



Hrvatsko asfaltno društvo



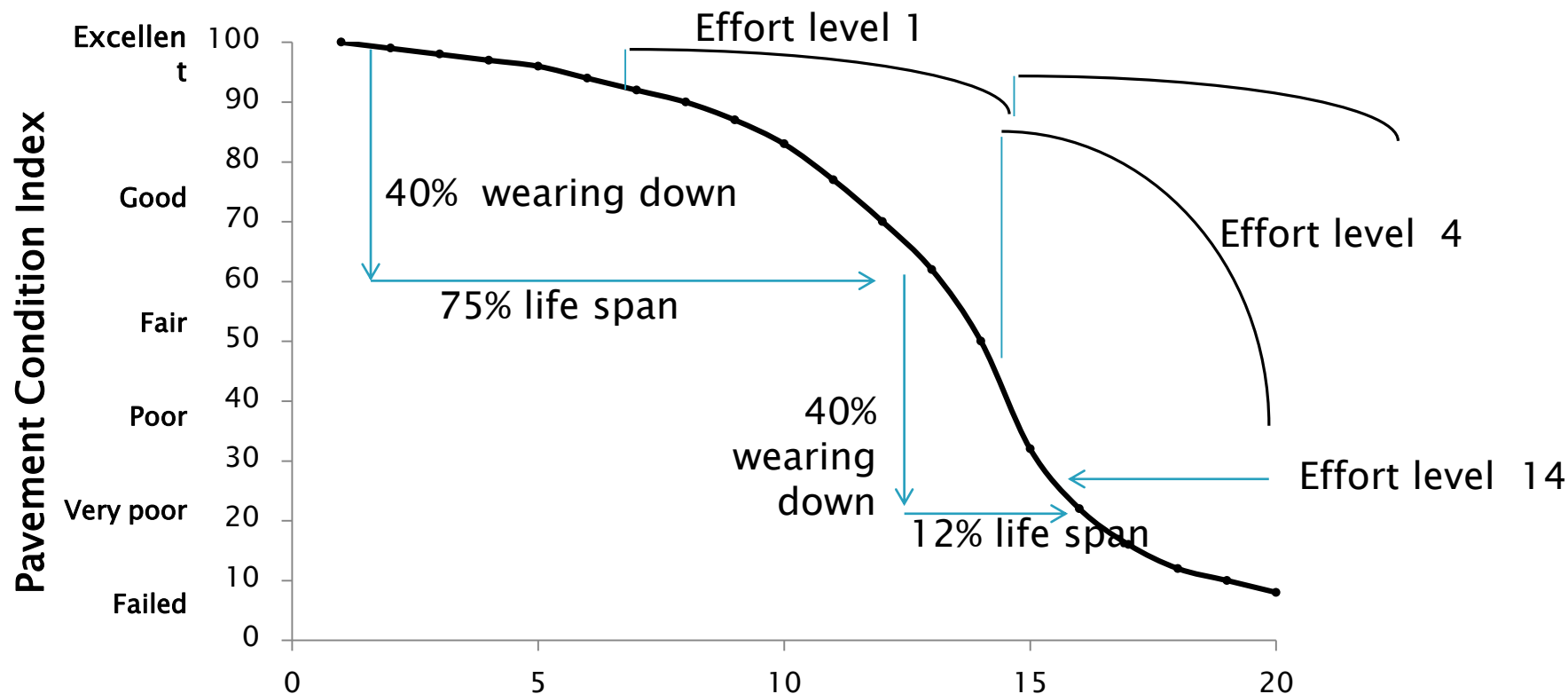
Croatian asphalt association

# Održavanje cesta – obnova korištenja hladnih tehnologija u svijetu Road Maintenance – the worldwide renewal of cold techniques

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Međunarodni seminar ASFALTNI KOLNICI 2017  
International seminar ASPHALT PAVEMENTS 2017  
Opatija, 05.–06. 04. 2017.

# ROAD MAINTENANCE/ ALWAYS THE FIFTH WHEEL OF THE CARRIAGE



Time, years (exact values vary depending on traffic, materials, etc.)

*“well maintained road deteriorates less quick than ones which are not ...”*

*“Regularly investing in maintenance saves money...”*

# TOOLS AND CONCEPTS TO MONITOR AND EVALUATE THE ROADS PAVEMENTS

## PREVENTIVE APPROACH

- Regular surface maintenance
- 2 to 3 €/m<sup>2</sup> every 5 to 7 years
- Network maintenance cost 0,40 €/m<sup>2</sup>/an,
- Constant satisfactory service level, answering to growing social demand

