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SEST 2020 - 3rd International Conference on Smart Energy Systems and Technologies

September 2020, Article number 9203333

3rd International Conference on Smart Energy Systems and Technologies, SEST 2020; Virtual, Istanbul; Turkey; 7

September 2020 through 9 September 2020; Category numberCFP20P05-ART; Code 163414

Degradation analysis of 5-year field exposed photovoltaic modules using low-cost thermography, electroluminescence and I-V curve tests in Ecuador (Conference Paper)

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Abstract

Detection of degradation of photovoltaic (PV) modules is important for the maintenance and operation of solar PV farms to reduce production losses. Infrared (IR) Thermography, Electroluminescence (EL) and I-V curve tracers are detection techniques that generally use high-cost equipment, which limits their use in developing countries due to the tight budgets they manage for research and development. This study shows the use of low-cost alternatives to determine the deterioration of 140 solar PV modules at the University of Cuenca-Ecuador. This array has functioned continually without fail for 5 years. Measurement equipment for degradation detection techniques with a cost of less than 1,000.00USD is used and its application is validated with professional equipment. A power loss of 1.29% per year is obtained. In addition, the use of degradation values obtained from similar studies is proposed to reduce the effort of detecting deterioration modes, whose approximation allows the calculation of the power delivered by the installation with a 2.04% error. A method for the economic quantification due to the losses caused by the deterioration of solar PV modules is also exposed. © 2020 IEEE.

SciVal Topic Prominence ⓘ

Topic: Solar Collectors | Photovoltaic System | Ethylene Vinyl Acetate Copolymer

Prominence percentile: 98.510 ⓘ

Author keywords

Degradation analysis Power loss PV module

Indexed keywords

Engineering controlled terms: Budget control Cost benefit analysis Deterioration Developing countries Electroluminescence Photovoltaic cells Thermography (imaging)

Engineering uncontrolled terms: Degradation analysis ITS applications Maintenance and operation Measurement equipment Photovoltaic modules Production loss Professional equipment Research and development

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ISBN: 978-172814701-7

Source Type: Conference Proceeding

Original language: English

DOI: 10.1109/SEST48500.2020.9203333

Document Type: Conference Paper

Sponsors: Yildiz Teknik Universitesi

Publisher: Institute of Electrical and Electronics Engineers Inc.

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