ENVIRONMENTAL SUSTAINABILITY OF PAVEMENT PRESERVATION

Bitumen Emulsions Spearhead Sustainability in Pavement Preservation, Construction

ills, according to new edition of IBEF white paper

What comes to mind in one word when you hear the term "sustainability"?

Environment, conservation, efficiency, renewal, responsibility, resources, recycling, the future…these are typical answers you might receive if you pose this question to a group of engineers.

Simply defined, sustainability is the ability to meet our needs without compromising the ability of future generations to meet their own needs.

In the context of road construction and maintenance, sustainability refers to practices that minimize environmental impact, conserve resources, and promote the longevity and safety of roadways while ensuring they meet both current and future transportation needs. This encompasses the use of eco-friendly materials, waste reduction, and consideration of the effects on surrounding ecosystems.

The International Bitumen Emulsion Federation (IBEF) recognizes its responsibility to define and promote sustainability within the bitumen emulsion sector.

Acknowledging the essential role that bitumen, or asphalt, emulsion plays in pavement construction and maintenance, IBEF affirms its status as one of the most sustainable products available.

By prioritizing eco-friendly practices and innovative solutions, IBEF aims to support the development and use of bitumen emulsion in ways that not only enhance the durability and performance of roadways, but also contribute positively to environmental stewardship and resource conservation.

THIRD REPORT NOW AVAILABLE

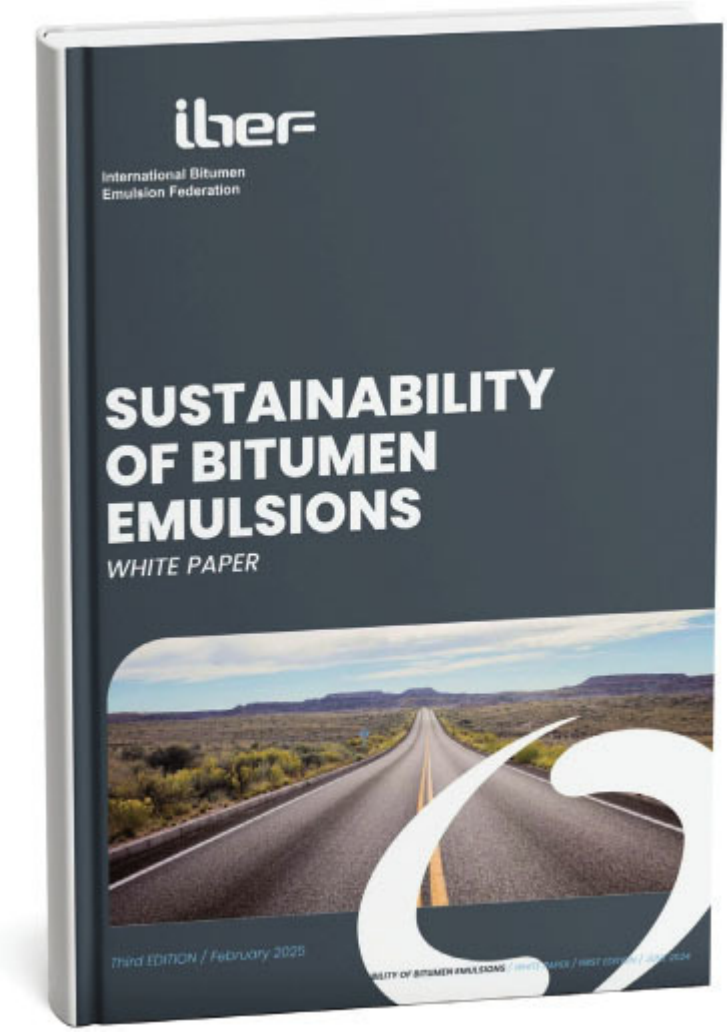
After two years of collaboration among a group of 14 specialists, the first revision of IBEF's sustainability white paper was released exclusively to IBEF members during the 8th Eurasphalt-Eurobitume Congress in June 2024 in Budapest.

Following this initial release, feedback and reviews were gathered to refine the document further. Consequently, the third revision of the bitumen emulsion sustainability white paper has been published for public access free of charge as of

broader understanding and application of sustainable practices in the industry.

The sustainability white paper released by the IBEF underscores the pivotal role that bitumen emulsions play in the construction and maintenance of road networks, aligning with sustainable development principles on a global scale.

