

AREP Solar P4 GreenCard™ Installer

Entry to advance level training

Brought to you in partnership with



Build your career in solar from foundation to certification through a structured, industry-led pathway designed for real-world success.

PQRS training modules provide a staggered, step-by-step training program to build Solar PV and BESS team skills through various exit level achievements.

- Master solar PV installation standards, best practices, mounting, grid-tied and mini-grid, earthing and lighting protection, and battery storage for domestic to commercial & industrial systems
- Flexible: Complete one step at a time over months or embed skills intensively in one week plus practical time
- Some steps include pre-recorded preparation modules, onsite theory, and practical training
- Each step issues an outcomes certificate, building towards your AREP Solar P4 GreenCard™ Installer Certification
- Allows staff or yourself to work competently in domestic, commercial and industrial Solar PV

Your steps to success...

1

Solar P4 Products & Systems: Prepares you for understanding components and systems that makes up solar systems, ideal for salespersons and beginners

2

Solar P4 Design and Installation – Domestic: Builds hands-on installation skills and prepares for commercial applications

3

Solar P4 Design and Installation – Commercial: Builds advanced skills for large scale commercial and industrial solar design & installation. Prepares candidates for AREP Level 2 & 3 assessments towards Solar P4 GreenCard™ Installer certification

4

AREP Solar P4 Greencard™ Installer Certification: Complete your own solar installation for assessment with an accredited assessment centre, or peer reviewed through the AREP process of an own installation

5

Advanced Battery Energy Storage Systems (BESS): Completes your skillset for renewable energy system integration

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Disclaimer:

NQF Levels are either QCTO registered or equivalent levels

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Endorsed by:



Who is this course for?

- Individuals with little or no electrical knowledge; because if you start out in a new sector, you can always start by selling equipment and products by understanding systems
- Individuals that have been installing solar for a while and who would like to sharpen up their hit rate for closing deals
- Persons interested in understanding how the market and the sector works
- Companies that want to introduce solar to their staff, or to provide continued skills development of staff

Course outline

Batteries

- The cost of energy
- Throughput, depth of discharge, and number of cycles
- Impact of temperature on batteries and the stages of charging

Fuses and circuit breakers

- How circuit breakers work
- Difference between AC and DC
- Circuit breakers, battery fuses and solar fuses
- Dealing with DC circuits arcs

Conductors

- Solar cables, cable insulation and conductance

Inverters & charge controllers

- Efficiencies and derating of inverters & charge controllers
- Optimisers, micro inverters, MPPT vs PWM charge controllers

Surge protection and earthing

- Minimum number of earth spikes for solar systems and when to use different types of surge protection devices

Solar modules

- Local manufacturers, couplers and module degradation considerations

Data loggers, meters, testers

- Municipal rates and consumption profiles
- Determining solar PV system sizing

Combiner boxes

- When and where to use a combiner box

Money matters

- Financial calculation to estimate the pay back period of a solar PV system
- When to sell a grid tied system vs and off-grid system
- Cashflow on commercial solar PV installations
- Feasibility & project viability
- Project finance and administration
- Transportation and logistics

Municipalities & standards

- NRS documents
- Safety
- Site insurance and what it is for



Solar PV Design and Installation

2

Domestic

2-days Training

Who is this course for?

- This course addresses the need for organisations, individuals or small businesses that require information on sizing, assessing and the installation of solar PV Systems
- The content is ideal for entry level experienced delegates, engineers and electricians as well as organisations and persons thinking of approaching the renewable energy sector, and those that completed their *Solar PV Systems and Products* course
- Companies that want to introduce solar to their staff, or to provide continued skills development of staff

Course outline

If you are planning on getting involved with solar PV as a power generation technology, prepare for many years of adventurous learning as candidates doing solar installations are exposed to a wide range of topics covering energy engineering, basic electricity, electrical engineering, report writing, data analysis and many more with the broad topic outline focussing on domestic applications, covering:

- | | | | |
|--------------------|--------------|--|---|
| • Irradiation | • Couplers | • System calculations and design | • Mounting on simple roofs |
| • Modules | • Enclosures | • Standards and regulations | • Electrical wiring, connection & installations |
| • PV technology | • Fuses | • Electrical principles and administration | |
| • Circuit breakers | • Inverters | | |
| • Conductors | • Batteries | | |

Who is this course for?

- Organisations, individuals or small businesses that require in-depth information on sizing, assessing and the installation of solar PV systems for commercial / industrial applications
- Experienced installers, engineers and electricians involved in solar PV technology design and installation
- Delegates needing training on electromagnetic earthing & lightning and other solar PV risks and their mitigation methods, standards, and best practices

Course outline

Protection of solar systems

- Surge and lightning protection
- Surge Protection Devices (SPD) and Lightning Protection Devices (LPS) systems for solar PV
- Sources of surges and surge protection systems for mechanical and electrical surge forces
- SPD requirements according to SANS10313, SANS1042-1, SANS60364-7-712
- "Coordination" of SPD's and Lightning Flash Density and how to implement co-ordination using the relevant standards
- Labelling of SPD's and their ratings along with how to interpret the codes for SPDs such as 8/20 & 10/350 & KA
- Bonded and isolated Lightning Protection Systems (LPS)
- Air termination, down conductors and earth termination
- Lightning flash density values for South Africa
- Risk analysis & risk calculations
- Upwards leaders and downward streamers of lightning
- How to limit losses caused by lightning and surges
- Bonding vs earthing
- Electro-magnetic and lightning electro-magnetic pulses
- Understanding terms and acronyms used in standards
- Circuit breakers & fuses for safety protection
- Trip curves and fuses for modules and batteries

