








# Online Industry & Research Training on Sustainable Hybrid Energy System Design and Analysis

## 25 June-05 July 2026

 India (IST) – 7:30 PM |  Saudi Arabia – 5:00 PM |  Dubai (UAE) – 4:00 PM |  Malaysia – 10:00 PM |  Singapore – 10:00 PM |  New York (USA) – 10:00 AM |  London (UK) – 3:00 PM

*This 10-day online training equips participants with practical knowledge and hands-on skills to design, simulate, and optimize hybrid renewable energy systems using HOMER Pro. It covers renewable resource assessment, techno-economic analysis (TEA), life cycle assessment (LCA), multi-objective optimization, and real-world case studies, enabling participants to bridge fundamentals with industry applications.*

### Benefits & Applications

- Master HOMER Pro for hybrid energy system design & optimization
- Integrate solar, wind, biomass & hydro with conventional systems
- Apply LCA & TEA tools for sustainable and cost-effective solutions
- Develop industry-ready skills for projects, research & consultancy
- Boost career prospects in renewable energy & sustainability sectors

### Training Features

- Certificate on completion
- Live + Hands-On: 1-hr session + practical exercises daily
- Resources: PPTs, Toolkits, Real Data & Research PDFs
- Lifetime Access: Recordings & HOMER Pro templates
- Insights: Policy briefs & career guidance



## About the CATR

The Centre for Advanced Training and Research (CATR) is a premier institution offering industry-relevant courses, technical training, and applied research in science, technology, and engineering. Specializing in Computational Biology, Biotechnology, Drug Design, Renewable Energy, Data Science, and Engineering Simulations, CATR ensures expert-led learning, hands-on workshops, and globally recognized certifications.

## Who Can Join?

- Engineering Students (B.Tech/BE/M.Tech/ME/Ph.D/Research Fellow)
- Researchers & Academicians
- Renewable Energy Engineers & Technologists
- Energy Analysts & Planners
- Government & Policy Professionals
- Development Sector Professionals
- Entrepreneurs & Startups in Clean Energy
- Urban & Regional Planners
- Students Aspiring for Careers in Energy

## Training Fee

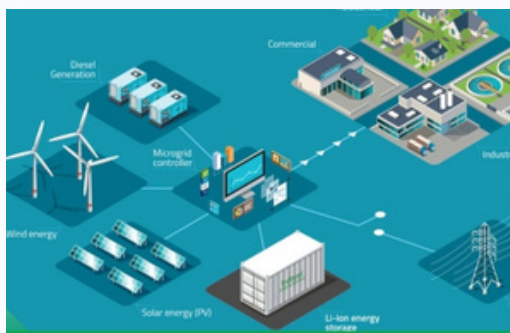
**Indian Participants:** ₹2500

**International Participants:** 130 USD



- 🎓 Certificate on Completion
- 📚 PPTs, Toolkits, Real Data & Research PDFs Included
- 🚀 Project Work, Policy Briefs & Career Guidance Insights

- 🖥️ Live + Hands-On Sessions
- 🎥 Lifetime Access to Session Recordings



# Training Module

## Day 1 – Introduction to Hybrid Renewable Energy Systems (HRES)

- Overview of renewable energy sources: solar, wind, biomass, hydro.
- Basics of SPV, wind, battery, and diesel systems.
- Hybrid system configurations and their role in rural electrification and microgrids.

## Day 2 – Overview of Optimization Platform HOMER Pro & LCA/TEA Concepts

- Need for optimization and techno-economic analysis (TEA).
- Introduction to Life Cycle Assessment (LCA) in renewable systems: cradle-to-grave environmental impact, carbon footprint, emissions.
- HOMER Pro interface: architecture, inputs, simulation, optimization, and sensitivity analysis.

## Day 3 – Load Profile Development & Demand Management

- Types of loads: residential, commercial, industrial, and community.
- Creating 24-hour, daily, seasonal, and annual load profiles.
- Using real data vs. synthetic loads.
- Load prioritization and basic demand-side management.

## Day 4 – Resource Assessment & Component Modeling and Hybrid Topology Design

- Understanding solar irradiance (GHI), wind speed, and data sources (NASA, NREL, SolarGIS, Meteonorm).
- Importing and modifying resource data in HOMER.
- PV module, wind turbine, diesel generator, battery, and inverter modeling.
- Hybrid topology design: DC/AC coupling, dispatch strategies (Load Following, Cycle Charging, Combined).

## Day 5 – Hybrid System Design & Integration

- Control strategies and system operation
- Load following, cycle charging, combined operation.
- AC/DC coupling and inverter management.

## Day 6 – Economic Assessment & Multi-Objective Optimization of Energy Systems

- Key financial parameters: Net Present Cost (NPC), Cost of Energy (COE), Levelized Cost of Energy (LCOE).
- Cost components: capital, O&M, fuel, and maintenance.
- Weighted multi-criteria optimization and scenario comparison.

## Day 7 – Multi-Objective Sensitivity Analysis & LCA Integration

- Sensitivity analysis: fuel cost, capital cost, inflation, discount rate.
- LCA metrics integration: environmental footprint, emissions, renewable fraction.
- Spider plots and scenario evaluation.

## Day 8 – System Performance & Environmental Impact

- Load and generation pattern analysis; DG vs. HRES performance.
- Peak shaving, backup integration, and energy export management.
- Grid reliability, policy considerations, net metering, and feed-in tariffs.

## Day 9 – Case Studies & Mini Project Work

- Participants select locations or load profiles.
- Model, optimize, and simulate hybrid systems with HOMER.
- Peer discussions and troubleshooting of challenges.

## Day 10 – Project Showcase & Program Wrap-Up

- **Hands-on Project Work:** Finalize HOMER models, optimization, and reports
- **Project Presentations & Result Interpretation:** Present findings with peer and instructor feedback.
- **Open Discussion & Knowledge Exchange:** Q&A, troubleshooting, discussion on future applications, research, and funding opportunities.