Boosting solar inspections for safer and sustainable renewable energy systems

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31st PPA Annual Conference, Nuku'alofa, 30 Sept – 3 Oct 2024

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OUTLINE

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- Benefits of Solar Inspections
- Recent Solar Inspections and Capacity Building Initiatives by SEIAPI
- Exploring Potential Structure of Solar Inspector Training, Mentoring and Accreditation
- Budget Estimates for Training Solar Inspectors in the region

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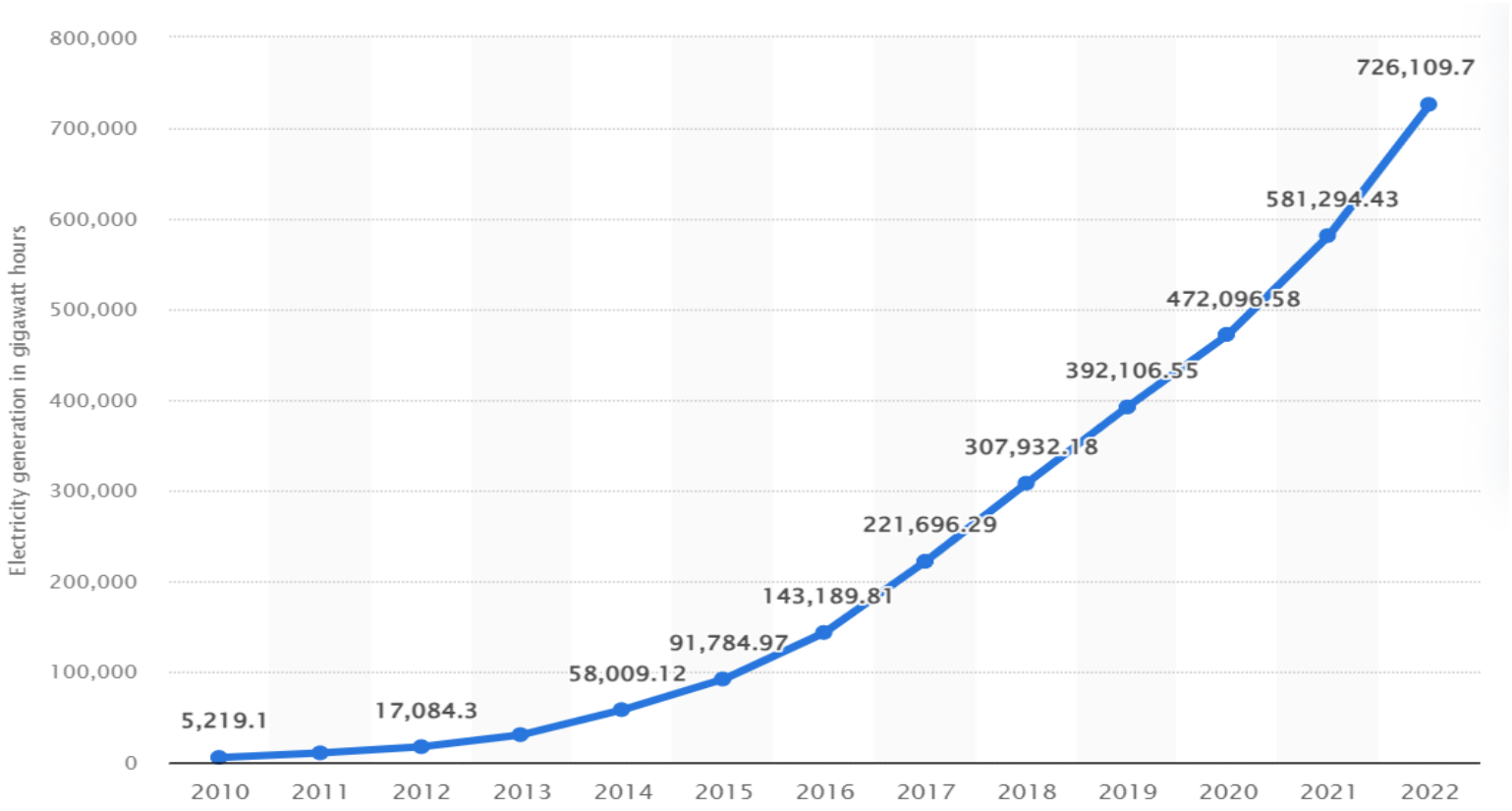
INTRODUCTION

- With the influx and growth of solar power generation in the Pacific, there are more and more systems being installed in the region



Annual electricity generation from solar photovoltaics in Asia Pacific from 2010 to 2022

Source : https://www.statista.com/ - Asia Pacific

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INTRODUCTION

- To improve safety and sustainability of solar PV systems, there is an urgent need to upgrade the quality of solar inspections
- This paper emphasizes the need for high-quality inspections to be undertaken by competent and accredited inspectors
- Once the installation is complete, the installer should not just flip a switch and start generating power. A thorough inspection is required
- Thorough inspections confirm that the systems are safe, compliant, operational and sustainable.
- From an industry perspective, quality inspections will support extending the longevity of systems which will then promote greater deployment of solar PV technology.

