the loop”



Source: EC

A lot to recycle!



Roofing materials
kaolin, iron oxide, talc, calcium carbonate, feldspar

Ceramics
silica sand, talc, calcium carbonate, feldspar, kaolin, wollastonite, zircon

Cosmetics/Pharma
talc, diatomite, silica, magnesia, bentonite, kaolin, mica, calcium carbonate, fluorspar, soda ash, borates, iodine, lithium

Light bulbs
silica sand, fused silica, quartz, rare earths, soda ash, calcium carbonate

Solar cells
quartz, fused silica, silicon carbide, fluorspar, wollastonite, talc

Insulation
kaolin, bauxite, alumina, dolomite, basalt, silica sand, soda ash, borates, calcium carbonate, vermiculite, perlite, diatomite

Bricks, mortar, cement
kaolin, gypsum, silica sand, calcium carbonate, bauxite, iron oxide

Wallboard
gypsum

Computer/IT devices
rare earths, alumina trihydrate, magnesium hydroxide, talc, calcium carbonate, quartz, lithium, graphite

Carpet backing
barite, talc, calcium carbonate, kaolin

Glass
silica sand, calcium carbonate, soda ash, fedlspar, syenite borates, fluorspar, lithium

Paper
kaolin, talc, calcium carbonate, TiO2

TV/DVD
rare earths, borates, lithium, graphite, quartz

Paint
talc, kaolin, calcium carbonate, barite, TiO2, wollastonite, mica, iron oxide, diatomite, feldspar, syenite

Garden
potash, phosphates, sulphur, nitrates, borates, vermiculite, perlite

Cat litter
bentonite, attapulgite, diatomite, zeolite, sepiolite

Automobile (+ ALL plastics)
plastics/rubber: talc, calcium carbonate, wollastonite, kaolin, mica, silica sand, alumina, barite, trihydrate, magnesium hydroxide
glass: soda ash, calcium carbonate, silica sand, borates, kaolin, lithium
Engine/Battery: rare earths, graphite, lithium, talc, borates

DIY tools
silica sand, fused alumina, silicon carbide

Lightweight construction materials
diatomite, perlite, vermiculite

Refrigerants
fluorspar

Oven/water heater/boiler
refractory minerals

Detergent
soda ash, borates

"White" goods
talc, calcium carbonate, kaolin, wollastonite

Saucepans – ALL metal/steel items
flux minerals: bauxite, olivine, lime, wollastonite
refractory minerals: alumina, bauxite, graphite, andalusite, fused alumina, magnesia, zircon, spinel, chromite, silicon carbide, kaolin
foundry minerals: bentonite, chromite, silica sand, zircon, olivine, andalusite, graphite

