



The economic importance of industrial minerals



Mike O'Driscoll
Editor
Industrial Minerals, UK





Industrial Minerals

- the authoritative monthly magazine for global non-metallic minerals & their markets
- covering the industrial minerals market since 1967
- reference books, directories, conferences
- www.indmin.com





Industrial Minerals - Growing with Europe

Brussels, 13 May 2004

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Outline

- 1. What are industrial minerals?**
- 2. Why are industrial minerals so important?**
- 3. Why are industrial minerals important to the EU economy?**
- 4. Challenging times ahead**



What are industrial minerals?

- **mined & processed from naturally occurring minerals**
- **processed direct from naturally occurring minerals/waste**
= *synthetic industrial minerals*
- **exploited for their non-metallurgical value**
- **non-metallic, non-fuel minerals for an extremely wide range of industrial & domestic applications**
= *industrial minerals*

What are industrial minerals?



Typical examples of natural IM:

- clays
- silica sand
- talc
- limestone/chalk
- gypsum
- pumice
- potash

What are industrial minerals?

Typical examples of synthetic IM:

- mullite
- aluminas
- silicon carbide
- ppt calcium carbonate
- spinel
- soda ash
- fused minerals

made from:

bauxite, kaolin

bauxite

quartz + coke

lime & CO₂

magnesite + alumina

salt + limestone + coal + ammonia

alumina, magnesia, spinel

What are industrial minerals?

Examples of IM that also have a *metallurgical* value:

	<i>non-met. value</i>	<i>metal value</i>
• bauxite	<i>cement, abrasives</i>	<i>aluminium</i>
• chromite	<i>foundry sand, chemicals</i>	<i>chrome, Fe-Cr</i>
• rutile	<i>white pigment</i>	<i>titanium</i>
• zircon	<i>ceramics, glass</i>	<i>zirconium</i>
• manganese	<i>batteries, pigments</i>	<i>manganese</i>
• quartz	<i>glass, ceramics</i>	<i>silicon</i>
• stibnite	<i>flame retardants</i>	<i>antimony</i>



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Why are industrial minerals so important?



Why are industrial minerals so important?

Industrial minerals in your kitchen



Why are industrial minerals so important?

IM in your kitchen

Glass/glasses/ light bulbs	silica sand, limestone, soda ash, borates, feldspar, lithium
Ceramic tiles/mugs/ plates etc.	kaolin, feldspar, talc, wollastonite, borates, alumina, zirconia
Paint	TiO ₂ , kaolin, mica, talc, wollastonite, GCC, silica
Plastic white goods eg. fridge, washer	talc, GCC, kaolin, mica, wollastonite, flame retardants (ATH, Mg(OH) ₂)
Wooden flooring	treatment materials- borates, chromite
Drinking water	treatment materials- lime, zeolites
Wine/beer	diatomite, perlite filters
Salt	salt
Sugar	lime in processing
Detergents/soap	borates, soda ash, phosphates
Surfaces	marble, granite
Books	kaolin, talc, GCC, lime, TiO ₂ in paper
Oven glass	petalite, borates
Heating elements	fused magnesia insulators
Wallboard/plaster	gypsum, flame retardants
Metal pots/cutlery	mineral fluxes & refractories in smelting

Why are industrial minerals so important?

Main consuming market mineral sectors

Abrasives

Absorbents

Agricultural

Cement

Ceramics

Chemicals

Construction

Oil well drilling

Electronics

Filtration

Foundry

Glass

Metallurgy

Paint

Pigments

Paper

Plastics

Refractories

Flame retardants

Welding

Why are industrial minerals so important?

Mineral to end use market

Mineral



Intermediate product



Intermediate market



End use market

ilmenite



titanium dioxide white pigment



white paint manufacturer



automobiles/DIY

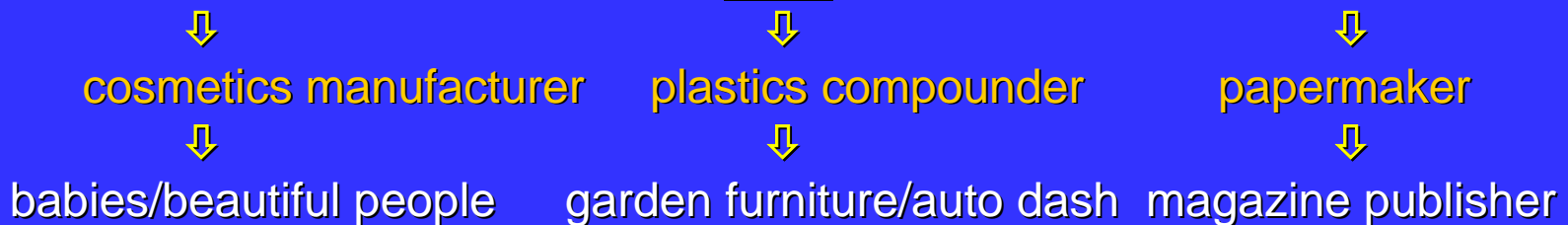
Why are industrial minerals so important?

