LIFE Solar Highways LIFE13
ENV/NL/000971

Solar panels as integrated constructive elements in highway noise barriers

Funding: European
Duration: Jun 2014 - Jun 2020
Status: Ongoing

Background & policy context:
Highway noise is a serious environmental problem in urbanised areas. Noise barriers, of various shapes and design, have been erected along highways in densely populated areas for over 20 years. These have lowered noise levels and can make a contribution to improving air quality. Meanwhile, electricity is being increasingly produced from solar power using Photovoltaic (PV) cells, which help to lower greenhouse gas emissions. Solar panels have been installed on existing noise barriers, but the results are sub-optimal. In many cases, the use of solar panels is adapted to the chosen type of noise barrier or the noise barrier is adapted to the requirements of the solar panels. In recent years, bi-facial solar cells have been developed that can produce electricity from light falling on both sides of the PV module. Such a module can produce over 30% more power on an annual basis compared to a standard module with a white back-sheet. Furthermore, the power output of the module is also less sensitive to orientation, and the module does not need to be placed facing south: east-west is also possible. These modules have great potential for integration with noise barriers.

Objectives:
The main objective of the LIFE Solar Highways project is to demonstrate the technical feasibility and the environmental, social and financial benefits of using multifunctional constructive elements for building highway noise barriers, in which bifacial PV modules have been integrated. A successful demonstration would simultaneously accelerate the use of PV modules and noise barriers along Europe’s highways, greatly contribute to the achievement of EU objectives concerning climate change, reduce noise levels and improve air quality.

Specific objectives of the project are:

- To demonstrate the technical feasibility of integrating PV cell technology in widely applicable highway noise barriers. The PV element will be a modular building block, which can be accessed and replaced if required, and it can be applied in any orientation of the noise barrier;
- To develop a technological-financial model to convince investors that the return on investment is sufficient to open up new business opportunities and to facilitate broad implementation;
- To develop, install and test a 450 m long prototype with an integrated bifacial PV solution along the A16 highway in the Netherlands;
- To demonstrate the energy yield that can be achieved during an 18-month testing period in the field; and
- To elaborate a business case, demonstrating that the tested integrated PV noise barrier has a lower total cost of ownership than currently used solutions. The proposed integrated solution will lower the financial threshold for noise barriers and solar panels.

The main expected results of the LIFE Solar Highways project are in order of importance:

- Demonstration of a 450 m long prototype noise barrier, 6 m high with 4 m high PV panels on both sides, along a north-south stretch of the A16 near Dordrecht. Target performance is 90% of time in use and output of 300 MWh/year based on full time performance during the 18-month testing period, yielding approximately 356 tonnes CO2 reduction in the demonstration period (based on solar energy produced);
- A convincing business case for the technical and financial feasibility of the prototype, based on reliable monitoring and clear evaluation of energy performance, air quality and noise reduction during a 18-month demonstration period. The beneficiaries expect to achieve a cost reduction of 20% compared to PV added to existing noise barriers;

- Design of a module, based on bifacial PV cells, which can be integrated in highway noise barriers. This module will be prototyped and tested using accelerated lifetime methods such as damp heat testing. Associated beneficiary ECN will also deliver six PV elements that will be monitored at ECN for the remainder of the project; and

- A comprehensive benchmark study on PV elements and their use as integrated construction elements in highway noise barriers.

**Parent Programmes:**
LIFE - EU financial instrument supporting environmental, nature conservation and climate action projects

**Institute type:** Public institution

**Institute name:** European Union

**Funding type:** Public (EU)

**Partners:**
- ECN(ecn), Netherlands
- SEAC(Solar Energy Application Center), Netherlands
- Rijkswaterstaat (NL)
- ECN (NL)
- Solar Energy Application Center (NL)

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**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Road transport

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Environmental/Emissions aspects

**Geo-spatial type:** Network corridors