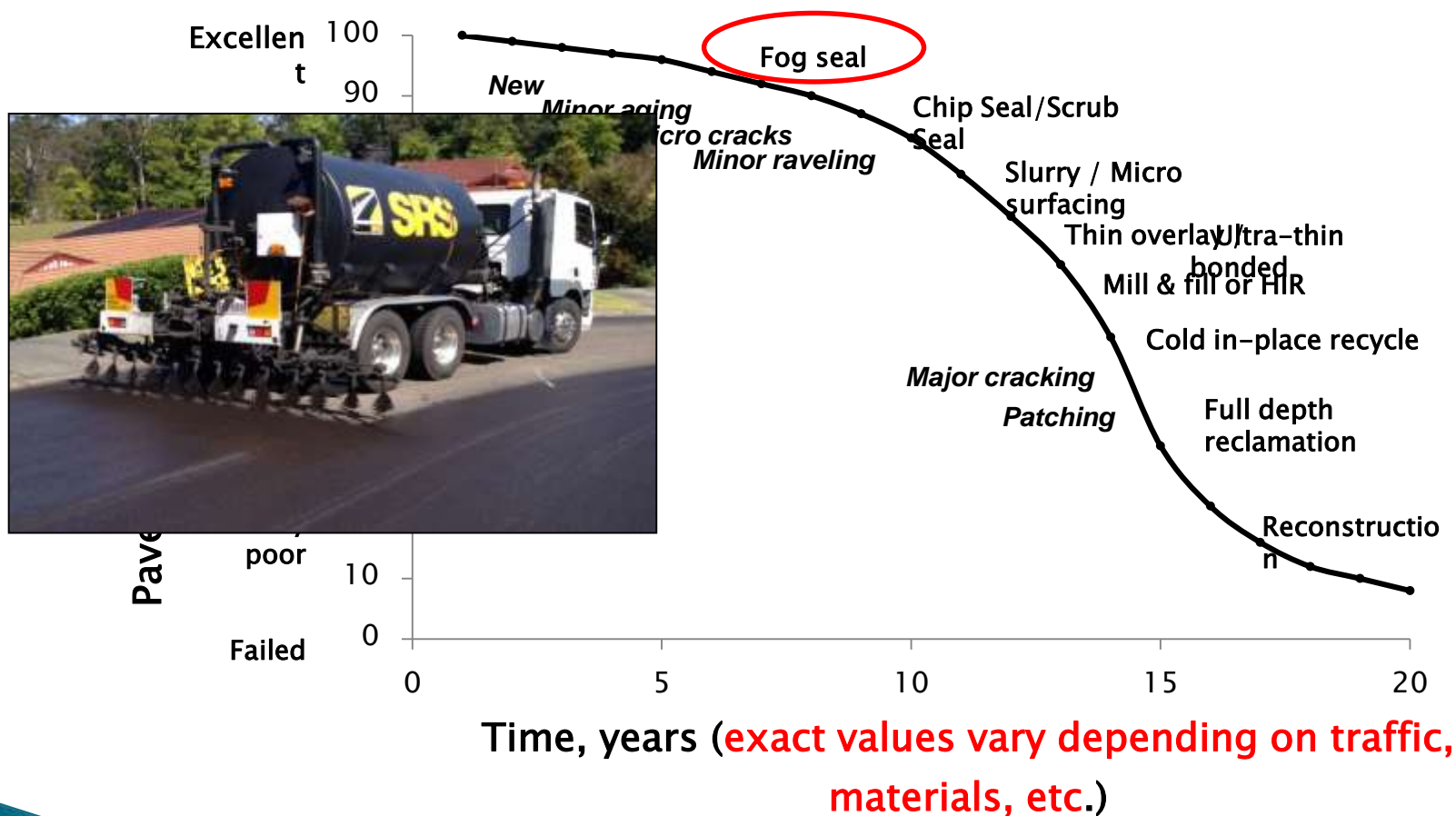


## CURRATIVE APPROACH

- Good service 8 – 10 years
- 2 to 3 euros / m<sup>2</sup> yearly
- Heavy degradations
- Heavy rehabilitation required
- Very low service level quickly



# THE ADAPTED ROADS TECHNIQUES



# THE ADAPTED ROADS TECHNIQUES

- Rejuvenating emulsion is added to reinforce the adhesion between aggregates and binder and to improve flexibility of the asphalt pavement
- Bitumen emulsion is added, small voids, cracks and voids between the stones are filled up



