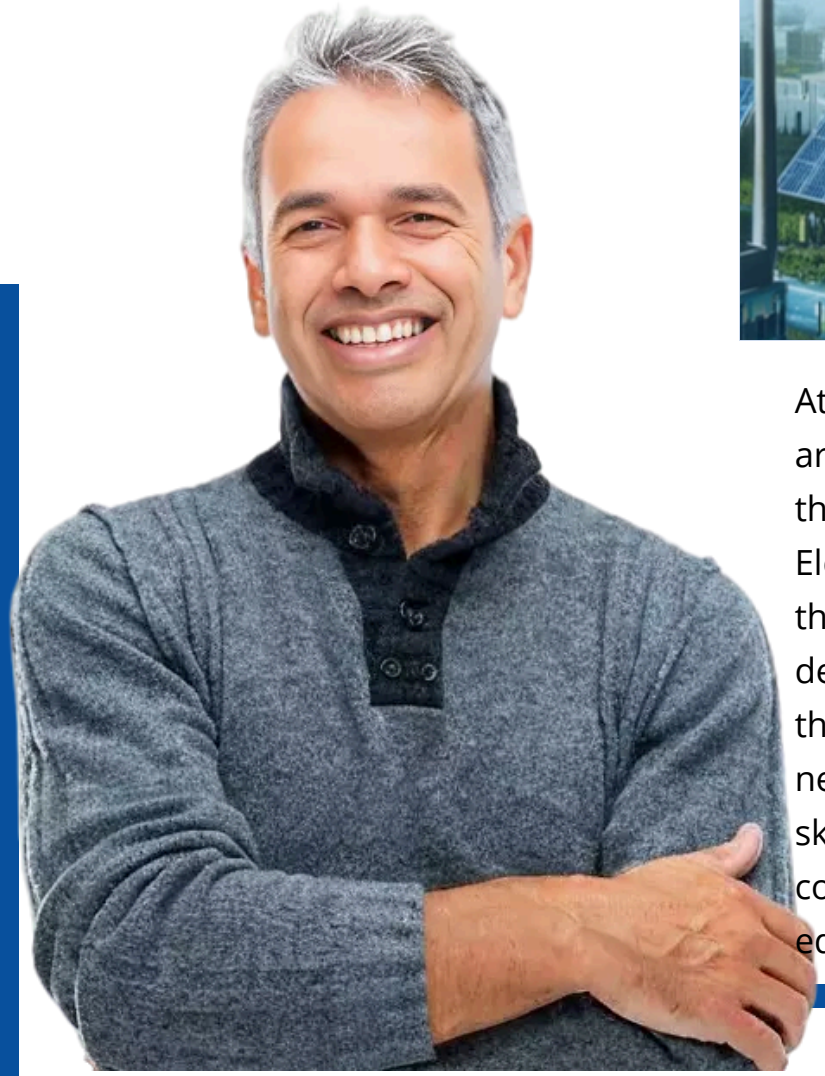
ELP

ENGINEERS' CERTIFICATION PROGRAM

Engineering Skills



CHALLENGES and SOLUTION of Renewable Energy Integration

At Electrical Learning Portal (ELP), we are dedicated to shaping the future of the electrical and MEP (Mechanical, Electrical, and Plumbing) industries through professional training and development. Our mission is to bridge the gap between the ever-evolving needs of employers and the dynamic skill set of engineers by providing comprehensive, industry-relevant education and training.

Degree + Skills = Career Growth

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CHALLENGES AND SOLUTIONS OF RENEWABLE ENERGY INTEGRATION

Welcome to the Challenges and Solutions of Renewable Energy Integration training program, a specialized course designed to address the complexities of integrating renewable energy sources into modern power systems. As renewable energy adoption grows, understanding and overcoming challenges such as grid stability, energy storage, and operational efficiency have become critical for sustainable energy development.

This course dives deep into the technical and operational challenges of integrating solar, wind, and other renewable energy sources into the grid. Participants will explore topics such as grid-forming vs. grid-following inverters, energy storage technologies, and grid applications like frequency regulation, peak shaving, and renewable energy integration.

