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The 2016 Eurasphalt & Eurobitume Congress Focused on Asphalt Sustainability

Global interest suggests issue key to our industry's future

by Tom Kuennen

Every four years, members of the asphalt pavement industry gather from Europe and around the world for the Eurasphalt & Eurobitume (E&E) Congress. It is conducted jointly by Europe's bitumen industry association, Eurobitume, and the European Asphalt Pavement Association (EAPA), a coalition of contractor organizations from different countries. This past June, the sixth E&E Congress was held in Prague and more than 1,000 asphalt and bitumen industry professionals and stakeholders attended.

From the opening general session through the last day of breakout sessions, a common thread of the Congress was asphalt's environmental sustainability. Whether the session topic was recycling, warm-mix asphalt, porous asphalt, in-place recycling, rolling resistance, environmental product declarations (EPDs), or the circular economy, sustainability was front and center.

In addition to more sustainable solutions, such as maintenance and keeping roads in good condition for low rolling resistance, there was also a strong focus on quantifying sustainability. In Europe, reliable information on environmental impact and costs of pavements through LCA and LCCA are sought. In addition, the European Union has developed a voluntary Green Public Procurement standard that several countries are implementing and requiring.

As part of the focus on sustainability solutions, there was a great deal of interest in NAPA's Environmental Product Declaration (EPD) program for asphalt mixtures in the United States. NAPA Director of Sustainable Engineering Dr. Heather Dylla and Michigan Technological University Associate Professor Dr. Amlan Mukherjee presented a peer-reviewed paper "Lessons Learned in Developing an Environmental Product Declaration Program for the Asphalt Industry in North America" by Mukherjee, Dylla, and Dr. Richard Willis, NAPA Director of Pavement Engineering and Innovation and formerly with the National Center for Asphalt Technology at Auburn University.

NAPA: Building the EPD

An environmental product declaration, or EPD, is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products.

"NAPA created an EPD program in 2014," Dylla said on a panel devoted to sustainable development. "We wanted to define our environmental performance, rather than have regulators specify that for us. Another reason is that in a lot of green rating systems, they have removed credits for incorporating recycled material. Asphalt no longer will receive credits for using RAP in asphalt mixes. They've replaced this with requiring environmental product declarations. To remain competitive, we had to create an asphalt industry EPD program."

Information contained in an EPD is based on a life-cycle assessment methodology that follows product-specific requirements and boundaries, called product category rules (PCRs). These are the rules a

Videos of most presentations — and photos of the event — are available at no charge online. To view, visit http://www.eecongress2016.org.

At the E&E 2016, NAPA's EPD Program and a related peer-reviewed paper were presented to attendees as part of a panel on sustainable development. Pictured: Michigan Technology University's Dr. Amlan Mukherjee (center) and NAPA's Dr. Heather Dylla (center right).

product must follow to develop and publish an EPD in order to create a fair, credible report.

"A life cycle assessment underlies an EPD," said MTU's Mukherjee on the same panel. "We created a framework that's inclusive of different designs — including different types of additives and recycled material content, and different mixture types that meet current specs."

Green Rating Systems and EPDs

In terms of an asphalt pavement project's "street cred" — in which the environmental sustainability of an asphalt project is impartially rated by a green rating system — none of the green rating systems have risen to the prominence of the LEED systems for structures and neighborhood developments. But that's changing, Dylla said.

"There's growing interest among the government agencies," she said at E&E. "It's not clear which will reign as the most popular, because there are national systems available, as well as DOTs developing their own systems. I am seeing more green rating systems being adopted at the municipal or city level. It's unclear which green rating systems they'll choose, but more and more of them will be used."

As a placeholder, some DOTs are using EPDs instead of adopting a green road rating system. "California is looking at possibly using EPDs," she said. "It's a slowly evolving process."

Smoothness = Sustainability

Other presentations during the Congress addressed aspects of asphalt sustainability. Huge savings in greenhouse gas emissions may be achieved by employing smooth asphalt pavements, the texture of which, when expertly compacted, results in less rolling resistance, thus lower fuel consumption and substantially reduced greenhouse gas emissions from traffic.

"There are two aspects to smooth asphalt as an environmentally sustainable product," said NAPA President Mike Acott. "One is the actual material we put down; in the U.S. we haven't yet optimized the mix in terms of meeting all specification requirements. There's an opportunity to reduce rolling resistance based on macro- and microtexture of the product itself. That's an opportunity we haven't exploited."

In addition, smoothness has a major impact on rolling resistance, Acott said. "Poorly maintained roads that are not smooth have a huge impact," he said. "There's a relationship between road surface condition, and the constituents of the mix, in terms of rolling resistance."