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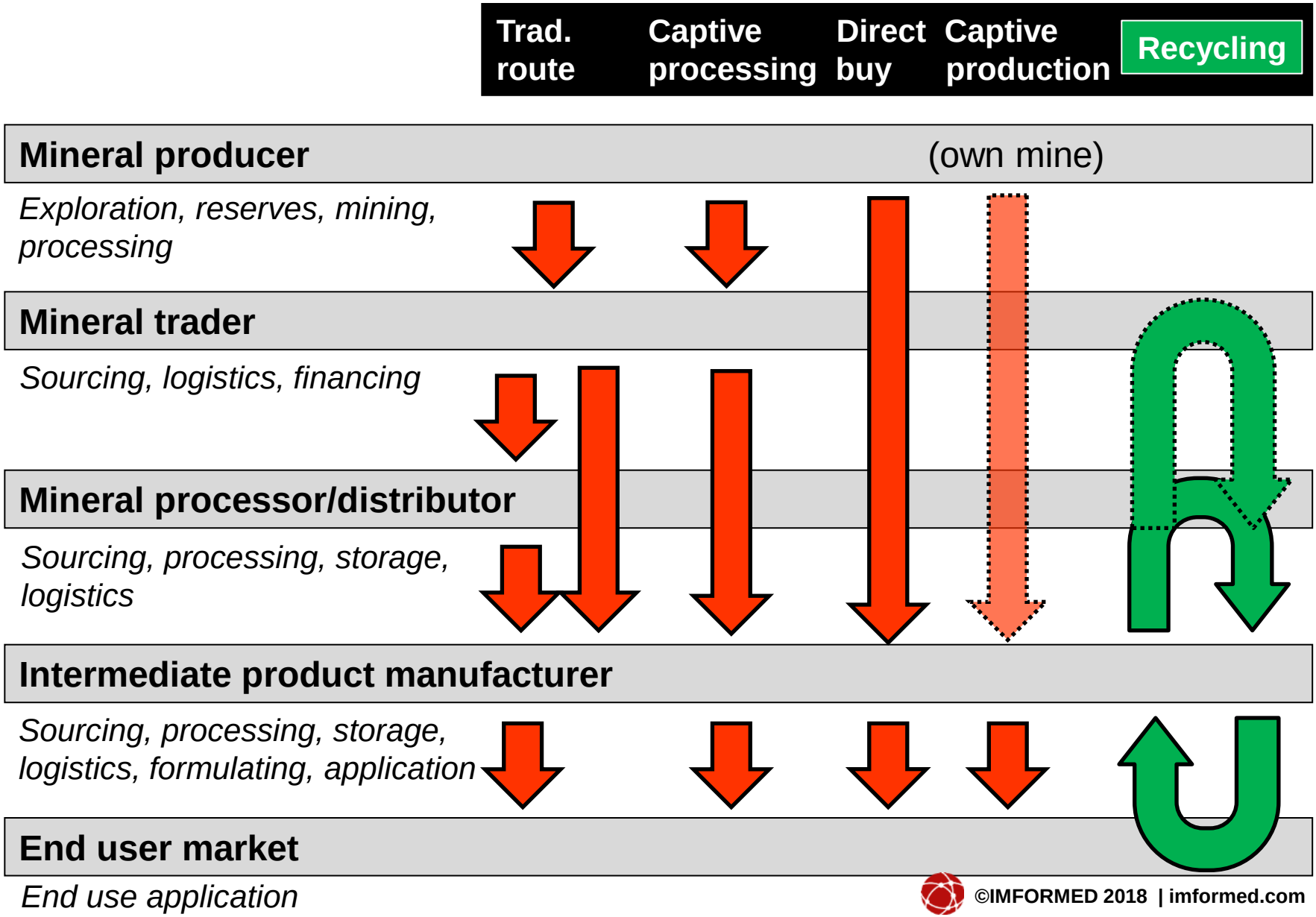
Source: Original house schematic Pinkpig

Supply chain options



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Secondary Raw Materials (SRM) for industrial mineral markets

SRM source*	SRM recovered	Market
Aluminium salt slag	alumina	cement; ceramics; geopolymers; metallurgy; mineral wool; refractories;
Batteries	graphite; lithium; manganese dioxide	batteries; ceramics; chemicals; glass; refractories
Fly ash	aluminosilicate	ceramics; coatings; construction; foundry; plastics; proppants (oil & gas drilling)
Glass	REE; silica	abrasives; chemicals; coatings; concrete; glass; plastics; sealants
Gypsum wallboard	gypsum	wallboard
Refractories	alumina; andalusite; bauxite; chromite; dolomite; mag-carbon; graphite; magnesia; silicon carbide; zirconia	ceramics; metallurgy; refractories
Steel slag	alumina; calcia; magnesia; silica	abrasives; aggregate; cement; concrete; fertiliser; filtration; metallurgy
Waste water	phosphorus	fertiliser
WEEE**	antimony trioxide; bromine FR; fluorspar; graphite; REE	batteries; ceramics; chemicals; flame retardants

* ie. waste from processing, or used/discarded mineral-bearing end products to be recycled
** waste electrical and electronic equipment

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Mineral recycling drivers

- Environmentally driven legal requirements – national/regional
- Conservation of primary mineral resources by use of recycled materials
- Alleviates mineral resource squeeze, their “criticality”, dependence on certain countries
- Mineral price rises
- Recycling contributes to CO_2 reduction
- Conservation of energy
- Controls hazardous substances
- Reduces landfill cost and pressure
- Technological advances in processing
- Employment opportunities

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Outlook: Challenges

- **Not cost-competitive with PRM; Increased competition with PRM**
- **Stigma of using a "waste" product:**
  Not "Primary" or "Secondary", and instead have them branded as "v-type" (virgin raw materials) or "r-type" (raw materials based on used products being recycled)**.**
- **Quality control issues: making the grade**
- **Investment in process/sorting technology**
- **Compatability in original product formulations**

