



# Trends towards sustainability for road construction in Europe

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**“Sustainable roads towards 2050 carbon neutrality”**  
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# Five megatrends driving our market

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**Global  
population  
growth**



**Urbanization  
and  
megacities**



**Increased  
demand for  
better living  
standards**



**Digitalization**



**Increased  
demand for  
sustainable  
construction  
solutions**

# The strongest innovation capabilities in the industry



## The global LafargeHolcim Innovation Center in Lyon (France)

is the most sophisticated R&D facility in our industry.



**A network of local Construction Development Labs and technical centers, close to our markets**



**We partner with leading academics, customers, start-ups and suppliers**

to jointly develop new technology-driven construction solutions for our customers.

## Main R&D missions

**Creating value**  
for our end users  
and  
customers with  
innovative solutions

**Anticipating**  
trends and new  
technologies

**Transferring  
innovation to**  
local markets

**1,500+  
patents**

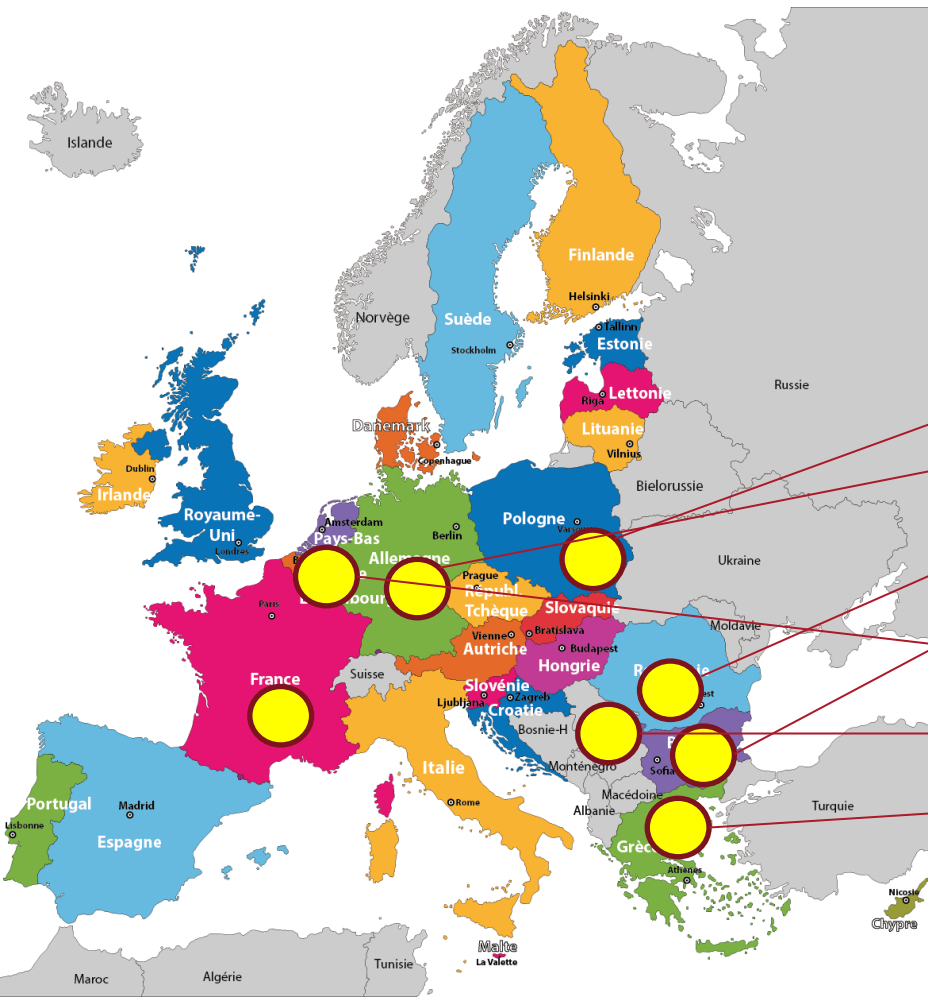
# Local road networks gets more durable with stabilized foundation: A new green deal ?