# THE ADAPTED ROADS TECHNIQUES

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- FOG SEAL

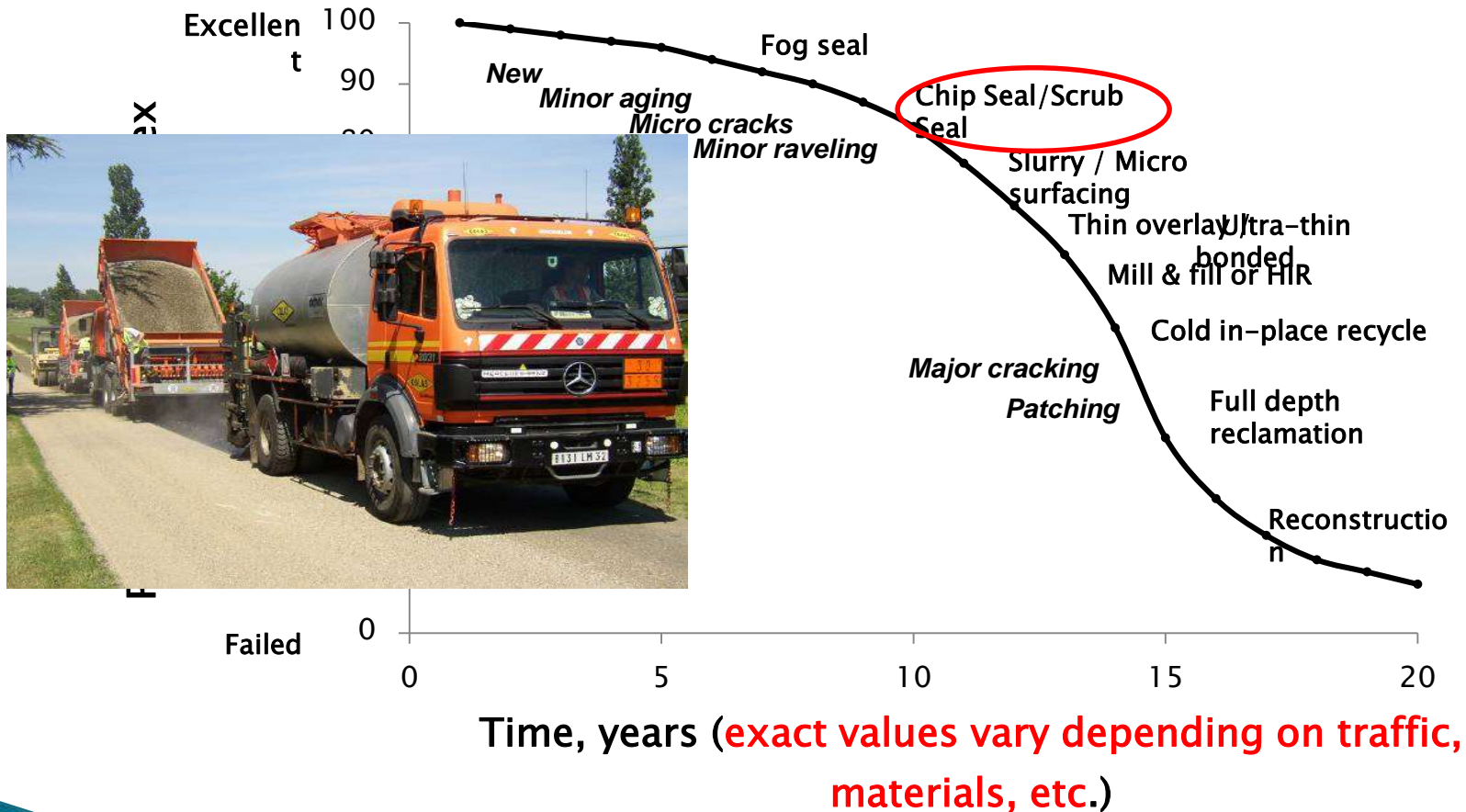
## Before



## After



# THE ADAPTED ROADS TECHNIQUES



## THE ADAPTED ROADS TECHNIQUES

- A “good old” technique, but totally up-to-date, and regularly improved (equipment, designs, emulsions...),
- Best money for value technique,
- Answering a strict design protocol & application procedures,
- Adapted solutions for various traffic conditions & supports types,
  - ❖ Answering clear norms (EU),
  - ❖ Reinforced with fibers,
  - ❖ With PMB emulsion based,
  - ❖ Adapted aggregates grading curve

## SURFACE DRESSING



# Surface treatment



# Surface dressing

## Fields of use

- Maintenance of existing pavements
- New pavement medium traffic

## Advantages

- Skid resistance (safety)
- Drainage
- Waterproofing (structure protection)
- Low cost and high installation output

## Specific advantages for emulsion

- to be used all the year long
- Low temperature
- Energy savings
- Low GHG emissions

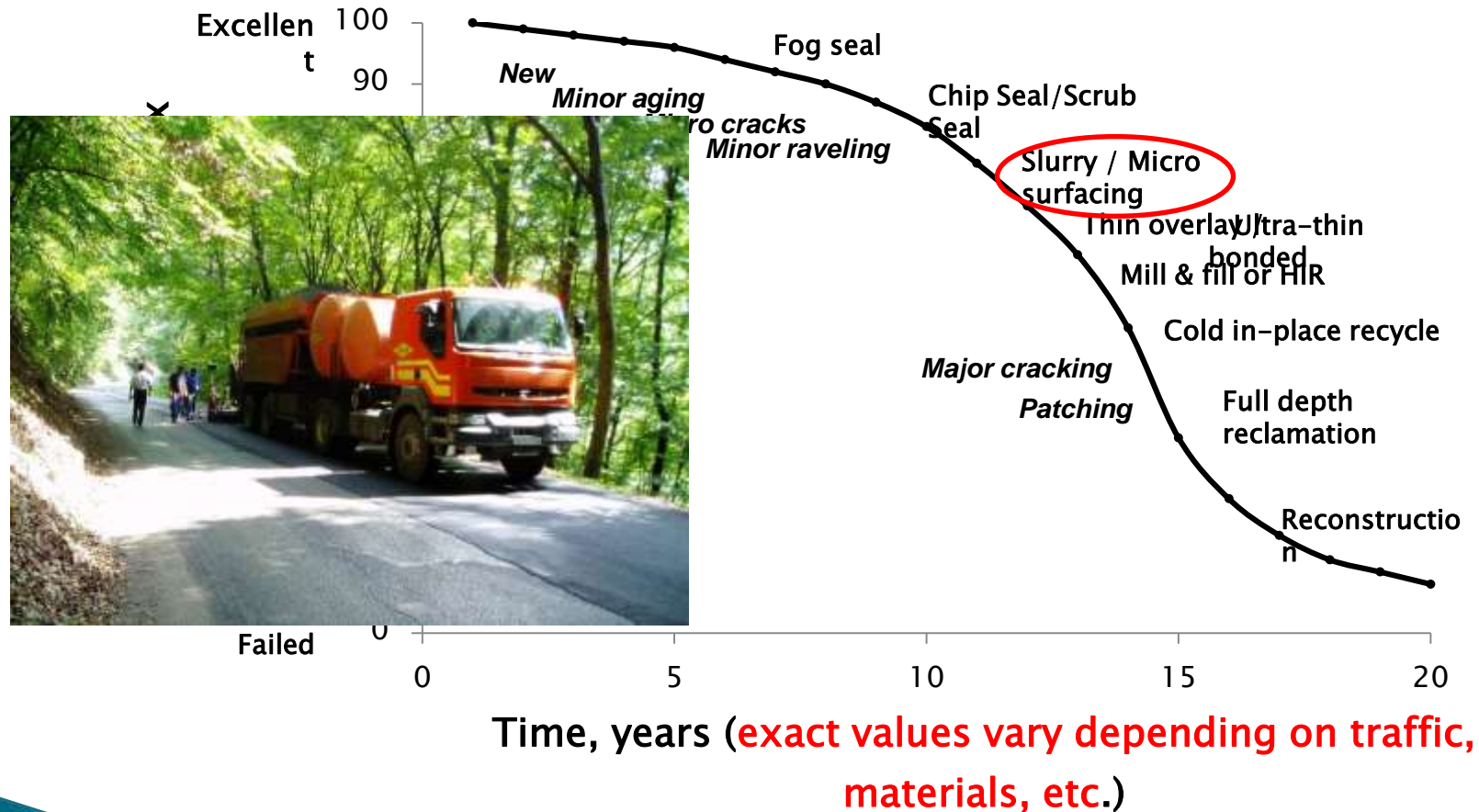




## Single course



# THE ADAPTED ROADS TECHNIQUES



## THE ADAPTED ROADS TECHNIQUES

- Used on roads, Highways, Runways, Urban road, Parking, Cycle paths as wearing course
- Quick installation and reopening to the traffic, Low inconvenience to road users
- Low thickness – no threshold issue, Flexible operations, No loose material
- Cold technique + very thin layer: energy savings and natural resources preservation