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Outlook: Challenges

- **Sourcing adequate supply of waste material: waste source becomes the new "mineral resource"**
- **Assurance of long term supply of consistent quality of SRM**
- **Management by the recycling company of balance between continuous and discontinuous flows of waste material against supply of recycled material flow to end users**
- **Permits/legislation in handling/treating waste material: clarity, consistency, across country borders**

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Outlook: Opportunities

- **Continued tight supply from China to drive more demand from recycled materials**
- **SRM on mineral purchaser's menu in future**
- **More and improved automation systems; development of mobile sorting systems, other processing technology**
- **More companies getting involved; evolution of supply chain of sources, processing, trading, distribution, logistics**

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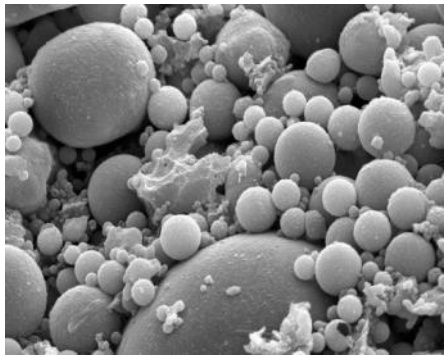
Outlook: Opportunities

- **Development of new product formulations to enhance/ease SRM use and ultimate recyclability**
- **Added value product development for more diverse market applications**
- **Increasing long term strategic alliances between waste sources, recyclers, and end users**
- **Education of end users to positively engage in and recognise benefits of recycling;**
  = employment, better for environment



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Programme Wednesday

WEDNESDAY 14 MARCH 2018

FIELD TRIP: HORN & CO. GROUP

Horn & Co. Group

08.45	**Meet Radisson Blu Hotel lobby, Cologne**
09.00	**Depart by bus**
11.00	**Arrive Weitefeld facility for introduction & tour: sorting, processing**
12.30	**Depart Weitefeld**
13.30	**Arrive Hunsborn facility for lunch & tour: analytical laboratory**
14.30	**Depart Hunsborn**
15.00	**Arrive Siegen facility for tour: LIBS sorting**
16.00	**Depart Siegen**
18.00	**Arrive Radisson Blu Hotel, Cologne**

Please wear suitable clothing and footwear that befits a visit to a working industrial site.

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Programme Thursday AM

INTRODUCTION & OVERVIEWS

07.30 **Registration**

09.00 **Introduction**
Ismene Clarke, Director & Mike O'Driscoll, Director, IMFORMED, UK

09.30 **The role of industrial minerals in the Circular Economy**
Roger Doome, Secretary General, IMA-Europe, Belgium

10.00 **A role for secondary materials in reducing supply vulnerability: EIT RawMaterials pioneering innovation in Europe**
Wesley Crock, Education Officer, EIT RawMaterials, Belgium

10.30 COFFEE

STEEL WASTE RECYCLING

11.30 **Efficient use of steel waste resources using methodology and technological innovation**
Jitka Halamová, Process Engineer, Technical Excellence Dept., ArcelorMittal Ostrava, Czech Republic

12.00 **Thermal treatment of steelworks dust and waste chlorides for recycled use in steel and cement applications**
Gerhard Auer, R&D Manager, Ferro Duo GmbH, Germany

12.30 LUNCH

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Programme Thursday PM

REFRACTORY RECYCLING

14.00 **Building a refractory recycling business through the use of PDCA/SDCA methodology**
Mario López, Recycling Specialist, RHI Magnesita, Brazil

14.30 **RHI Magnesita refractory recycling: the past and the future**
Michael Postmann, Recycling Manager, RHI Magnesita, Austria

15.00 COFFEE

REFRACTORY & FOUNDRY SAND RECYCLING

16.00 **Refractory waste valorisation under Sidenor steel plant strategy**
David Maza, R&D – Knowledge Group Leader, Sidenor, Spain

16.30 **Chromite sand reclamation from foundry waste**
Chris Wilding, Sales Director, Omega Foundry Machinery Ltd, UK

