



Environment



Agriculture
& forestry



Iron and steel



Building
construction



Civil
engineering



Chemicals

Hydrated Lime in Asphalt Mixtures: An International Perspective

D. Lesueur - Technical Expert

European Lime Association (EuLA) Civil Engineering Task Force

didier.lesueur@lhoist.com

Lime in Construction: It's a Game of two Halves

A seminar from the British Lime Association

Arsenal Emirates Stadium – Thursday 24 Oct. 2013

Hydrated Lime is a Multifunctional Additive that increases Asphalt Mixtures Durability



Environment



Agriculture & forestry



Iron and steel



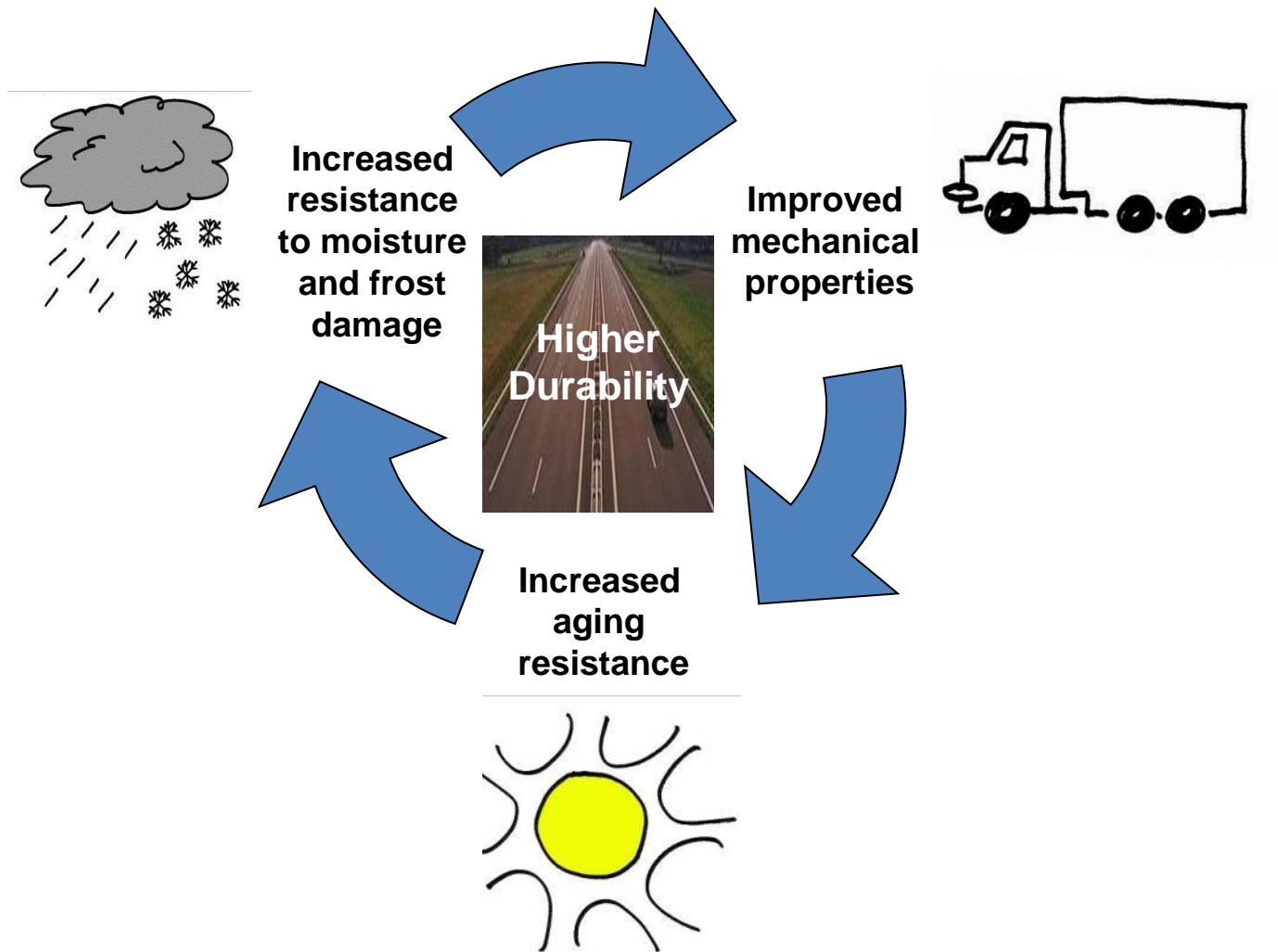
Building construction



Civil engineering



Chemicals