- A global trend that reached Europe the last years

More extreme climatic events



**Soil stabilization is well installed in Europe**



**FRANCE**

**GERMANY**

**ROMANIA**

**BULGARIA**

**BELGIUM**

**SERBIA**

**GREECE**

**And also solid trend out of EUROPE in  
RUSSIA, AZ, PHILIPPINES, EGYPT, US...**



# Road can use less natural resources with HRBs

## A dedicated lab for R&D



## Cement / Hydraulic Road Binders solutions for difficult soils

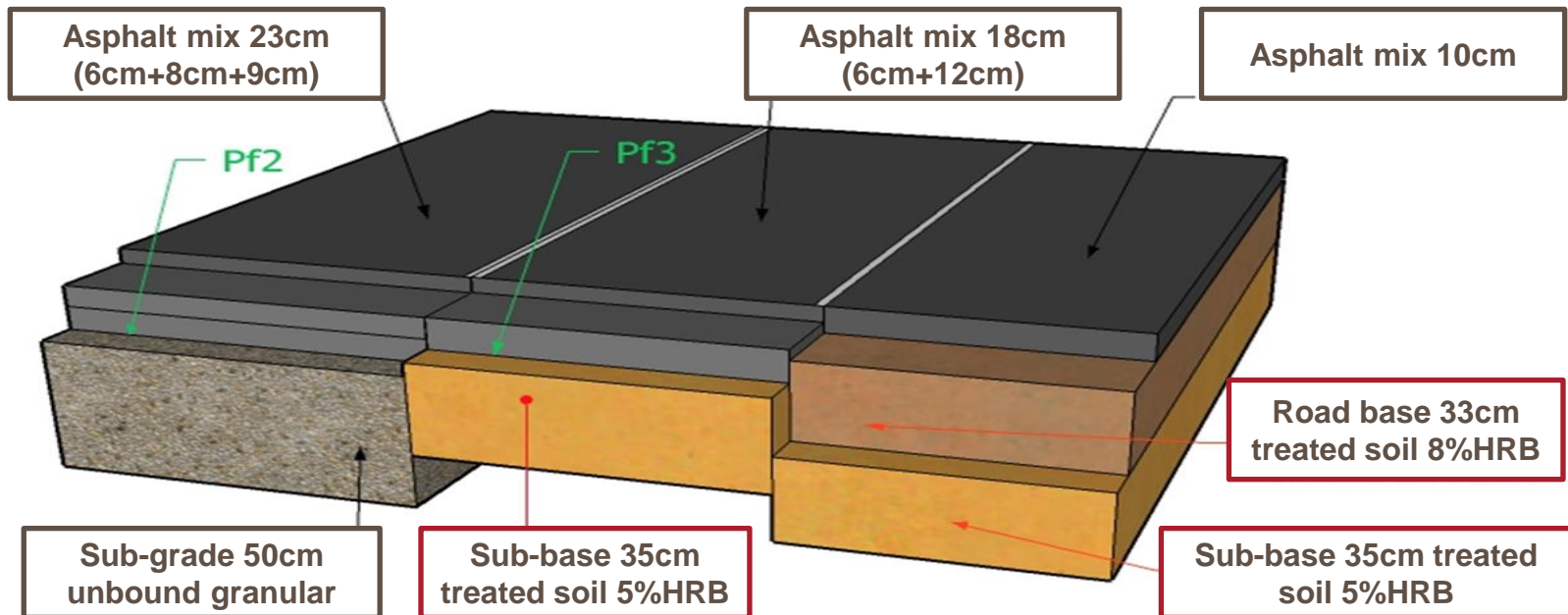
Solutions for clayey / wet soils

Solutions for sandy soil

Solutions for contaminated soils: sulfated soils, organic soils, heavy metals

Solutions for Full Depth Reclamation

Solutions for Deep Soil Mixing



# Road Soil Treatment :

the best material is local on each jobsite...



- **Develop customized solutions adapted to any soils conditions**
  - Clayey,
  - Organic soils,
  - Wet soils
  - Non-cohesive soils...
- **Similarly, road maintenance with full depth reclamation**
  - Reuse local roads as foundations raw materials with retreatments in situ.

