Press release

Avantium and Roelofs construct the world's first test road with lignin produced in the Netherlands

AMSTERDAM and DEN HAM, 2 June 2021, 07:00 CEST – Infrastructure company Roelofs today starts the construction of the world's first test road made from bio-asphalt with Dutch lignin. This lignin is produced by Avantium, a leading technology company in renewable chemistry. The fully plant-based lignin is used as a substitute for bitumen in asphalt, which is derived from crude oil.

In collaboration with the province of Groningen, the 250-metre-long lignin-based test section will be constructed in the north of the Netherlands, on the N987 between Siddeburen and Wagenborgen. This test road is part of the CHAPLIN XL* project, a collaboration of industrial and academic parties aiming to demonstrate that lignin as bitumen replacement works effectively at scale and leads to a significant CO_2 reduction of road construction.

Avantium develops and commercialises innovative technologies for the production of plant-based chemicals and materials. In its DAWN pilot biorefinery in Delfzijl (the Netherlands), Avantium converts woody feedstock into industrial sugars and lignin. Lignin can be used for energy generation, but is also suitable for many higher value applications such as for bio-asphalt. In total, about 1,000 kg of Avantium lignin was added to the asphalt to replace a portion of the bitumen used in the production of the top layer of the test section on the N987. Annelie Jongerius, senior scientist at Avantium responsible for the valorisation of lignin, comments: "We are excited to showcase the potential of our lignin for the production of bio-asphalt. It is a great example of realising Avantium's mission to replace fossil-based chemicals and materials with renewable alternatives." The DAWN biorefinery has been made possible with a financial contribution from the province of Groningen.

The asphalt producing partners of CHAPLIN XL have improved the process to produce bio-asphalt at conventional asphalt plants, allowing for the scale-up of the lignin-based asphalt technology. Avantium closely collaborates with Roelofs, who has the ambition to transition to bio-asphalt. Roelofs will also construct a second test section on the N987 with conventional Kraft lignin from a Finnish paper mill. Gerard Hoiting, managing director at Roelofs, is pleased with the collaboration: "As a company we have the ambition to be climate neutral in 2030. Not only internally, but also with clients and partners we look for innovations and concrete applications and inspire each other towards a better world. This collaboration is a great example of this."

The CHAPLIN XL partners will extensively analyse the lignin-based test road on performance, on techno-economic feasibility as well as on environmental benefits through a Life Cycle Assessment.

Preliminary results indicate that lignin-based asphalt allows for a substantial reduction of the carbon footprint compared to its fossil-based counterpart. Martin Junginger, professor Biobased Economy at Utrecht University and project coordinator of CHAPLIN XL, comments: "For the wide application of lignin in road construction in the future, it is necessary for road constructors to be able to provide financial, technical and environmental validation of bio-asphalt in tenders. We also notice that there is high international interest from road constructors for our test results".

IJzebrand Rijzebol, member of the Provincial Executive for Groningen, is pleased that the innovative test road is being built on the N987 near Groningen Seaports and Chemiepark Delfzijl. The production of the bio-asphalt will also take place in Groningen, at Asfalt Production Westerbroek (APW) in Westerbroek. The Chemport Europe ecosystem in the Dutch northern region is known as a leader in green chemistry and in reducing CO_2 emissions. "The northern region of the Netherlands has high ambitions to move away from fossil resources and to transition to a circular economy also based on regional available resources such as sugar and wood residues. The CHAPLIN XL partners share this ambition and the bio-asphalt test road therefore fits well with our goals".

***About CHAPLIN XL**

The CHAPLIN XL (Collaboration in aspHalt Applications with LIgniN) project members comprise academic and industrial organisations. Project members are Avantium, Roelofs Groep, Utrecht University, Wageningen Food & Biobased Research, Asfalt Kennis Centrum, H4A Infratechniek and Stichting Biobased Delta. The Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland - RVO) awarded the CHAPLIN XL project with a €1.5 million grant in 2020.

About Roelofs

Roelofs is a family business that is at the heart of society. For us, working on public space means working on the future. With our broad approach, we provide meaning and added value to the development and realisation of infrastructural projects. Our expertise includes area development, mobility, water, sewerage and raw materials. As a knowledge partner, Roelofs manages the entire project process, from advice and design to realisation, management and maintenance. As a knowledge partner, Roelofs manages the entire project process, from advice and design to realisation, management and maintenance. We want to share our knowledge and work with our strategic partners to achieve a high-quality use of public space with an eye for the climate and future generations. To make circular intentions and environmental plans concrete, Roelofs has set itself the goal of being climate neutral by 2030.

About Avantium

Avantium is a leading technology development company and a forerunner in renewable chemistry. Avantium develops novel technologies based on renewable carbon sources as an alternative to fossil-based chemicals and plastics. The company currently has three technologies at pilot and demonstration phase. The most advanced technology is the YXY® plant-to-plastics–technology that catalytically converts plant-based sugars into a wide range of chemicals and plastics, such as PEF

(polyethylene furanoate). Avantium has successfully demonstrated the YXY Technology® at its pilot plant in Geleen, the Netherlands. The second technology is the Dawn Technology™ that converts non-food biomass into industrial sugars and lignin in order to transition the chemicals and materials industries to non-fossil resources. In 2018, Avantium opened the Dawn Technology™ pilot biorefinery in Delfzijl, the Netherlands. The third technology is called Ray Technology™ and catalytically converts industrial sugars to plant-based MEG (mono-ethylene glycol). Avantium is scaling up its Ray Technology™ and the demonstration plant in Delfzijl, the Netherlands opened on November 7, 2019. Next to developing and commercialising renewable chemistry technologies, the company also provides advanced catalysis R&D services and systems to customers in the refinery and chemical industries. Avantium works in partnership with likeminded companies around the globe to create revolutionary renewable chemistry solutions from invention to commercial scale.

Avantium's shares are listed on Euronext Amsterdam and Euronext Brussels (symbol: AVTX). Avantium is included in the Euronext Amsterdam SmallCap Index (AScX). Its offices and headquarters are in Amsterdam, the Netherlands.

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