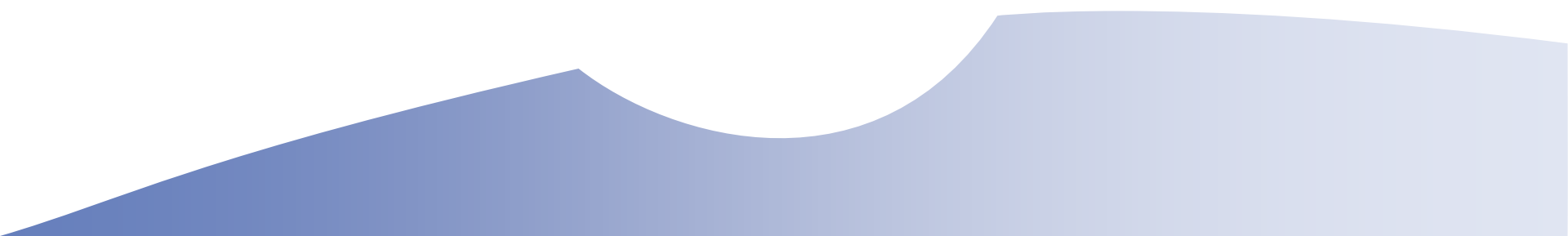


# Mineral Uses for a Sustainable Future - an Industrial Perspective

**Andy Riley**

**Imerys Performance and Filtration Minerals Europe**



# Agenda

- Introducing Imerys
  - Imerys and the Sustainable Environment
  - Mineral Filler for Energy Efficient Truck Tyres
  - Engineered Calcium Carbonate in Non-wovens
  - Sustainable Mining of Mica
- 

# Introducing Imerys

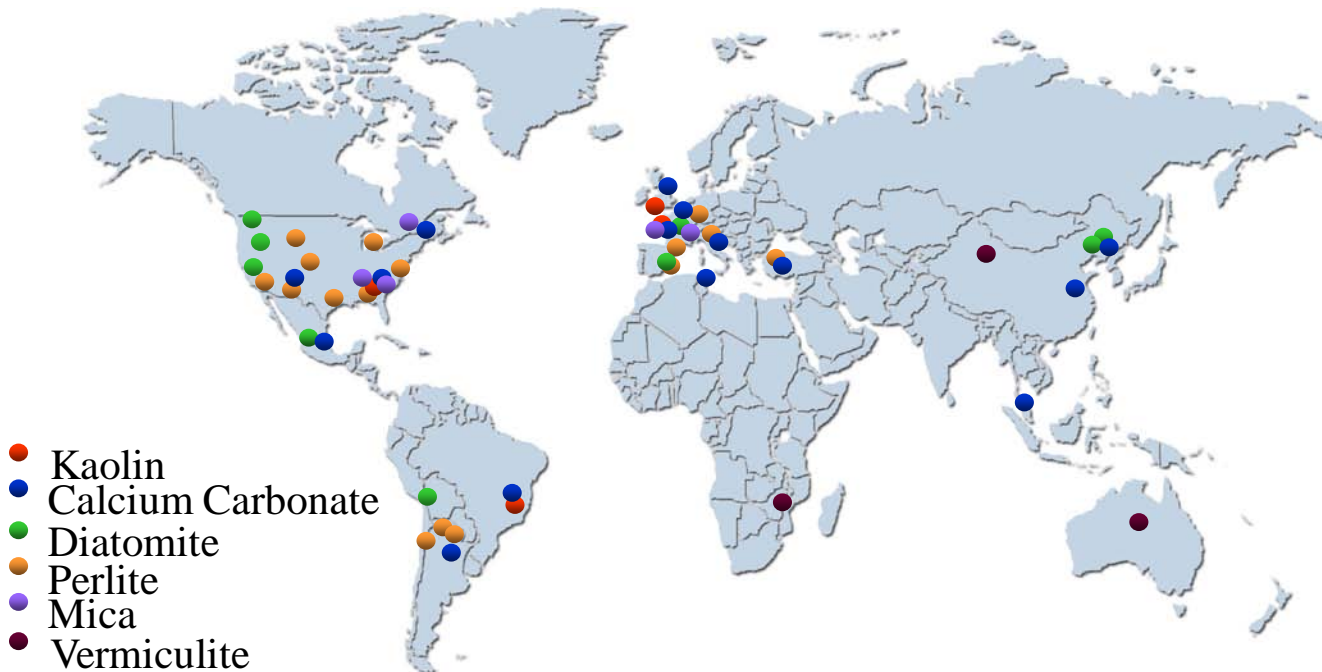
**a world leader in adding value to minerals**



