Imagine the Future with Industrial Minerals

2050 Roadmap

Together for a Sustainable Future
IMA Europe

IMAGINE THE FUTURE
WITH INDUSTRIAL MINERALS
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The Industrial Minerals 2050 ROADMAP AT A GLANCE
Executive Summary

This roadmap outlines the industrial minerals sector’s response to the European Commission’s “Roadmap for moving to a competitive, low-carbon economy in 2050” and the “Flagship initiative for a resource-efficient Europe”. It defines how the sector can contribute to achieving the goals established in those documents. It looks at:

- The role industrial minerals play in today’s economy
- A vision of society in 2050 and its demand for industrial minerals
- The steps the industrial minerals industry will take to meet that demand in an innovative, sustainable, resource-efficient way
- The support required from policy makers if the vision is to become reality.
Where are we now?

**Industrial minerals are vital to Europe’s economy**

They are everywhere in our daily lives from the rubber, plastics, glass and steel in automobiles to the wires and optic fibre cables in information technology. They are essential to construction, ceramics, detergents, paints and coatings, paper, packaging and almost every other manufacturing sector.

**Industrial minerals are increasingly essential to high-tech as well as environmentally friendly products and technologies** such as wind turbines and photovoltaic panels. Industrial minerals play a significant role in the transition to a low-carbon economy.

**The industrial minerals industry is a major European employer and GDP contributor**

With 42,500 people directly employed, 30 million jobs in downstream industries depending on mineral raw materials, and a 10 billion euro contribution to Europe’s GDP, industrial minerals are at the heart of EU manufacturing. They are a foundation stone of smart, innovative growth in Europe.

Where will we be in 2050?

**New technological developments will fuel a marked global increase in minerals demand**

Demand for goods and raw materials will increase in tandem with a global rise in population of 40%. By 2050 technological innovations in sectors such as construction, and transportation will make increasing use of industrial minerals. Buildings will last longer and require less maintenance thanks to the functionalities of mineral raw materials. Energy-efficient cars, trains, and even space transportation will all rely on materials and energy in which industrial minerals play a key role.

**Industrial minerals Vision for 2050**

**With the right policies and partnerships in place our vision is of an industrial minerals sector with:**

- enhanced resource efficiency
- improved recycling, recovery and re-use to make the most efficient use of minerals produced
- increased demand from innovative, multifunctional product applications
- better access to minerals based on well-established raw material policy
- highly-skilled jobs kept in Europe
- Europe setting an example in industry best practices
- continuous engagement with local communities and workforce.

How will we get there?

**Making the Vision Real**

**On the Road to 2050: Heading towards a low carbon economy**

Maximise resources

Reducing the specific energy consumption by half – Many existing technologies to improve energy efficiency in the industrial minerals sector, for example grinding efficiency techniques, thermal processes, energy recovery and closed circuits, will continue to evolve. These and other technologies will contribute in the reduction of the industry’s specific energy consumption.

Reducing transport emissions – Changing from truck-based freight to rail and barge will lead to reduced CO₂ emissions.

Extracting locally – Facilitating extraction permits, where possible, close to industrial clusters will reduce the need for transportation.

**On the Road to 2050: Innovative technologies and sustainable products**

A true materials science industry – The industrial minerals sector has started to evolve towards a “materials science” industry and this will accelerate as new technologies continue to transform the way we work and live.

Multifunctional industrial minerals – Thanks to the multiple properties of industrial minerals, many new uses will be developed in the future.

Customers will increasingly be able to identify the product that provides them with the best performance.

Enabling users to improve their own efficiency – Through the industrial minerals wide ranging properties, quality and longevity of products can be increased, thereby cutting overall consumption as well as contributing to higher resource efficiency.

**On the Road to 2050: Contributing to a resource efficient economy**

Maximising resources – The minerals sector is driven by resource efficiency. But this does not necessarily mean using less. What really matters is using better. The Industrial minerals sector contributes to resource efficiency at every stage of the supply chain:

From the mine site – where new technologies will continue to save water and energy while increasing the rate of marketable materials –
through the value chain, reducing consumption by improving the performance of the end product. Waste is given a value by supplying less valuable but optimum grades to downstream markets and improved recovery and recycling of industrial minerals through the products that contain them.

Towards a zero-waste business model – By developing new uses for mined materials and using by-products in new applications, waste can be considered a resource. The formation of integrated industrial clusters will also allow waste from one process to become a valuable raw material for another.

Improving recycling by 20% – An estimated 60% of all industrial minerals consumed in Europe are already recycled along with the glass, paper, plastics or concrete in which they are used.

These rates will improve.

Some products that are hardly recycled today will progressively be recycled.

The industrial minerals industry will work in partnership with downstream industries on processes to increase recyclability.

