Training Program:

Photovoltaic (PV) and Energy Storage

Introduction:

This training course covers photovoltaic (PV) systems, energy storage systems (ESS), and the interactions between these systems and the grid, along with microgrids and off-grid systems. Photovoltaic (PV) and storage are a match made in heaven. Photovoltaic (PV) and lithium batteries have gone down in price tenfold in the last decade, making these systems in a position to further down in price. In combination, it is imminent that these systems will take over the grid in the next ten (10) years.

Fossil fuels have a limited supply and the easier to reach sources are taken out of the ground, first making a trend for higher prices in the long term. Photovoltaic (PV) and energy storage systems (ESS) are made of materials that are not rare in most cases. As mass-production increases, prices drop faster than expected, as history shows. Energy Storage Systems (ESS) prices are also dropping because of the huge demand for batteries from the electric vehicle industry.This will include PV systems, energy storage systems, grid connections, inverters, charge controllers, microgrids, batteries, site analysis, solar radiation, solar resource, and much more. Taking this training course will keep you informed about the latest trends in technology

Who Should Attend?

This training course is designed for energy professionals, engineers, or those with a background in aspects of designing PV and energy storage systems. Many power professionals can benefit from quickly adding solar and storage to their repertoire of skills.

This training course is suitable for a wide range of professionals but will greatly benefit:

- Energy and Power Professionals
- Electricians and Utility Engineers in the Electric and Power Plant Company
- Mechanical Engineers and Electrical Engineers in the Energy and Power Industry

Objective:

By the end of this BTS training course, the participants will be able to:

- Intelligently Discuss Photovoltaic (PV) and Energy Storage Systems (ESS) Applications
- Understand Photovoltaic (PV) and Energy Storage Systems (ESS) Markets
- Forecast Advances in Photovoltaic (PV) and Energy Storage Systems (ESS) Technology
- Explain Benefits of Different Photovoltaic (PV) and Energy Storage Systems (ESS) Applications
- Determine Correct Applications of coupling Photovoltaic (PV) and Energy Storage Systems (ESS)

Course Outline

DAY ONE: MARKETS AND APPLICATIONS

- Common types of Photovoltaic (PV) System Applications
- Key contributions to the development of technology
- Grid-connected Photovoltaic (PV)
- Grid-connected Photovoltaic (PV) with Batteries
- Stand-alone Systems
- Microgrids with Photovoltaic (PV)

DAY TWO: PHOTOVOLTAIC (PV) ELECTRICITY BASICS AND SAFETY BASICS

- Solar Power vs. Solar Energy
- Multimeters: Measuring Photovoltaic (PV) Voltage, Current, and Resistance
- Maximum power point tracking and IV (current/voltage) curves
- Generation, Transmission, and Distribution
- Personal Protective Equipment (PPE) and Fall Protection
- Shock Prevention

DAY THREE: SOLAR ENERGY FUNDAMENTALS AND PHOTOVOLTAIC (PV) MODULE FUNDAMENTALS

- Irradiance, Irradiation, Insolation, Peak Sun Hours, and AC Energy
- Sun paths, Solar Time, and Latitudes
- Shading and Inter-row Spacing
- Global, Diffuse, Direct, Albedo Solar Radiation, Pyranometers, and Pyrheliometers
- Photovoltaic (PV) Cells, Modules, Panels, and Arrays

- Silicon and Thin Film Technologies

DAY FOUR: SYSTEM COMPONENTS AND PHOTOVOLTAIC (PV) SYSTEM SIZING

- Inverters, Islanding, and Anti-islanding
- Optimizers (DC-to-DC converters)
- Balance of Systems
- String Sizing (Temperature Voltage Calculations)
- Calculating Annual Energy Production
- Sizing Grid-connected and Battery Photovoltaic (PV) systems

DAY FIVE: ELECTRICAL AND MECHANICAL DESIGN, AND OPERATIONS & MAINTENANCE

- Photovoltaic (PV) System Single and Three-line Diagrams
- Photovoltaic (PV) to Inverter Ratios, Clipping, and Batteries
- Racking Systems without and with Tracking
- Piles, Earth Screws, Ballasts, and Roofing Attachments
- Cleaning Photovoltaic (PV) Systems in Different Climates
- Operations & Maintenance Best Practices including IV Curve Tracing and Monitoring

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