As fossil fuel sources continue to diminish, oil prices continue to increase, and global warming and CO2 emissions keep impacting the environment, it has been necessary to shift energy consumption and generation to a different path. Solar energy has proven to be one of the most promising sources of renewable energy because it is environmentally friendly, available anywhere in the world, and cost competitive. For photovoltaic (PV) system engineers, designing a PV system is not an easy task. Research demonstrates that different PV technologies behave differently under certain conditions; therefore energy production varies not only with capacity of the system but also with the type of module. For years, researchers have also studied how these different technologies perform for long periods of time, when exposed out in the field.

In this study, data collected by the Florida Solar Energy Center for periods of over four years was analyzed using two techniques, widely accepted by researchers and industry, to evaluate the long-term performance of five systems. The performance ratio analysis normalizes system capacity and enables the comparison of performance between multiple systems. In PVUSA Regression analysis, regression coefficients are calculated which correspond to the effect of irradiance, wind speed, and ambient temperature, and these coefficients are then used to calculate power at a predetermined set of conditions.

This study allows manufacturers to address the difficulties found on system lifetime when their modules are installed out on the field. Also allows for the further development and improvement of the different PV technologies already commercially available.

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The public is welcome to attend.