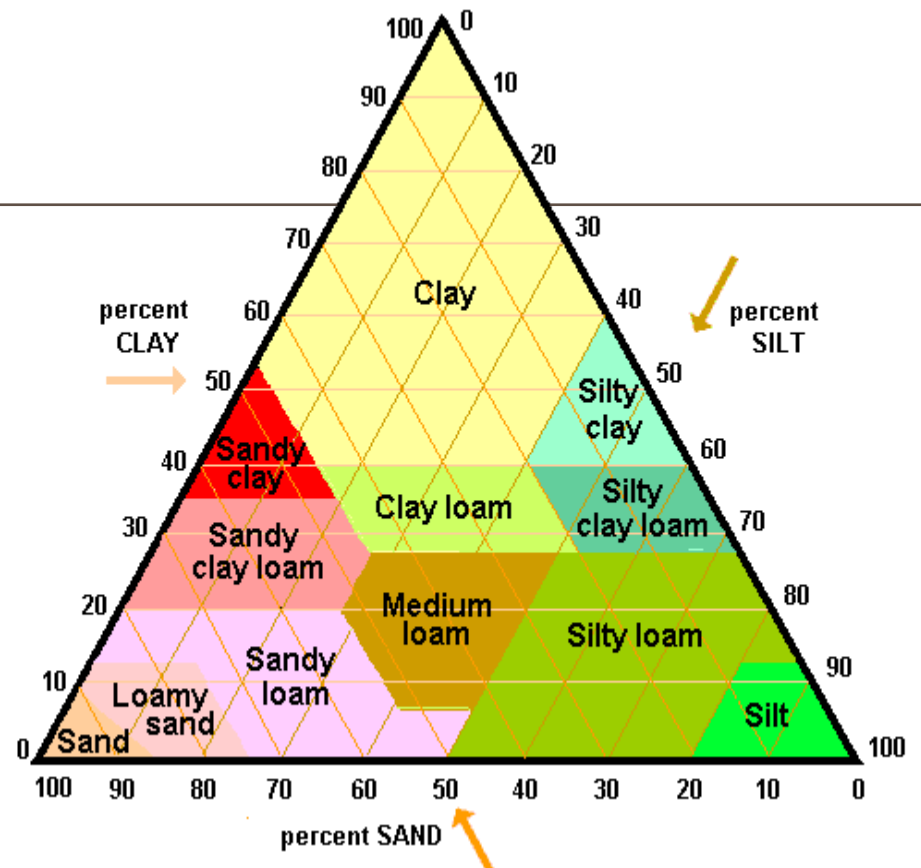
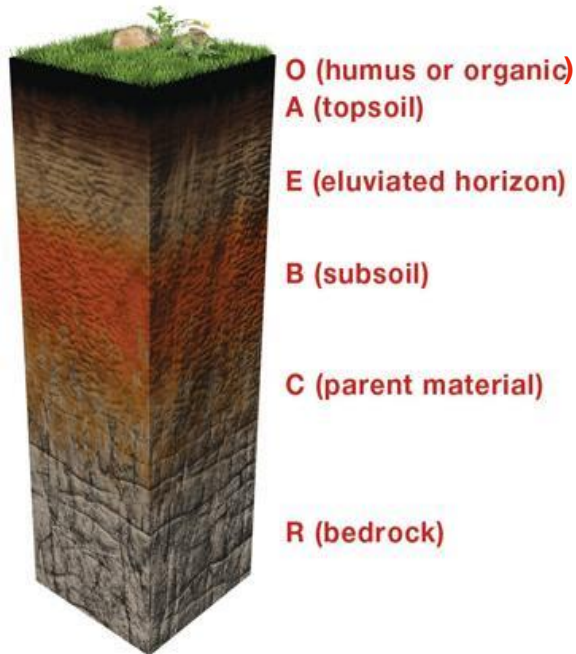
## Sustainability benefits

- “Circular economy” - No excavation, no deposits
- Less natural resources consumption
- Longer service life time
- Less transport, less emission (80km)
- Preservation of side and access roads

## Countries involved

- Actively used in 15 countries (*France, Romania, Belgium, Ecuador, Poland, Azerbaijan, Serbia, Russia, US, Canada, Morocco, Algeria, South Africa, Nigeria, Uganda*)
- under development in about 10 more *Kenya, Ivory Coast, China, Germany, UK, Argentina, Brazil, ...*

