

Training module on Energy Transition: Solar Energy, Microgrids and Electric Vehicles

The training program is designed to provide participants with a comprehensive understanding of the key technologies driving the global energy transition towards a low-carbon and sustainable future. It begins with the fundamentals of solar energy, covering solar resource assessment, photovoltaic (PV) technologies, system components, design, installation, commissioning, operation, maintenance, troubleshooting, and safety practices. The programme then explores microgrids, including their architecture, distributed generation, energy storage, control strategies, grid integration, design, operation, optimization, and applications for resilient and decentralized power systems. Building on this foundation, it covers electric vehicles (EVs), focusing on EV architecture, battery technologies, Battery Management Systems (BMS), charging infrastructure and technologies, and the operation, safety, and maintenance of the EV ecosystem. Throughout the program, participants are introduced to the techno-economic, financial, policy, regulatory, and supply chain aspects of these clean energy systems, including project development, investment considerations, risk mitigation, and enabling market frameworks. Delivered through a balanced blend of classroom lectures, practical demonstrations through site visits, hands-on exercises, and case studies, the program equips participants with the technical knowledge and practical skills to design, implement, operate, and manage clean energy systems while strengthening their understanding of RE integration, distributed energy resources, sustainable mobility, decarbonization, and net-zero pathways.

Program Title	Energy Transition: Solar Energy, Microgrids and Electric Vehicles	
Duration	2-weeks	
Venue	NTPC School of Business, Noida	
Day	Time	Topic(s)
0 (Sun)	<i>Arrival of participants</i>	
1 (Mon)	Forenoon (FN) 3 hours	- Global Energy Transition: Role of Solar Energy, Distributed Energy Resources, Microgrids, and Electric Vehicles - Overview of India's Power Sector and Renewable Energy Landscape
	Afternoon (AN) 3 hours	- Fundamentals of solar photovoltaics and PV system components - Emerging solar PV Technologies and future trends
2 (Tue)	Forenoon (FN) 3 hours	- Solar Resource assessment and measurement techniques - Solar Energy Yield assessment and performance calculations
	Afternoon (AN) 3 hours	- Design of Rooftop solar PV Systems - Design of utility scale solar PV power plant
3 (Wed)	Forenoon (FN) 3 hours	- Introduction to Microgrids & Minigrids – Definition, Types (AC/DC), Components & Design architecture - Design & planning of Microgrids– Approach, Challenges & Solutions
	Afternoon (AN) 3 hours	- Smart Microgrids, Grid Interconnection & reliability of Microgrids - Solar and Microgrid Policies, guidelines and regulatory framework in India

4 (Thu)	Forenoon (FN) 3 hours	• O&M of solar and microgrid power plants • Policies, schemes and regulations related to solar and Microgrid
	Afternoon (AN) 3 hours	• Economics and Financial aspects of Solar and Microgrid power plants • RE Grid Integration
5 (Fri)	Forenoon (FN) 3 hours	• Solar for Agriculture • Floating solar PV Systems
	Afternoon (AN) 3 hours	Field visit to Solar and Microgrid Facility
6 (Sat)	<i>Agra Visit</i>	
7 (Sun)	<i>Day-off</i>	
8 (Mon)	Forenoon (FN) 3 hours	• Basics of Electric Vehicles • Designing of EV Charging Infrastructure
	Afternoon (AN) 3 hours	• EV Ecosystem • Smart application, G2V and V2G concepts
9 (Tue)	Forenoon (FN) 3 hours	• Battery energy storage for solar, microgrids and Electric Vehicles • Battery Management System
	Afternoon (AN) 3 hours	• Fleet electrification plans and EV acquisition • Economics and Financial aspects of Electric Vehicles
10 (Wed)	Forenoon (FN) 3 hours	• Policies and regulatory framework for electric vehicles and hybrid electric vehicles • Solar and battery waste Management
	Afternoon (AN) 3 hours	Field visit of the EV charging station and/or battery assembly facility
11 (Thu)	Forenoon (FN) 3 hours	Field visit to EV manufacturing facility
	Afternoon (AN) 3 hours	
12 (Fri)	Forenoon (FN) 3 hours	• Techno-institutional/Business models (with and without entrepreneurial models & anchor loads) for rural and urban Microgrids • Socio-Economic aspects of solar, microgrids and Electric Vehicles
	Afternoon (AN) 3 hours	• Recap of program • Assessment of the participants • Feedback and Valedictory session
13 (sat)	<i>Return of participants</i>	