

Design and Comparative Analysis of Grid-Connected Bipv System with Monocrystalline Silicon and Polycrystalline Silicon in Kandahar Climate

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Abstract : Building an integrated photovoltaic (BIPV) system is a new and modern technique for solar energy production in Kandahar. Due to its location, Kandahar has abundant sources of solar energy. People use both monocrystalline and polycrystalline silicon solar PV modules for the grid-connected solar PV system, and they don't know which technology performs better for the BIPV system. This paper analyses the parameters described by IEC61724, "Photovoltaic System Performance Monitoring Guidelines for Measurement, Data Exchange and Analysis," to evaluate which technology shows better performance for the BIPV system. The monocrystalline silicon BIPV system has a 3.1% higher array yield than the polycrystalline silicon BIPV system. The final yield is 0.2%, somewhat higher for monocrystalline silicon than polycrystalline silicon. Monocrystalline silicon has 0.2% and 4.5% greater yearly yield factor and capacity factors than polycrystalline silicon, respectively. Monocrystalline silicon shows 0.3% better performance than polycrystalline silicon. With 1.7% reduction and 0.4% addition in collection losses and useful energy produced, respectively, monocrystalline silicon solar PV system shows good performance than polycrystalline silicon solar PV system. But system losses are the same for both technologies. The monocrystalline silicon BIPV system injects 0.2% more energy into the grid than the polycrystalline silicon BIPV system.

Keywords : photovoltaic technologies, performance analysis, solar energy, solar irradiance, performance ratio

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