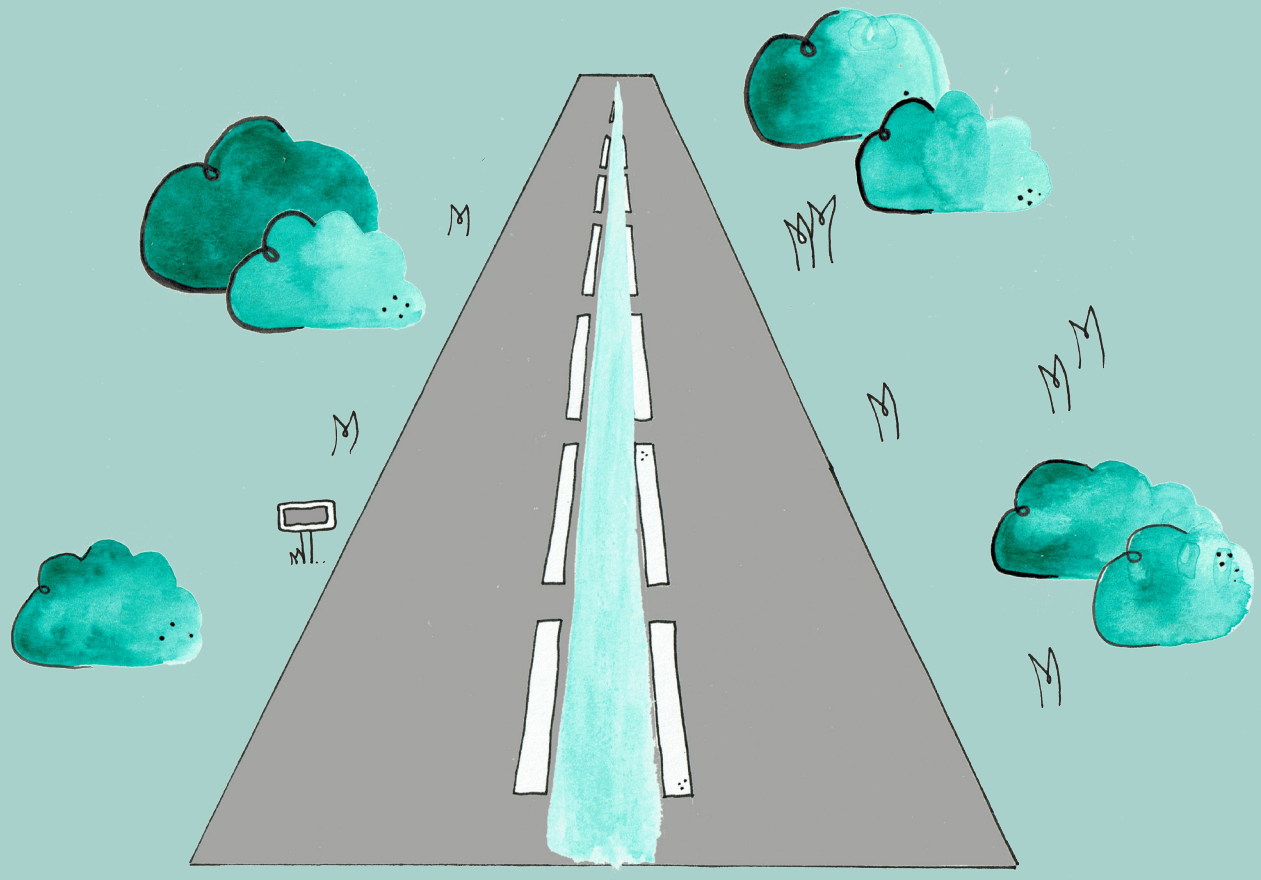
ROAD PAVEMENT INDUSTRIES HIGHLIGHT HUGE CO_2 SAVINGS OFFERED BY MAINTAINING AND UPGRADING ROADS



Almost 28 million tonnes of CO_2 from road transport could be saved yearly – let's not waste this opportunity!

EAPA
European Asphalt Pavement Association
www.eapa.org

EUPAVE
European Concrete Paving Association
www.eupave.eu

FEHRL
www.fehrl.org

1.INTRODUCTION

Road transport contributes to about a fifth of the EU's total emissions of CO_2[1]. Unlike other sectors, transport emissions have been generally increasing since 1990. As a result, the EU sets binding targets on cars and commercial vehicles, aiming to steadily reduce vehicle emissions. Heavy-duty vehicles, which contribute to about a quarter of EU road transport CO_2 emissions, are not yet subject to binding targets.

One route to greater reductions in CO_2 emissions from road transport is currently not being exploited: the influence the road infrastructure itself has on vehicle emissions. Specifically, smooth, well maintained road pavements will lead to the best performance of vehicles with regard to CO_2 emissions. Conversely, a road network which is allowed to deteriorate will not only work against all efforts to reduce vehicle emissions, but will also lead to higher road maintenance or reconstruction costs over the long term.