On the Road to 2050: Protecting and promoting biodiversity
Open surface mining often provides perfect conditions for unique habitat creation and the sector will continue to take great care to minimise the environmental impact of its operations.

On the Road to 2050: Engaging with local communities and the workforce
It wants to work in even closer partnership with local communities to foster mutual understanding of the communities’ needs and of an industry which cannot choose where it mines.

Improving working conditions – The sector has introduced a global effort to improve safety through the IMA-Europe Target Zero Injury Strategy.

New technologies will make the sector safer. Automated processes and geolocation will be fully developed, reducing the workers’ exposure to safety and health risks.

Partnership with policy makers is essential - What we need...
Policy makers and legislators must contribute to building an innovative and competitive European minerals sector through policy measures guaranteeing:

A stable, predictable and favourable business environment
A coherent industrial policy is vital for competitiveness, sustainable growth and employment, supporting innovation and investment by new industries and traditional ones.

Realistic taxation levels
Corporate and environmental taxation should not endanger industry’s competitiveness.

Competitive energy prices
The creation of a single energy market and the development of affordable alternative sources of energy will enable energy prices to be more competitive.

A value chain approach
Europe’s industry clusters can give an important competitive edge. Integrated thinking will allow for cross-industry collaboration with improved land and materials use.

A shift from road to water and rail transport
There must be a shift from road to water and rail transport where possible, requiring investment in a Single European Transport Area.

Easier access procedures
Uniform access to raw materials in all Member States needs to be achieved. EU Member States should facilitate permitting requirements and procedures – including in protected areas – to allow economic growth and regional development.

Process simplification
A “one-stop shop” approach will simplify the permitting process based on the principle of parallel processing and full cooperation between authorities.

Continued availability of skills and brains
Cooperation between industry and academia is key to ensuring highly trained and motivated personnel for the industrial minerals sector.

R&D partnerships to promote innovation
There must be ongoing support for innovation via the promotion of research and development partnerships with the emphasis on market-driven research, to bring innovative products to market more quickly.
FOREWORD
It is true that 2050 might seem a long way off. However we, as Europeans, have decided to set ambitious objectives for 2050. We are working together to put into place the right measures and necessary transformations to reach those objectives. For us, 2050 is, in fact, tomorrow.

The industrial minerals industry provides the raw materials that make up the goods we use in everyday life. Most of the time, the end consumer cannot see them, or feel them. Yet a family house contains up to 150 tonnes of minerals in the cement, plaster, glass, paint, ceramics, tiles and steel that it is made of. Industrial minerals are, literally, essential to our lives.

Many industries rely on them, not only to manufacture their products but also to improve their properties or the performance of their processes. The industrial minerals sector is one of the drivers of EU competitiveness and, as such, plays a crucial part in reaching the EU's objectives for 2050.

With this roadmap, producers of industrial minerals invite policy makers, EU citizens, downstream users and all the players in the transition to a greener economy to acknowledge that this transition cannot be made without industrial minerals, or even, as is commonly suggested, by "using less" when it comes to industrial minerals. They are also essential to a better, greener future.

For many years, our sector has been promoting "better" exploitation of resources, not only in our own businesses, but also down the value chain. Our commitment goes far beyond the mining and processing on our sites and minimising the impacts of our activities on our surroundings.

We feel responsible for reaching the EU's objectives for 2050. But we share this responsibility with the policy makers who are shaping Europe's challenging transition to a greener economy. Making the future sustainable starts with keeping our sector strong to provide the resources that the next generations will need.

We invite our readers to discover the world of industrial minerals today, and in the future. We wish everyone an interesting, truly informative read.

Daniel J. Reuss  
IMA-Europe President

Michelle Wyart-Remy  
IMA-Europe Secretary General
"Raw materials are the lifeblood of EU industry: at least 30 million jobs in the EU depend upon access to them"

European Commission

Why This Roadmap?
The EU acknowledges the importance of raw materials

In 2008, the role raw materials play in stimulating growth and jobs was acknowledged in the European Commission’s Communication on the Raw Materials Initiative which aimed at improving access to Raw Materials in Europe on a three-pillar based approach:

- ensuring a level playing field in access to resources in third countries
- fostering the sustainable supply of raw materials from European sources
- boosting resource efficiency and promoting recycling.

EU plans for a resource-efficient low-carbon Europe

In its 2020 strategy, the European Union sets out ambitious plans for smart, sustainable and inclusive economic growth.

The overall plan outlined in the Flagship Initiative for a Resource Efficient Europe is to achieve sustainable growth by promoting better use of resources and reducing their environmental impact by 2050.

The European Union also has its own Roadmap charting the way to a competitive, low carbon economy in 2050.

This EU Roadmap identifies the main emission contributing sectors – power generation, industry, transport, buildings and construction, and agriculture – and establishes 2050 targets in terms of greenhouse gas emissions (80% cut from 1990 levels) and energy consumption (30% cut from 2005 levels).