BRIEF HISTORY OF TRAINING, ACCREDITATION AND INSPECTIONS IN AUSTRALIA

- The Solar Energy Industry Association of Australia (SEIAA) (Revived 1991) and later Sustainable Energy Industries Association (Australia) (SEIA) (1998) were quite instrumental in setting up training, accreditation, etc. SEIA became Business Council for Sustainable Energy(BCSE) in 2001/02

- Industry based training was developed and then this was included in National Training packages

- In parallel with training, the SEIA focused on improving industry standards–lobbied Standards Australia for the development of AS4086- Batteries in Stand Alone Power Systems. Later came AS/NZS4509, AS/NZS 4777 and AS/NZS 5033 and AS5139

- Despite longstanding standards & training, BCSE only obtained funding for inspections in 2003. The quality of the some of the system installations before 2003 was in general poor.

- The industry boomed and accredited installers grew from 400 to 4000 in 2007. There are now around 10,000 accredited installers.

- Standards, compliance & quality of systems have improved since 2007 due to quality inspections, development of inspection/audit checklists and trained inspectors.

BENEFITS OF SOLAR INSPECTIONS

- Solar inspections are crucial to maximize the benefits of solar power. There are many benefits of a thorough inspection after installation, three of which are summarized here:
- 1. Enhances Safety

An electrical/solar system inspection confirms that all safety protocols are followed during installation. Solar Inspectors examine the electrical system to ensure proper grounding/earthing and protection against potential hazards.

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BENEFITS OF SOLAR INSPECTIONS 2

➢ 2. Detects and prevents issues

Inspectors can potentially identify and detect installation issues and poor workmanship that breach the standards and could become a safety hazard. Loose connections, wrong size end clamps, mismatch in type of plug and socket, under-sized cable, under-sized or over-sized circuit protection device, damaged cable insulation etc. could be issues.

(1) wrong size end clamp used (2) PV cables pinched

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BENEFITS OF SOLAR INSPECTIONS 3

- 3. Enhances performance

The tests and checks during an inspection could enhance performance e.g. lack of ventilation, loose connections, incorrect connections, undersized cables, etc. could be picked up during inspections and rectified. Such improvements could enhance system performance.

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RECENT SOLAR INSPECTIONS AND CAPACITY BUILDING INITIATIVES BY SEIAPI

1. **Standards and Guidelines Workshop for Electric Power Corporation (EPC) Inspectors**

- One-day workshop 20th February, 2024-by SEIAPI Executive Officer, Geoff Stapleton Follow-up to training in 2019.

- Morning session - refresh and overview of SEIAPI/PPA Technical Guidelines, accreditation scheme, planned USP Pacific TAFE Regional Training Centre and current online training and other initiatives

- Afternoon session - overview of updated AS/NZS 4777 and AS/NZS 5033 updates. Updated SEIAPI Solar Inspection Checklist for inspecting grid connected PV systems presented with key changes since 2021.

QUESTION – IS ONE DAY OVERIEW ENOUGH?

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STANDARDS AND GUIDELINES WORKSHOP FOR ENERGY FIJI LIMITED (EFL) INSPECTORS

2. Standards and Guidelines Workshop for Energy Fiji Limited (EFL) Inspectors

- A SEIAPI member advised that permitting and licensing approval for grid connected PV systems in Fiji can take 3-4 months and requested SEIAPI assistance.
- SEIAPI asked EFL about the application procedure and the checklist requirements for grid connected PV systems
- Some SEIAPI members were not fully compliant with the paperwork so SEIAPI decided to organize a joint workshop
- Simultaneously, a senior EFL staff raised the need for capacity building for their Electrical Inspectors on inspecting solar PV systems.
- A one-day workshop was held on 15th July, 2024 at USP Pacific TAFE, in Suva, facilitated by Mr. Stapleton. It provided an overview of key requirements of AS/NZS 5033 and AS/NZS 4777 standards.
- Both EFL and FCCC (Fiji's energy regulator) presented on Fiji's application requirements for grid connected PV.
- Open forum between SEIAPI members, EFL inspectors, and FCCC staff.
- Overview of inspection check sheets that have been developed for inspectors.