The main impact over the life of a road is the emissions from vehicles riding on it. The amount of energy and emissions associated with building and maintaining a road is a fraction of that used by the traffic on the road. For a highly trafficked road, embodied impacts are just 1 or 2 % (or even less than 1% for very high traffic volumes) of the total impact over 30 years[2,3,4].

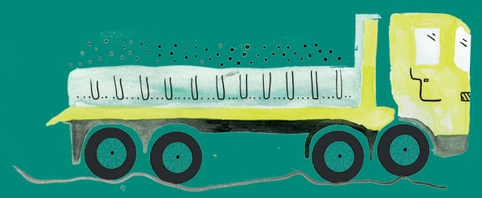
There are many reasons why a modern, well-maintained road network is desirable; the opportunity to reduce CO_2 emissions is just one of these. Policy-makers should be made aware of how such CO_2 savings can contribute to their overall emissions targets, and how this can be achieved in combination with the regular road maintenance. Armed with this information, policy-makers will be better placed to see the benefits of investing in their road network.

The fact is that with Europe's current road network, if all other factors remained the same, CO_2 emissions from road transport would steadily creep up each year. This is a call to take action now!

Unlike other CO_2-saving strategies, upgrading the road network can start now. It does not rely on new technologies to be developed.

Such upgrading is meant to take place as regular road maintenance, which is often delayed due to budgetary constraints. Regular road maintenance is part of road asset management. When the road gets a new surface layer this new surface layer will automatically have lower rolling losses because it is smoother and more even than the replaced one.

THE DIFFERENCE..



In this way even normal maintenance leads to CO_2 reduction. Additionally, upgrading roads would have a positive effect in terms of growth and jobs. Construction activity has a strong multiplier effect on growth thanks to its local nature.

The contribution of the road industry to the European economy in numbers:

- *Every euro invested in construction generates €3 in total economic activity[5]*
- *The estimated turnover of the road construction sector in Europe is about €110 billion/year[6]*
- *Number of people working in the road construction sector in the EU is about 600,000[7]*

Further benefits include: better air quality (since emissions other than CO_2 will also be reduced proportionally), noise reduction, reduced vehicle maintenance costs and safer roads. Total energy use will be reduced too, so savings remain relevant as we move towards renewable sources.

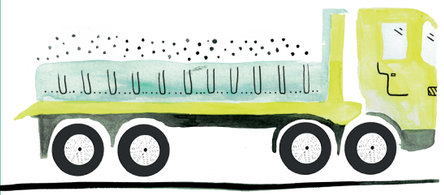
This paper aims to quantify the benefits to be gained for Europe from investments in roads, and provides ideas on policies that would be needed to capitalise on this CO_2 saving potential. The focus is on motorways and major roads, as these are responsible for a substantial proportion of road transport CO_2 emissions.

This paper deals only with the savings thanks to road pavements – which can be constructed from asphalt or concrete - and not with the effects of (re)alignment of infrastructure or optimisation of traffic flows.

Improved pavements reduce CO_2 while simultaneously providing other advantages:

- *Safety*
- *Noise reduction*
- *Comfort*
- *Energy reduction*

..BETWEEN WELL MAINTAINED AND NON-MAINTAINED ROADS



2. HOW DO ROAD PAVEMENTS INFLUENCE CO_2 EMISSIONS?

The road pavement directly influences vehicle fuel consumption through the rolling losses experienced by a vehicle riding over it. Rolling losses include both energy losses in the suspension system due to an uneven road, and losses at the level of contact between the tyre and the pavement. Various aspects of the quality of the road surface influence rolling losses: evenness, rutting, potholes and deteriorated joints. Other factors, such as pavement characteristics, can also influence rolling losses.

Poor quality or deteriorated pavements contribute to higher rolling losses.

Road maintenance will reduce emissions immediately and for the future. Road maintenance can contribute to CO_2 reduction in two ways.

- Road maintenance or upgrading improves the smoothness of the road. This will lead to a reduction in vehicle CO_2 emissions.
- By applying new surface layers with low rolling resistance in mind, an even greater CO_2 reduction will be achieved.
- In both cases, other aspects such as a higher durability can be built in to ensure that the reduction continues into the future.

Despite the fact that roads are, and will remain, the principal mode of land transport in Europe, at this moment many major roads are in poor condition[8]. This situation leads to more CO_2 emissions from vehicles, more air pollution, more traffic noise and unsafe roads. If not dealt with, poor quality of road pavements can even lead to imposing lower speed limits and closure of roads.

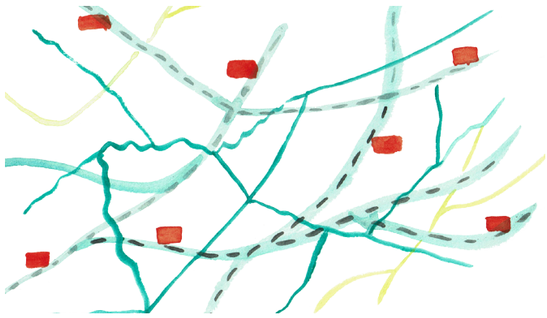
3. THE NUMBERS

What is the magnitude of the potential savings?