# What is a soil ?



Clayey sandy soil



Sandy soil



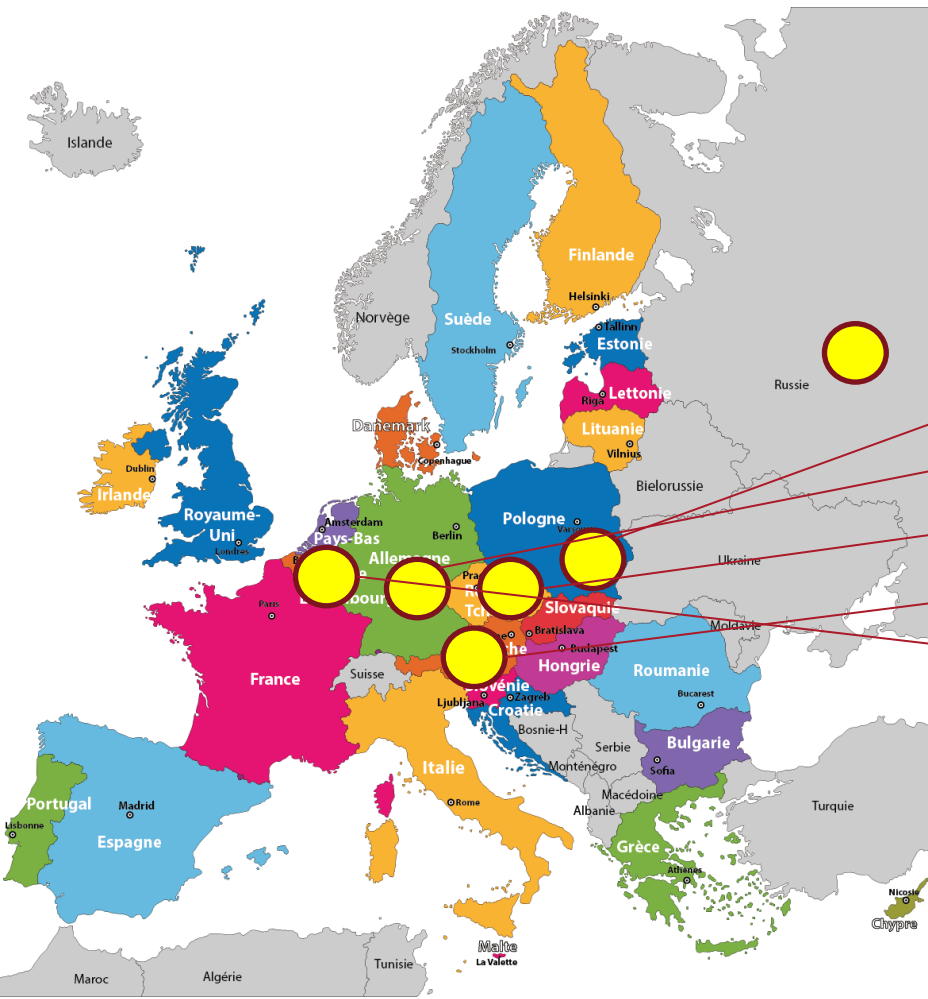
Silty soil



# Resilience to climate change with Concrete pavement : a new requirement for EUROPE

- A global trend that reached Europe the last years

More extreme climatic events



**Rigid and semi rigid structures are becoming popular**

**POLAND**

**GERMANY**

**CZECH REPUBLIC**

**AUSTRIA**

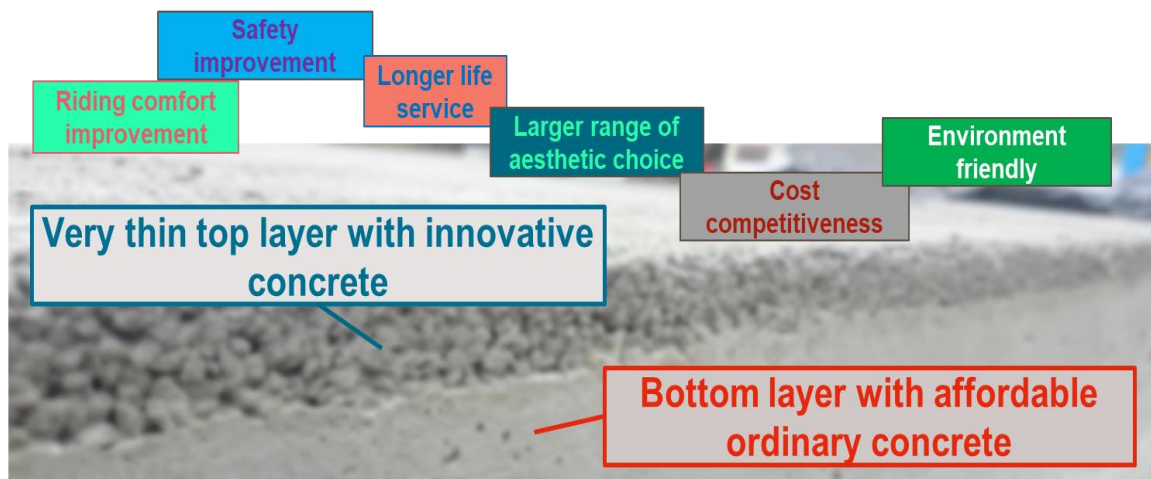
**BELGIUM**

**And also solid trend out of EUROPE in  
RUSSIA, INDIA, PHILIPPINES, EGYPT, US...**



# Next generation with low maintenance composite coating :

Combine comfort and Durability into one pavement system...