## MICRO SURFACING



# Micro surfacing

## Fields of use

- Roads, Highways, Runways, Urban road, Parking, Cycle paths as wearing course, or as tack coat or as SAM or SAMI
- 

## Limitations

- no reinforcement effect , two layer surfacing when surface deformation,
- preliminary works can be necessary (cracks, etc)

## Advantages

- Quick installation and reopening to the traffic, Low inconvenience to road users
- Low thickness – no threshold issue, Flexible operations, No loose material
- Cold technique + very thin layer: energy savings and natural resources preservation

## Performances

- Waterproofing: pavement protection, good skid resistance
- Rolling noise = AC & < chip seal

# COLFIBRE



ASFALTNÍ KOLNÍCI. Opatija,  
2017.04.5-6

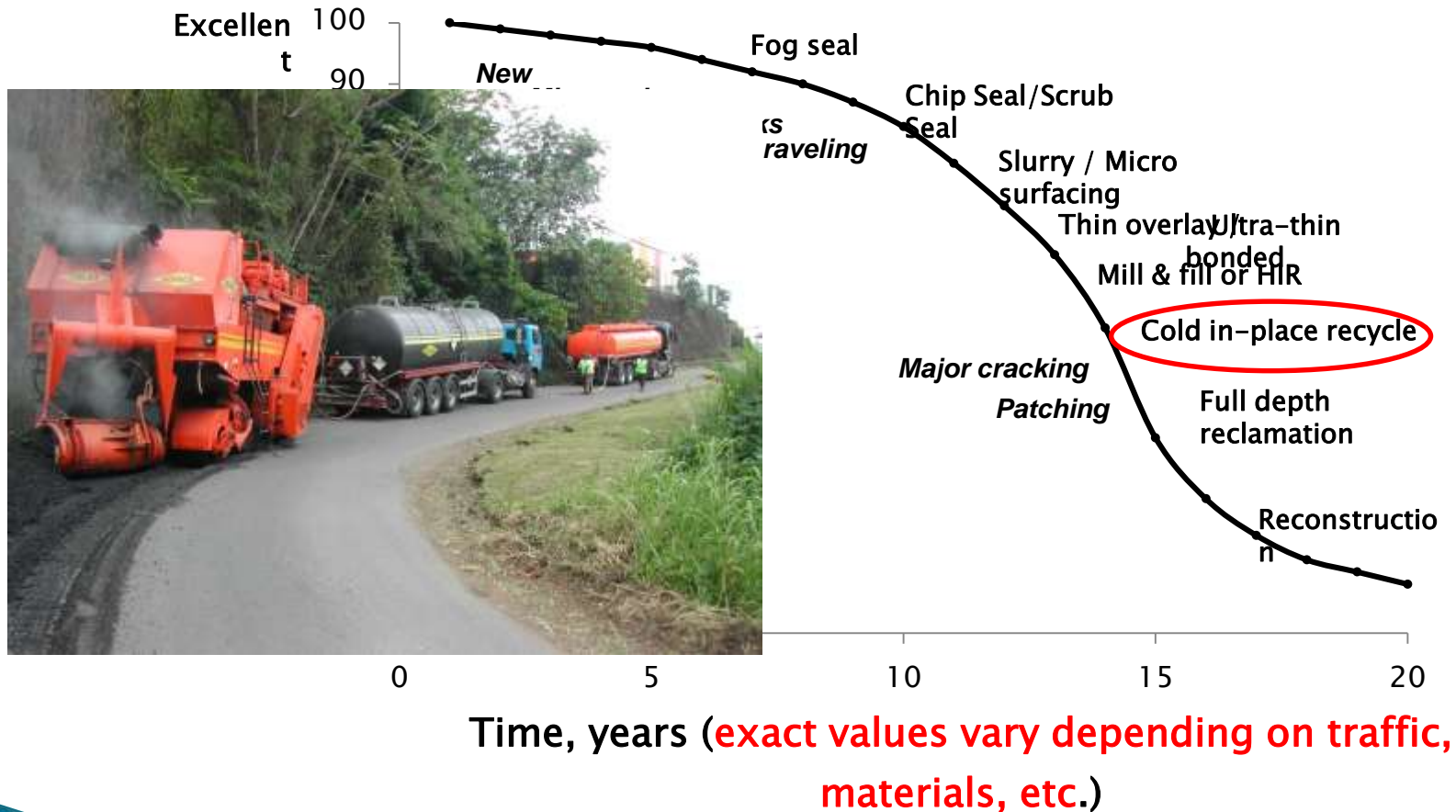
# COLFIBRE



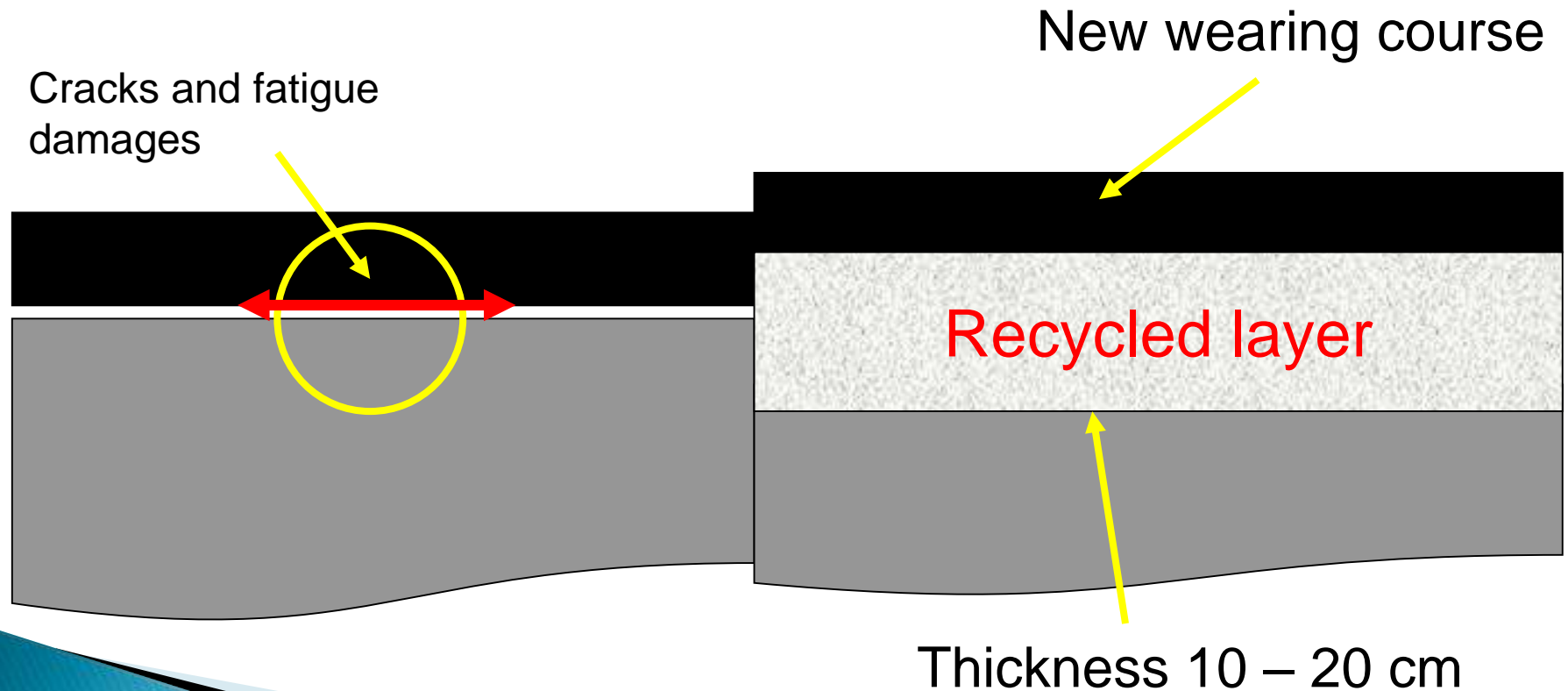
# COLFIBRE



# THE ADAPTED ROADS TECHNIQUES



# cold in place recycling; old road with structural damages



# Novacol

## Cold in-place recycling

Cold in-situ recycling process consists:

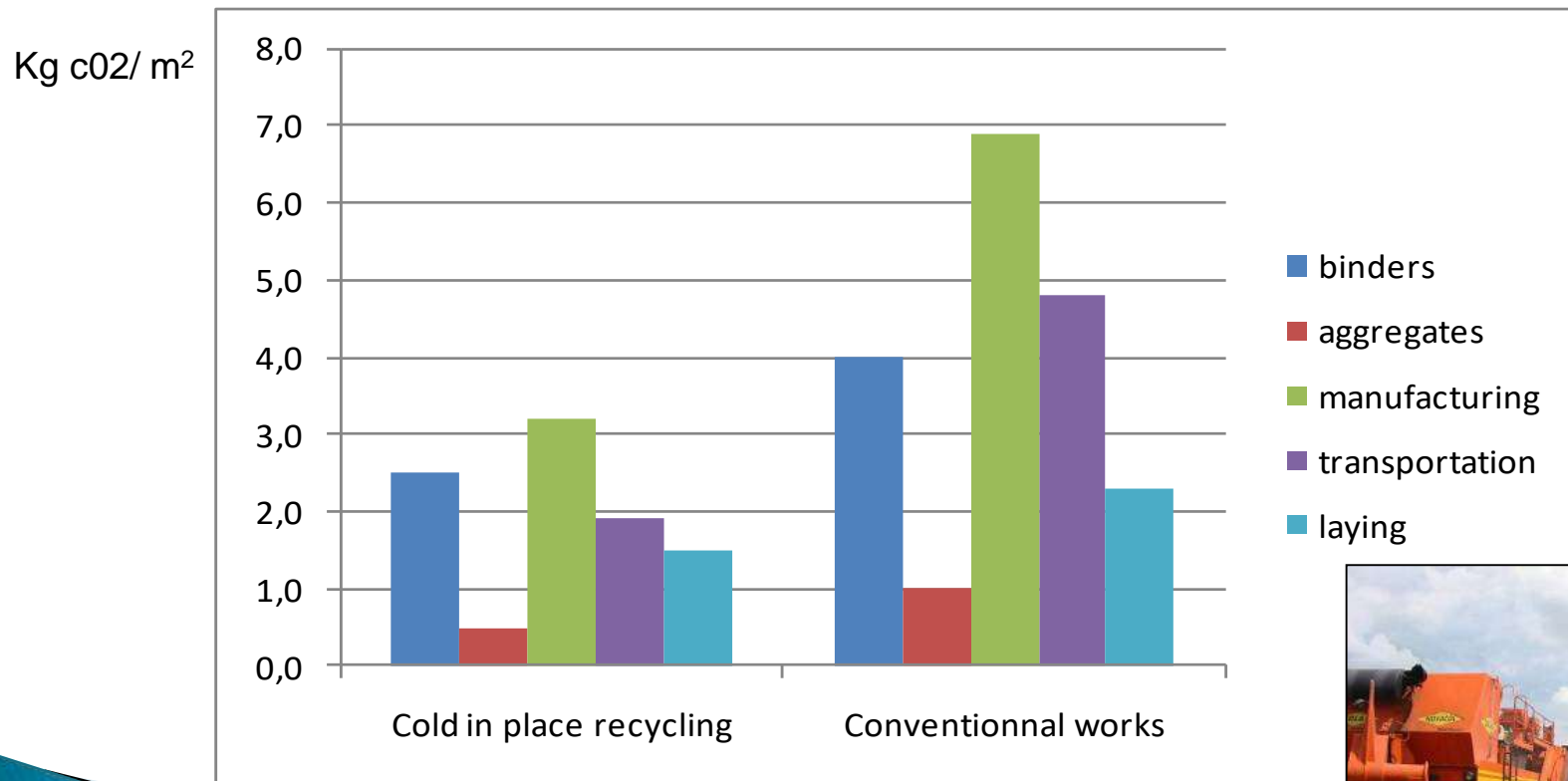
- milling or crushing the old pavement, up to 20 cm depth,
- and incorporate in the same time in the fragmented material an bituminous emulsion, to stabilize the recycled layer in order to give it rejuvenation and cohesion.