Independent studies demonstrate that vehicle fuel consumption and CO_2 emissions increase with an increasing pavement roughness and inadequate surface texture for all types and classes of vehicles. Thus, a higher pavement smoothness reduces CO_2 emissions.
A Transportation Research Board report[9] shows that an increase of surface roughness (measured by using International Roughness Index - IRI) IRI of 1 m/km leads to an increased fuel consumption for heavy trucks of 1% at normal highway speed (96 km/h) and 2% at low speed (56 km/h). Surface texture (measured by Mean Profile Depth - MPD) has an influence for heavy trucks too: an increase in MPD of 1 mm will increase fuel consumption by about 1.5% at 88 km/h and by about 2% at 56 km/h.
In a Danish report[10], it is shown how the development of the national evenness index of the Danish State Road network depends on the budget for maintenance and repair from 1998 to 2008. It gives a good overview what happens if the budget for maintenance is not sufficient: fuel consumption could increase by some 3%[9,10]. Therefore, a proper and well-budgeted maintenance of the road surfaces is crucial for keeping the IRI and the related CO_2 emissions low.
A study at a test track in Nevada [11] showed that trucks driving on smooth pavements after the rehabilitation of the pavement consume 4.5% less fuel.

Proper maintenance to replace pavement surfaces that show "bad" or under-performing surface conditions by smooth road surfaces with "good" properties would result in CO_2 emission reduction for the existing European road network. The presented data prove that this would lead to fuel reductions and lower CO_2 emissions of up to 5%.

Therefore, an upgrade of one third of the entire road networkof Europe by 2030 could lead to yearly savings of 14 million tonnes of CO_2. If two thirds of the network were upgraded, this could be 28 million tonnes of CO_2 saved yearly[12]. This is the equivalent of replacing 6 million cars with zero-emission cars![13]



4. WHAT ACTIONS ARE NEEDED TO MAKE THESE SAVINGS A REALITY?

a. Alignment of road investment policies with CO_2 policies

The potential CO_2 savings offered by investments in roads will not be apparent unless European Member States' CO_2 policies are aligned with road asset management policies.

b. Good procurement practices

Road authorities should be empowered and encouraged to raise the quality of construction processes to achieve higher quality pavements. In particular, this means avoiding awarding contracts based on the lowest initial cost only - resulting in lower quality infrastructure, and consequently resulting in potentially higher vehicle emissions. In the pavement industries the knowledge and technology is available to deliver high quality and durable solutions, but for now there is, in most cases, little incentive for the construction companies to use these or to innovate. Construction companies should be rewarded for improved performance, robustness and efficiency of road infrastructure. This will lead directly to CO_2 savings.

c. Improving asset management

"In many countries, road infrastructure is the most important of all public assets. The European road network consists of **5.5 million km** and it represents an estimated value of over **€ 8,000 billion**, managed under local, regional and national responsibility"[14].

"Lack of information and political awareness on the importance of sufficient investments for the maintenance of the road infrastructure lead to its chronic underfinancing and deterioration. As a consequence it can no more offer the required level of service and loses its value"[14].

For an adequate road maintenance, a good road asset management is essential. Road asset management provides decision makers with the necessary tools for efficient and sustainable management of roads.

Good asset management not only reduces maintenance costs, it also reduces wear and maintenance costs of vehicles and again leads to less CO_2 emissions by the cars rolling on a well maintained, smooth and even roads.

d. Improving expenditure for maintenance

Maintenance expenditure in road infrastructure in EU was only around €10bn in 2013, down from €30bn in 2006[15]. Higher expenditure in maintenance is an ultimate must to save CO_2 emissions.

5. EAPA, EUPAVE AND FEHRL CALL ON POLICY-MAKERS, ROAD OWNERS AND OPERATORS TO TAKE ACTION

Only pavements with smooth surface conditions (low IRI and low MPD) prevent higher CO_2 emissions. (Road surfaces made with low roughness and special tailor made texture to reduce CO_2 emissions provide even more CO_2 emission reduction). A proper and well-funded maintenance strategy for CO_2 emission reduction would require investment, but would additionally have a huge payback in terms of stimulating the economy, growth and jobs, fuel savings, reduced vehicle maintenance costs as well as contributing to climate change mitigation.

EAPA, EUPAVE and FEHRL call on policy-makers, road owners and operators to:

- **Initiate a study to demonstrate how prioritising maintenance and/or upgrading of pavement quality has benefits in terms of CO_2 emissions, as well as for growth and jobs.**
- **Encourage Member States and local and regional road authorities to consider the CO_2 effect in their road maintenance plans.**

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