

Investigating the Impact of Solar Highways on Driver's Safety and Road Maintenance

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Abstract: Effective utilization of vacant areas within highway right-of-way (ROW) could produce a significant amount of electricity from photovoltaic systems, and provide a revenue generation opportunity to the department of transportation in addition to the environmental benefits. However, this is only feasible if it can be done in a manner that does not interfere with the operation and maintenance of the highway system, and does not create an unacceptable risk to the transportation system users. A careful site evaluation and impact analysis need to be performed before installing a PV system in the ROW. In United States of America, initial feasibility studies and the National Environmental Policy Act (NEPA) process is currently being used, which does not include the impacts to the driver's safety, and highway maintenance and operations. A more comprehensive methodology for impact modeling and analysis is proposed in this paper.

Baseline study was performed by evaluating the relevant federal and state requirements, and guidelines published by relevant professional societies. Field study and focus group discussion were conducted to gather the information and concerns of the various constituents within the highway operation in coordination with Colorado Department of Transportation. Software tools were used to model, assess and analyze the impacts at various locations. The level of impacts depends upon the geographical location, road orientation and PV system technology and sitting design. Relevant factors, their severity and probability of occurrence is analyzed and formulated into impact matrix, which is a quantitative model that could be used as a decision making tool by the PV developer and transportation authorities. General mitigation strategies are also presented to minimize the impact and protect the lives of the travelling public and maintenance crew.

Keywords: Solar array systems, right of way, energy provider, environmental, safety, operation and maintenance, impacts, mitigation, risk impacts, glare, snow drifting, decision making tools, NEPA