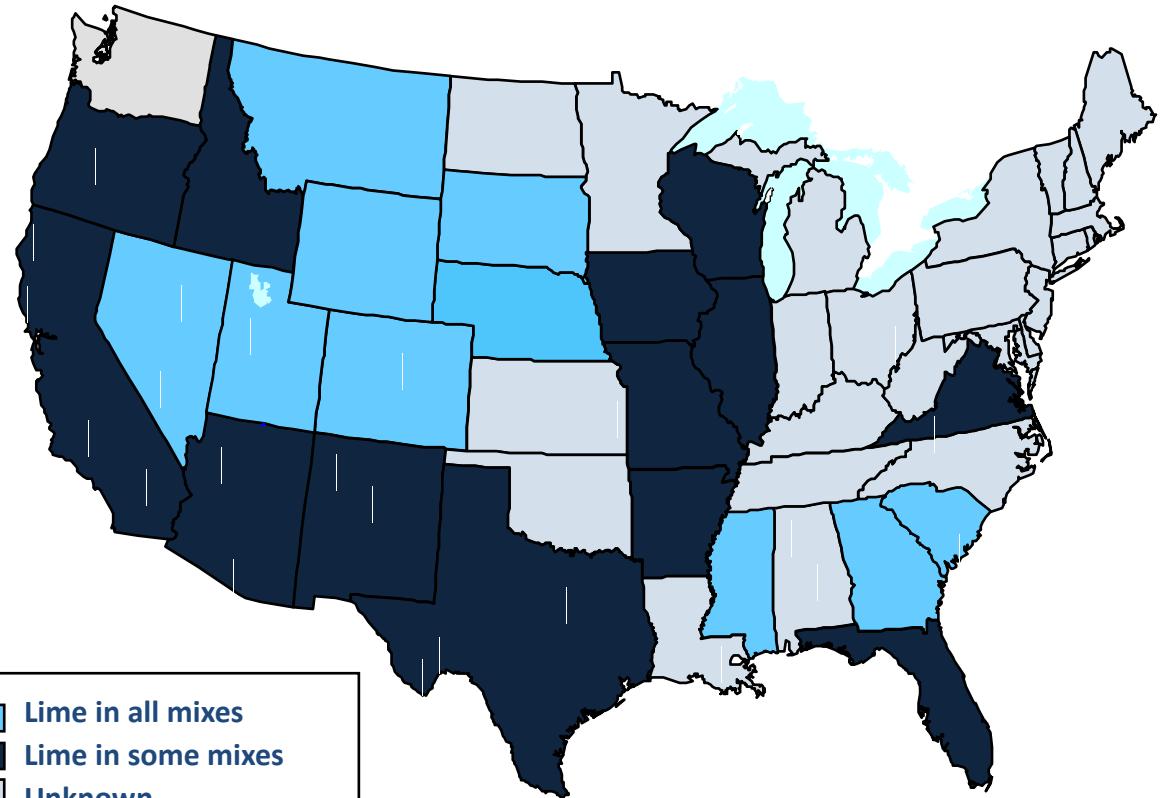
source:

Download critical literature review from www.eula.eu



~40 Mt/yr of Asphalt Mixtures with Hydrated Lime in the USA

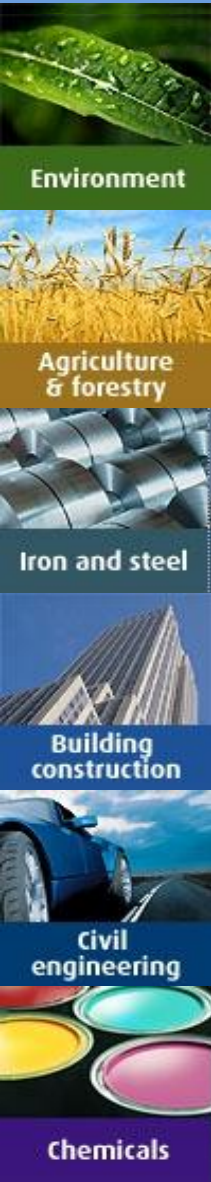
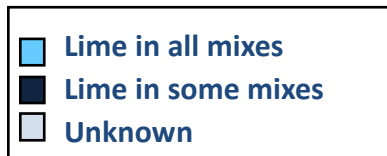
- According to DOTs, 1-2 % Hydrated Lime
 - Increases wearing course life by up to 10 yrs
 - Otherwise 4-20 yrs = 20-50 % increase in durability



sources:

data: Hicks + Scholtz, NLA 2004

map: E. Berger





~1 Mt/yr of Porous Asphalt with Hydrated Lime in the NL

- Dutch Road Administration specifies 2 % Hydrated Lime in Porous Asphalt
 - > 70 % of highways w/ PA
 - 11 yrs durability w/ 70/100 bitumen
 - No HL = premature stripping