Mineral to end use market

bentonite clay



talc



Why are industrial minerals so important?

Mineral to end use market

silica sand



zeolites



emery



diatomite



Why are industrial minerals so important?

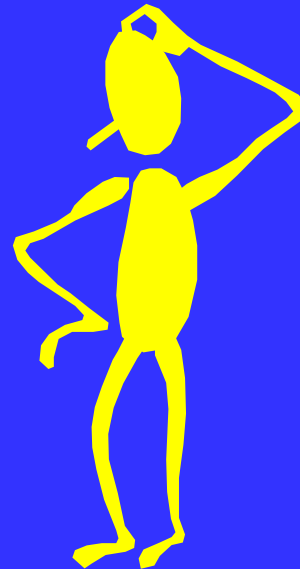


- Mineral consuming market existence & its performance directly affects demand for mineral raw materials, ie. industrial minerals
- no market demand = no mineral supply
= no mineral development

Why are industrial minerals so important?



“Without a market, an industrial mineral deposit is merely a geological curiosity”





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Why are industrial minerals so important?

- **centres of high population**
- **their economy - the driver**
- **directly influence demand for IM**



Why are industrial minerals so important?

Mine to market supply chain



- **supply sector**



- **logistics sector**



- **consuming market sector**

Why are industrial minerals so important?

Mine to market supply chain

SUPPLY

SUPPLY

- exploration
- mineral finance
- plant engineering
- mining
- processing

LOGISTICS

- trading
- port handling
- mineral inspection
- freight

MARKET

- warehousing/distribution
- direct market mineral consumer
- intermediate market mineral consumer
- end market mineral consumer

DEMAND



Why are IM important to the EU economy?

Price comparison of metals & IM

US\$/tonne unless indicated

<i>Metals</i>		<i>Industrial minerals</i>	
Gold	392/oz	Salt	15-18
Silver	6.23/oz	Silica sand	14-25
Aluminium HG	1,645	Olivine	50-110
Copper A	2,760	Dead burned magnesia	140-210
Zinc	1,014	Zircon	400-490

Source: LME; *Mineral PriceWatch*





Why are IM important to the EU economy?

Factors influencing IM pricing

- **source of mineral**
- **volume**
- **grade/end use – ie. quality of mineral, dictated by desired end use**
- **further processing required**
- **freight/shipping – can be 50-70% of final delivered cost of mineral**
- **port handling**
- **warehousing/storage**
- **mineral inspection**
- **insurance**
- **relationship of buyer & seller**



Why are IM important to the EU economy?

US metals & IM production 2003

tonnes; US\$/tonne

<i>Metals</i>			<i>Industrial minerals</i>		
	Volume	Value		Volume	Value
Aluminium	2.7m.	4,000m.	Crushed stone	1,490m.	8,600m.
Gold	266	2,900m.	Sand & gravel	1,158m.	6,366m.
Copper	1.1m.	2,000m.	Lime	18.2m.	1,017m.
Zinc	770,000	664m.	Soda ash	10.6m.	800m.

Source: USGS

Why are IM important to the EU economy?

EU IM production & share of world supply 2002

tonnes

Aggregates*	2,520m.	-
Gypsum	28.2m.	28%
Salt	52.4m.	25%
Feldspar	7.3m.	52%
Magnesite	6m.	30%
Kaolin	5.7m.	27%
Potash	4.5m.	16%
Bentonite	3.7m.	31%
Talc	1.3m.	16%

* sand & gravel, and crushed rock

Source: BGS

Why are IM important to the EU economy?

Multinational IM leaders based in Europe

- Carmeuse, Belgium
- Imerys, France
- Lhoist Group, Belgium
- Luzenac Group, France
- Omya, Switzerland
- S&B Industrial Minerals, Greece
- SCR-Sibelco, Belgium
- Süd-Chemie AG, Germany
- Treibacher AG, Austria
- WBB Minerals, UK

Why are IM important to the EU economy?

