Thesis (Bachelor/Master)

Topic:
Empirical optimization of flexible PV modules for Road Application

Contact persons:
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Subject:
Materials in conventional roads have been optimized to withstand extreme temperatures, different climatic conditions (rain, hail, drought etc.) and continuous mechanical loading (traffic) without losing their structural integrity and without compromising road safety. By integrating PV modules into road elements to create 'PV road elements', additional materials will be added to the road structure that were not designed for this application. At least one (and possibly more) layers will need to be added on top of the PV modules to act as anti-skid layer and guarantee road safety. The PV modules will also need to be glued to a foundation (e.g. concrete or asphalt). The combination of all these different materials can lead to significant mismatches in coefficients of thermal expansion, which might in turn result in delamination of, and/or damage to different layers in the elements upon exposure to temperature variations and mechanical stress. To determine whether a design for a PV road element is safe, the adhesion and structural integrity of the entire system and its components will need to be determined under different temperatures and mechanical loading conditions. The PV modules to be used are based on the baseline from TNO-Solliance.

In this study, the student will perform mechanical tests on a number of different combinations of materials and architectures using the setups normally used for road materials at RWTH Aachen. Weak points in the test designs will need to be identified from these first tests, and suggestions will need to be made for improvement of design. Experiments will be conducted in laboratory to gain a better understanding of the effect of overload on the fatigue behavior of bituminous materials.

Possible start:
Immediately

Language:
English

Additional Information:
Project in collaboration with TNO-Solliance

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