The mixture is laid and compacted to reconstitute the binder course



# In situ recycling: energy saving

## A case study (2007)



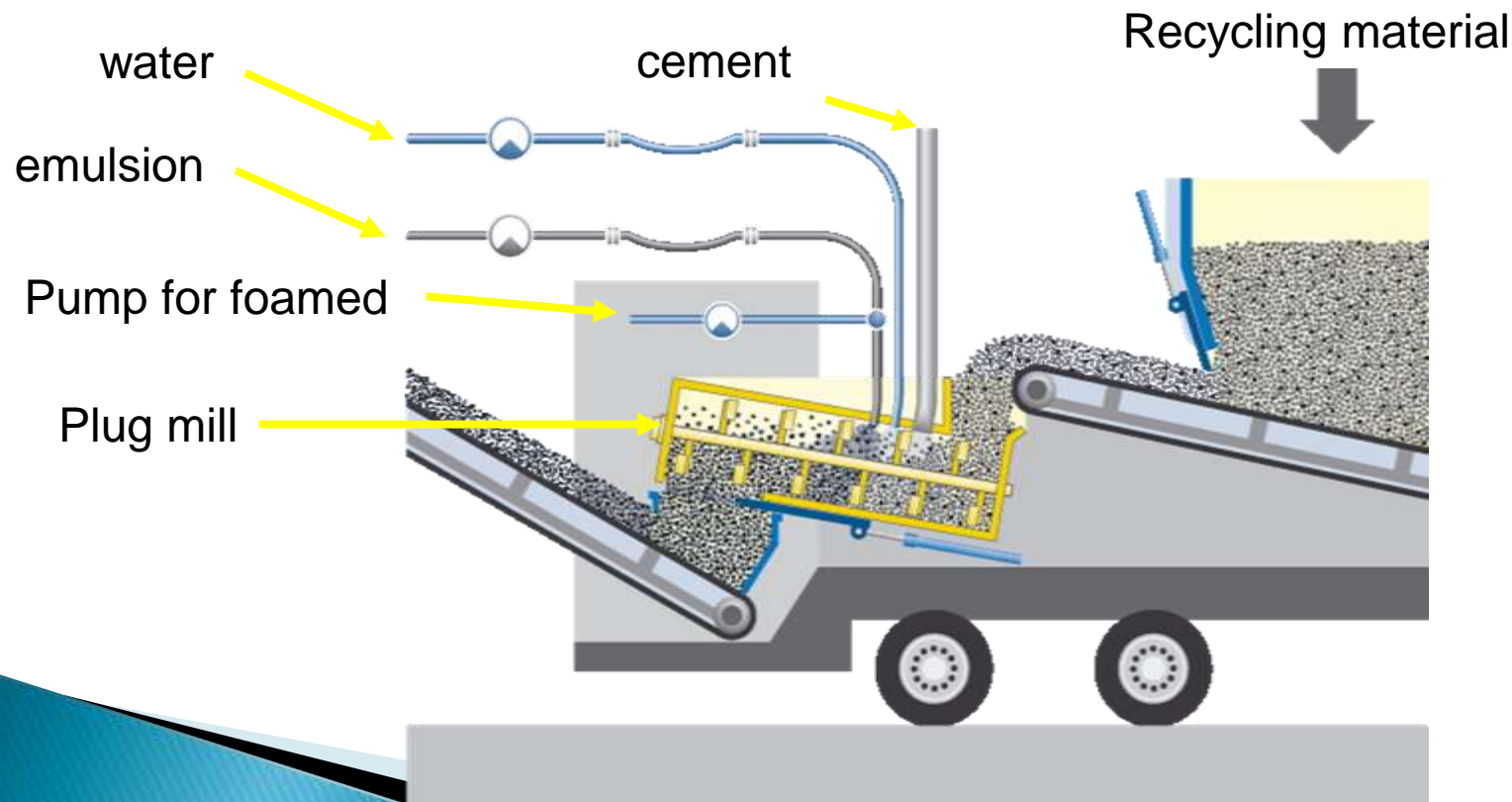
# Novacol: Cold in-situ recycling

## ADVANTAGES

- ▶ To save new material by the re-use of whole in place
- ▶ To reduce the energy consumption
- ▶ To reduce the need for transport
- ▶ To limit the ancillary works (adjustment of levels, raising kerbs)
- ▶ Very economic about 30% less traditional techniques
- ▶ Environmental less G.E.S.
- ▶ To reopen the roadway to traffic immediately
- ▶ To recycle only one lane if necessary
- ▶ Etc...