Environment



Agriculture
& forestry



Iron and steel



Building
construction



Civil
engineering



Chemicals



sources:

data: Hagos et al., RILEM 2009

Voskuilen + Verhoef, RILEM 2003

picture: www.holland.com

~400 kt/yr of Asphalt Mixtures with Hydrated Lime in France

- French Highway Agency (SANEF) specifies 1.5 % Hydrated Lime in wearing courses
 - All mixtures (AC, PA, BBTM...) since 2004
 - Maintenance operations from 12 to 14 yrs thanks to HL addition (20-25% more durability)



sources:

*data: Raynaud, BTP Matériaux
2009*

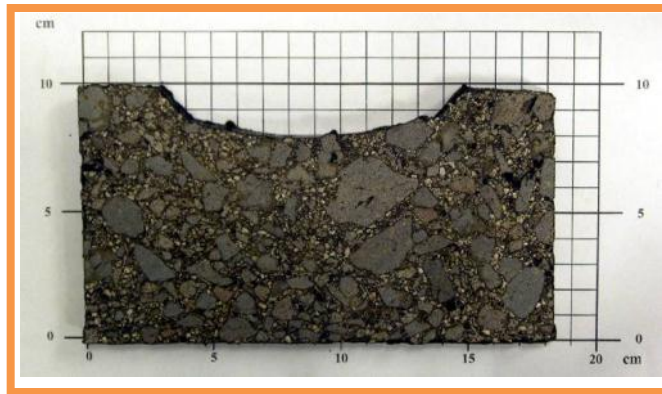
picture: SANEF



~150 kt/yr of Asphalt Mixtures with Hydrated Lime in Austria

- Commonly used in all asphalt mixtures
 - Wearing and base courses
 - Rutting resistance

Without hydrated lime



With hydrated lime



source:

*AC 32 base 70/100 w/ 3.5% HL (Ka30)
after 30,000 cycles at 60°C – Buchta +
Kunesh, Gestrata 2005*