A low carbon and resource-efficient economy needs industrial minerals

Industrial minerals are already proving to be a key element in the technologies needed for the transition to a competitive, low carbon economy.

Plans for a re-industrialised Europe

The 2010 industrial policy flagship initiative, updated in 2012 and reinforced in 2014 with a Communication by the European Commission “for a European Industrial Renaissance”, paves the way for the gradual re-industrialisation of the European Union, to bring back industry’s weight to 20% of EU GDP by 2020, from less than 16% now.
The industrial minerals sector - A committed player

The industrial minerals industry has taken seriously its role and contributes to these recent policy developments.

Industrial Minerals – Raw materials for European industry

Industrial Minerals are at the centre of Europe’s economy. They are also at the heart of European innovation; they are essential to high-tech sustainable technologies – such as wind, solar power and electronics – and offer environmentally friendly options – such as gas and water treatment and self-cleaning glass.

The efficient use of Europe’s industrial mineral resources is already a key business driver within the sector.

Industrial minerals are a major GDP contributor

IMA-Europe represents:

- 500 member companies.
- 685 mines and quarries and 750 plants
- 42,000 people employed in 28 European countries
- 80 million tons of minerals produced per year
- 10 billion Euros contributed per year to Europe’s GDP

The aim of this roadmap is to outline the industrial minerals sector’s response to the European Commission’s “Flagship Initiative on a resource-efficient Europe” and its “Roadmap for moving to a competitive, low-carbon economy in 2050”. It defines how the sector can contribute to achieving the goals set out in those documents.

It looks at:

- The role industrial minerals play in today’s economy
- A vision of society in 2050 and the demand for industrial minerals
- The steps the industrial minerals industry will take to meet that demand in an innovative, sustainable, resource-efficient way
- The support required from policy makers to ensure that the vision becomes reality

Why This Roadmap?
“When I look around, it’s amazing to think how many industrial minerals are hidden. In fact, our world is made of them.”

Nicolas Goffaux, Geology student, KU Leuven

**Why Industrial Minerals Matter**
Industrial minerals are a natural resource present in practically every single manufactured product we use in our daily lives. They are an indispensable part of many industrial processes and are thus vital to Europe’s economy.

Industrial minerals are also essential components of today’s most eco-efficient products and technologies:

- A family house contains up to 150 tons of minerals in cement, glass, paint, ceramics, tiles, etc.
- A car contains up to 250kg of minerals in rubber, plastics, glass, fibreglass and steel. Talc and other mineral fillers are notably used to improve the impact strength of polypropylene automotive components such as bumpers, dashboards and interior trim.
- Wind turbine blades are essentially fibreglass which contains almost 100% minerals (kaolin, borates, alumina, lime, silica sand, soda ash, calcium carbonate, wollastonite)

On the road to 2050, the role played by industrial minerals in continuing to create smart, multifunctional materials and products will be an essential element of sustainable, innovative growth in Europe.
Why Industrial Minerals Matter?

**Construction:**
- Clays, sand, feldspar, kaolin, perlite and other minerals are basic components of all construction materials.

**Detergents:**
- Industrial minerals (bentonite, zeolite) are used in detergents for bleaching and adsorption.

**Information Technology:**
- Industrial minerals are in wires and optic fibre cables. Smart phones and tablets use high purity silica, low iron silica, borates, graphite, lithium, and talc.

**Oil well drilling, shale gas:**
- Use of bentonite in oil well drilling and frac sands and ceramic proppants (silica, kaolin, bauxite) for shale gas extraction.

**Ceramics:**
- Pottery, tableware and tiles are all made of 100% minerals.

**Environmental Engineering:**
- Industrial minerals are crucial in water management, from drinking water purification to waste water treatment. Silica sands are used as filters. Perlite, zeolites and talc as flocculants or adsorbents, bentonite as a degreasing agent, calcium carbonate as a neutralising agent.

**Metal Casting & Foundry:**
- In the foundry sector casting is traditionally carried out in moulds made of silica and other industrial minerals bonded by bentonite.
Paints & Coatings:
Industrial minerals determine many of paint’s properties: gloss, opacity, flow, film toughness, permeability, resistance.

Glass:
The glass industry is a prime market for industrial minerals, for silica sand, limestone, feldspar and soda ash. The colour, brightness and resistance of the glass rely on the properties of the mineral used.

Paper:
Up to fifty percent of paper is made from industrial minerals. The principal minerals used - mainly as fillers or coatings - are kaolin, talc, ground calcium carbonate, precipitated calcium carbonate and bentonite.

Packaging:
Industrial minerals make environment friendly food packaging. A grease resistant pizza box can be made with a mineral-based coating instead of wax reducing carbon footprint.

