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Solution for Blue Smoke Emissions In Europe's Green Capital 2021

BY MARY MCCAIG

Not quite 50 years ago, the city of Lahti, Finland, was facing some hard truths brought about by a history of rapid industrial growth and urbanization. In 1976, however, Lahti began working to reverse its environmental decline, starting with water conservation. Following regular advancements over the years, the city's environmental efforts have paid off—to the point that the European Commission named Lahti the European Green Capital 2021.

As a partner with Lahti in its pursuit of this honor, asphalt paver and producer Peab Asphalt, along with its parent company, Sweden-based construction company Peab, have made it a mission of their own over the years to develop ecologically friendly products and practices. For example, the company's innovative ECO-Asfalt, introduced in 2015, uses climate-neutral biodiesel for drying and heating aggregate in its plants.

With the 2019 Peab acquisition of paving operations of a separate Scandinavian company, YIT, Peab Asphalt today comprises a total of 70 stationary and 20 mobile plants in Scandinavia, with 37 of those plants located in Finland. In early 2021, Peab Asphalt launched ECO-Asfalt in its Lahti asphalt plant.

"When we realized we would be introducing ECO-Asfalt in Finland, I knew we also needed to do something about the blue smoke that was produced by our asphalt plants," said Eero Sorri, Peab Asphalt's production and purchasing manager for Finland. "We had been receiving feedback about it from neighbors and truck drivers loading from the silos. Apart from our work with Lahti on the award, we knew we had to do something. For the past five years, we had more and more odor issues due to our increased use of RAP in our plants. It was becoming a problem for everyone."

THE SOLUTION FOUND — IN ASPHALTPRO

The odors created by blue smoke are the result of emissions consisting of sub-micron droplets and aerosols, created if super-heated during the production of hot-mix asphalt. Sorri knew that eliminating the blue smoke would also eliminate the associated odors. As he began to proactively research a solution to Peab's blue smoke challenge, Sorri says he was struggling to find a good solution for eliminating blue smoke—until he ran across an article online that had been published in *AsphaltPro* magazine (October 2014).

"I read that BoDean Company in California had found a solution to its blue smoke and odor issues by installing a system including the Blue Smoke Control collector, patented and produced by Butler-Justice Inc.," Sorri said. "From there, I found the Blue Smoke Control website and a YouTube video that explained how the system worked."



This picture shows the Blue Smoke Control collector and ductwork along the silo loadout system at Peab Asphalt's Lahti asphalt plant.
Photo credit: Julius Jäntti

Sorri had already talked to numerous manufacturers in Europe and the United States. "After finding this system, I contacted Butler-Justice at the end of November 2020, and we began to work together on a solution. We had our first Teams meeting in January 2021. We've had hundreds of Teams meetings since."

A MEETING OF MINDS

Blue Smoke Control is a division of Butler-Justice Inc., based in Anaheim, California. According to Butler-Justice President Mike Butler, he, Sorri and their respective teams collaborated on possible solutions. What seemed on the surface as though there might be a simple answer to Peab Asphalt's blue smoke issues quickly turned into a challenge that required minds from both sides of the Atlantic Ocean to join forces and develop a custom remedy.

"Silos at asphalt plants in Europe are not set up the same way as they are in the United States," Butler explained. "Where asphalt plants in the US typically load hot mix into trucks positioned on driveways and truck scales that are centered directly beneath a row of silos, most European plants have trucks that drive beneath individual silos from a perpendicular direction. In this way, multiple trucks can be loaded simultaneously. This required that we rethink the way our inlet headers at the truck loadout had to be configured to fit the European operations." Butler says that the entire group from Peab was open to making minor concessions to plant operations. In fact, he believes that their

teamwork, as well as give and take between the two companies, was the basis for the ultimate success of the common objective.

“The collector is only one part of the system,” he explained. “While the Blue Smoke collector is most certainly the heart of the system, the ducting layout, pickup locations, and inlet header designs are paramount to the success of a responsible system.”

HOW THE SYSTEM WORKS

Blue Smoke Control, as a complete operation, is designed to capture blue smoke from key emission points in the asphalt production process—including transfer points, silo-filling operations, and truck-loading areas. Once the smoke is captured by a duct system, ambient air is drawn in at key points to help to begin the process of coalescing the sub-micron asphalt binder droplets and aerosols into larger droplets that are by then large enough to be filtered through the seven stages contained in the Blue Smoke collector. The droplets accumulate on the outside of the filters. When the droplets become heavy enough, the liquid effluent is drained to a collecting sump below the collector.

