



The All Party Parliamentary Group on Highways

Working for better roads

Warm Mix Asphalt:
reducing carbon emissions and improving efficiencies



September 2019



FOREWORD



Over 300¹ UK councils covering an area populated by over 70% of the population have declared 'climate emergencies'. This publication is designed to encourage those authorities which have responsibility for highways to put their theoretical support for environmental measures into practice. The measures referred to can be actioned without delay and are a cogent example of how everyone has a part to play in tackling environmental issues for future generations.

At a recent meeting of the All Party Parliamentary Group on Highways we were informed about a solution developed by the highways industry that will help cut carbon emissions associated with road construction and maintenance while saving time and money, improving road worker health and safety and reducing disruption for road users: warm mix asphalt.

It is a solution that everyone at the meeting agreed should be brought to the attention of a wider audience of specifiers and policy makers so they can act quickly.

I hope you find this report of interest and use.

Sir Christopher Chope OBE MP
Chairman, All Party Parliamentary Group on Highways

www.highwaysmaintenance.org

This report has been researched and funded by the members of the Asphalt Industry Alliance (AIA), which jointly supports the APPG on Highways in conjunction with the Institute of Highway Engineers. The AIA is a partnership between the Mineral Products Association (MPA) and Eurobitume UK and was established in 2000 to increase awareness of the asphalt industry and its activities, and the uses and benefits of asphalt.

This is not an official publication of the House of Commons or the House of Lords. It has not been approved by either House or its committees. All-Party Parliamentary Groups are informal groups of Members of both Houses with a common interest in particular issues. The views expressed in this report are those of the group.

INTRODUCTION

Carbon reduction lies at the heart of the Government's Construction Strategy as it works to achieve its emissions reduction targets and move the UK to a low-carbon economy. Vehicle manufacturers have already made significant improvements to fuel efficiency and emissions and this needs to be matched by those with responsibility for operating and managing our roads – which are the lifeblood of the economy and our communities.

An innovative approach to road construction and maintenance offering enhanced efficiencies and a lower-carbon production process is already here. Asphalt technology has come a long way since its earliest use in road construction and a more recent advance has been the development of modern **Warm Mix Asphalts** (WMA).

The simple principle behind WMA technologies is to manufacture and lay the asphalt at lower temperatures, thereby using less energy and delivering meaningful carbon savings, without compromising performance.

WMA can be produced at temperatures up to 40°C lower than traditional Hot Mix Asphalt (HMA) and requires limited modification of existing plant. It can also be laid using existing equipment.

WMA now accounts for significant volumes worldwide – almost 40% of production in the USA and over 15% in France – but remains under-utilised in the UK, where it represents less than 4% of asphalt production.

There is a significant lost opportunity of not switching to WMA. Not only does its use save time and provide a safer working environment for road contractors, but the carbon emissions associated with the production of WMA are also less than those for HMA.

If all asphalt production in Great Britain in 2017 (the last year for which data is available) had been switched to WMA, it would have saved at least 61,000 tonnes of CO₂ – the equivalent of cutting almost 300 million miles of car journeys.



BENEFITS

Environmental

WMA is produced at lower temperatures, so less energy is used in its manufacture and therefore fewer emissions are generated.

As well as reducing the CO₂ associated with manufacture, warm mix asphalt will arrive at trafficking temperature sooner, leading to earlier re-opening to traffic. This then reduces vehicle emissions arising from lower vehicle speeds or stationary traffic at roadworks and improves fuel efficiency.

WMA, like its hot equivalents, is also still 100% recyclable back into asphalts in the future, giving further embodied CO₂ reduction benefits and helping to prevent waste going to landfill and conserve natural resources as less aggregate needs to be quarried.

Safety

The lower mixing and paving temperatures of WMA can cut fume generation by around 50% for approximately each 10°C reduction in temperature², improving air quality at production plants as well as visibility for the workforce and passing traffic on laying sites.

The reduced temperature also provides a more comfortable working environment for contractors, particularly in summer months.

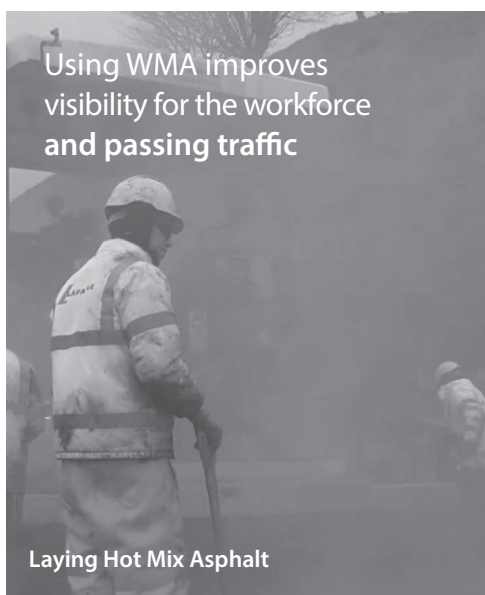
Using WMA can
reduce CO₂
emissions associated
with asphalt production



by around 15%
depending on specific
product and plant



better visibility
for night-time and
winter working



Using WMA improves
visibility for the workforce
and passing traffic

Laying Hot Mix Asphalt



Laying Warm Mix Asphalt

Efficiency

Hot Mix Asphalt (HMA) needs to cool down and harden before it is open to traffic to prevent damage to the newly laid materials.

