



VEGECOL: Road pavement with a plant-based binder for light traffic lanes



The long-term goal of the present project is to replace petroleum-based bitumen (the binder used in asphalt mixes for roadways) with a plant-based binder.

The first step in deployment consists in doing away with petroleum-based, colorable synthetic binders. The advantage of abandoning a fossil-based resource is twofold: the replacement renewable resource sequesters carbon and produces attractive light-colored mixes.

Start of the project	2016
Project location Sites at which the project has been implemented so far and its target area (when replicable elsewhere).	This solution is set to be deployed in 2022, after several years of R&D spent ensuring that the product is reliable. It will mainly be deployed on several sites in mainland France, followed by several sites abroad.
Project goals Ways in which the project participates in climate innovation, including addressed issues/goals.	<p>Goal 1 - Reduce the carbon footprint of this type of pavement:</p> <ul style="list-style-type: none"> - By using plant-based raw materials instead of bitumen, a non-renewable petroleum-based resource, - By reducing the energy consumption of the pavement manufacturing process, thanks to lower temperatures than for the production of traditional asphalt mixes. <p>Goal 2 - Promote solutions with light and/or natural colors to accentuate the albedo effect and, thereby, combat urban heat islands.</p>
Detailed description of the project	<p>As a global player in the construction and maintenance of transport infrastructure, Colas is committed to providing ever-more effective products and to meeting the growing expectations of road users, residents and society at large. These needs include improved living conditions, comfort, safety and environmental protection.</p> <p>With Vegecol, Colas is able to provide an environmentally-friendly alternative to asphalt mixes, by replacing non-renewable petroleum-based bitumen with a binder made mainly from plant-based raw materials.</p> <p>What's more, this binder's translucency allows the aggregate's natural color to show through, which makes for aesthetically pleasing cycling paths, sidewalks and urban development projects. Vegecol proves ideal for improving various living environments.</p> <p>This product is part of the Colas Group's pledge to lower carbon emissions, which includes ambitious targets in line with the Paris Agreement: reducing the Group's direct greenhouse gas emissions (Scopes 1 and 2) by 30% and its indirect upstream emissions (Scope 3a) by 30% by 2030.</p>

Main means through which the project reduces greenhouse gas (GHG) emissions Enter information into the relevant fields.	<table border="1"> <thead> <tr> <th>Means for reducing emissions</th> <th>Relevant details</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Energy and resource savings (including behavior)</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Energy decarbonization</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Improved energy efficiency</td> <td>Lower production temperature than traditional asphalt mixes and clear mixes with colorable synthetic binder</td> </tr> <tr> <td><input checked="" type="checkbox"/> Improved efficiency regarding non-energy resources</td> <td>Binder mainly made with plant-based raw materials instead of bitumen (petroleum-based) or synthetic binder (also petroleum-based)</td> </tr> <tr> <td><input checked="" type="checkbox"/> Emission absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S)</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Investment in low-carbon products and departure from carbon-heavy assets</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Reduction of other greenhouse gases</td> <td></td> </tr> </tbody> </table>	Means for reducing emissions	Relevant details	<input type="checkbox"/> Energy and resource savings (including behavior)		<input type="checkbox"/> Energy decarbonization		<input checked="" type="checkbox"/> Improved energy efficiency	Lower production temperature than traditional asphalt mixes and clear mixes with colorable synthetic binder	<input checked="" type="checkbox"/> Improved efficiency regarding non-energy resources	Binder mainly made with plant-based raw materials instead of bitumen (petroleum-based) or synthetic binder (also petroleum-based)	<input checked="" type="checkbox"/> Emission absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S)		<input type="checkbox"/> Investment in low-carbon products and departure from carbon-heavy assets		<input type="checkbox"/> Reduction of other greenhouse gases	
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Emission scopes on which the project has a significant impact and GHG emission reduction quantification per emission scope

State the aspects of the project that contribute to reducing emissions per emission category (left hand column) and relevant emission quantities.

In the field below the table, state the main hypotheses and steps behind these calculations.

For further details, please refer to the methodology note.