17.00 CLOSE OF DAY 1

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Programme Friday AM

Li-ION BATTERIES | FERTILISER MINERALS

09.00 **What the EV revolution will mean for the recycling/raw material industry**
Hans Eric Melin, Managing Director, Creation Inn, UK

09.30 **ICL and recycling, a review on actual performance and potential**
Kees Langveld, Technical Expert , ICL Fertilizers, the Netherlands

10.00 COFFEE

SALT | FLY ASH | LIBS

11.00 **Introducing ALUSAL®: aluminium flux salt recovery and recycling process with hydroextraction**
Vladimir M. Sedivy, President, Salt Partners Ltd, Switzerland

11.30 **Modified fly ash: a green & advanced solution for cement & concrete – application technology, processing solutions, mobile container plants for R&D and production**
Dietmar Alber, Business Development Director, Hosokawa Alpine AG, Germany, & Anna Huttunen, Process Director, Fatec Ltd, Finland

12.00 **Maximising value in recycling: mining and metal applications by fast inline elemental analysis (LIBS)**
Dr Christian Bohling, General Manager, SECOPTA analytics GmbH, Germany

12.30 LUNCH & CLOSE OF CONFERENCE

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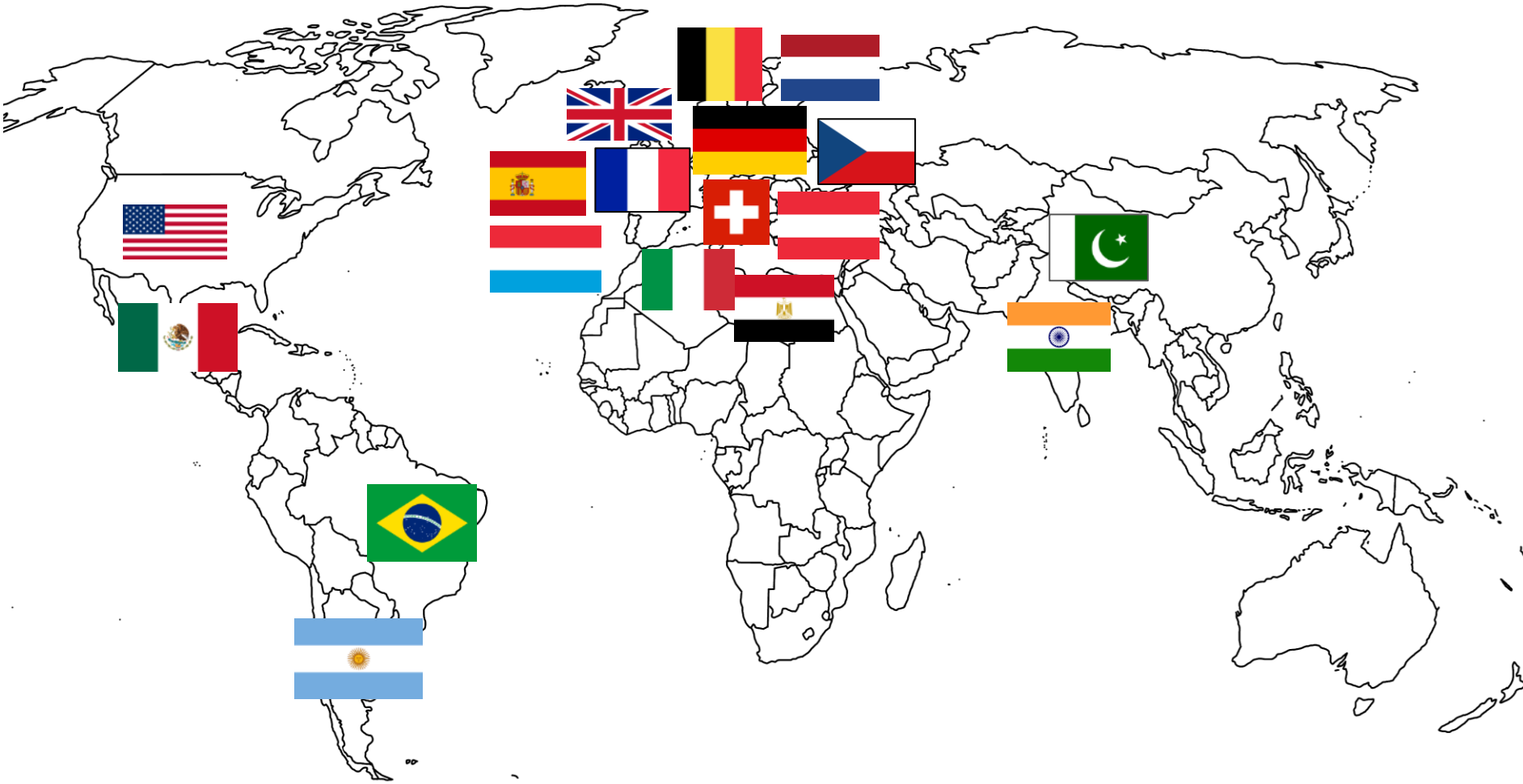
Introduction