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STANDARDS AND GUIDELINES WORKSHOP FOR ENERGY FIJI LIMITED (EFL) INSPECTORS

Presenters from EFL and FCCC during the Open Forum on Day 1

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STANDARDS AND GUIDELINES WORKSHOP FOR ENERGY FIJI LIMITED (EFL) INSPECTORS

Inspector Training

- 16th July at EFL Kinoya Depot (Fiji) Training Room where EFL Electrical Inspectors learned about solar PV inspections and to develop inspection checklist skills
- 24 EFL staff (mostly inspectors, regulatory and planning team) attended
- Electrical Inspectors undertook ~~a~~ trial inspection of two grid connected PV systems at Fiji Ports

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RECOMMENDATIONS AND WAY FORWARD

Exploring Potential Structure of Solar Inspector Training, Mentoring and Accreditation

- The structure and format of solar inspection training must–be based on proven methods in countries that excel in solar installations. Experience from Australia, USA and elsewhere can be used to draft a programme suiting the Pacific context.

Australia (Victoria) - Example

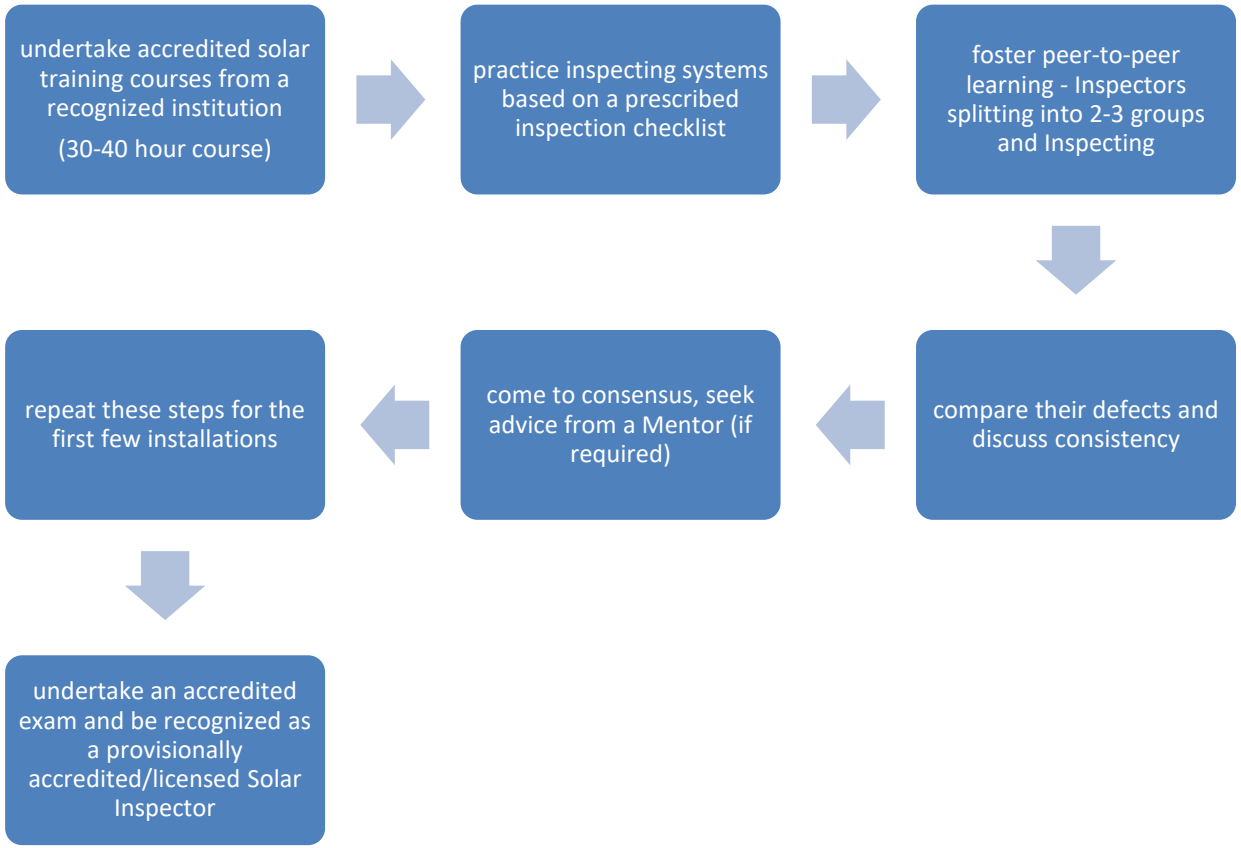
- Energy Safe Victoria (ESV) licenses and registers electrical workers and businesses in Victoria. Future Energy Skills (FES) assesses candidates who intend to apply for an Electrical Inspector's license – General (G) Class and RE Class (written exam covers various relevant standards).