# Second technic: VALORCOL

## Cold recycling in place using technology in plant

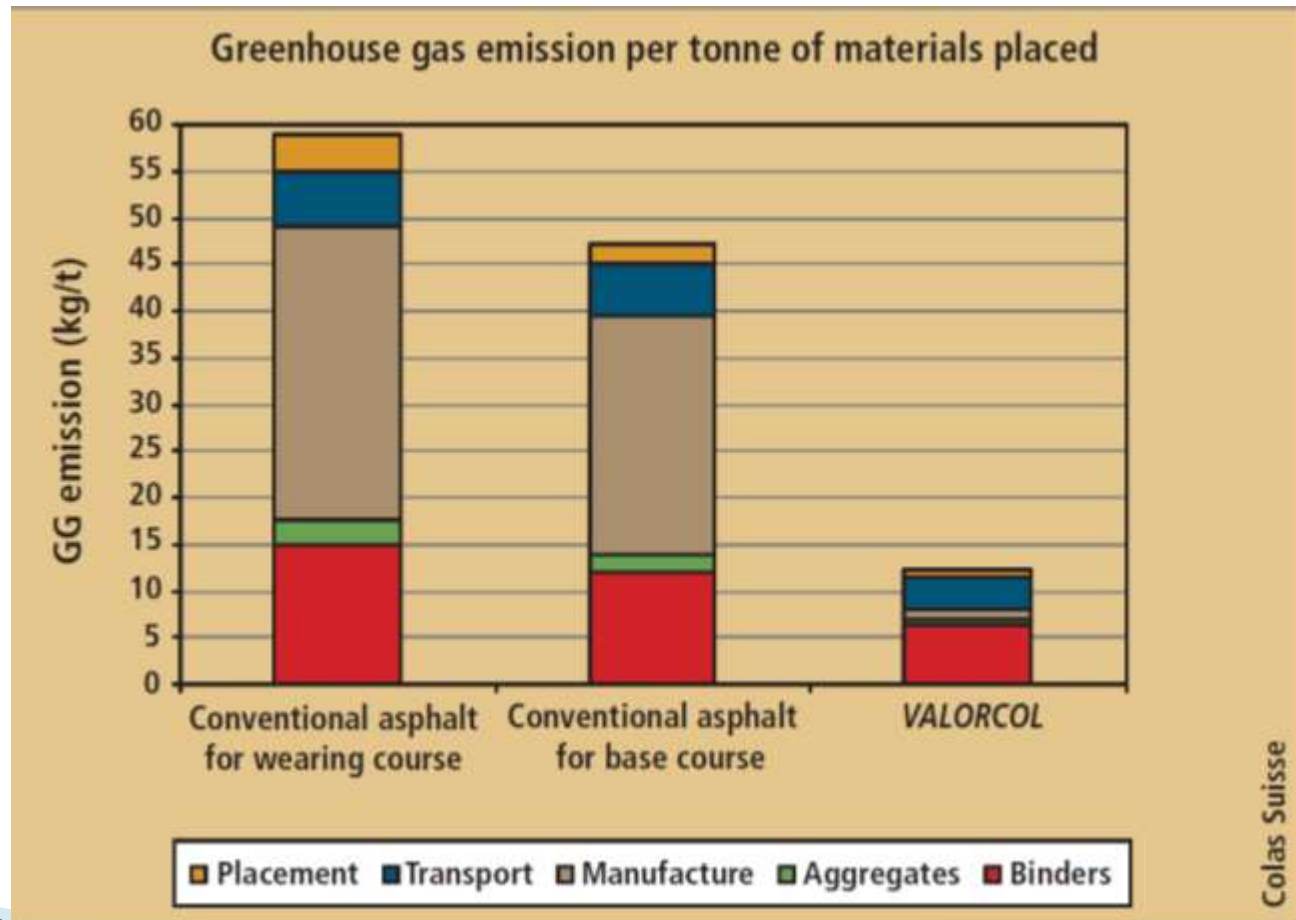


## THE ADAPTED ROADS TECHNIQUES

# In plant cold recycling

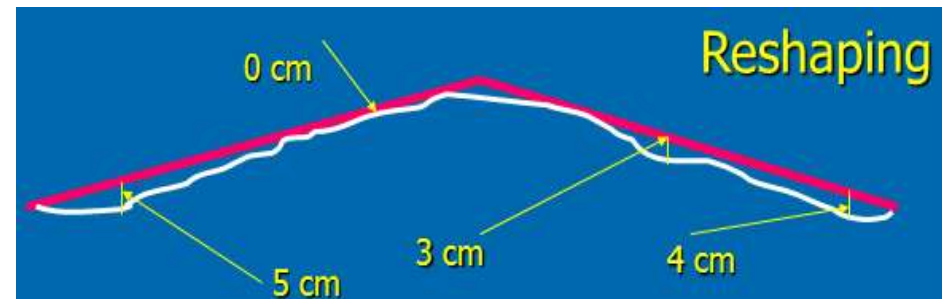


# C02 emission per Ton compare to VALORCOL



# Gravel emulsion

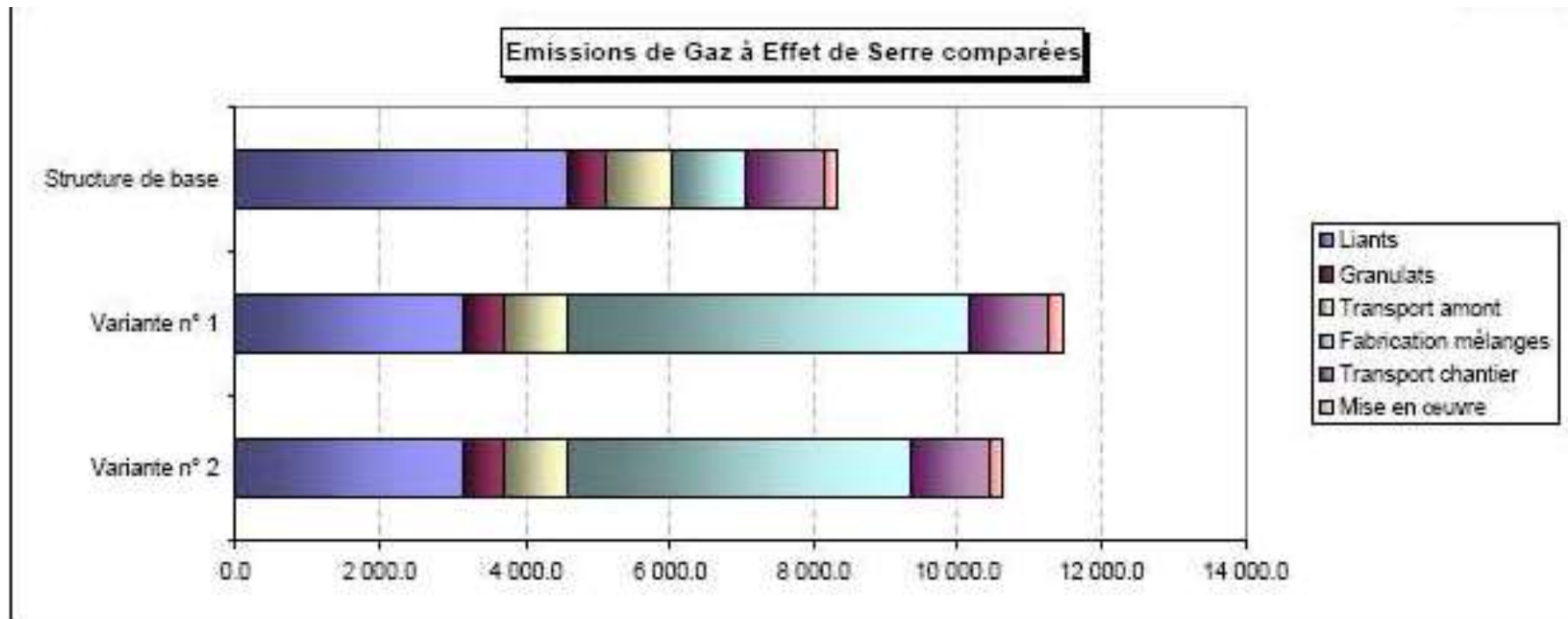
- Cold mix,
- Asphalt levelling or base course with emulsion (from 0 up to 9cm),
- Best repair method on badly damaged roads,
- Cold product : flexibility of use, extended transport distance, possible laying with grader in one single layer,
- No traffic interruption,
- Manufacturing, transportation, & compaction: conventionnal



# Gravel emulsion



# Green house gas effect



Structure de base: gravel emulsion

Alternative 1: traditional asphalt concrete base

Alternative 2: warm asphalt concrete base

# Cold asphalt concrete

## Manufacturing

- ✓ Cold mix plant
- ✓ Specific equipment that include placing



## Placing

- ✓ Paver
- ✓ Specific equipment that include manufacturing