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Attending Companies

Alcoa
ALFRAN
ArcelorMittal Ostrava
Arcillas Refractarias S.A
Calderys
Carboref GmbH
Creation Inn
DEREF
Diproinduca Europe
EIT Raw Materials
Euragglo
Euronordic
Eurosalt handelmaatschappij
Fatec Ltd
Ferro Duo GmbH
Carbon Action Ltd
Global Recycling
Gouda Refractories
HarbisonWalker International
Harsco Metal & Minerals
Horn & Co Products GmbH
Hosokawa Alpine AG
Hudig & Veder Bulk BV
ICL Fertilizers Europe CV
IMA Europe
Imerys Belgium SA
IMFORMED Ltd
Imperial Shipping
Independent Consultant
Lehmann&Voss&Co
LKAB Minerals Ltd
Midegasa
Mine Feuerfest GmbH & Co KG
Mineralen Kollee
Mineralmahlwerk C. Welsch GmbH
Mineralmahlwerk Westerwald orn GmbH & Co. KG
Nueman & Esser
OBA Bulk Terminal Amsterdam
Omega Foundry Machinery Ltd
Pasek Espana Sau
PK Rohstoffe GmbH
Port of Amsterdam
Possehl Erzkontor GmbH & Co. KG
Prince Minerals Ltd
Protrade Company
Quarzwerke GmbH
REF Minerals
RHI Magnesita
Richmond Reclamation Ltd
Saint-Gobain Cree
Salt Partners
SECOPTA Analytics GmbH
Sibelco
Sidenor
Tata Steel Ijmuiden BV
Tempest Capital Ltd
TYMO Engineering GmbH
Vesuvius

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Feedback

"Good programme. Thought provoking and stimulating presentations."
Daniel Lucente, Sourcing Manager, HarbisonWalker International, USA

"The network the event creates is great"
Alex Aizupura, Raw Material Business Development Manager, Midegasa, Spain

"Good mixture of recycling topics"
Wolfgang Brast, Managing Director, PK Rohstoffe GmbH, Germany

"It's an interesting Forum for recycling and the networking very important."
David Maza, R&D Knowledge Group Leader, Sidenor, Spain

"Very interesting and good for networking; excellent programme and venue"
Jitka Halamová, Process Engineer, ArcelorMittal Ostrava, Czech Republic

"Good programme and venue; very interesting visit to the Horn plant. Well organised."
Marc Faverjon, Technical Department, DEREF, Italy

"Very informative, well presented and excellent venue. Keep it going!"
Richard Thompson, Francis Flower, UK

"Good and interesting programme, insightful presentations, good diverse subjects; good networking opportunity"
Pim Steenhuis, Commercial Manager, Port of Amsterdam, Netherlands

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Picture Gallery

Missed attending **Mineral Recycling Forum 2018**?

A set of presentations (as PDF) maybe purchased:
Price £500 – please contact:

Ismene Clarke, T: +44 (0)208 224 0425; M: +44 (0)7905 771 494; E: ismene@imformed.com

Ensure you don't miss out on news and updates for the next **Mineral Recycling Forum**!