Major EU consuming market sectors

- **Ceramics**
- **Chemicals**
- **Glass**
- **Paints**
- **Paper**
- **Plastics**
- **Refractories**

Why are IM important to the EU economy?

Ceramics

Sales: €26,800m.
Employs: 227,000
World share: 30% production
Growth: tiles, 4%

baddaleyite
ball clay
borates
celestite
feldspar
fluorspar
halloysite
kaolin
limestone
lithium minerals
nepheline syenite

petalite
plastic clay
quartz
rare earths
silica sand
soda ash
spodumene
talc
wollastonite
zircon



Why are IM important to the EU economy?

Chemicals

Market value: €457,000m.
Output: €527,000m.
Employs: 1.7m.
No. co.s: 25,000
Share of EU manufacturing ind. gross value: 12%
Share of EU GDP: 2.4%
Other: EU hosts 15 of world's top 30 co.s
Growth: 3%

borates
celestite
chromite
fluorspar
iodine
limestone
lithium
magnesia
manganese
nitrates

phosphates
pyrites
rare earths
salt
soda ash
sodium sulphate
sulphur
zirconia



Why are IM important to the EU economy?

Glass

Output: 28.8m. tonnes
Market size: 28.2m. tonnes
Employs: 175,701
Growth: flat glass, 3.5%



borates
dolomite
dolime
feldspar
fluorspar
kaolin
lime
limestone
lithium carbonate
lithium minerals
nepheline syenite
petalite
quartz
rare earths
silica sand
soda ash
sodium sulphate
spodumene
zircon

Why are IM important to the EU economy?

Paint

Paint sales: 5.4m. tonnes

Paints mkt value: €15,400m.

Powder coating output: 360,000 tonnes

Powder coating mkt size: 330,000 tonnes

Growth: 0.5%



alumina trihydrate

barytes

bentonite

brucite

celestite

chromite

diatomite

feldspar

ground calcium carbonate

gypsum

huntite-

hydromagnesite

ilmenite

iron oxide

kaolin

manganese

mica

ppt calcium carbonate

quartz

rutile

silica sand

talc

wollastonite

Why are IM important to the EU economy?

Paper

Ann. turnover: €400,000m.
Output: 91m. tonnes
Mkt. size: 82.3m. tonnes
Employs: 250,000
Plants: 1,260
World share: 28% paper & board
Growth: 1.5%



Plastics

Employs: >1m.
Total sales: €159,000m.
Turnover: €135,700m.
Raw materials turnover: €29,000m.
Market size: 38.1m.
EU per capita: 94.8kg
Growth: 6% 2000-2002;
3% 2001-2002



Why are IM important to the EU economy?

Refractories

Sales: €3,000m.

Employs: 27,000

Growth: 2-3%



andalusite

bauxite

fused alumina

alumina

chromite

dolomite

graphite

kyanite

fused magnesia

dead burned magnesia

sintered mullite

fused mullite

olivine

pyrophyllite

refractory clays

silica sand

fused silica

silicon carbide

sillimanite

sintered spinel

fused spinel

zircon

fused zirconia



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Why are IM important to the EU economy?

- **IM are critical raw materials supporting EU market sectors**
- **add value to end products**
- **demand is consistent and long term**



Why are IM important to the EU economy?

