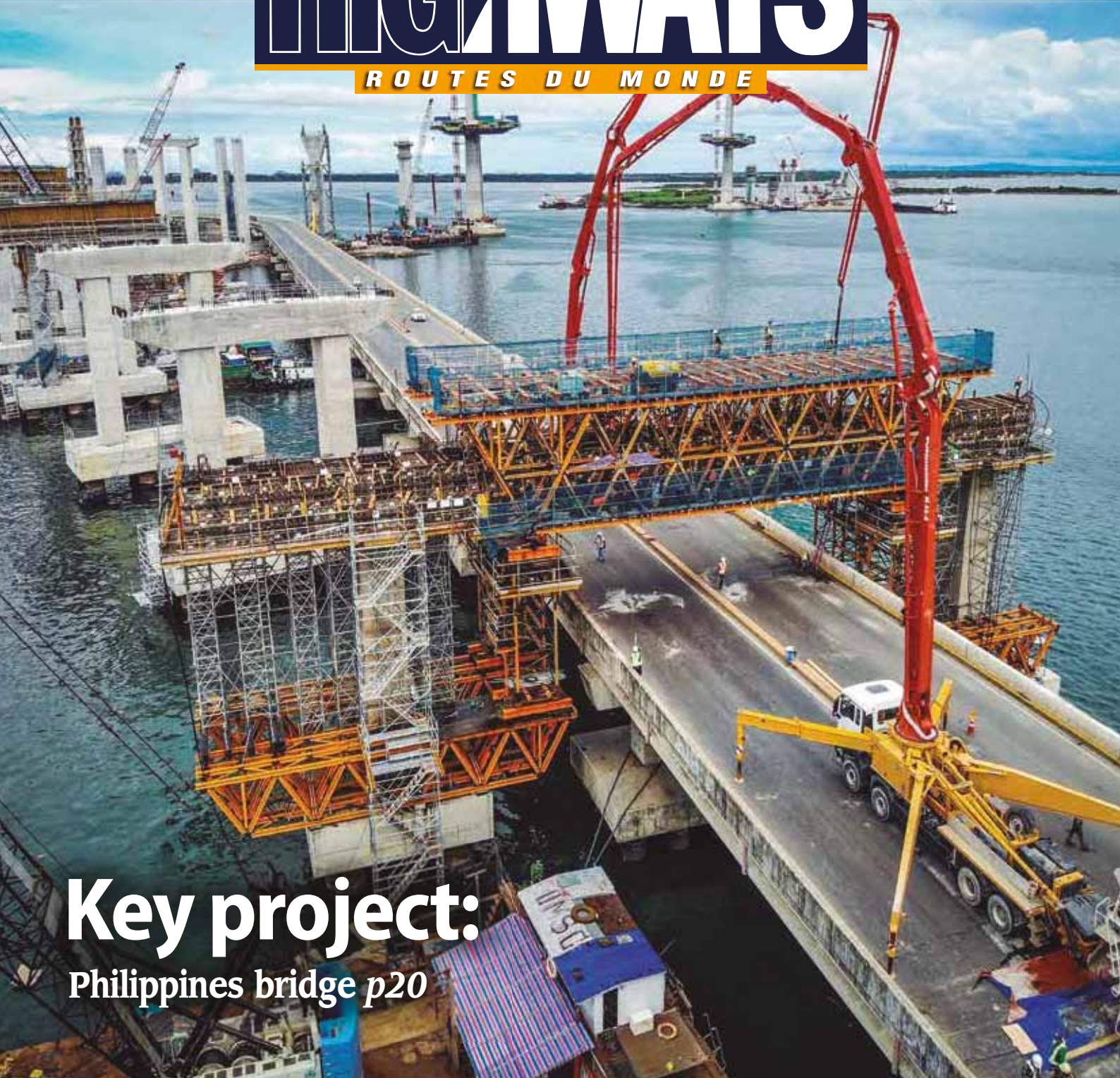




WORLD HIGHWAYS

ROUTES DU MONDE



Key project:

Philippines bridge p20



Highway & safety:
Asset maintenance;
data collation;
WIM p26



Bridges:
New bridge
developments p35



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» Longer lives save carbon

Both Shell and TotalEnergies are keen to emphasise that creating roads that last longer is one of the best ways to save carbon, once energy spent at the plant has been reduced as far as possible – by improving the efficiency of the burners, perhaps using biomass or switching to warm mix (or all three).