A presentation from Denmark highlighted the importance of smoothness and its relationship to sustainability. "In Denmark, one fourth of the total energy consumption has been recognized as associated [with] the road transportation sector," said Bjarne Schmidt, Danish Road Directorate, in his opening-day presentation, "Low Rolling Resistance Pavements

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in Denmark." "Rolling resistance, which develops between tire and pavement, can dissipate up to one third of that energy."

Implementing low rolling resistance pavement on the entire 4,000 km [2,485 miles] of state roads in Denmark will provide a reduction in CO_2 emissions by 160,000 tonnes [176,370 short tons] per year, saving road users 64 million liters [16.9 million gallons] of fuel, Schmidt said. To this end, in 2012, the Danish government financed a project to determine CO_2 emissions reduction by exploitation of rolling resistance modelling of pavements.

WMA: U.S. Leads Europe

Warm-mix asphalt was a prime topic at E&E, and themes included foaming techniques, WMA additives, WMA and recycled asphalt, laboratory evaluations of mechanical and compaction properties, full scale trials, evaluation of carbon footprinting, environmental benefits, and demonstration projects to aid implementation.

Europe may have launched warm-mix asphalt around 2000, but the United States is far ahead of implementing WMA in the field, said Eivind Olav Andersen, Veidekke Industri AS, in his keynote address on WMA.

Andersen said WMA offers significant reduction of fumes and improved working environment, reduced energy consumption and carbon footprinting, and other benefits, with a product quality equal to hot mix asphalt. Plus, it's a wanted shift in the industry.

"These technologies were developed here," Andersen said. "So why is Europe (on average) struggling to implement, and the U.S. is succeeding?" Andersen asked. "We are still evaluating, demonstrating, and developing, rather than implementing."

After 2000, WMA use in Europe was negligible, but in 2007 a U.S. fact-finding scanning tour examined European WMA practices, and from then on, use in the states soared to 33 percent of asphalt mix production by 2014, while use in Europe was less than 6 percent in the same period.

"We have something to learn from how the U.S. has implemented WMA, not only WMA, but how the industry there works in general to implement new processes, like Superpave, which represented a significant shift in the industry."

Andersen credited NAPA and its allies for their work in promoting WMA as the future of asphalt, and mentioned in 2013 NAPA

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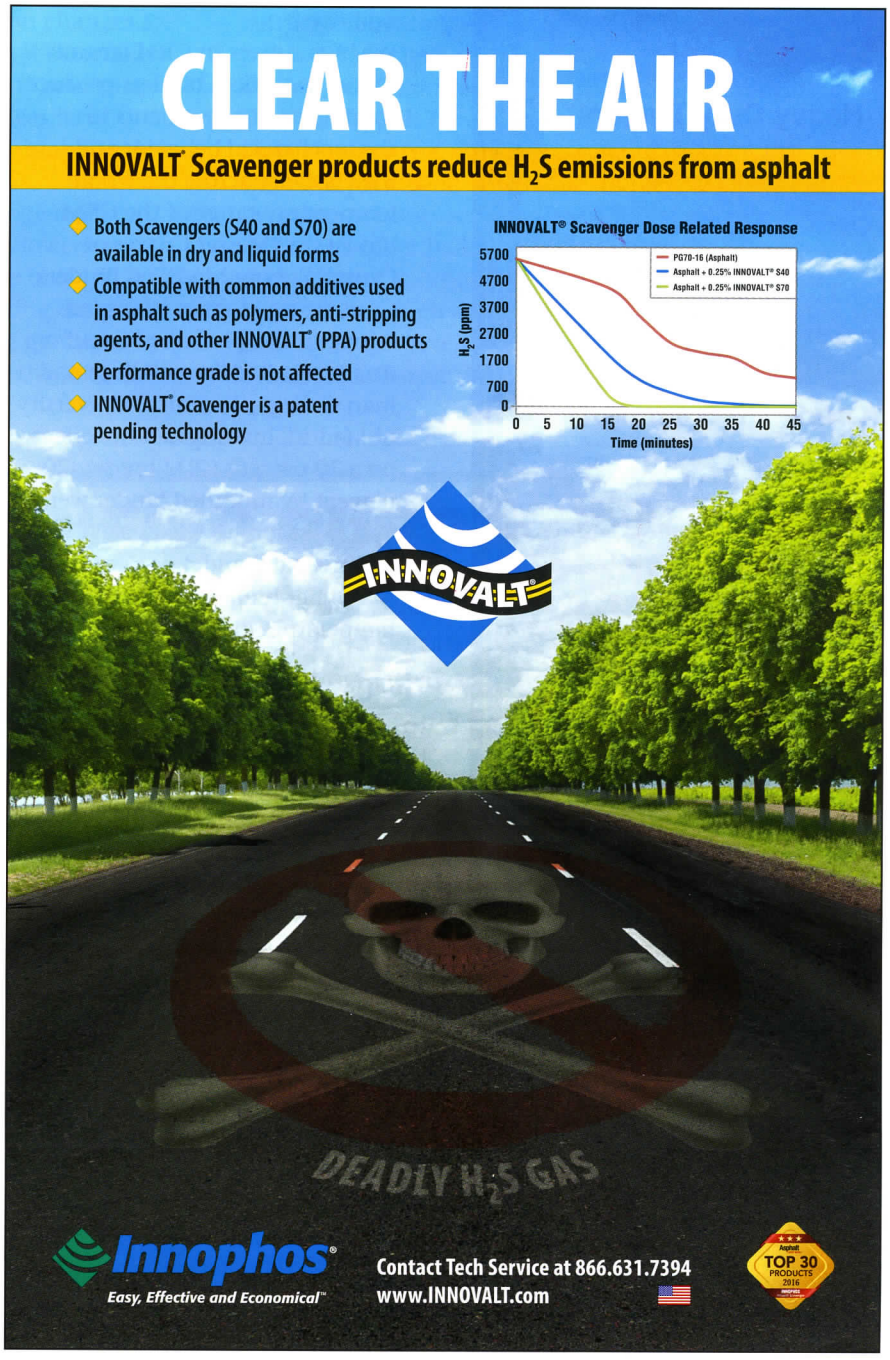

