Improving Translation Models for Predicting the Energy Yield of Photovoltaic Power Systems

Cooperative Research and Development Final Report

CRADA Number: CRD-13-526

NREL Technical Contact: Keith Emery

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In accordance with Requirements set forth in Article XI, A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

Parties to the Agreement: Commonwealth Scientific and Industrial Research Organization (CSIRO)

CRADA Number: CRD-13-526

CRADA Title: Improving Translation Models for Predicting the Energy Yield of Photovoltaic Power Systems

Joint Work Statement Funding Table Showing DOE Commitment:

Estimated Costs	NREL Shared Resources
Year 1	$ 123,177.00
Year 2	$ 144,622.00
TOTALS	$ 267,799.00

Abstract of CRADA Work:

The project under this CRADA will analyze field data of various flat-plate and concentrator module technologies and cell measurements at the laboratory level. The field data will consist of current versus voltage data collected over many years on a latitude tilt test bed for Si, CdTe, amorphous silicon, and CIGS technologies. The concentrator data will be for mirror- and lens-based module designs using multijunction cells. The laboratory data will come from new measurements of cell performance with systematic variation of irradiance, temperature and spectral composition. These measurements will be labor-intensive and the aim will be to cover the widest possible parameter space for as many different PV samples as possible. The data analysis will require software tools to be developed. These tools will be customized for use with the specific NREL datasets and will be unsuitable for commercial release. The tools will be used to evaluate different translation equations against NREL outdoor datasets.

Summary of Research Results:

The reports and presentations cover the work that was done. Reports and presentations:

1. Christopher J Fell, Benjamin C Duck, Ricky Dunbar, Michael Rae, Lyndon Frearson, Mikaila Thwaites, Mark Glavan, Graham Carter, Keith Emery, "Improving translation models for predicting the energy yield of photovoltaic power systems, Australian Renewable Energy Agency (1-UFA005), Final Report, November 2014.
2. Benjamin C Duck, Christopher J Fell, Bill Marion, and Keith Emery, "Comparing Standard Translation Methods for Predicting Photovoltaic Energy Production," Proc. 39th IEEE Photovoltaic Spec. Conf., Tampa, FL, June 16-21, 2013, pp. 763-768, DOI: 10.1109/PVSC.2013.6744261.

3. Benjamin C Duck, Christopher J Fell, Mark Campanelli, Brian Zaharatos, Bill Marion and Keith Emery, "Determining Uncertainty for I-V Translation Equations," Proc. 40th IEEE Photovoltaic Spec. Conf., June 8-13, 2014, Denver, CO, pp. 181-186, DOI: 10.1109/PVSC.2014.6925518.
4. Mark Campanelli, Benjamin Duck, Keith Emery, "Quantifying and Reducing Curve- Fitting Uncertainty in Isc," Proc. 42nd IEEE Photovoltaic Spec. Conf, New Orleans, LA, June 14-19, 2015.

Formal ISO 17025 audit of the CSIRO PV calibration by Keith Emery, a technical assessor and a member of the Australian National Association of Technical Auditors (NATA) and another assessor of the quality system. This two-day audit had several findings that were corrected allowing the group to be formally ISO 17025 accredited for secondary PV calibrations.

Subject Inventions Listing:

None

Report Date:

June 22, 2015

Responsible Technical Contact at Alliance/NREL:

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