The program also provides practical insights into system design and sizing, including Power Conversion Systems (PCS), energy management systems, and balance of system components. Participants will analyze real-world challenges like battery safety, recycling, cost reduction, and carbon emission mitigation, alongside innovative solutions to tackle these barriers effectively.

By the end of the course, participants will gain a thorough understanding of the challenges surrounding renewable energy integration and the strategies to overcome them, equipping them with the tools to contribute to more stable and efficient energy systems.
Join us to discover how to turn challenges into opportunities and drive the future of renewable energy integration!

PVSYST
PHOTOVOLTAIC SOFTWARE

TOPICS

1. Grid Forming Inverter V/S Grid Following Inverter

- *Introduction to Grid-Forming and Grid-Following Inverters*
- *Working Principles and Key Characteristics*
- *Performance in Grid Stability and Disturbances*
- *Comparison: Operational Differences and Applications*
- *Challenges and Future Trends in Inverter Technologies*

2. Energy Storage Technologies

- *Storage Types*
- *Components of a Battery Energy*
- *Storage System (BESS)*
- *Energy Storage System Components*
- *Grid Connection for Utility-Scale BESS Projects*
- *Battery Chemistry Types*
- *Lead–Acid (PbA) Battery*
- *Nickel–Cadmium (Ni–Cd) Battery*
- *Nickel–Metal Hydride (Ni–MH) Battery*
- *Lithium-Ion (Li-Ion) Battery*
- *Sodium–Sulfur (Na–S) Battery*
- *Redox Flow Battery (RFB)*

3. Grid Applications of Battery Energy Storage Systems

- *Scoping of BESS Use Cases*
- *General Grid Applications of BESS*
- *Technical Requirements*
- *Round-Trip E□iciency*
- *Response Time*
- *Lifetime and Cycling*
- *Sizing*
- *Operation and Maintenance*
- *Use Cases*
- *Frequency Regulation*
- *Renewable Energy Integration*
- *Peak Shaving and Load Levelling*
- *Microgrids*

4. Challenges and Risks

- *General Challenges*
- *Cost Reduction*
- *Deployment*
- *Incentive Program*
- *United Nations Framework Convention on Climate Change*
- *General Risks*
- *Poorly Defined and Categorized Systems*
- *Unbundling of Operation and Network Development Activities*
- *Grid Tarif Applications and Licensing Issues*
- *Battery Safety*
- *Challenges of Reducing Carbon Emissions*
- *Battery Recycling and Reuse Risks*
- *Examples of Battery Reuse and Recycling*
- *Reuse of Electric Vehicle Batteries for Energy Storage*
- *Recycling Process*

5. Selection & Sizing Of PCS

- *Selection & sizing of PCS and grid-tied solar inverter*
- *Working principle of bi-directional PCS*
- *Selection & sizing AC rating of PCS*
- *Selection & sizing AC rating of grid-tied solar inverter.*
- *Selection of critical parameters of inverter and PCS: input AC, AC*
- *output DC Input, DC output, Battery charger parameters, efficiency,*
- *protection, communication, Auxiliary power requirement*
- *Energy Management System.*
- *Batteries and battery management systems*

6. Selection & Sizing of Balance Of System For BESS

- *Selection sizing of inverter duty transformer*
- *Sizing of BESS container & ventilation arrangement*
- *Cable section for PCS and Inverter*
- *Type of Earthing and calculation*
- *Section of string inverter or central inverter*
- *Liquid cooled and air cooled BESS*

7. Engineering Drawings and Layouts

- *Single Line Diagram/One Line Diagram (BESS, AC and DC)*
- *Preparation of BESS container layout & location*
- *Earthing layout*
- *Cable layouts*

8. PVSyst (Software)

Tools

o All Classes are Live via Google Meet or Zoom
o MS PowerPoint slides
o Calculation on MS Excel
o PDF material

Benefits of the program

1. *Join the professional training*
2. *Understand the real world*
3. *Be a part of the Professional Engineers' Community*
4. ***Program Completion Certificates***
5. ***Join our engineers' WhatsApp Groups***
6. ***Session Recordings***

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