



MORNINGSTAR
World's Leading Solar Controllers & Inverters



AFRICAN ENERGY REGIONAL SOLAR TRAINING IN ABUJA

After 15 years and over 40 training sessions across the continent, African Energy is expanding their training format to provide even better training. The new format will include 32 courses spread over 4 days, taught by 6 different manufacturers and African Energy staff. Participants will receive a certificate of attendance or can sit for a final exam at the end of the training in order to receive a certificate of achievement. Courses will be classified as beginner or advanced. Cost for the 4 days will be N60,000 and it includes lunch, tea breaks and materials.

We expect the training to be popular with new comers, so we are allowing the industry to reserve their places first. Please fill and return this form along with a copy of your deposit receipt to reserve your place.

Abuja, Nigeria: 16 – 19 October 2017

Company: _____

Number of places desired: Advanced - _____ Beginner - _____

Number who will sit for the final exam to receive a certificate: _____

Contact email: _____

Names of participants, if known _____

PLEASE REPLY TO: DAVID@AFRICANENERGY.COM

Space is limited. To guarantee your place you may prepay to our local organizer:

Renecon Energy Ltd, GT Bank Account: 0025336260

Training Venue: Protea Apo Apartments, 2 Ahmadu Bello Way, Apo, Gudu 102215 Abuja



African Energy Solar Training Curriculum

| Monday, 16 October | | Track 1 - Beginner | Track 2 - Beginner | Track 3 - Advanced | Track 4 - Advanced |
|---------------------------|---|--------------------|--------------------|--------------------|--------------------|
| 8:30 - 9:30 | Morning Meeting Combined - Sponsored by Deka | | | | |
| 9:30 - 12:30 | Beginning Battery | Load Assessment | Advanced Inverter | Advanced Sizing | |
| LUNCH | | | | | |
| 13:30 - 16:30 | Load Assessment | Beginning Battery | Advanced Sizing | Advanced Inverter | |
| 16:30 - 17:15 | Evening Meeting Combined - Sponsored by Outback | | | | |

| Tuesday, 17 October | | Track 1 - Beginner | Track 2 - Beginner | Track 3 - Advanced | Track 4 - Advanced |
|----------------------------|--|--------------------|--------------------|--------------------|--------------------|
| 8:30 - 9:30 | Morning Meeting Combined | | | | |
| 9:30 - 12:30 | Beginning Inverter | Sizing | Advanced Battery | AC Coupling | |
| LUNCH | | | | | |
| 13:30 - 16:30 | Sizing | Beginning Inverter | PV Charging | Advanced Battery | |
| 16:30 - 17:15 | Evening Meeting Combined - Sponsored by Magnum | | | | |

| Wednesday, 18 October | | Track 1 - Beginner | Track 2 - Beginner | Track 3 - Advanced | Track 4 - Advanced |
|------------------------------|---|--------------------|--------------------|--------------------|--------------------|
| 8:30 - 9:30 | Morning Meeting Combined - Sponsored by Schneider | | | | |
| 9:30 - 12:30 | Advanced Battery | Advanced Inverter | AC Coupling | Design and Install | |
| LUNCH | | | | | |
| 13:30 - 16:30 | Advanced Inverter | Advanced Battery | Design and Install | PV Charging | |
| 16:30 - 17:15 | Evening Meeting Combined - Sponsored by Morningstar | | | | |

| Thursday, 19 October | | Track 1 - Beginner | Track 2 - Beginner | Track 3 - Advanced | Track 4 - Advanced |
|-----------------------------|---|--------------------|--------------------|--------------------|--------------------|
| 8:30 - 9:30 | Morning Meeting Combined - Sponsored by Rolls | | | | |
| 9:30 - 12:00 | PV Charging | Design and Install | Advanced Inverter | Master Class | |
| LUNCH and Final Exams | | | | | |
| 13:30 - 16:00 | Design and Install | PV Charging | Master Class | Advanced Inverter | |
| 16:00 - 17:15 | Evening Meeting Combined - Award Ceremony | | | | |

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|--------------------------------|--|
| Beginning Battery | Battery types, construction, and differences. Factors affecting battery life. Proper charging and basic battery chemistry. Understanding deficit cycling and partial state of charge. Sizing and capacity. |
| Advanced Battery | Optimum battery selection. Advanced charging considerations. Equalization, specific gravity and temperature sensing. Emerging technologies and partial state of charge applications. |
| Beginning Inverter | Inverter types and functions. High frequency and transformer designs. Wave forms and applications. Charger sizing, transfer times and relays, basic programming. Voltage selection. |
| Advanced Inverter | Offsetting with battery based inverters. Stacking and three-phase configurations. Remote monitoring. Advanced programming and proper charger settings |
| Sizing | How to answer the question: "How Much Do I Need?" PV, battery and inverter selection based on load information. |
| AC Coupling | Schneider will explain the details of their XW+ and CL grid-tie inverter coupling, including bills of materials, schematics and real-life experience from the field. |
| PV Charging | Morningstar will lead this session to teach PV principles and PWM and MPPT charging technology, proper use of combiner boxes and breakers, moving to advanced features, remote monitoring, etc |
| Design and Installation | How to combine components into an intelligent system. Judging capacities and ratings and advanced sizing considerations. Earthing, combining circuits, cable selection, orientation, module racking, etc |
| Master Class | Led by a group of manufacturers, this is a wrap-up course to cover outstanding questions and weaknesses identified during the week. |

| Manufacturer | Trainer |
|---------------------|-----------------|
| Deka | Bruce Habeck |
| Surrette | Steve Higgins |
| Magnum | Glenn Darby |
| Outback | John Webber |
| Morningstar | Russell Borum |
| Schneider | Kenneth Sokhela |
| AE | David/Lincoln |