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was honored with the international NOVA award from the Construction Innovation Forum.

In addition, two papers of note were presented on warm-mix asphalt:

- A bio-based "half-warm mix" asphalt modifier holds promise for successfully preparing mixes using 100 percent RAP, according to Laurent Porot and Pieter Eduard, Arizona Chemical, in their paper, "Laboratory Evaluation of Half Warm Recycling with Bio-Based Additive."
- WMA additives in CRM (crumb rubber modified) binders produce significant improvements to the mechanical behavior and the elasticity across the whole temperature range of the CRM binder. In "Master Curves of Crumb Rubber Modified Binders Containing Montan Waxes as Warm Mix Asphalt Additives," Ana María Rodríguez-Alloza and Juan Gallego, Technical University of Madrid, investigated the effect on a 20 percent CRM binder (20 percent by modified binder weight), and two Montan waxes as WMA additives at 2 and 4 percent content, for binder high and intermediate temperature properties.

The Circular Economy

In another vein of sustainability, the concept of a "circular economy" was discussed. It is a major focus in the European Union. Instead of today's linear "take, make and dispose" economic model, the circular economy preserves and enhances natural capital, optimizes resource yields, and minimizes risks by managing finite stocks and renewable flows.

"The term 'circular economy' is not one we use commonly in the United States, but it's a 'cradle-to-grave' concept that fits asphalt pavements perfectly," NAPA's Acott said. "Asphalt is in a great position here. Our product — in terms of its recyclability — has enormous application to a circular economy.

"We generate asphalt millings as a fundamental way to rehabilitate our roads, not just to obtain RAP," Acott said. "We know how to incorporate RAP into our mixes, and we probably are ahead of the Europeans in terms of RAP use. But then we look at Japan and see how they very effectively use much higher rates of recycling and get good performance. That means there's a good opportunity for us to increase the use of RAP, while keeping a keen eye on how our roads perform."

Also, the concept of asphalt perpetual pavements fits perfectly into the circular economy theme. "With perpetual pavement, we are placing a pavement down that will never have to be reconstructed, having been built strong enough to withstand traffic over a long period of time," Acott said. "The renewable surface can be incorporated and re-incorporated into recycled pavements. The combination of asphalt's recyclability, and its use in perpetual pavements, is a really good example of how roads can fit into the circular economy."

And that's important to understand, as we will be hearing more about the "circular economy" on these shores in the coming years. "The ability to reclaim and re-use binder as well as aggregate in RAP — as opposed to portland cement in recycled concrete, where the best recycling can do is create aggregates — favors asphalt as a paving medium in the circular economy," he said.

"Obviously, there are benefits to the reclaimed aggregates," he said. "But you are reclaiming a binder that very often is worth more at the end of its life than what it was when we used it in the beginning," Acott said. "It's an investment, with a return on the product at the end of its life." AP

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