Shining light on solar panels

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Foreword

Shining light on solar panels is found on the front page and as item 3 in the Engineering section of *http://.jimhadams.org*. It shows how to raise power output by reflecting light on solar panel arrays on flat roofs.

This is not a full technical review of the subject, which would be interesting. We do not have time. However, we have compared our ideas, developments and implementations with those of others, and given references to their work.

The technical part of the report should be accessible to those with a science A level. Its contents are designed for people who wish to educate themselves about the theory and practice of solar panels. Its recommendations may be of interest to decision makers who wish to increase the efficiency of their photovoltaic (PV) installations.

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* = omitted in the first edition

1. Executive summary.

1.1. Scope and specification.

The present work arose from a specification by Will Cottrell of Brighton Energy Co-op who wanted to install reflectors for fixed photovoltaic (PV) arrays on flat roofs. The questions he asked were

(A) Is it necessary to cover all of a PV panel with additional radiation from a reflector in order for the output of the panel to be boosted by the increased illumination?

(B) What is the optimum panel reflector setup on a flat roof?

(C) Is there a design that can illuminate a panel from below using a reflector, and will this work?

(D) What is the additional output you expect?

1.2. Summary.

On average about half of the light from the sun which reaches the ground reaches it directly and the other half comes from blue sky or clouds. We find that for a solar panel nearly facing south, a slope angle of 30 degrees from level boosts output by 10%. When the panel is not near to south facing, a steeper slope, say 35 degrees, is better.

A reflector material like 3M™ Cool Mirror Film 330 should be used. The reflector material should be in a continuous line along the PV arrays, even when there is spacing between arrays.

The bottom of the reflector should be near the bottom of the panel. The reflector should be tilted at 15 degrees from a level position. At best, the length of the reflector should be 3 times that of the length of the panel, but two and a half times the length is OK.

This set-up should boost power output of the panel by 23% over a year.