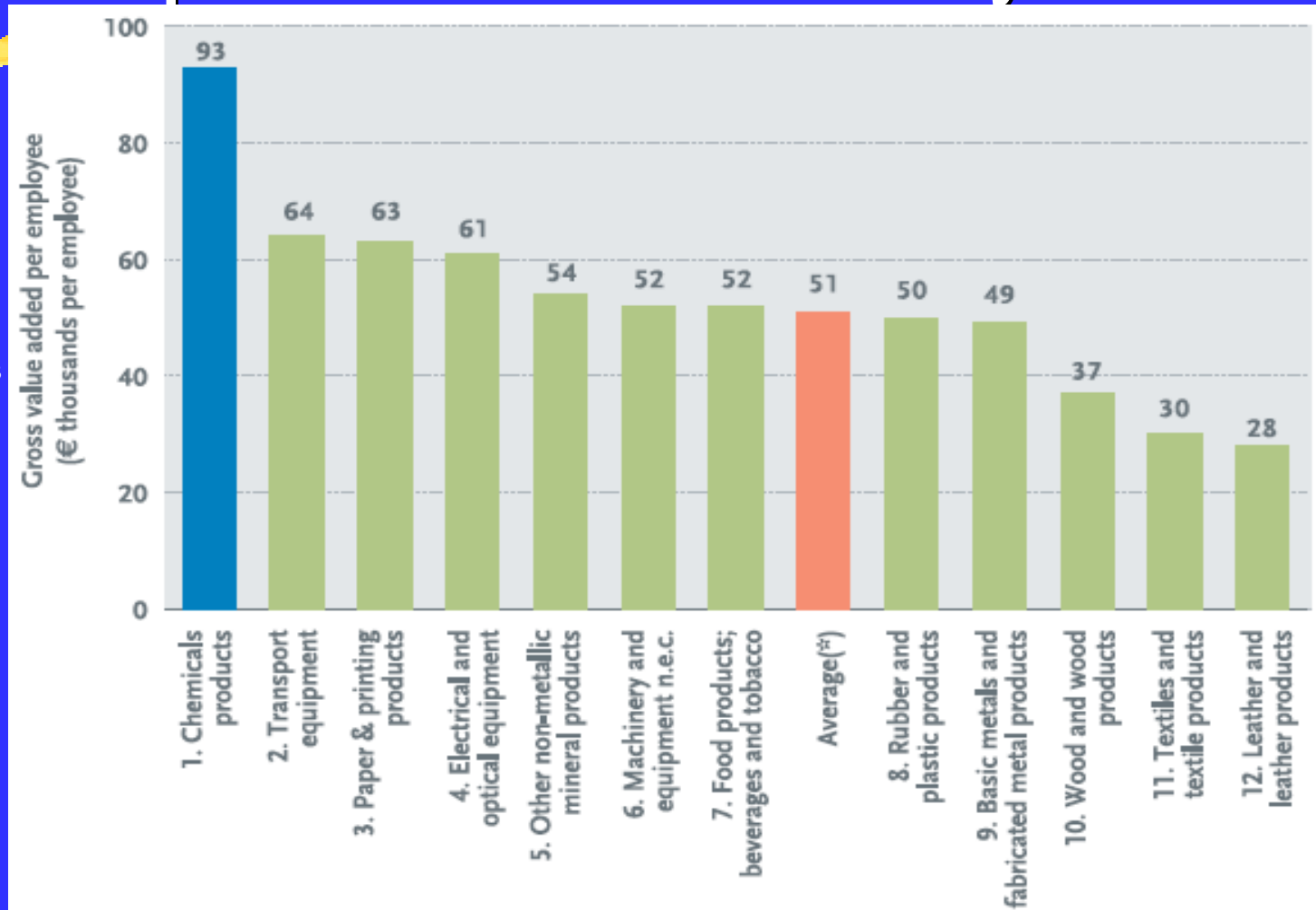
IM contribution to UK economy 2001

- **290m. tonnes extracted**
- **contributed £25,665m. (€38,497m.); 2.9% of UK total GVA (£885,000m.)**
- **BGS:** *“...manufacturing and construction, which are heavily dependent on minerals and metals, together contributed a further £100,000m. (€150,000m., 11% of UK total GVA) to the GVA in 2001”*
- **UK GVA per employee 2001: £54,583 (€81,874)**

Why are IM important to the EU economy?

EU industrial sectors' GVA per employee 2001

Source: CEFIC/Eurostats





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Changing times

A thick, horizontal yellow brushstroke that spans across the width of the slide, positioned below the title.

- **EU enlargement**
- **IM trade trends**
- **New markets**



Changing times

EU enlargement

- Enlarged population 450m.
- Product demand
- New sources development
- Manufacturing shift





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Changing times

IM trade trends

The China factor





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Changing times

IM trade trends

The China factor

- **China's growth economy**
- **Domestic market demand has soared**
- **Increased costs & shortages in power supply**
- **Increased costs & shortages in internal freight**
- **Increased costs & shortages in ocean freight**





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Changing times

IM trade trends

The China factor

**= increased costs & shortages of Chinese
IM exports to EU**

= opportunity for EU IM producers to fill gap



Changing times

New markets

- Fuel cells



Changing times

New markets

- **Nanomaterials**



Summary & conclusions

- **IM are high volume, low value, but vital commodities**
- **IM are prerequisite raw materials for a wide range of industrial and domestic products**
- **Market demand drives IM supply**
- **EU IM supply chain employs people & businesses**
- **IM support and add value to EU industrial sectors**
- **EU IM industry future in EU enlargement, EU consuming markets, exports, & new growth markets**



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Thank you for your kind attention