Electronics:
The central system processor of a computer is composed of silicon, extracted from extremely pure silica sand or massive quartz rocks.

Plastics & Polymers:
Polymeric resins are generally filled or reinforced with industrial minerals. Talc and calcium carbonate give plastic garden tables and chairs their strength.
“Europe’s vision of inclusive growth will require the construction of buildings, schools, hospitals, transportation systems and all kind of services and infrastructure. All that will require industrial minerals. It is as simple as that.”

_Thierry Salmona, Imerys_
The world is changing fast with a rapidly expanding population.

The UN estimates that by 2050 the global population will rise by 40% to 9.6 billion people. \(^{19}\)

While projections for European population growth are lower (at 10%), the population is getting older with the fastest growing segment being people aged 60 and older.

Overall, the planet will be a far more crowded and urbanised place. It’s expected that by 2050, around 70% of the population will live in cities with an increasing middle class.

Global economic growth is expected to be driven by Asia and, as people in these buoyant economies become wealthier, there will be a greater demand for goods and consequently for raw materials.

At the same time, the ever growing need for food and agricultural products may create competition for land and access to water among different industry sectors.

Innovative technologies, many of which will be impossible to develop without industrial minerals, will be required to adapt to this changing world.

Transportation and buildings are just some examples of crucial elements in the move to a low carbon economy, where industrial minerals are used extensively.

**Imagine how we will live and work ....**

In 2050, with more of us living in urban areas, there will be more skyscrapers, multi-story and compact buildings designed to use less water and energy. Buildings will need less maintenance and will last longer by making optimum use of the functionalities of mineral raw materials.

An ageing population will bring its own set of demands and healthcare will become even more important.

The renewable energy market will be mature and industrial minerals will continue to play a major role in the provision of alternative energy technologies, such as wind turbines and solar panels.

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**Fast FACTS:** Industrial minerals are vital for our healthcare. *Borates* allow smart targeting of cancer cells. *Calcium Carbonate* is an essential ingredient in pharmaceuticals.
Imagine how we will travel ....

Smaller, cheaper, more energy-efficient cars. A new generation of cars will use even more industrial minerals. The engine may be ceramic, the chassis may be reinforced with mineral fillers, tyres filled with nano-sized carbon, batteries from metal hydride fuel cells.

A new generation of trams, metros and trains are likely to use electromagnetic levitation. Industrial minerals are used in the production of the steel stator pack with a resin coating which protects against corrosion. Lime is essential in the production of steel and quartz is used as a filler to give the epoxy resin coating its stability and durability.

Space travel – a reality.
A rapid growth in space travel is expected - for science and tourism- thanks to advances in materials technology which will greatly improve fuel efficiency. For instance, industrial minerals are used in sophisticated systems such as in the solar cell diode used to generate voltage in space.

Fast FACTS:
Industrial Minerals are crucial in water management. Bentonite, Calcium Carbonate, Lime and Silica are used to purify water. Diatomite is used to filter microbials from drinking water.
It is all possible

With an expanding population the demands on industrial minerals are growing too. But with fair access to raw materials, the sector will be well placed to supply Europe’s innovative industries with the materials they need to build a sustainable future for us all.
With the right policies and partnerships in place, the Industrial Minerals sector will continue to have a crucial place in the EU economy in 2050, helping to support a European economy which is:

- resource efficient
- low-carbon
- highly innovative
- competitive

**Enhanced resource efficiency**

Europe will have moved to ever more sustainable practices, making better use of its resources throughout the whole life-cycle of products, and "closing the loop" whenever possible.

**Even more recycling**

The sector, in collaboration with downstream users, will have significantly improved the recycling rates of products.

**Increased demand from innovative applications**

There will be an increase in demand for primary raw materials for innovative and high-tech applications as well as for construction to meet the needs of the growing and ageing population.

**Better access to minerals**

An appropriate raw materials policy framework will guarantee a sustainable supply of raw materials from European sources with easy access to mineral deposits.

**Keeping highly skilled jobs in Europe**

The industrial minerals sector will be strongly anchored in Europe and its research and innovation facilities will provide excellent employment opportunities. There will be training and career-development programmes for the increasingly sophisticated and highly skilled workforce.

**Europe setting an example**

European companies will be leading the exchange of best practices and product innovation all over the world, benefiting the global community.

**Engaging with local communities**

Industrial minerals producers will continue to work in close partnership with local communities, to build public infrastructure and services, to provide jobs, and contribute to environmental protection.
“The minerals business is driven by resource efficiency. But resource efficiency isn’t just about using less. That’s only part of the solution. What really matters is “using better” and that’s something which makes sense for every single industrial minerals company in Europe”

Michelle Wyart-Remy, IMA-Europe Secretary General
Resources. Not just using less, but using better

Resource efficiency starts at the mine site: a well operated mine or quarry yields higher volumes of marketable minerals, whilst using less energy and fewer resources. Mine and quarry lifetimes can be extended and productivity boosted by using state-of-the-art technologies such as electrostatic separation and optical sorting to maximise mineral recovery rates.