US - Example

- NABCEP's PV System Inspector (PVSI) – recognizes skills for effective PV inspection
- In Georgia (the US state) –voluntary certification
- Solairgen runs a 40-hour face to face course that includes 8 hours National Electrical Code (NEC) coverage and 6 hours building code and fire code

RECOMMENDATIONS AND WAY FORWARD

Possible structure for the Pacific



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Flowchart explaining the possible structure of solar inspector training and capacity building

RECOMMENDATIONS AND WAY FORWARD

Exploring Potential Structure of Solar Inspector Training, Mentoring and Accreditation

SEIAPI with PPA or another relevant technical regional body such as the Office of the Pacific Energy Regulators Alliance (OPERA) could manage a 12-18 month programme:

- Activity 1: Consult and identify an in-country body to accredit inspectors with management and guidance provided.
- Activity 2: Conduct accredited inspector training courses in-country after registering the training programme in each country with the in-country registering body (where possible)
- Activity 3: Facilitate a mentoring scheme for inspectors to clarify doubts during their course of inspection. Also, to facilitate one-day online refresher course prior to exam
- Activity 4: Conduct exam and accredit inspectors with assistance from the in-country body. Run two sets of exams every 6 months and hand-over training material and exam guidelines to the in-country body.

RECOMMENDATIONS AND WAY FORWARD

- If the candidate cannot pass the accreditation/license exam, they can undertake more inspections and mentoring to re-sit for the next scheduled accreditation exam in the next 3-6 months by the relevant body.

- In a year, through such programmes (assuming sufficient) funding, around 80-100 solar inspectors in grid connect PV system could be trained/accredited/licensed in the region.

- It is envisioned that at the conclusion of the program, each in-country regulatory body or similar will have standard procedures to manage future accreditation of inspectors.

ESTIMATED BUDGET TO BUILD CAPACITY OF INSPECTORS

No.	Summary	US$
1	Consultation with country body (20 countries)	$ 50,000
2	In-country Inspection Training and Standards Workshop (including material) 4-day training and one-day workshop	$ 401,950
3	Mentoring Services	$ 61,600
4	Accreditation Exam	$ 24,500
	Sub total	$ 538,050
5	Other expenditure include Inspector accreditation program document, admin costs, exam papers, printing, certificates, logistics planning, field visit planning, miscellaneous	$ 107,610
	Grand Total	**US$645,660**

Countries: Fiji, Kiribati, Tuvalu, Nauru, Niue, Cook Islands, Tonga, Samoa, Vanuatu, Solomon Islands, PNG, Guam, Pohnpei, Yap, Chuuk, Kosrae, RMI, Saipan, American Samoa and Palau
Notes: Around 80-100 solar inspectors in grid connect PV system could be trained
Timeframe: 12-18 months, could potentially extend to 24 months due to delays/logistical challenges

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RECOMMENDATIONS AND WAY FORWARD

- Funding of approximately USD 0.65 million for grid-connect PV system inspection program will be required in the initial phase (12-18 months). Some on-going costs are anticipated.
- This could expand to off-grid inspections in the next ongoing phase
- In parallel with training the installers, training of inspectors is equally important as they are the ones doing the final checks and potential safety issues such as fire hazards, people getting electrocuted and equipment damage could be avoided
- Poor inspections could possibly have a lot of cost implications later on due to installation errors that get overlooked
- The PICTs have been losing skilled technical staff, hence capacity building programmes are essential

  EFL lost about 300 staff in the last 3 years (majority migrated – source: Fiji Village Aug 2024)

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END OF PRESENTATION

Tribute: Yambali village in Enga Province, Papua New Guinea where more than 2,000 people are feared buried in a landslide.
May 2024
Photograph: AFP/Getty Images

THANK YOU!
ANY COMMENTS/SUGGESTIONS/QUESTIONS
Email: secretariat@seiapi.com

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