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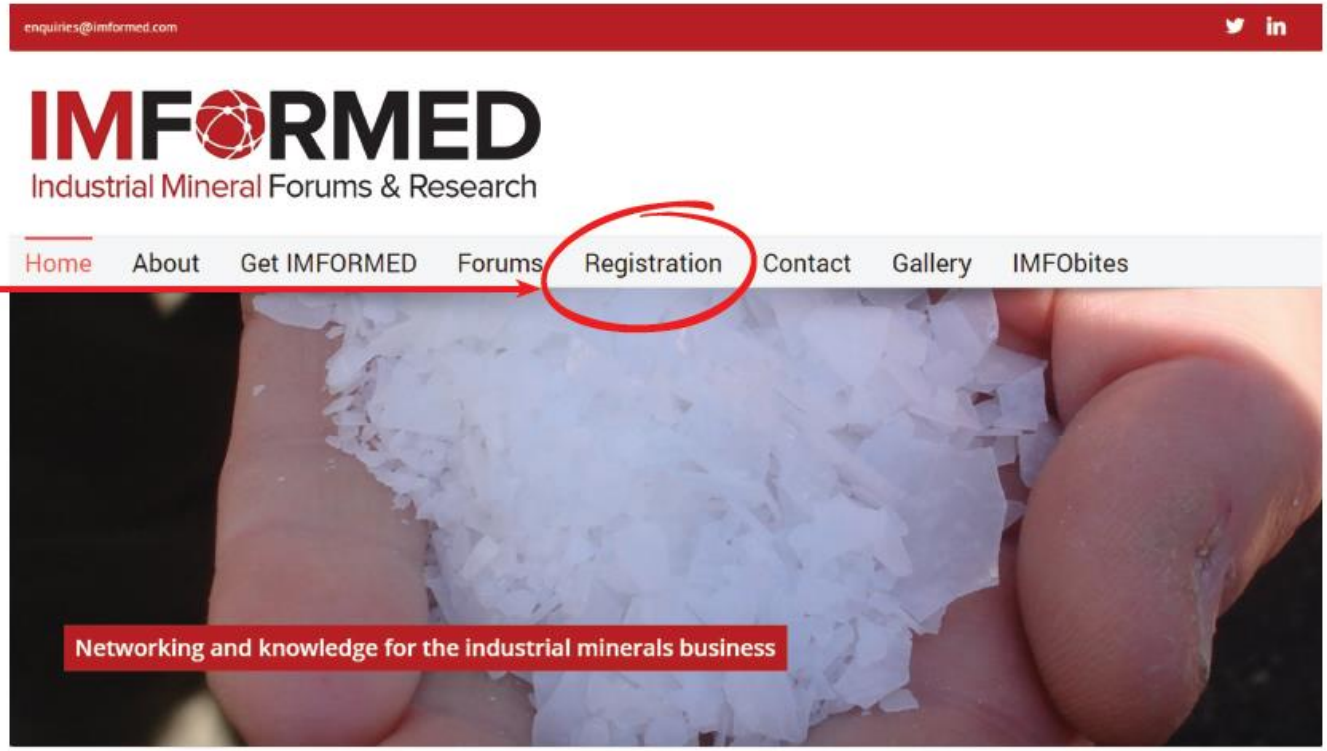

NEWSFILE

FORUMS

IMFObites

Upcoming Conferences in 2018

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2018

Hilton Houston Post Oak, Houston, 6-8 May 2018

MAGFORUM 2018

Magnesium Minerals & Markets Conference

Grand Elysée Hotel, Hamburg — 17-19 June 2018

CHINA REFRACTORY & ABRASIVE MINERALS FORUM 2018

Regal International East Asia Hotel, Shanghai, 10-12 September 2018

FLUORINE FORUM 2018

Hotel Wellington, Madrid

15-17 October 2018

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MAGFORUM 2018

Magnesium Minerals & Markets Conference

Grand Elysée Hotel, Hamburg — 17-19 June 2018

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EARLY BIRD RATE ENDS 11 MAY 2018

CHINA REFRACTORY & ABRASIVE MINERALS FORUM 2018

Regal International East Asia Hotel, Shanghai, 10-12 September 2018

Alumina | Bauxite | Fused Alumina
Dead Burned Magnesia | Flint Clay
Fused Magnesia | Garnet | Graphite
Silicon Carbide | Spinel

Bringing together an expert panel to discuss the latest trends and developments in Chinese refractory and abrasive mineral supply and demand.