# Profile

Imerys is a leading supplier of industrial minerals that improve the processes and products of its customers

- French company quoted on Paris stock exchange
- Head office in Paris
- 14,600 employees in 47 Countries
- 115 mining sites - 560 million tonnes mineral reserves
- Technical centres in UK, mainland Europe & US
- €2,774 million Sales



# Our Products

## Imerys' Mineral Portfolio - an "A to Z"

- Alumina (fused)
  - Ball Clay
  - Bauxite
  - Bentonite
  - **Calcium Carbonate (ground)**
  - **Calcium Carbonate (precipitated)**
  - Carbon Black (specialty)
  - Clinoptilolite
  - Cordierite
  - **Diatomaceous Earth**
  - Dolomite
  - Feldspar
  - Graphite (Natural)
  - Graphite (expandable)
  - Graphite (synthetic)
  - Halloysite
  - **Kaolin (hydrous & calcined)**
  - Mica
  - Perlite
  - Silica (fused)
  - Silicates (synthetic)
  - Vermiculite
  - Zirconia
- 

# Markets - Consumer Goods → 43% sales

## ➤ Applications for daily life

- Fused aluminum oxide for polishing computer screens
- Diatomite to filter beer & wine
- Carbonates for baby diapers
- Ball clays for tableware
- Kaolin for coated papers
- Perlite for toothpaste
- Graphite for batteries...



# Markets

## - Building renovation & construction → 34% sales

➤ Variety of products for every stage of construction work

- Red clay for roof tiles and bricks in France
- Diatomite for matting paint
- calcined clays for paint extenders
- Bodies for wall and floor tiles
- Fused aluminum oxide for polishing
- Carbonates for window profiles...



# Markets - Industrial goods → 23% sales

## ➤ Infinite usages in industrial equipment

- Abrasives for polishing turbine blades
- Refractory minerals for investment casting
- Refractory linings for high temperature industries (steel, aluminum making)
- Functional fillers for industrial rubber and plastics





# **Imerys and the Sustainable Environment**



# Sustainability - The Environmental Challenge



## ➤ Definition of sustainable development

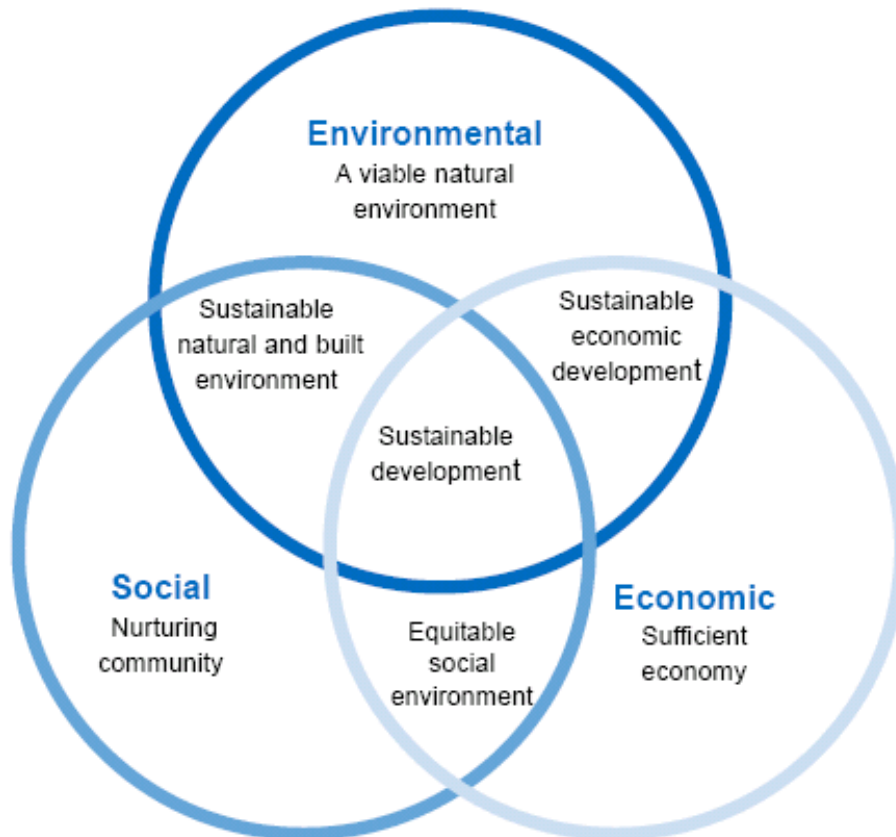
“sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Bruntland Commission ‘Our Common Future’ 1987