IBEF serves as a recognized authority uniting bitumen emulsion producers through national associations and partners, comprising 35 members from around the world. This document is dedicated to Carl Robertus, a former executive committee member whose contributions were instrumental in its development.



New edition of sustainability white paper released by IBEF underscores pivotal role that bitumen or asphalt emulsions play in the construction and maintenance of road networks

emulsions.

- **The first pillar,** pavement durability, emphasizes the importance of maximizing the lifespan of pavements through various applications of bitumen emulsions.

The use of prime, bond or tack coats is critical in achieving this goal. Prime coats create strong adhesion between the hot mix asphalt and the aggregate base, waterproofing and stabilizing the road base. This prevents common issues such as cracking and delamination, which can lead to expensive repairs.

In contrast to traditional methods that employ fluxed bitumen or cutbacks, emulsion prime coats offer several advantages, including enhanced safety, reduced environmental impact, and quicker curing times, thereby improving overall pavement durability.

- **The second pillar** focuses on pavement structural improvement. Rehabilitation techniques aim to restore the structural integrity of distressed pavements requiring more than routine maintenance

Methods such as **cold in-place recycling** (CIR) and **full-depth reclamation** (FDR) utilize existing materials, significantly reducing energy consumption and greenhouse gas (GHG) emissions associated with material extraction and transportation.

In-place applications of bitumen emulsions not only lower transportation-related emissions, but also reduce construction time, leading to shorter disruptions for road users. The economic advantages of using these methods are substantial, as they can be 20 to 50 percent less expensive than traditional mill-and-pave techniques.

- **The third pillar** addresses the environmental and social impacts of bitumen emulsions and their technologies.

The document highlights how preventive treatments using bitumen emulsions effectively reduce the embodied carbon of existing pavements while conserving natural resources through increased durability.

Pavement preservation practices, which evaluate the life cycle costs of maintaining a road, promote the use of these treatments as a means of conserving energy and

agencies can extend the life of pavements and minimize their carbon footprint.

In exploring environmental impact, the white paper discusses the benefits of recycling and utilizing **reclaimed asphalt pavement (RAP)** in surface treatments, which reduces dependency on virgin materials.

The integration of RAP has demonstrated considerable cost savings and environmental benefits, including substantial reductions in GHG emissions and energy consumption. For instance, case studies highlight how certain sustainability programs have achieved remarkable reductions of over 80 percent in GHG emissions along with significant energy savings.

SUPPORTING HEALTH, SAFETY

The health, safety, and environmental (HSE) aspects of bitumen emulsions play a significant role in their sustainability profile. The document emphasizes that bitumen emulsions, when applied at lower temperatures, produce significantly fewer fumes and volatile organic compounds (VOCs) compared to traditional hot bitumen.

This not only enhances the safety of workers on-site, but also contributes to improved air quality. Furthermore, the absence of hot mixing and reduced transportation needs during the application process minimize environmental impacts, making these methods safer and more sustainable.

The social impacts of using bitumen emulsions extend beyond immediate construction benefits. The document notes a reduction in odors typically associated with hot bitumen, which contributes to a more favorable environment for construction workers and nearby residents. Enhanced road safety is another notable benefit, as bitumen emulsions improve skid resistance through various maintenance applications, ensuring safer conditions for road users.

ECONOMIC CONSIDERATIONS

Economic considerations are integral to the argument for increasing the use of bitumen emulsions in road construction.

The potential for significant cost savings through reduced material and energy use

resources. The lower temperatures associated with bitumen emulsion applications

reduce energy demands during production, further supporting their economic viability.

In conclusion, the IBEF white paper on the sustainability of bitumen emulsions positions these materials as a critical component of modern road construction and maintenance practices. The emphasis on durability, structural improvement, and minimized environmental and social impacts underscores the multifaceted benefits of adopting bitumen emulsions. As the road construction industry moves toward more sustainable practices, the insights provided in this white paper serve as a valuable resource for promoting the adoption of bitumen emulsions, highlighting their role in advancing both economic and environmental sustainability in road infrastructure.

Edited by Pavement Preservation Journal from material provided by the International Bitumen Emulsion Federation. Download your copy of the IBEF sustainability white paper by using the QR code below, or visit ***https://www.ibef.net/en/report/sustainability-of-bitumen-emulsion-whitepaper/***