Hydrated Lime in Asphalt Mixtures from a Sustainable Development Perspective



Environment



Agriculture & forestry



Iron and steel



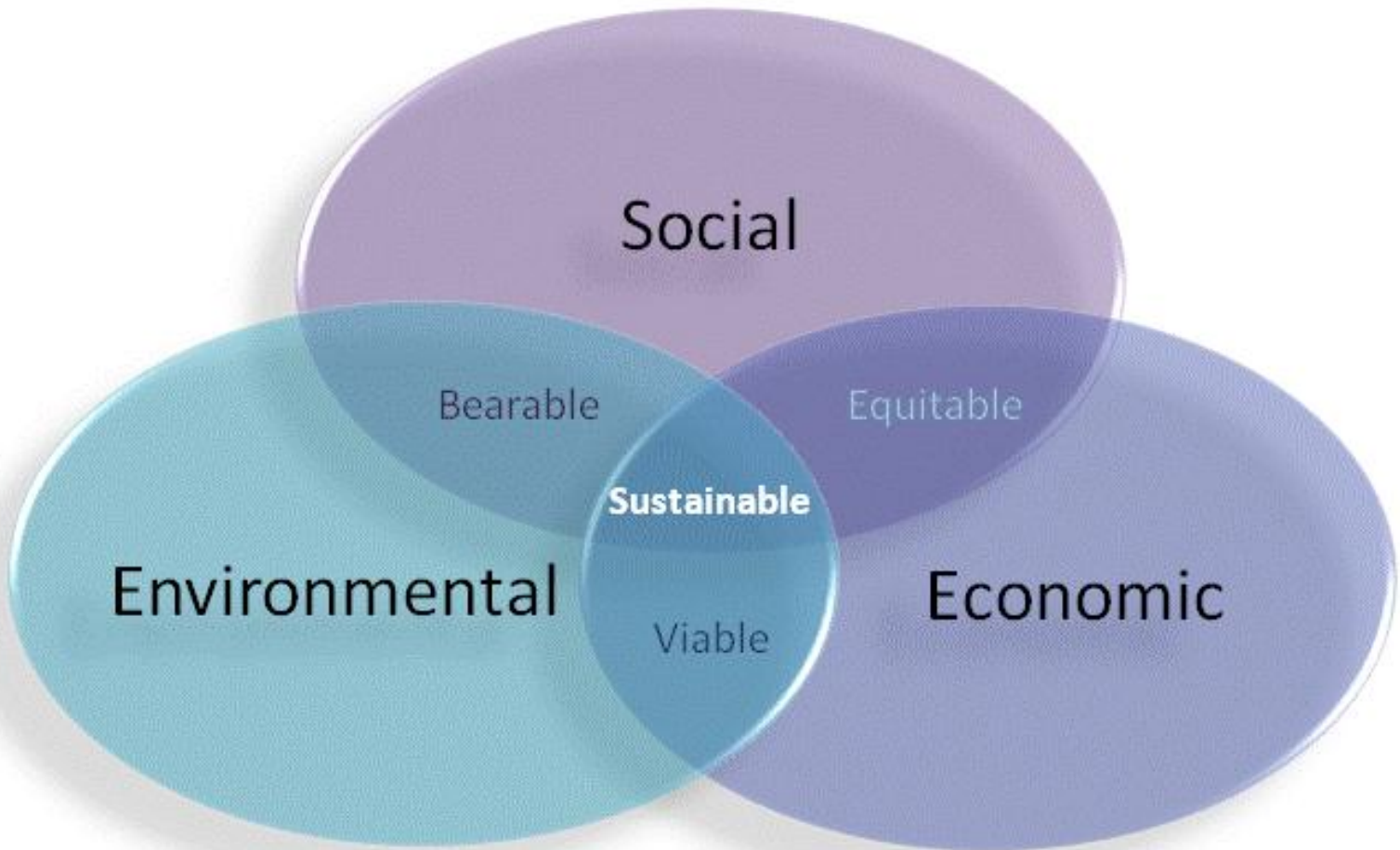
Building construction



Civil engineering




Chemicals





An Environmentally Friendly solution

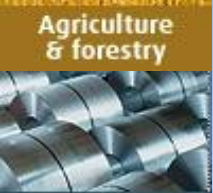
- EuLA requested a LCA for Hydrated Lime in Asphalt Mixtures
 - Independent consulting company  EESAC
 - ISO 14040 compliant
 - Critical review by TNO (Utrecht, NL)
 - Functional Unit: 1 km of wearing course (3.5 m width) for 50 yrs (= lifespan of the road)
- Based on published LCA by French Road Contractors Association (USIRF)
 - Bilal et al., RGRA 2008