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EARLY BIRD RATE ENDS 3 AUGUST 2018

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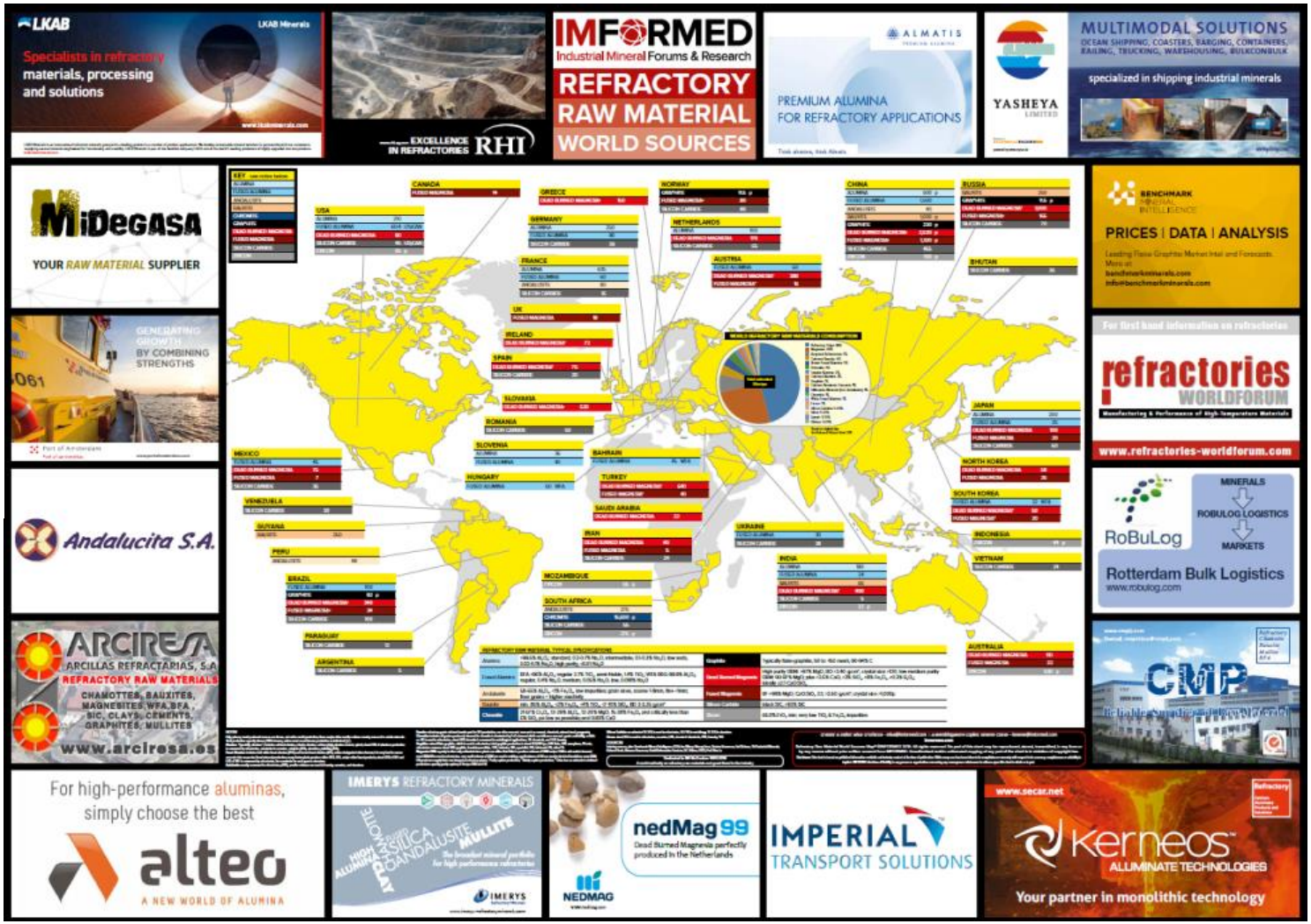
REFRACTORY RAW MATERIAL WORLD SOURCES

PRIMARY WORLD SOURCES & PRODUCTION CAPACITY OF KEY REFRACTORY MINERALS

PICK UP A COPY AT OUR STAND

KEY - see notes below

- ALUMINA
- FUSED ALUMINA
- ANDALUSITE
- BAUXITE
- CHROMITE
- GRAPHITE
- DEAD BURNED MAGNESIA
- FUSED MAGNESIA
- SILICON CARBIDE
- ZIRCON



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