The industrial minerals sector aims to be increasingly resource-efficient at every stage of the supply chain: from the extraction of raw materials through their use in products and processes to the recycling of the end products. In so doing the industrial minerals sector:

- reduces the impact on the environment by reducing the amount of water and energy consumed at its sites
- participates in the development of innovative techniques and sustainable products with its customers
- enables resource savings through the recycling of the products they are contained in
- preserves eco-systems, and enhances biodiversity
- engages with neighbouring communities.

It starts at the mine site: Resource efficiency starts with sustainable mining and processing. Producing the required quality and saving energy and water through new technologies increases the rate of marketable ore.

Creating value through the value chain: Minerals contribute to creating value throughout the product value chain. By improving the quality and performance of the end product, minerals reduce consumption. They also enable savings in the downstream industry’s production processes, whilst improving the performance of the applications they contribute towards developing.

Giving waste a value: Optimising resource management through the valorisation of by-products and waste contributes to reducing waste streams. Less valuable but optimum grades are supplied to the appropriate downstream markets, increasing mining productivity.

Recycling: Industrial minerals are recovered through the recycling of materials from the products in which they are used. Minerals are recycled at a rate of up to 60% at the current recycling rate of their applications.
A holistic approach

Considering the absolute consumption of raw materials as a guideline to a product’s efficiency will lead to wrong conclusions. In the case of industrial minerals, “using less” is only part of the solution.

Addressing resource efficiency from a holistic point of view, which considers the full life cycle of a product along the entire value chain, allows its environmental footprint to be analysed and reduced at every stage, from cradle to cradle.

The sector is working at EU level, through IMA-Europe, Life Cycle Inventory studies for its products. Data collected at the extraction and processing stages allow the environmental impact of products containing industrial minerals to be assessed and for action to be taken to reduce the overall environmental footprint.

Fast FACTS: Industrial Minerals play an important role in schools and universities. Borates make laboratory glassware heat resistant. Bentonite is used to help ink flow and to help it penetrate the paper.
Many technologies to improve energy and resource efficiency and to reduce CO₂ emissions are already available and will continue to evolve within the industrial minerals sector.

On the road to 2050
In 2050: Specific energy consumption reduced by half

Many technologies to improve energy and resource efficiency and to reduce CO₂ emissions are already available and will continue to evolve within the industrial minerals sector. Grinding efficiency techniques and thermal processes, energy recovery and closed circuits are just some examples. Developments like these should allow the sector’s specific energy consumption to be reduced by a factor of two by 2050.

In addition, the consumption of renewable energy, which is currently used wherever possible, will increase dramatically in the future. For instance, a minerals operation in southwest France owns and runs three hydroelectric power stations of its own. Such initiatives will contribute to reducing the use of fossil fuels.

In 2050: Reduced transport emissions

Water and rail transport is significantly more energy-efficient than road transport. Facilitating and investing in rail and barge transport will lead to a reduction in CO₂ emissions and energy use. This, however, will largely depend on the public infrastructure available.

In 2050: Local extraction and use of industrial minerals

Facilitating extraction permitting procedures close to the areas that need the raw materials where possible, and thus, avoiding long distance transportation, will also contribute to a significant decrease in emissions by 2050.

Transport via waterways currently requires around 20 litres of fuel per 1,000 revenue tonne-kilometres. Rail transport needs about 6.8 litres per 1,000 tonne-kilometres and trucking, around 50 litres (McKinsey MGI study 2011).

Most operations now employ closed-circuit systems in which used water passes through sedimentation ponds before being returned to the process. This results in an extremely modest net consumption of water. For example, the processing of one tonne of kaolin uses some 6 m³ of water, but as much as 98% of this water is recycled internally and re-used.
Heading towards a low carbon economy

Some of Today’s Examples

Harnessing solar power at a sand quarry at Maasmechelen in Belgium.
A 1.5 hectare solar panel park at a quartz sand processing plant is helping the operation move towards CO₂ neutrality.

By exploiting the warm climate of the Greek Island of Milos to naturally dry bentonite in open fields, 35% less energy is used.