“Over the last few years, we have dedicated more and more R&D effort to the circular economy. We are not just thinking about recycling, we are looking at how to extend the life of the materials, slowing down the loop,” said Taylor. “There’s a lot of focus on RAP and recycling but a big part is how long roads stay in service. Extending the life of products is a really important part of the circular economy.”

According to TotalEnergies, resurfacing 1.6km of single-lane carriageway produces around 26.5tonnes of carbon, excluding what is used for transport. If two resurfacing interventions were saved over a road’s life that would equate to the carbon emissions produced by the average car driving 432,000km.

TotalEnergies has been working with

Eurobitume and the Mineral Products Association (MPA) to look at new designs that improve durability. “The argument is sustainability through durability,” said Schofield. “I think that approach is by far the most effective and efficient route to sustainability. Do a job once, do it properly and make it last.”

Shell Bitumen is working on a pavement life model that can calculate the impact of different mix and road designs on longevity. “Tools where we can assess estimated service life are absolutely vital,” said Taylor. “I firmly believe the focus will swing to how we keep roads in service for as long as possible.”

Of course, one of the challenges in proving long life in service is that you have to wait a long time for the results. As well as keeping a close eye on the A43, core samples that have been installed on a nearby service road will be taken and tested at regular intervals. ■

Shell Bitumen

www.shell.com/business-customers/bitumen

Total Energies

www.bitumen.totalenergies.com

Sripath’s ‘growing’ rejuvenator market

The Illinois Tollway, the agency which maintains and operates toll roads in the state of Illinois, is currently trialling rejuvenators in a bid to increase the percentage of RAP that can be used in its roads while maintaining their performance.

One of these rejuvenators is ReLIXIR, a product based on bio-oils which has been created by Sripath Technologies, based in Franklin, New Jersey and headed up by president Krishna Srinivasan. According to Sripath, it is on the approved list for 60% of US states and has also been used in India, Australia and New Zealand. Now Sripath is looking to widen ReLIXIR’s global footprint, with laboratory tests underway in Europe and the hope of live trials later this year.

Srinivasan, who describes himself as “a veteran of the industry”, worked as vice president of technology for roofing company GAF Materials Corporation before he set up Sripath Technologies in 2006 to supply polymers, oils and antistripping agents. “Our philosophy was that we wanted to find technical solutions to various issues and problems by looking at things from a different viewpoint, trying to see if they could be simpler, easier,” he said. “We also wanted to be environmentally and socially responsible.”

Although ‘green’ products often have “performance limitations” said Srinivasan, this is not the case for ReLIXIR. “In the beginning, while we wanted to be environmentally responsible, there was no bias in that direction. The principal bias was performance. We looked at petrochemical oils, organic oils, RREOB (rerefined engine oil bottom) and it turned out that bio-oils possessed the best level of properties.”

Sripath began developing ReLIXIR in 2011, with trials beginning in 2014 and a commercial launch in North America in 2015. The first sales of the rejuvenator in Asia came three years later, said Sripath, with trials in Russia and South America from 2019.

One of ReLIXIR’s longest users is Ashoka Buildcon, based in Nashik in India which has been using the rejuvenator since 2018, when its first project was a road in Chandigarh. According to quality control manager Devendra Marode, the company uses between 25% and 40% RAP in both the base course and wearing course, depending on the job.

“We performed our own internal



ABOVE: A stretch of road in Cumbria is one of three trial sites for the Shell Bitumen system in the UK
BELOW: The technology developed by TotalEnergies helps to stop oxidation



evaluations, comparing ReLIXER to other rejuvenators, and came to the same conclusion that it was the best rejuvenator available. The dosage efficiency, cost savings, sustainability, and ease of use were key," said Marode. "But beyond that, the technical service we received as we evaluated the product, and actually on site at several jobs, was outstanding."