Mounting structure

- Ballasted mounting structures, short rail, as well as expansion joints
- Mounting structure guidelines
- Wind and hail loads on structure
- Inspection and maintenance of mounting structures
- Portrait vs landscape mounting of modules
- Structural integrity of modules
- Cable bending ratios and radii
- Do's and Don'ts for mounting structures
- Hail frequency, negative & positive wind pressure caused by uplift and down force loads and their impact on solar modules and mounting structures
- Oscillation during windy conditions on free-field solar modules mounted with tracking systems

Regulations and standards

- Electrical Installation Regulations
- Electrical Machinery Regulations
- NRS097 and variety of SANS standards
- Registration with the Department of Employment and Labour

Calculations & factors

- Climatic zones
- String calculations
- Module coefficients & factors
- Load profiles
- Conductor calculations
- Inverter sizing
- Storage calculations
- Fuse calculations



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Certification with AREP

Assessment



- Complete your own solar installation for assessment with an accredited assessment centre, or peer reviewed through the AREP process of an own installation

- All assessments from Level 0-3 must be completed under controlled AEE Assessment Centre Guidelines for AEE renewal credits

Battery Energy Storage Systems

5

Additional Course

2-days Training



Who is this course for?

- Organisations, individuals or small businesses that require in-depth information on sizing, assessing and the installation of solar PV systems for commercial / industrial applications
- Experienced installers, engineers and electricians involved in solar PV technology design and installation
- Delegates needing training on electromagnetic earthing & lightning and other solar PV risks and their mitigation methods, standards, and best practices

Course outline

Introduction to batteries

- LV to HV modular vs single units
- HV BMSs and controllers

Battery energy storage hazard types

- Mitigation of energy storage risks and hazards safety codes and standards with a focus on fire hazards
- HV inverters, specifications and change-over devices

Supplementing with solar

- Temperature co-efficient, sizing modules
- Using the internal MPPT's
- AC coupled systems
- Micro inverters

Genset integration through connecting and operating

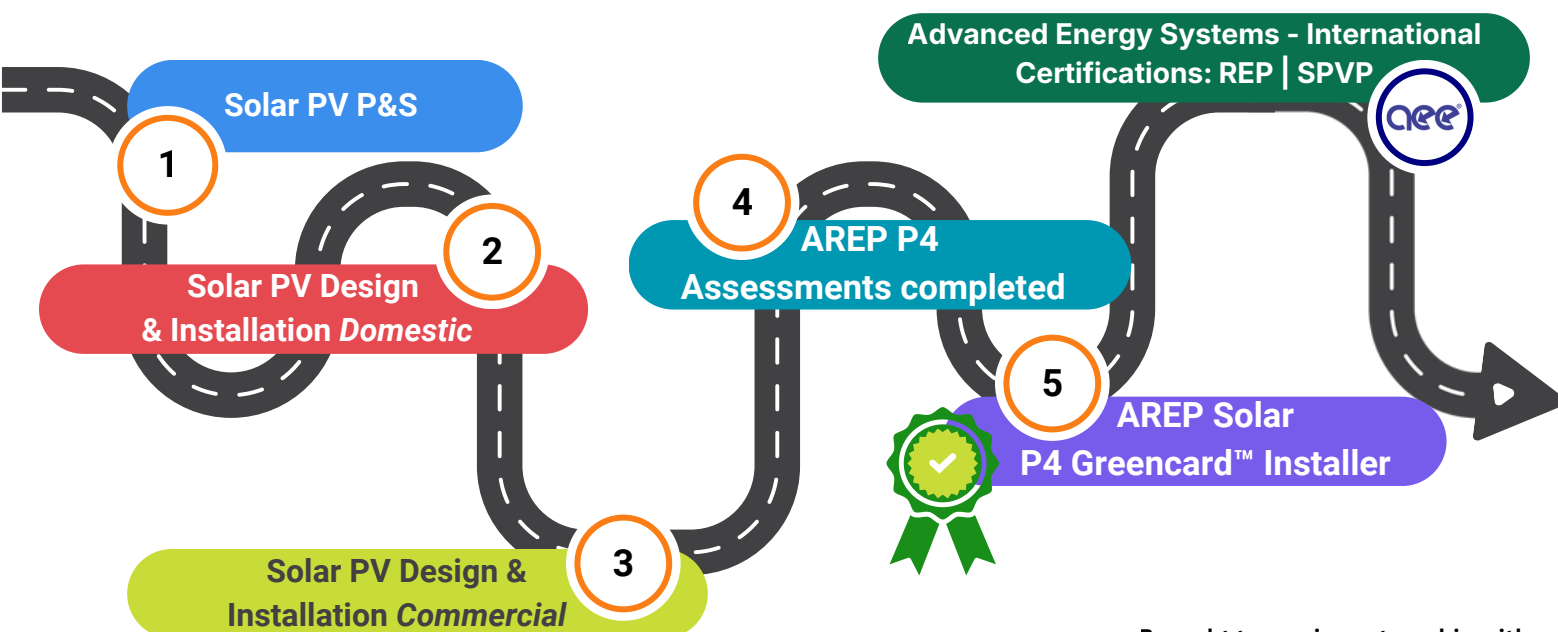
Portal and firmware setup and communications

Case studies

Commercial/industrial BESS design and construction

Power security

- Peak shaving
- Financial and economic modelling arbitrage
- Payback periods
- Tax incentives
- Financing
- Diesel savings



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