At a talc mine in the French Pyrenees, ore is transported to the processing plant by cableway, rather than by truck, providing major savings in fuel and CO₂ emissions.
The EuLA Roadmap

EuLA, the European Lime Association, member of IMA-Europe, wrote a Roadmap for “A Competitive and Efficient Lime Industry – Cornerstone for a Sustainable Europe”. While lime is an important enabling material for many sectors, allowing them to achieve functionalities with a reduced carbon footprint, lime production is a carbon intensive process. This technically well-documented paper looks at what the sector can influence itself, discussing the different options for CO₂ emission abatement in the lime industry via energy recovery, energy efficiency, energy savings and changing the fuel mix.
“Minerals represent an important raw material in the paper making process, they support efficient fibre use and improve functionalities of finished paper products.”

Confederation of European Paper Industries

On the road to 2050
Through their wide ranging properties, industrial minerals are essential ingredients in sustainable products and innovative technologies.

Very often these properties can increase the quality and longevity of products, thereby cutting overall consumption as well as contributing to higher resource efficiency.

For example:

- **Mono-crystalline solar cells** require high purity minerals such as quartz in their manufacturing process. Silicon solar cells are produced from the chemical reduction of quartz. The exceptional characteristics of quartz (resistance to heat, light transmissivity...) are essential to the efficiency of photovoltaic technologies.

- **Car manufacturers** use industrial minerals to improve resource efficiency: precipitated silica and talc lower resistance in "green tyres", improving fuel economy. 1 kg of talc – or other mineral fillers – in the plastic part of a car helps to reduce the weight of that part by 20% which means less fuel used and less CO₂ generated.

- **Flue gas desulphurisation (FGD)** processes make extensive use of calcium products (lime, limestone) for the removal of sulphur oxides from the flue gases. Engineering companies are working on technologies able to remove up to 99% of SO₂. 

**In 2050: A true materials science industry**

The industrial minerals sector has started to evolve towards a “materials science” industry and this will accelerate as developments in Information and Communication Technologies (ICT) and Nanotechnology continue to transform the way we work and live.

For example:

- **Nanominerals** will increasingly be found in a wide range of products such as memory chips, flame-resistant cables, sunscreens and other cosmetics and pharmaceuticals as well as lighter automotive parts.

**In 2050: Greater benefits to society from multi-functional industrial minerals**

Thanks to the multiple properties of industrial minerals, many new uses will be developed in the future.

With more precisely targeted and tailored products in terms of the physico-chemical properties required in their application, customers will increasingly be able to identify the product that provides them with the best performance.
In 2050: Enabling users to improve their own efficiency

They will appeal to downstream users because they are lightweight, inert, recyclable, with high strength, good insulators, incombustible and durable.

In the future, for example, new spherically-shaped and closed-structure perlite (CSP)-based end-products will be used in insulation panels, boards and bricks, mortars and functional fillers, which will be tailored to the construction, manufacturing and chemical industries.

Fast FACTS:
Industrial minerals help to improve our safety on the road. Borates are contained within the chemical trigger that inflates airbags. Feldspar is a vital component of safety glass in windscreens.

Daniel Reuss, Omya (IMA-Europe President)

It's all about competitiveness because we are in a global environment. If you’re European and you believe you want to create a future for the generations to come we will need to be active to defend our interests through innovation, through partnership, through raising awareness, through helping each other understand what we can offer to society in Europe.”
On the road to 2050
Contributing to a resource efficient economy

Moving towards a resource-efficient, low-carbon economy to achieve sustainable growth is at the heart of the EU agenda. The European Commission aims at achieving a circular economy that is “re-using, repairing, refurbishing and recycling existing materials and products”.

This is something the industrial minerals sector is already committing to.

The industry is developing new uses for mined materials. Working on the basis of ‘using clever’ and ‘using again’, waste rock can be considered a resource.

In 2050: Towards a zero-waste business model

In 2050, there will be a greater trend towards the formation of industrial clusters and industrial integration, to allow waste from one process to become a valuable raw material for another.

This maximises the efficiency of resource use and allows the industrial minerals industry to evolve towards a zero-waste business model in which new market opportunities and utilisation of unused minerals in post-mining rehabilitation programmes are key.

Thanks to new technologies, new applications and full use of resources, the sector should be able to improve its productivity by 1% per year.

Industrial minerals recycling

Although industrial minerals themselves may not be recyclable per se, many of them already have second, third, fourth or even an infinite number of lives (as it is the case of glass) in the products that contain them.

Today, the industrial minerals sector estimates that up to 60% of all minerals consumed in Europe are recycled along with the glass, paper, plastics or concrete in which they are used.