# Sustainability - The Environmental Challenge

➤ For sustainable development we must consider environment, social and economic factors equally



➤ Imerys UK uses an Environmental Management System (EMS) conforming to ISO 14001

- sets goals
- performance review/audited
- externally verified (BSI)

➤ Aspects covered include

- waste generation
- air emissions
- water use/discharge
- landscape

# Sustainability - The Environmental Challenge

- The EMS covers company operations including mining, refining, drying and ports and support functions (R&D, IT, Engineering, Purchasing & Landscaping)
- Local community involvement through liaison groups
- Since implementation (2001) environmental efficiency has improved
  - fewer environmental incidents

## Waste Tip reprofiling – Before & After



**EcoLink™**

**Engineered Mineral Filler for Fuel Efficient  
Truck Tyres**

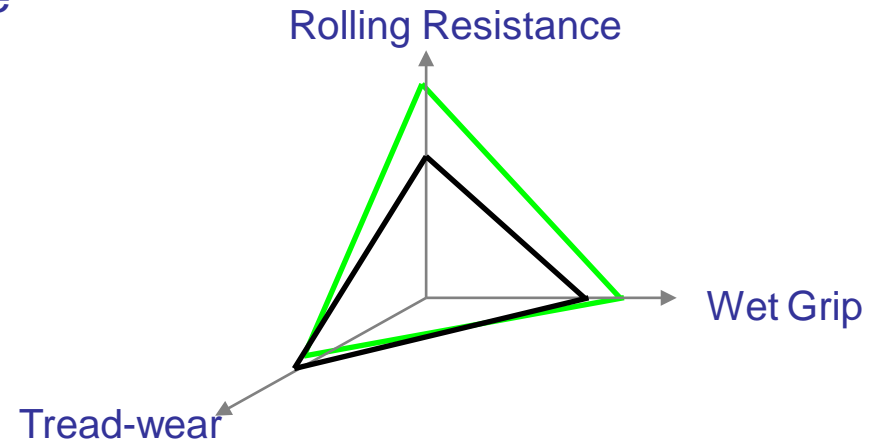


# “Green Tyre” Technology - Background

- When a tyre rotates it deforms as it comes into contact with road surface
- Energy lost during each deformation cycle - produces rolling resistance
- Overcoming rolling resistance accounts for up to 30% of fuel usage
- ~50% of tyre rolling resistance from the tread compound
  - hysteresis losses from elastomer
  - continual destruction/reformation of electrostatic forces between filler particles