The final filter in the Blue Smoke collector is produced from proprietary media developed exclusively for collecting oils and aerosols. This media, combined with a special outer wrap, allows the filter cartridge to drain and prevents the collected “blue smoke” from entering the clean air stream. Because the Blue Smoke Control filters are arranged vertically inside the collector, gravity aids in the draining process, where the most efficient filters drain onto the pre-filters, which are washable. The result is more complete capturing of the sub-micron droplets, easier maintenance, and higher filtration efficiency.

In some cases, the system can recover as much as five gallons of coalesced liquid asphalt binder per day from the plant operations.

LEARNING CURVES

“I knew I was taking a chance on a new technology manufactured in the US to be installed in Finland, but as I talked to Mike, I realized that he understood our system—the different types of silos we have and how we load trucks. Mike quickly understood the problem and started designing the ductwork that would work for our system. Mike and our engineers worked closely together to understand the intricacies of our asphalt plant and how to apply each other’s experience to reach the best solution,” Sorri said.

“Over the course of a couple months, Eero and his team worked with us almost daily, sending drawings back and forth, to complete the engineering for the ductwork and damper systems,” Butler said. “The whole group at Peab were so motivated and helpful, it was a truly refreshing meeting of the minds, aimed solely at accomplishing all of the company’s goals.”

Once the ducting, fan and damper designs were squared away for fabrication in Finland, Butler said he had a completed new Blue Smoke collector in his yard, which was being stored for a customer that did not need it for another several months. The system was ready to ship, but Butler’s team faced another learning curve—that of shipping the system internationally. With Sorri’s help, Butler contacted logistics company Kuehne+Nagel USA, which had experience in international shipping with oversize containers. The shipping specialist helped Butler’s team load and secure the collector in two containers—one high-cube and one standard height. The load left Butler’s yard in mid-March 2021.

Meantime, the Peab team was working to build the Blue Smoke Control system’s ductwork, based on the final design. “We worked together on the engineering for the ductwork, but they had to build



This side of the Blue Smoke Control collector system shows the collector fan that pulls fume into the filter system. Photo credit: Julius Jääntti

it themselves,” Butler said. “Another part of the system that they supplied was the fan, which had to meet European CE standards, similar to our UL-Listed.” Butler had sent the fan specifications to Sorri, advising that a variable-frequency drive fan (VFD) was preferable. “Peab engineers ultimately chose to use a Ferrari fan,” he added.

“This was an expensive solution,” Sorri admitted. “We were a little nervous.”

The Blue Smoke collector, in its two containers, traveled with 20,000 other containers on a ship that first headed south from Long Beach, California, along the Pacific Ocean, through the Panama Canal, stopping in the Dominican Republic, and then across the Atlantic Ocean. Following another stop in Rotterdam, Netherlands, the Blue Smoke Control collector arrived in Helsinki, Finland, in mid-June, before reaching its final destination in Lahti. With the ductwork, fan and dampers already in place, Sorri’s team installed the collector by July 1. Peab Asphalt started up the system on July 12, 2021.

A SUCCESS STORY

To the Peab team, the truck drivers and the plant’s neighbors, the benefits of the system were quickly apparent. “As one neighbor told us, ‘You can’t find the blue smoke,’” Sorri said. “And while it hasn’t removed the odors 100 percent, the visible blue smoke is gone. The odors that remain are at the molecular level. We are working with Mike on different technology to solve all of the remaining problems, such as odors coming from the main chimney. We will continue to work with Mike to find other solutions for the future,” he added.

Since the system’s startup, Peab Asphalt has ordered three additional Blue Smoke Control collectors—two for the Helsinki area and one for Hämeenlinna, all in southern Finland. Butler said, “These collectors are scheduled to ship in early January 2022 from the East Coast. Hopefully, delivery will take only three to four weeks to make the Atlantic crossing to Finland. Peab will be able to install them and have them ready when paving season starts in early spring.”

To Sorri, the greatest success of his partnership with Butler-Justice is that he has proven the Blue Smoke Control system will eliminate the blue smoke and the odors that go with it. “From feedback with neighbors and truck drivers, we feel this is a success. It is the first step to becoming the cleanest asphalt plant in Finland—or even all of Europe,” he said. **AP**



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Eliminate Asphalt Odor and VOCS

X-VOCS™ from Blue Smoke Control filters and removes up to 99% of odors and volatile organic compounds (VOCs), such as hydrogen sulfide (H₂S), from hot asphalt storage tanks.

Blue Smoke Control®

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