The industrial minerals industry has estimated the recycling rates of various minerals.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Recycling Rate (%)</th>
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<tbody>
<tr>
<td>Lime</td>
<td>68%</td>
</tr>
<tr>
<td>Feldspar</td>
<td>67%</td>
</tr>
<tr>
<td>Talc</td>
<td>60%</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>58%</td>
</tr>
<tr>
<td>Bentonite</td>
<td>50%</td>
</tr>
<tr>
<td>Kaolin &amp; Clay</td>
<td>49%</td>
</tr>
<tr>
<td>Silica</td>
<td>73%</td>
</tr>
</tbody>
</table>
In 2050: A 20% improvement in recycling of industrial minerals

With the creation of industry clusters, which will provide a market for recycled materials, recycling will be significantly improved through a combination of factors:

- **Increased recycling rates.**
  The recycling rates of products containing minerals will improve. For instance: Up to fifty percent of paper is made from industrial minerals. The principal minerals used - mainly as fillers or coatings - are kaolin, talc, ground calcium carbonate, precipitated calcium carbonate and bentonite. Paper recycling in Europe, now at 72%, should increase by a further 8%.

- **New recycled products.**
  Some products that are hardly recycled today are, progressively, being recovered into mineral components. This is the case in the recycling of spent refractory materials products used in iron and steel plants. Due to the diversity of refractory products and the presence of varying amounts and types of impurities within the used refractories, it requires rigid control, proper segregation and handling during all phases of the process. The recycled materials may be used as raw materials for refractory products, metallurgical additives, powder coating applications, etc.

- **Increased recyclability of end-products.**
  The industrial minerals industry will work on processes that increase recyclability as well as the compatibility between different products. For instance, surface chemistry applied to minerals can make polymers compatible with one another and therefore increase their recyclability.

**Giving waste a value**

When calcium carbonate is used in the de-sulphurisation of a powerplant it produces flue gas gypsum. This is the case at the Schwarze Pumpe powerplant in Spremberg, the gypsum is supplied as a raw material to the Knauf Plasterboard plant next door.

**Fast FACTS:**

Industrial Minerals are in the operating theatre. Kaolin provides a key component in pacemakers. Feldspar is used to repair bones via bio-ceramic implants.
“The contribution of the industrial minerals sector to biodiversity is something it can be proud of. Quite a number of its mining operations are next to Natura 2000 sites and, through restoration, they are in fact building the initial stepping stones to allow climate change adaptation,”

Sebastian Winkler, Global Footprint Network
More than 700 of the UK’s Sites of Special Scientific Interest are on former quarry sites. And more and more mineral companies around Europe now have their own biodiversity action plans.

The minerals sector cannot choose where it mines – this depends on geology. Few industrial minerals lend themselves to underground mining but the sector takes great care to minimise the environmental and visible impact of its open-cast mine and quarry operations.

And in terms of protecting nature, open surface mining often provides perfect conditions for unique habitat creation. Especially for rare pioneer species, which thrive on the bare rocks and gravel of open-pit mines.

European industrial minerals producers have to submit a full restoration plan. This aims to preserve and improve the ecosystem and fauna on-site during and after extraction.

The Eagle Owl, Europe’s largest bird, had practically died out but has now colonized several limestone quarry sites in Belgium and Germany.

More than 700 of the UK’s Sites of Special Scientific Interest are on former quarry sites. And more and more mineral companies around Europe now have their own biodiversity action plans.
“The Rabenwald talc mine is located in the Pöllauer Tal Nature Park. It is a fascinating site. Visitors to the Park and local inhabitants alike are impressed by the mining techniques, as well as the efforts being made to protect the biodiversity of rehabilitated areas.”

Stephanie Schuster, Manager, Pöllauer Nature Park, Austria

Optimising land use

Although only about 0.4% of the EU territory accounts for mining activities – of which only a part represents the industrial minerals industry – efficiency in the sector can be improved even further through a holistic approach.

For example, soil moved for large infrastructure works could find alternative destinations

Fast FACTS:

Industrial Minerals are a vital part of our daily hygiene programme. Calcium carbonate is used to clean and brighten our teeth.
Long term studies show that the biodiversity in open pit mining sites is even greater than in the surrounding area. \(^xv\)

A French study found that up to 50% of the country’s species could be found in existing or restored quarry sites. \(^xvi\)
“Communication and engagement with local communities enables capacity building for effective management of other relationships and issues”,

Michalis Stefanakis, S&B Industrial Minerals
Engaging with local communities and the workforce

The industrial minerals sector already enjoys fruitful partnerships with people living near to extraction sites and welcomes tens of thousands of visitors to its mines during the European Minerals Day events. Operators want to encourage dialogue to foster mutual understanding of the communities’ expectations and of the social and economic benefits that mining and quarrying projects can bring to local communities, as well as achieving recognition of their wider effects on downstream industries and local, regional and national economies.

European Minerals Day

The EMD is a biannual initiative by the European minerals sector and related organisations, which gives the public an opportunity to explore the world of minerals and discover more about an industry that affects every aspect of our lives. The last edition of this pan-European Open Day played host to 30,000 children and adults at over 180 sites in 21 European countries and 11 in the rest of the world.

www.mineralsday.eu

Fast FACTS: Industrial Minerals give us better food to eat. Bentonite purifies oil for healthy food. Talc provides natural UV protection for fruit as an alternative to chemicals.
Safety – The industrial minerals sector commitment

The industrial minerals industry provides more than 40,000 jobs across Europe and aspires to world class safety practices. The industry has introduced a global effort to improve safety.