## The “Golden Triangle”

- key properties inter-related

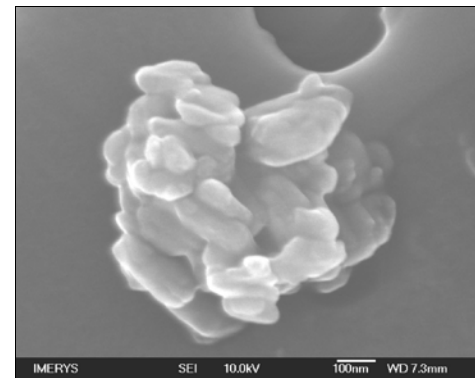
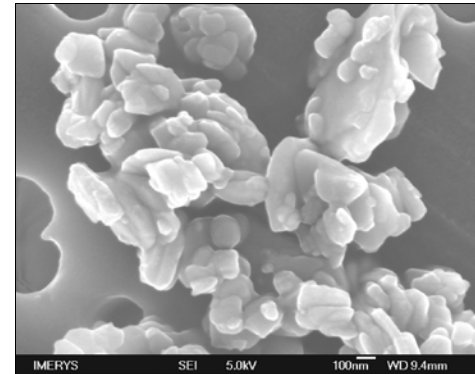
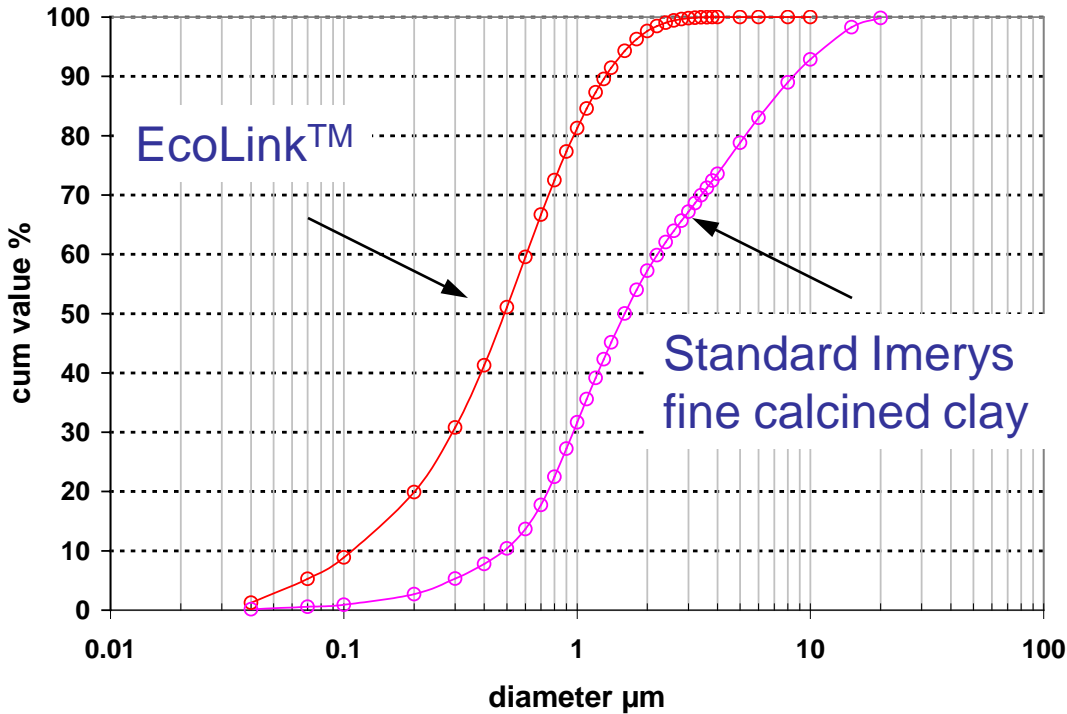


- Tyre companies developed **new tread formulations** combining **synthetic rubbers, precipitated silica and silane coupling agent** - the “green tyre”
  - improved rolling resistance - increased fuel economy by ~5 to 7%
  - improved wet grip (in passenger tyres)
  - tread-wear ~maintained
- **Imerys** developed an alternative approach **partially replacing carbon black** with an engineered kaolin-based filler - **EcoLink™**

# EcoLink™ Characteristics

Heat treated (calcined) kaolin - processed to sub-micron particles

Particle Size Distribution  
Laser diffraction method



## Typical Properties

Specific gravity	2.6g.cm <sup>-3</sup>
Surface area	25m <sup>2</sup> g <sup>-1</sup>
Oil absorption	58g/100g
Particle d50	500nm
surface -OH groups	2 to 4/nm <sup>2</sup>

# Imerys Truck Tyre Formulation

Control		
100	100	Natural Rubber
52.5	43.8	Carbon Black N220
0	20.8	EcoLink™
2.5	0	Process Oil
1.5	1.5	Antioxidant
1.5	1.5	Antiozonant
1.5	1.5	Wax
3	3	Stearic Acid
5	5	Zinc Oxide
1.2	1.2	Accelerator
1.2	1.2	Sulphur

- 27 volume % of carbon black replaced with EcoLink™
- Process oil eliminated from compound with EcoLink™
- Encouraging laboratory trials



