

Science for Environment Policy

Green innovations could cut carbon emissions from road projects by a third

Carbon emissions from Dutch road networks could be reduced by almost a third if more innovative materials and processes were used, a new study suggests. Researchers assessed the potential benefits associated with 10 innovations in road construction and maintenance, and compared them to conventional materials and processes.

In order to meet its emissions goals, the EU transport sector must reduce [greenhouse gas emissions](#) by at least 60% by 2050, compared to 1990 levels. Different EU countries have set different national-level targets that contribute towards these goals. The Netherlands have introduced a green procurement procedure for all [road construction](#) projects, involving a life-cycle assessment for each project as well as a CO₂ emissions certification scheme that calculates companies' carbon footprints. However, these methods do not readily account for the benefits of innovative materials and processes since the relevant data is not included in national databases.

The researchers therefore aimed to provide insights into the impact of [innovative approaches](#) in road infrastructure projects, in order to support policy decisions. As Dutch road designs vary considerably, they based their analysis on a limited number of representative road types. Using life cycle assessment methods, they calculated the reductions in carbon emissions that could be achieved by adopting a range of innovative materials and processes compared to a baseline situation — the current situation, based on information about representative roads in the existing Dutch National Road Authority database. The baseline situation included, for example, methods for producing, constructing and resurfacing asphalt roads; methods for producing, constructing and maintaining brick roads and pavements; and lighting.

Currently, total greenhouse gas emissions for Dutch road infrastructure stand at 2200 kilotonnes of CO₂ equivalents per year. Ten innovative materials and processes were assessed. Overall, the researchers calculated that a combination of the innovative materials and processes could reduce carbon emissions from construction, maintenance and recycling or disposal of road infrastructure by 30%. This would amount to a reduction of 660 kilotonnes annually.

The innovations assessed included: treatments that increase the lifespan of binder materials in asphalt; low-temperature asphalt production processes; inclusion of recycled materials; 'zero bricks' approaches that cut out energy-intensive brick production; and road lighting powered by LEDs or renewable energy.

According to the results, lighting is currently responsible for a large proportion — at least a fifth — of carbon emissions from road infrastructure in the Netherlands, but these emissions could be reduced by 84% by the use of innovative lighting and energy sources. In terms of road types, the carbon emissions associated with asphalt roads in the main and secondary road networks could be reduced by 37%, whilst a smaller reduction of 28% could be achieved for concrete or brick roads.

Translating the results to the wider European scenario suggests that emissions savings equivalent to those produced by passenger cars driving 125 million kilometres could be made over the course of a year by using more innovative materials and processes in road infrastructure projects. This reduction potential shows that innovative techniques can have a significant impact on the carbon footprint from infrastructure.



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