	Aspects of the project that contribute to reducing emissions per emission category	GHG emission quantities per emission category <i>Please follow the quantification methodology used in the Afep's note.</i>
Reduction of the company's carbon dependency		
Scope 1 <i>Direct emissions generated by the company's activities.</i>	Decrease in plants' fossil fuel consumption	Production of traditional asphalt: 16kg CO2eq/t Production of Vegecol: 14.5kg CO2eq/t Production of asphalt with synthetic binder: 17.5kg CO2eq/t
Scope 2 <i>Indirect emissions linked to the company's electricity and heat consumption.</i>		
Scope 3 <i>Emissions induced (upstream or downstream) by the activities, products and/or services in the company's value chain.</i>	3a - Bitumen and colorable synthetic binders replaced with plant-based VEGECOL, which has a much smaller carbon footprint	Emission factor for bitumen: +250kg CO2eq/t Emission factor for colorable synthetic petroleum-based binder: +1,500kg CO2eq/t Emission factor for Vegecol: up to -250kg CO2eq/t
Promotion of carbon sinks		
Emission absorption <i>Creation of carbon sinks, (BECCS, CCU/S, etc.)</i>		
External GHG emissions avoided by the company		
Avoided emissions <i>Emissions avoided by the company's activities, products and/or services, or by financing emission reduction projects.</i>		

Clarifications regarding calculations and other additional information:

In the current market, clear asphalt mixes with synthetic petroleum-based binder have an emission factor of around +1500kg CO2eq/t. Bitumen (traditional binder) scores around +250kg CO2eq/t and Vegecol binder boasts an emission factor of -250kg CO2eq/t. Therefore, emissions are reduced by 1,750kg CO2eq for each ton of Vegecol used instead of the same amount of synthetic binder, and 500kg CO2eq for each ton of Vegecol used instead of bitumen.

In terms of energy, a natural gas burner consumes approximately 75 kWh per ton of conventional asphalt produced. Replacing bitumen by Vegecol binder leads to about 10% reduction in energy consumption. Given that gas has an emission factor of 214kg CO2eq/MWh HHV, the use of Vegecol reduces emissions by around 1.5kg CO2eq per ton of asphalt produced. When used instead of synthetic binder, Vegecol reduces emissions by around 3.0kg CO2eq per ton of asphalt produced.

Method for verifying emission quantity calculations

Calculation standard (ADEME, GHG protocol, etc.): ISO-14040 standard.

Verification of the calculations (internal or external): Life cycle assessment carried out by an external consultant in accordance with ISO-14040 standards and validated through critical review by third party experts.

Other environmental and social benefits of the project

If possible, mention its impacts and relevant [Sustainable Development Goals](#).

As far as the SDGs are concerned, Vegecol falls under Objective 13: measures to combat climate change.

Another notable benefit of Vegecol pavements is their ability to increase albedo levels compared to traditional dark-colored asphalt pavements.

Stage of development

Select the project's current stage of development.

- Laboratory prototype test (TRL 7)
- Live test (TRL 7-8)
- Pre-commercial prototype (TRL 9)
- Small scale implementation
- Medium to large scale implementation

Note: Click or tap here to further specify the project's stage of development

Potential and conditions for the project to be replicated, including relevant positive impacts on the climate	This solution can technically be replicated on a global scale through local sourcing.
Total investment to date (in €)	Funds essentially went towards R&D. New industrial equipment or works are not required, given that the solution is compatible with Colas' current capabilities.
Timescale for the project's return on investment (ROI)	<input type="checkbox"/> ST (0-3 years) <input checked="" type="checkbox"/> MT (4-10 years) <input type="checkbox"/> LT (> 10 years) Note: Click or press here to add text.
Partnerships	No partnerships
Additional comments from the company leading the project	/
To find out more about the project:	
Contact details for the company leading the project Please provide an email address to directly contact the company leading the project.	Thierry Delcroix - Colas Technical Research and Development Department delcroix@campus.colas.fr
Project URL links /	/
Project illustrations 3 photos/videos minimum (attached in HD).	 