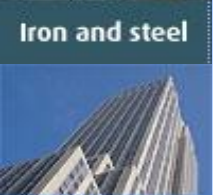
Environment



Agriculture
& forestry



Iron and steel



Building
construction



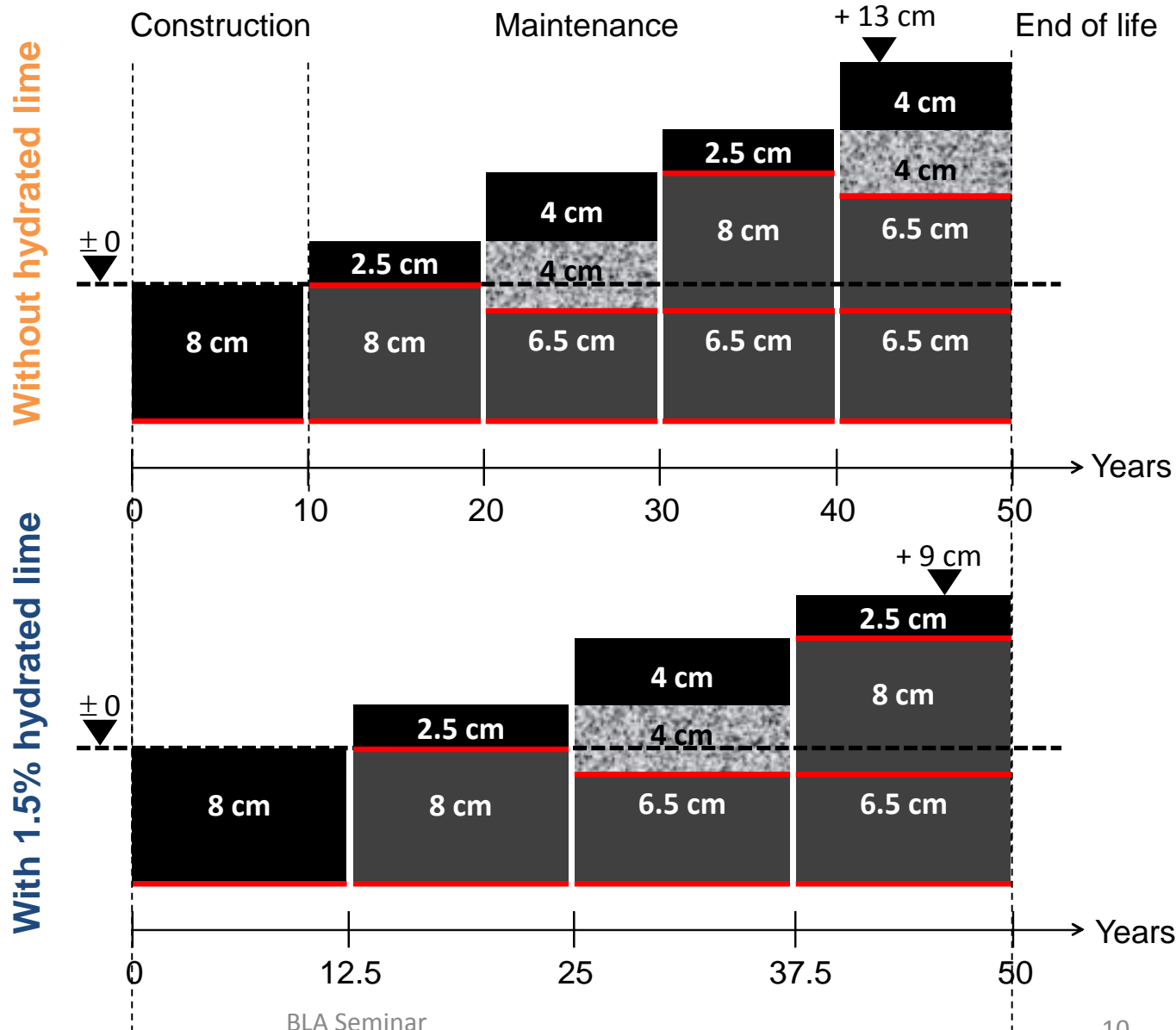
Civil
engineering



Chemicals



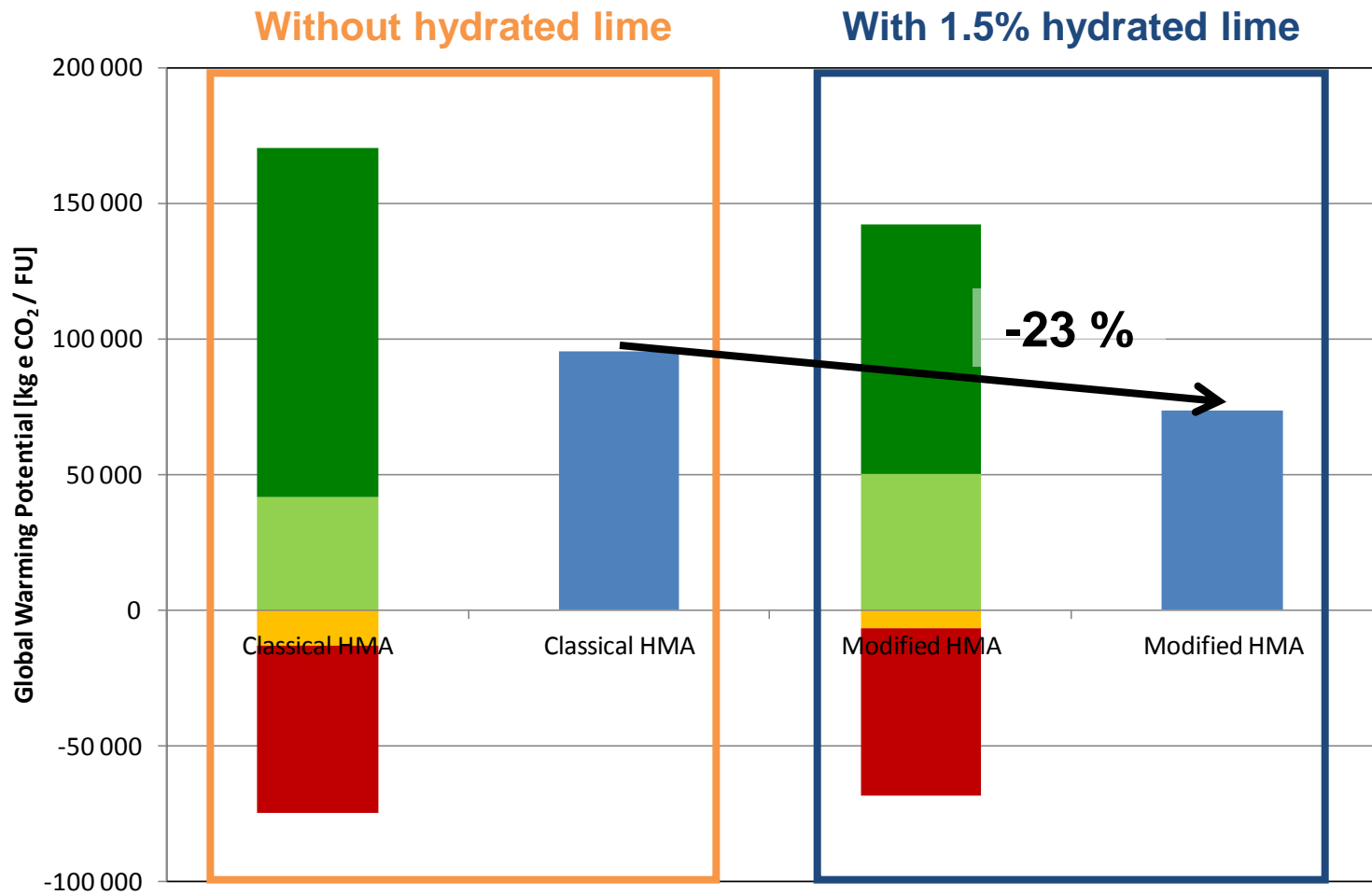
LCA to compare wearing courses with and without Hydrated Lime



source:
*T. Schlegel et al.,
 submitted to RCR
 2013*



Global Warming Potential is lower for Hydrated Lime section



source:
T. Schlegel et al.,
submitted to RCR
2013

■ Road construction
 ■ Road maintenance
 ■ Recycling of RAP
 ■ End-of-life
 ■ Total life cycle

A Socially Responsible solution

- Hydrated Lime is produced locally
- Less roadworks = less traffic jams
 - Thanks to increased durability



source:

*J. Robertson – The Telegraph
(www.telegraph.co.uk)*

A Cost-Effective solution

- Cost estimate for wearing course over 50 yrs based on LCA scenario

Without hydrated lime

Construction: 8.78 £/m²
Maintenance: 30.09 £/m²

Total: 38.87 £/m²

With hydrated lime

Construction: 9.00 £/m²
Maintenance: 18.29 £/m²
Total: 27.29 £/m²

-30 %

Cost sources:

