Summary: Results were found using terms from the Need Statement received on June 14, as well as related terms: solar, photovoltaic, noise barrier, noise wall, snow fence. All results are about solar noise barriers/walls, and there were none found regarding snow fences. They are divided into Most Relevant (U.S.) and European Studies.

Most Relevant (U.S.):

Title: Highway Renewable Energy: Photovoltaic Noise Barriers
Abstract: Highway photovoltaic noise barriers (PVNBs) represent the combination of noise barrier systems and photovoltaic systems in order to mitigate traffic noise while simultaneously producing renewable energy. First deployed in Switzerland in 1989, PVNBs are now found in several countries where transportation agencies have sought ways to find multiple uses of their infrastructure. The PVNB experience documented in literature and supplemented through a series of interviews provides evidence suggesting that noise barriers can be designed to produce renewable energy without compromising their abilities to reduce noise, and do so safely. The business case for a PVNB often hinges on the availability of subsidies or other incentives that promote the renewable energy market. Although the first highway PVNB is yet to be constructed domestically, at least two State Departments of Transportation are currently working with partners to pursue PVNB pilots in the United States. Given the substantial extent of noise barriers in the country, the potential for solar energy production on American noise barriers is likely at least 400 Gigawatt hours annually, roughly equivalent to the annual electricity use of 37,000 homes, and perhaps much higher.
Full-text: https://ntlrepository.blob.core.windows.net/lib/62000/62300/62341/fhwahep17088.pdf

Title: Renewable Energy Generation in the Highway Right-of-Way
Abstract: State Departments of Transportation (DOTs) are increasingly exploring the use of highway right-of-way (ROW) to accommodate renewable energy technologies. This document includes potential business models, example applications to accommodate solar energy technologies, federal and state regulations, potential funding sources, and examples of solar development programs.
Title: Solar Highway Program: From Concept to Reality: A Guidebook for Departments of Transportation to Develop Solar Photovoltaic Systems in the Highway Right-of-Way
Source: Oregon DOT (Nov. 2016)
Excerpt: FHWA policy (p. 22): The guidance makes clear that federal regulations allow for the accommodation of renewable energy facilities within the right-of-way only when the facility does not impede the safe and efficient operation of the highway. If this can be achieved, the guidance spells out two policy options under which such projects can proceed: utility accommodation and airspace lease. The FHWA's guidance provides a two-part test to determine if the renewable energy facility can be sited using utility accommodation—the provisions laid out at 23 CFR 645 Subpart B that requires states to develop policies and standards for the siting of utility facilities in the highway right-of-way. The test is designed to check if the facility meets the regulatory definition of a "utility" set forth at 23 CFR 645.207. Part one of the test asks if the facility meets the description of technologies listed in the definition. According to the guidance, since renewable energy facilities and therefore solar PV facilities produce electricity, they satisfy the first part of the test. The second part of the test asks if the facility meets the public service criteria specified in the definition. According to the guidance, a facility satisfies this test when it provides service to the general public or when it is dedicated to a transportation agency for its own use.

Title: An Array of Possibilities
Source: Public Roads (September 2015)
This article discusses how transportation agencies are working to develop strategies to adapt infrastructure to the effects of climate change. Strategies include reducing greenhouse gases by using highway rights-of-way (ROW) to install renewable energy technology, such as wind turbines and solar panels. Many agencies are looking to develop innovative and sustainable uses for highway ROW, especially as more than a one-off project.
Full-text: https://www.fhwa.dot.gov/publications/publicroads/15sepoct/02.cfm

European Studies:

Title: State of the Art in Managing Road Traffic Noise: Noise Barriers (Technical Report 2017-02)
Source: Conference of European Directors of Roads (2017)
Summary: Chapter 6 focuses on innovative noise barriers with a comprehensive review of recent research projects on noise reducing devices in the various CEDR member countries: combined noise and safety barriers, photovoltaic noise barriers, noise barriers with TiO2 coating, etc.

Title: M27 Trial of Highway Noise Barriers as Solar Energy Generators
Source: TRL Limited (2006)
Abstract: This report describes a full scale trial to recover solar energy using photovoltaic noise barriers installed on the M27. In addition to the electrical performance of the system, whole life costs studies were undertaken to assess the benefits of a wider implementation of the technology. Any impact on driver behaviour due to the presence of a visible technology adjacent to the highway was also investigated, as were the implications on reflected noise levels of using a photovoltaic barrier as opposed to a conventional noise barrier.
Full-text via https://trl.co.uk/reports/PPR178
Title: Photovoltaic noise barriers: Scope for demonstration schemes on London's main roads
Source: TRL Limited (2006)
Abstract: The Mayor's Ambient Noise Strategy (Greater London Authority, 2004) seeks a higher profile for reducing noise in the management of transport systems, whilst promoting the concept of electricity generation by photovoltaic (PV) arrays. Specifically, Policy 9 of the Strategy states that Transport for London (TfL) ‘…will, and London boroughs and others should, investigate the potential benefits of noise barriers, other noise screening and acoustic modifications to highway structures, where source-related measures would not be effective.’, while the Executive Summary of the Strategy states (Paragraph 14) that ‘opportunities, such as for combining barriers with generation of solar electricity using photovoltaics, will be investigated’. As part of work towards achieving these objectives, Greater London Authority (GLA) has commissioned TRL Limited to undertake a study identifying potential sites for the demonstration of photovoltaic (PV) noise barriers on the London transport network. The study was originally focussed solely on the rail network, but in view of the limited opportunities in the context of current constraints and cost-effectiveness, the scope was extended to include the road network. This report provides details of an inspection survey undertaken to identify potential demonstration sites for PV noise barriers on London roads, based on locations with existing noise barriers provisionally identified by the London Energy Partnership.
Full-text via https://trl.co.uk/reports/PPR128

Title: Integration of PV in Noise Screens
Source: OTAR, vol. 80, no. 5 (May 1995)
Abstract: This article discusses a project in which a photovoltaic (PV) structure of solar panels is integrated in a noise screen along the Dutch A27 state road. In this grid-connected PV system a voltage is generated by sunlight, thus producing electrical energy. Besides this function of energy production the solar panels also have a noise protecting function. A safety barrier is integrated in the noise screen as well. The following aspects are discussed: (1) the results of a feasibility study into the integration of PV in noise screens; (2) the design of the screen: (a) design of the screen as a whole; (b) integration with the safety barrier; (c) prevention of vandalism and theft; (d) structure for the integration of the solar panels; and (e) electric design of the PV system; and (3) realization of the project.
Full text: requires inter-library loan (ILL)