CIRCUROAD,
-evaluation, validation and implementation of bio-enriched binders in the Dutch road industry-

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In the Netherland a new triple-helix public-private partnership has been established to develop bio-enriched binders for flexible pavement applications. For this program, raw material suppliers, bitumen upgraders and producers, contractors, knowledge institutes, consultancy organizations and municipal, provincial and federal road owners have jointly set the objective to achieve a tangible contribution in 2023 to the reduction of CO_2 emissions in the Dutch road industry by using bio-based and sustainable concepts. Bio-based is one of the six road maps defined in the Dutch road sector and the other five activities are focusing on, viz., (1) service life extension using preventative maintenance measures, (2) recycling and/or upcycling, (3) quality control of processes and materials to achieve a higher service life of pavements, (4) low temperature asphalt production and improved energy efficiency of asphalt mills, (5) electrification of equipment and further initiatives to reduce CO_2 emissions during transport and application of asphalt.

Within CIRCUROAD, four different bio-enriched binder concepts are currently under evaluation and binders, mastics and asphalt mixtures have been tested by various parties in the market. All binders perform according to the Dutch RAW standards for SMA 8b mixtures and, therefore, it was decided to speed up the implementation by conducting pilot trails end of 2024. First test sections will be applied on the InnovA58 test tracks near Eindhoven and these tracks will be monitored in order to decide to upscale the amount of test sections throughout the Netherlands, which will subsequently be monitored on a TRL 7 level. In view of the relatively large number of municipalities, these test tracks will be coordinated by BouwCirculair, a separate organization coordinating the innovations for smaller road owners. Besides Rijkswaterstaat and provincial road owners, municipalities are key to achieve the 2030 CO_2 reduction targets as the majority of the asphalt volume in the Netherlands is applied for these road owners. The strength of the CIRCUROAD program is that it is has become a binding factor in the entire Dutch road construction sector as historic boundaries are rapidly vanishing in view of common drive to achieve the 2030 targets.

After a thorough cost-benefit analysis, it was decided to focus primarily of 30% bio-enriched binders as the risks associated with this transition of fossil-based technologies to bio-based binders is limited and, hence, market acceptance is enhanced. Furthermore, the price implications are significantly reduced, whereas, the benefits are still in line with the 2030 objectives. A first estimate of the Global Warming Potential resulted roughly in CO_2 neutrality for a 30% bio-enriched binder. The composition taken in this analysis was based on the

average of the four bio-enriched binders of interest. This analysis will be further validated in detail via a PhD research program at the University of Utrecht. Furthermore, in this study also more economical aspects will be evaluated as well, like the long-term availability of bio-based feedstock and how future supply chains will have to develop in the asphalt industry. These are certainly important topics to understand the critical economical issues in order to debottleneck the implementation of new sustainable binder technologies.

After a successful start-up of CIRCUROAD over the last 18 month, the focus is now on the future in which the challenge arises to meet the 2040 targets. In 2025 the research will be focusing on other asphalt mixtures, like open-graded mixes, base-layers and dense top layers. Furthermore, the evaluation criteria for current bituminous binders are not entirely covering the relevant parameters for bio-enriched binders. Within the CIRCUROAD program, this aspect will be addressed using the expertise of various knowledge institutes in the Netherlands. Furthermore, the energy- and material transition are noticeable in various sectors. Continuous monitoring of these transitions to determine the impact for new concepts for sustainable binders for flexible pavements is certainly a relevant topic and these new initiatives can further contribute to the development of new and innovative technologies. A last, but certainly not the least challenge is to stimulate the use of bio-enriched binders in contracts between contractors and road owners. In view of the current standard NEN-EN 15804, the current ECI (MKI) method is not fully addressing all relevant parameters to take the benefits of carbon capture via bio-based binders into account. A joint task force will address this issue to come-up with a method enhancing the use of more sustainable concepts.

Contact

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