# Cold asphalt concrete

## Advantages

- Low impact on the environment
- Easy and flexible use
- Suited to low bearing capacity surfaces
- Good skid resistance (similar to AC)

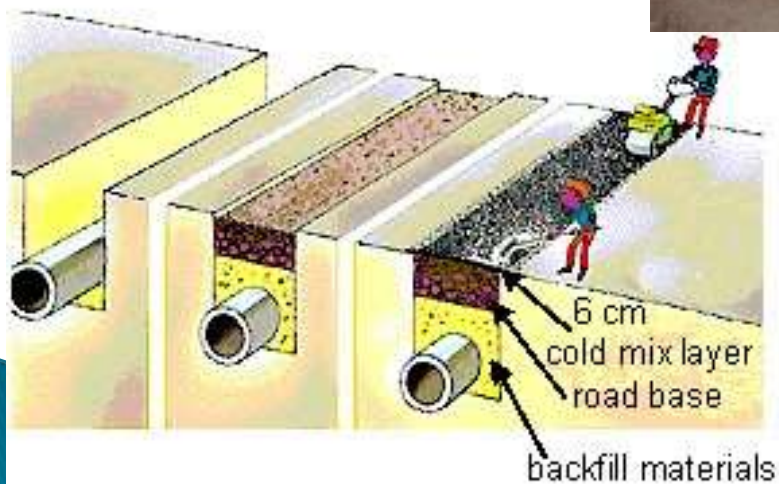
## Fields of use

- Surface course
- 3 to 5 cm thick
- Low bearing capacity pavements
- Low to medium traffic ( $< 300$  HV/d)



# Cold mix for patching

Use of cold mixes for pavement repair after refilling a trench



## THE ADAPTED ROADS TECHNIQUES

# Jet Patching

- General maintenance,
- For potholes and localized patching works,
- Adapted emulsion,
- Totally coated mixes,
- Easy working and important productivity.



# Storable cold mix



## THE ADAPTED ROADS TECHNIQUES

# Cold storable mix



Compomac in France (2014):  
*264 000 t produced*



## Immediate opening to traffic



**Emulsion asphalt mixes**



**Micro surfacing**



**Emulsion recycling of pavement materials**



**Chip seals**



**Emulsion techniques are energy efficient and limit greenhouse gas emissions**