SAMPLE PAPER TEMPLATE:
A STATUS REPORT FROM THE FIELD

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ABSTRACT

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1. INTRODUCTION

Amorphous silicon (a-Si) and crystalline silicon (c-Si) solar cells have different spectral responses owing mainly to the different band gaps of the two materials. This is readily apparent if one compares the summer and winter outdoor efficiencies of photovoltaic (PV) panels fabricated from them. In particular, under clear sky conditions, it is found that panels of c-Si cells have their maximum noontime efficiencies in midwinter, whereas those employing a-Si cells exhibit their maximum efficiencies in midsummer. The difference, of a few percent, has been interpreted [**1**] as being caused by the “redder” noontime spectrum that occurs in midwinter due to Rayleigh scattering over a greater optical path length than in summer. This natural phenomenon, coupled to the greater “blue” sensitivity of a-Si (owing to its larger effective band gap) compared to c-Si, gives rise to the observed seasonal difference.

2. EXPERIMENTAL DETAILS

Recently, with the availability of “AC-module” type inverters, it has become possible to set up miniature grid-connected PV systems whose performance can be carefully monitored. The present research follows upon (and uses some results from) a previous study [**3**] of a substantial number of such inverters, of type NKF OK4E-100. In the present work, 3 mini systems, each employing an OK4E-100 inverter, were studied in parallel for an entire year. All 3 systems were of the conventional static, tilt = latitude, equator-facing configuration.

3. RESULTS AND CONCLUSIONS

The monitored AC energy output from each of the inverters was first re-processed into hourly data, which were then organized into monthly tables and bad hours were removed. By “bad” we mean that some system malfunction had been recorded (usually related to the data acquisition system).

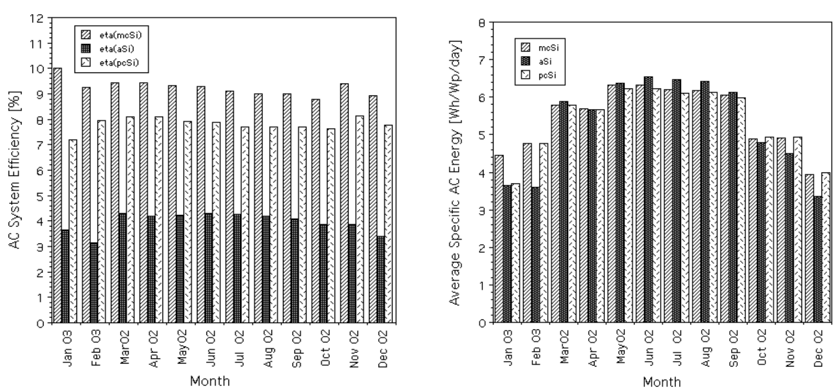

Figure 1: Monthly mean (a) efficiency, (b) specific AC energy output [Wh/Wp/day] for the 3 systems under test at Sede Boqer.

Fig. 1b displays the corresponding specific energy outputs of the three systems. Here, all systems are seen to have comparable performances but with the a-Si system slightly outperforming both of the c-Si systems during the summer months, albeit yielding a lower output during the winter months. Furthermore, one observes that the increased specific energy output of the a-Si based system is not symmetric about the month of June when the spectrum is bluest. Rather, it extends throughout the hottest summer months of July and August. Moreover, since afternoon ambient temperatures tend to be higher than their corresponding before-noon values, this suggests that it might be instructive to examine the *hourly* variations in specific energy output for the three systems.

4. ACKNOWLEDGMENTS

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