ReLIXER is a blend of bio-oils or vegetative oils, combined with a proprietary additives package which Sripath said have been designed to aid the speed of diffusion into the RAP as well as reactivating the aged bitumen and aiding long-term stability.

Srinivasan will not reveal what vegetative oils make up ReLIXER, only that they are not oils that can be used for food. "We don't want to enter the food versus fuel debate," he said.

Other rejuvenators made from vegetative oils are often based on coniferous tree woods, from which crude tall oil (CTO) is extracted. For example, Ingevity's Evoflex – which is also under trial by Illinois Tollway – and Kraton's SylvaRoad PR 1000, which was developed by Arizona Chemicals which was acquired by Kraton in 2015.

There are bio-based rejuvenators based on food oils. Oil from sunflowers, soybeans, palm, castor, cashew nuts, cotton seed and linseed are all potential ingredients. Cargill's Anova and Biorestor from BioBased Spray Systems are examples of these.

ReLIXER, which is also marketed as



With some success in India and the US, Sripath Technologies is looking to new markets for its bio-oil-based rejuvenator

ReJUVEN8 in some countries, can work with any type of asphalt mix process, says Sripath; at a batch plant, pug mill or continuous mill where it can be sprayed onto the RAP on the conveyor, added to the bitumen tank or

fed into the bitumen line. It is also suitable for different environments, said Srinivasan. "It can work for a wide range of roads and temperatures, as well as with different mixing plants. We think it's a robust technology that >>

Polymer Modified Bitumen Plants

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» can be deployed worldwide.”

The problem with RAP

The reason why owners like Illinois Tollway want to investigate rejuvenators is that some roads containing higher proportions of RAP have not performed well. Higher proportions of RAP can make the road stiffer and hence more resistant to rutting but that's no good if they fail prematurely due to cracking.

Some rejuvenators have proved better than others. RREOB has been banned in several states, for instance, according to Srinivasan.

The problem was that the tests being used were not appropriate for aged bitumen. “We devised certain tests, some of which have been adopted,” said Srinivasan. Back in 2010, Sripath was working with Professor Hussain Bahia from the Department of Civil and Environmental Engineering at the University of Wisconsin, who developed tests that would better predict performance of pavements containing RAP.

“Hussain set about devising lab tests methodology for ageing virgin bitumen and producing RAP bitumen. Some of that has morphed into the Delta TC argument,” said Srinivasan.

Delta Tc (ΔT_c) is an asphalt binder parameter aimed to predict the long-term durability performance of asphalt pavements. It is calculated by using the results (S and m)



ReLIXER comprises bio-oils or vegetative oils and a proprietary additives package

from the standard Bending Beam Rheometer test and can be used on binder that has been aged, or binder recovered from RAP.

The proportion of RAP used obviously varies from state to state and country to country. Generally speaking, the more landlocked the area, the more likely it is to allow high RAP content. So New York City, where truck movements in any direction are a problem, has looked at 100% RAP, as have parts of London in the UK.

Local specifications also govern which layer of the road that material containing RAP can be used in. For instance, Switzerland does not allow it in the surfacing layer, while France does, said Srinivasan.

However, the drive towards circular economies is strong in Europe, says Srinivasan, which should be good news for

Sripath and ReLIXER. RAP with rejuvenators is good news environmentally and economically. “Historically when you look at green technology, the price was five times higher. It's very rare that you are saying the price is less,” he said. “We show the contractor that in a properly designed mix, you will not only get properties that are similar to a no-RAP mix, here's how you do it to save you money.” Savings can be between 5% and 15%, he explained.

Now that movement is a little easier, after the restrictions of the pandemic, Srinivasan hopes that his case will be compelling enough for European road owners and contractors to want to trial ReLIXER. ■

Sripath
sripath.com

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