# EcoLink™ for Fuel Efficient Truck Tyres

## Truck Tyre Tests - at TARRC UK

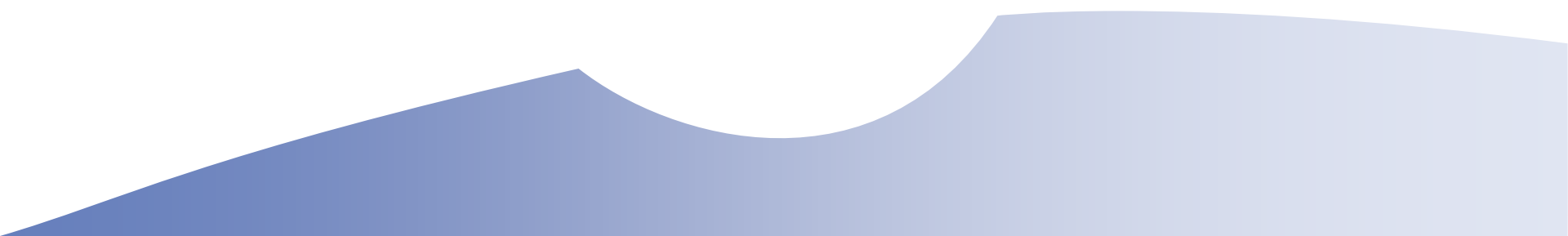
- Tyres : 295/80R22.5 (Michelin XZA Pilote pattern)
- Fitted to twin-wheel drive axle of commercial vehicle tractor unit
- Rolling resistance tests on dynamic test rig
- Tread-wear on UK roads (run for ~30k km)



	<b>Rolling resistance</b> kg force at tyre surface	<b>Treadwear</b> Projected Lifetime %
<b>Control</b>	22.8	100
<b>EcoLink™</b>	20.3	93

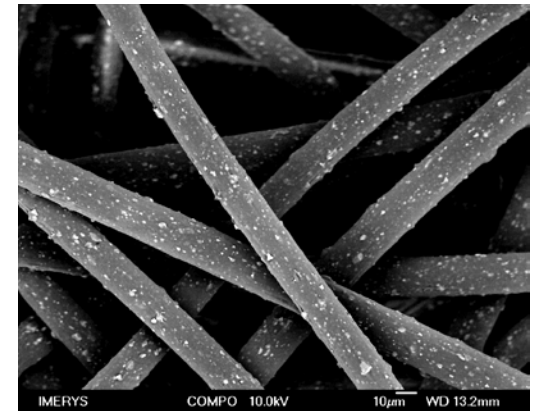
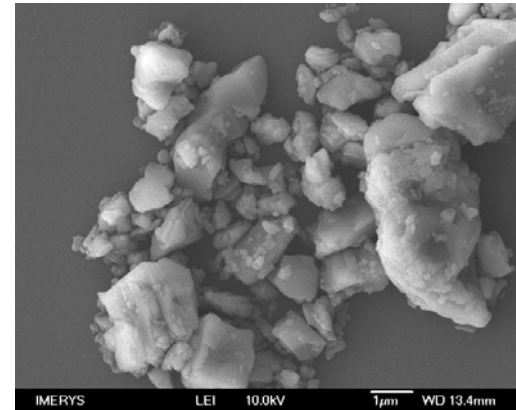
- 11% reduction in rolling resistance - equates to ~3% fuel saving
- Projected 7% reduction in tyre life
- Economics unfavourable (borderline) in 2004 - diesel at pump ~82p/litre
- Diesel currently ~120p/litre - economics better ?

**FiberLink™**  
**Economics & Sustainability**  
**in Non-Wovens**



# FiberLink™ - Economic & Sustainability Value

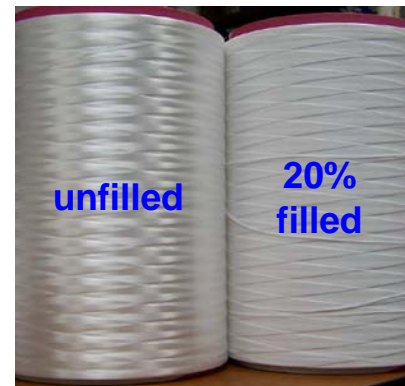
- Nonwoven fabrics finding increasing use
- Traditionally, inorganic fillers have not been used in fibrous products at significant loading levels.
- Imerys has developed FiberLink™, a range of engineered calcium carbonate suitable for nonwoven applications made by spunlaid (meltblown & spunbond) and drylaid (carded) processes.
- FiberLink™ is engineered to enable the amount of resin used in nonwoven production to be substantially reduced without detrimental effect on performance.



