A General Bifacial Photovoltaic Device Method to Predict System Performance with Albedo

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INTRODUCTION

- Bifacial photovoltaics >80% of solar market-share by 2030
- Rear irradiance varies 0-700 W/m², primarily driven by ground albedo
- No consensus on how to implement albedo in bifacial measurements

MEASUREMENT METHODS

IEC METHODS

- Bifacial: AM1.5(A) + AM1.5(A) × R²
- Monofacial: AM1.5(A) × A × N
- Energy yield, P_ACCESS

SPECTRAL ALBEDO

- Fixed rear irradiance
- Accounts for power and spectral effects
- Overcomes rear irradiance

CELL PERFORMANCE

- Maximum power (P_ACCESS) modelled for each method using developed Sentaurus optoelectronic model for textured devices under bifacial illumination

CONCLUSIONS

- Scaled rear irradiance method best represents outdoor operation and predicts bifacial gain with a simple calculation to within 2% of outdoor systems across North America
- IEC bifacial measurement standards can be adapted to include broadband or spectral albedo
- Adapted IEC methods for albedo could inform future bifacial module power ratings

REFERENCES