In 2050: Improved working conditions

The IMA-Europe Target Zero Injury Strategy sets an aspirational target of zero injuries for the sector, to be reached in two phases:

- A 50% reduction in the IMA Lost time injury frequency rates (LTIFR) by 2016
- A further 50% reduction by 2020

This strategy is being implemented through the sharing of best practices, dissemination of safety alerts and data collection at sector level.

New technologies will also make the sector safer with the further development of automated processes and geo-location.
The European Commission Vice-President and Commissioner for Enterprise & Industry, Antonio Tajani, visited the Omya underground mining operations in Vipiteno, Italy, on the occasion of the European Minerals Day Launch Event (24 May 2014).
“Our commitment as an industry can only be maintained if certain boundary conditions are put in place. We need:

- A level playing field
- A value chain approach
- A uniform access to raw materials in all Member States”

Jean-Luc Deleersnyder, Sibelco Group
An efficient policy framework is needed to facilitate sustainable growth and competitiveness

Europe has sufficient resources of industrial minerals to serve growing domestic and international markets if access to these resources is ensured. Access needs to be granted on a level playing field that enhances the sector’s global competitiveness.

New mind-sets and mechanisms are necessary to develop coordinated approaches to meet the increasing demand for resources in a sustainable way.

Finding synergies between different industries and removing barriers which hamper the expansion of the European resource supply will not only lead to higher resource efficiency but also boost economic development at European level.

The road to a competitive European industrial minerals sector in 2050 depends on a number of policy measures:

A level playing field
The same principles should be applied to all Member States in the same way, as well as to imported goods.

A stable, predictable and favourable business environment
A broad and coherent industrial policy for competitiveness, sustainable growth and employment will not only support new industries, but also enable existing, well-established traditional industries to innovate, invest and remain competitive within the EU.

A regulatory system for a competitive Europe
While striving to accomplish

IMA-Europe is already deeply involved in currently ongoing European innovation initiatives:

internal goals, Europe must not forget the global picture. By implementing a smart regulation approach it will succeed in keeping industry strong and competitive in Europe.

**Realistic taxation levels**
A similar approach is needed for corporate and environmental taxation: shifting from labour taxation to environmental taxation as suggested in the Commission's Roadmap to a resource-efficient Europe, should be carefully examined against its potentially severe impact on the production and supply of mineral resources in Europe, and its consequences along the value chain.

**Competitive energy prices**
Prices will become more competitive through the creation of a single energy market and the development of affordable alternative sources of energy.

**A value chain approach**
Europe should adopt a value chain approach, whereby industry clusters and operations will be identified at an early stage.

This precursory cluster setting will give Europe an important competitive edge over the rest of the world.

**A shift from road transport to water and rail where possible.**
This will require investment in an improved infrastructure network to create a Single European Transport Area.

**Easier access procedures**
Uniform access to raw materials in all Member States needs to be achieved. EU Member States should facilitate permitting requirements and procedures to allow economic growth and regional development.

Facilitated procedures—including in protected areas—mean: cheaper and quicker permitting applications as well as optimum timing and use of mining licenses. Planning systems need to balance competing demands for land-use and create synergies between different users.

**Process simplification**
There needs to be a “one-stop-shop” approach to simplify the permitting process based on the principle of parallel processing and full cooperation between authorities which is successfully implemented all over Europe.

**Continued availability of skills and brains ensured**
Europe needs to set up a programme to ensure the continued availability of skills and brains. Cooperation between industry and academia is key to achieving this.

**R&D Partnerships continue to promote innovation**
Innovation will remain a top priority for Europe and for the industrial minerals sector. Through the promotion of research and development partnerships, there should be ongoing support for innovation.

The move from academic research to market-driven research will greatly benefit the Industrial Minerals industry and the entire value chain making sure that innovative products get to market more quickly.
CONCLUSION
Europe’s industrial minerals sector is ready to face the challenges ahead. With an expanding population, the demand for industrial minerals is growing too.

The industry will continue to use best available technologies and step up its efforts in terms of safety, optimising energy efficiency, resource efficiency and recycling while developing its business model based on an integrated, value chain approach.

Responding to society’s future expectations and needs will only be possible through strong partnership with downstream users, dialogue with communities and commitment to the workforce.

The sector will seek to strengthen its global competitiveness and, with fair access to raw materials, it will be well placed to supply Europe’s innovative industries with the materials they need to build a sustainable future for us all.
IMAGINE THE FUTURE WITH INDUSTRIAL MINERALS

References


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