WMA needs less time to cool because it is applied at a lower temperature, thereby allowing roads to be re-opened quicker, reducing disruption to road users as well as the costs associated with traffic management to protect the workforce.

Productivity increases are obtained through the use of WMA by re-opening roads earlier than scheduled on a shift-by-shift basis, or by laying more material per shift, resulting in earlier project completion. Less time spent in road works and keeping traffic moving will always be a benefit welcomed by the public.

Highways England estimates that an **increase in shift outputs of 20%** could be provided by using WMA on its network, saving up to **£70 million a year**³



▲ As part of a redesign proposal, over 2,500 tonnes of WMA was laid on the A2 in Kent in just 28 hours, reducing the initial 53-day programme by 24 days and helping to deliver a **£400,000 project cost saving** for Highways England⁴



WMA needs less time to cool because it is applied at a lower temperature, **thereby allowing roads to be re-opened quicker**

BENEFITS continued

Performance

WMA complies with all current UK asphalt composition and performance criteria, with the exception that it is compacted at lower temperatures than covered by some existing requirements.

Although lower temperatures are allowed by the European Standards, clauses in the UK's specifications continue to hold back WMA's default use on this side of the channel.

Nevertheless, there are many sites across both the Strategic Road Network (SRN) – managed by Highways England and on the local road network where WMA has been trialled and used successfully. Some authorities routinely specify the material and Highways England will allow its use subject to successful departure from standard application and approval.



WMA complies with all current UK asphalt composition and performance criteria

WMA provides similar performance and durability to HMA

▲ WMA is quick and easy to lay and **requires less cooling time** between courses, increasing the amount of material that can be laid in a standard shift – saving time and money

▲ Adopting WMA technology will **help meet sustainability targets** while still providing durable roads

THE FUTURE

Seizing the opportunity

WMA can provide solutions to delivering long-lasting roads to help meet the country's low-carbon objectives, while also improving conditions for the workforce, road users and the wider community.

So, why is laying WMA the exception, not the rule?

Red tape and a reluctance, by some, to switch to a new approach may have been part of the problem. Sticking with the status quo means that the specifications and guidance used in contracts by highways authorities continue to lag behind advances in product technologies – requiring expensive and prolonged re-tendering or 'departure' processes to secure approval for WMA's use.

In July 2019, Highways England published Clauses in its Specification for Highways Works to explicitly include WMA. This is a positive step, but more needs to be done to remove the remaining practical and procurement barriers that prevent existing client support for WMA's performance leading to its broader adoption.

Wider take-up of WMA would lead to enhanced plant efficiencies and lower carbon footprints, which are currently held back by intermittent demand. Broader adoption and WMA's acceptance as a mainstream material would also help to fully realise the projected savings that come with economies of scale and volume efficiency.

Overseas markets are already embracing the environmental, safety, efficiency and performance benefits WMA can offer – with clients, producers, highway authorities, unions and industry all championing its use.

UK authorities need to get on board and support an industry that is focused on reducing its carbon footprint. **It's time to catch up and make WMA use the norm in the UK.**

Sustainability and innovation

- ✓ **IMPROVED PRODUCTIVITY**
Lay more in a single shift and still open to traffic on time
- ✓ **REDUCED PROGRAMME DURATIONS**
Through optimising volumes laid and compressing contracts
- ✓ **EARLIER RE-OPENING TO TRAFFIC**
Less time for material to cool to trafficking temperatures
- ✓ **LOWER ON SITE COSTS**
With regard to plant, labour and traffic management
- ✓ **REDUCED PUBLIC DISRUPTION**
Through earlier re-opening and reduced programme durations
- ✓ **H&S BENEFITS**
Improved safety and working environment benefits
- ✓ **REDUCED CARBON FOOTPRINT**
Lower fuel usage during manufacture

References:

1. <https://climateemergencydeclaration.org> Figures quoted correct at time of publication.
2. <https://eapa.org/warm-mix-asphalt>
3. See slide numbers 11-13 in AECOM associate Director James Burdall's presentation: *Update from the Highways England Pavement Efficiency Group* <http://www.asphaltuk.org/events/>
4. <https://www.tarmac.com/media/957766/ultilow-a2-bluewater-case-study-2016.pdf>

Additional sources of information:

- The Carbon Trust's 2015 report: 'A study on Lower Temperature Asphalts Commercialisation in the UK': <https://bit.ly/2H16paK>
- Information developed by Highways England Pavement Efficiency Group for use by pavement delivery teams to identify opportunities to implement best practices that deliver efficiencies for Highways England: <https://bit.ly/2YFHd4d>

This report has been researched and funded by the members of the Asphalt Industry Alliance (AIA), which jointly supports the APPG on Highways.

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