Asphalt: French 2009 national survey (SETRA)

Tack coat + milling: 2009 average price in Western France (CETE Ouest)

Hydrated lime and asphalt filler: www.indexmundi.com 2011 and 2010

Asphalt mixture (55.53 €/t = 46.65 £/t)

Asphalt mixture with HL including silo amortization (56.99 €/t = 47.95 £/t)

Tack Coat (0.23 €/m² = 0.19 £/m²)

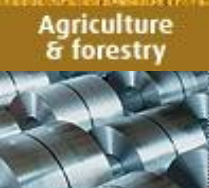
Milling (4.04 €/m² = 3.39 £/m²)



Environment



Agriculture & forestry



Iron and steel



Building construction



Civil engineering



Chemicals

Hydrated Lime is a Sustainable Solution for Long Lasting Asphalt Pavement

- A multifunctional additive...
 - Improved moisture and frost resistance
 - Slower bitumen ageing
 - Better mechanical properties
- ...increasing the durability of asphalt pavement...
 - Road managers talk about 25% more durability
- ...in a sustainable way
 - Socially, Environmentally and Economically



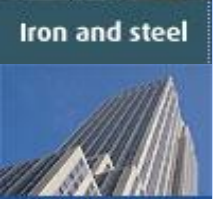
Environment



Agriculture & forestry



Iron and steel



Building construction



Civil engineering



Chemicals