*Spunbond*

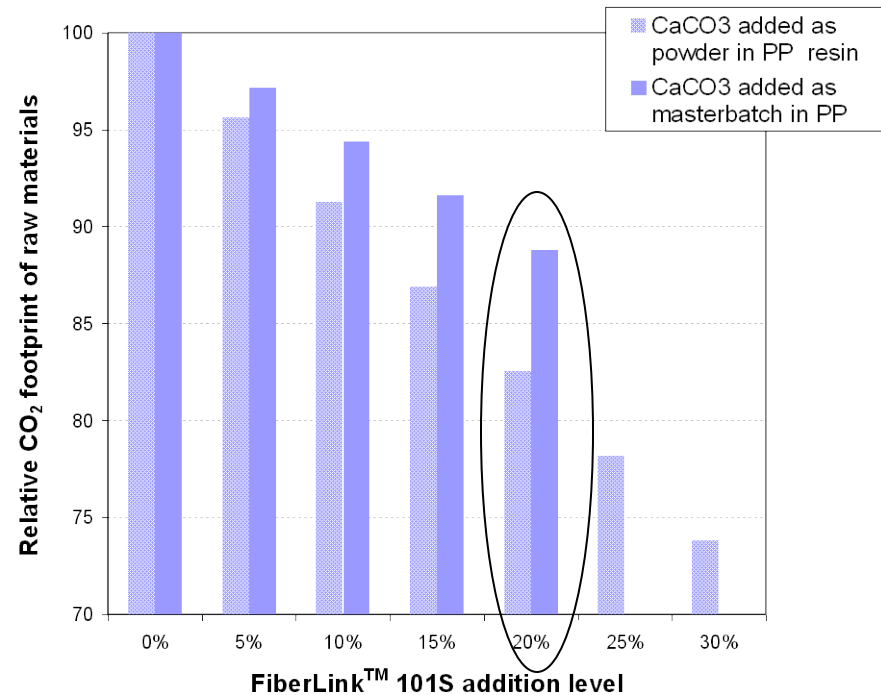


*Melt Blown*



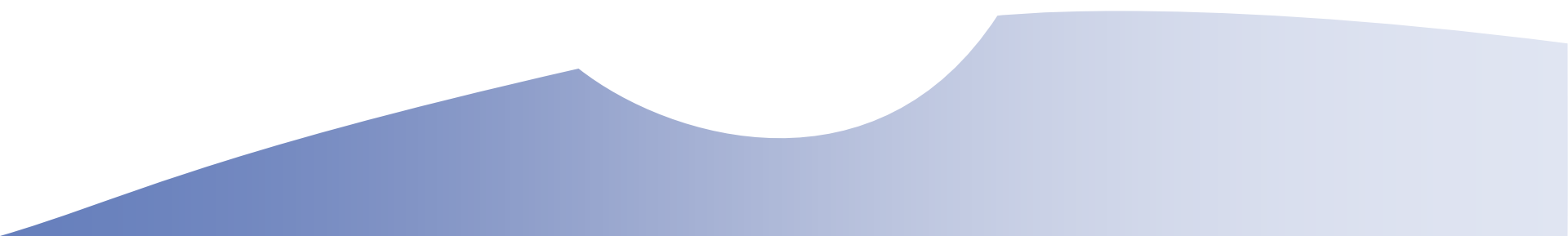
# FiberLink™ - Economic & Sustainability Value

- FiberLink™ is manufactured from a naturally occurring mineral deposit and our LCA (Life Cycle Assessment) has shown that its carbon footprint is much lower than that of petrochemical based resins
- The addition of FiberLink™ reduces the overall carbon footprint of the final product whilst also providing specific performance enhancement in certain applications:
  - Softer tactile perception for wipes
  - Improved opacity for all fabrics, hence potential to reduce TiO<sub>2</sub>
  - Better filtration performance for meltblown fabrics
  - Increased absorption per unit volume (eg. oil sorbents)
  - Performance at lower cost



More at [www.nonwovens.imerys.com](http://www.nonwovens.imerys.com)

# **Sustainable Mining - Mica Dam Reclaim**



# Sustainable Mining - Mica Dam Reclaim

- For over a century, Imerys has mined a kaolin deposit near Lorient in Brittany
- Prior to 1980s waste sands rich in muscovite mica deposited in dams
- Post 1980s mica recovered from kaolin processing as useful product for coatings
- Re-processing the mica dams will allow continued activity related to mica for many years beyond the lifetime of the deposit



# Summary

Imerys recognises the importance of sustainability and promotes this in its activities and culture by consideration of environmental, social and economic factors.

Illustrated with examples of developments that provide opportunities to improve sustainability, offer economic benefit and utilise waste streams.

**Thank you**

