450 PEARL TF-PV: Performance and Electroluminescence Analysis on Reliability and Lifetime of Thin-Film Photovoltaics

Project Duration: 07.2017 to 01.2021
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Summary

Renewable energy assets are characterised by a high initial investment, long payback times and low operational costs. This is especially true for PV plants. PV modules represent up to 50% of the investment, and module reliability is crucial for the economic success of the plant. Each unexpected yield reduction or increase in maintenance expenses will seriously threaten the economic viability of the plant.

Pre-installation testing and field inspection can reduce investment risks and increase plant yield. For silicon wafer technologies, there exists a generally accepted set of standards for rejecting modules that are unlikely to perform to specification. However for thin film, it is not yet fully understood how to interpret the test results. This introduces uncertainty into investment models and maintenance reserve estimates, in turn reducing bankability of thin film PV projects.

The project aims to reduce the cost of electricity produced by thin-film PV power plants, by improving plant reliability, yield, and prediction of overall plant lifetime using electroluminescence imaging methods.

The knowledge gain on the appearance, behaviour and progression of failure mechanisms acquired during this project is implemented to strengthen the productivity and competitiveness of European industry within the O&M and quality assurance industry, as well as within the thin film research and manufacturing sector.

In particular, the PEARL TF-PV project contributes to the photovoltaic community and to the energy industry as a whole in the following ways. Firstly, the extensive database of defects in industrial and minimodules established during the project provides a better understanding on the origin and evolution of defects and failure-mechanisms in thin-film modules. Secondly, the project brought the state-of-the-art image analysis methods into the photovoltaics community allowing fast processing of large quantities of image data, hence indirectly decreasing O&M costs. Lastly, the power rating standardisation techniques are now better understood, allowing more precise module characterisation.

The project brought together partners from research and industry, gathered knowledge from different fields and opened new possibilities for future collaborations.

Project consortium

Coordinator and contact details:

Full name of organisation:	Forschungszentrum Jülich
First and family name of coordinator:	Vito Huhn
Full address:	Wilhelm-Johnen Strasse, Jülich, 52428, Germany
E-mail:	v.huhn@fz-juelich.de

Participating countries and financing:

Country	**Number of organisations involved**	**Project costs in EUR**	**Public funding in EUR**
Germany	3	1’502’710	1’258’124
The Netherlands	6	902’754	722’162
Austria	2	330’824	273’660
Total	*11*	*2’736’288*	*2’253’946*