## ➤ An innovative coating for Roads:

- Drive safer with high skid resistance for long duration
- More comfortable (fast drainage, noise absorption)
- More durable with low maintenance
- Cost-effective compared to existing wearing course
- Customized colors
- Easy placement

### Sustainability benefits

- Local raw materials optimization
- Low CO2 footprint
- Longer service life time

### Countries involved:

France (full scale testings), Poland (pilot)  
Potential next trials : Switzerland, Germany,

# Rigid techniques can adapt to any needs:

A large range to meet local requirements :



Reinforced Concrete Pavement



Cement Bound granular Material



Diamond grinding  
Re Surfacing

**Our industries are ready to serve a better future**



Roller Compacted Concretes



Two lift exposed aggregates

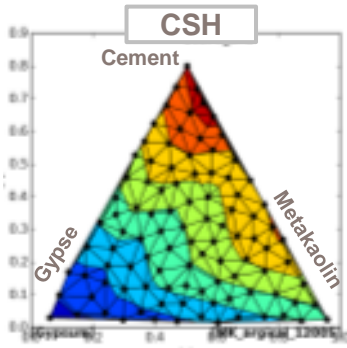


Joint Plain Concrete pavements

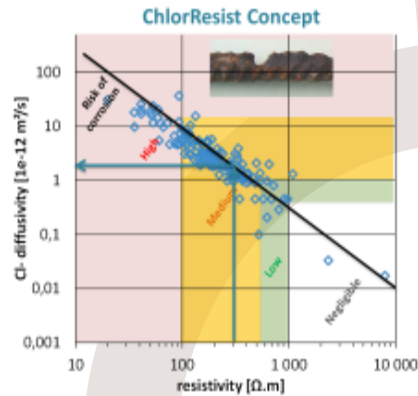
# Durability “equals” sustainability



## Anticipate solution for durability requirements



Coupled transport-chemistry modeling Fast non-destructive method  
Durability indicators  
Service life predictions



Durability tools



Natural weathering



Outdoor exposure sites Long-term traceability Weather data processing

### Characterization

Transport properties  
Hydric properties  
Mineral assemblage  
Volume stability



### Controlled weathering



Carbonation  
Alkali-silica reaction  
Freeze-thaw & Scaling  
Sulfate & Chloride attack



# Circular Economy is a reality, to be « augmented »

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Roads are a natural partners for circular economy :



- needs for large volumes of materials
- Low risk on structures
- Less transport with local remployments..

## Sustainability benefits

- Local raw materials optimization
- Less quarries
- Less transport





# Advanced material engineering remployment with Waste Management for tunnels and drillings:



- Result of excavation usually a combination of
  - Contaminated material → potential reuse as alternative raw material in cement kilns or decontamination with special binders
  - Soil (silt, clay) → potential reuse as landfilling in sand & gravel pits or quarries
  - Mix of aggregates and soil or crushed stone → potential reuse as raw material to produce aggregates for concrete and/or asphalt

## Sustainability benefits

- SDG #12: Responsible consumption and production (circular economy limits the material consumption of natural resources)
- SDG #9: Industry, innovation and infrastructure (circular economy increase efficiency of construction processes)
- SDG #13: Climate action (CO2 decrease)

## Countries involved

Switzerland: several references in the past, especially in Gotthard base tunnel different lots and in urban rail tunnels, usually in consortium with other players (see picture)

France: in Grand Paris decontamination of soils rich in sulfates with a tailor-made binder

Italy: reuse of tunnel excavation material from Metro 4 line construction; in the past use of building excavation material as raw material to produce aggregates

# **We need to accelerate in order to meet our 2050 milestones**

**Because Road unefficiency is not a fatality !**

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Regulations are key to lead the transformation

Road construction sector has not progressed in last 20 years

Industries and technologies are ready !

Procurement rules can still evolve towards :

- **Measurement**
- **Control**
- **Predictability**
- **Digitization**
- **Innovation**

**EUPAVE welcomes the European green Deal !**