BOOST
THE LEADING TRAINING PROVIDER

Electrical Engineering

Demand Side Management

Course Introduction

This course presents advanced methodologies that implement demand response and energy conservation programs in light of the integration of new technologies, regulatory changes and the penetration of renewable energy resources facilitated by the operating flexibility brought by power electronics. The course presents examples from other jurisdictions including requirement for the new building codes to achieve zero net energy.

It describes a public agency’s goals and objectives for conserving and otherwise reducing energy consumption and managing its demand for energy. The course presents the Demand Response implemented for economics and system security such as system balancing and relieving transmission congestion, or for system adequacy. The webinar also presents the principal attributes of conservation programs and the associated success criteria. In a system with increased penetration of renewable resources, demand response provides flexibility to system operators, helping them to maintain the reliability and the security of supply.

Target Audience

Regulators and government agencies advising on public energy conservation programs o All professionals interested in expanding their expertise, or advancing their career, or take on management and leadership roles in the rapidly evolving energy sector o Energy professionals implementing demand side management, particularly in power systems with increased renewable penetration, to allow the much needed operational flexibility paramount to maintaining the reliability and stability of the power system and in the same time offering all classes of customers flexible and economical choices o Any utility professional interested in understanding the new developments in the power industry

Learning Objectives

- Demand Response is presented as a competitive alternative to additional power sources, enhancing competition and liquidity in electricity markets.
- The unique characteristics are discussed from a local, consumer centric and also from a system perspective bringing to life the ever changing paradigm for delivery energy to customers. Interoperability aspects and standards are discussed, as well as the consumer centric paradigm of Transactive Energy with IOT enabled flexibilities at system level, distribution networks and microgrids.
- The course introduces the Blockchain as a new line of defense against cyber threats and its increasing application in P2P transactions and Renewable Certificates.

Course Outline

- **DAY 01**

  1.The Regulatory Framework

  - The Bulk Electricity System
  - Demand Aggregators and Virtual Power Plants
  - The role of the Regulator in Energy Conservation

  2. The Evolution of the Power System

  3. FUNDAMENTAL COMPONENTS OF DEMAND SIDE MANAGEMENT

  - Demand Side Management Categories
  - Implementation of Energy Efficiency and Conservation Programs
  - Impact of Energy Efficiency on the Demand Forecast
  - Drivers used in Demand forecast
  - Market Segmentation
  - Customer Type
  - Electrical Vehicles
  - Other factors such as rail Transit

- **Day 02**

4. Conservation Programs and Conservation Regulations

- Demand Side Management Cost
- Tariffs and Time-of-Use Rates
- Demand Response Programs
- Load Management: Industrial demand response for frequency balancing and voltage control
- Energy Management
- Automation and Metering Requirements
- Case Study: Demand Response Pilot implemented in CAISO
- Case Study: Demand Response Auction implemented in IESO
- Internet and cloud based standards: NAESB – North American Energy standard Board
- New Operational Paradigm: Changes in Load Shapes, Variable Resources, Operational
- Flexibilities
- Demand Response Model NIST -National Institute of Standards and Technology

• **Day 03**

Renewable Resources

- Wind
- Solar
- BESS
- Microcontrollers

5. Overview of Power Electronics and Power System Controls in Systems with Renewable Resources

- Inverter based resources: controls and algorithms
- Case Study: A System with 100 % Renewable Penetration and Dispatchable Loads
- Microgrids

6. Operational Flexibility

- Ramping Ratio on the Demand Side- Example CAISO
- Increased Renewable Resources Requires Operational Flexibility on the Demand Side
- Demand Response ENTSO-e EUROPE

• **Day 04**

7.Load Forecasting and DSM

- Artificial Intelligence
- Machine Learning - Pushing Innovation Boundaries
- Machine Learning Approaches
- Training the algorithm
- Load Forecasting
- Solar Energy Forecasting
- Impact of BTM Solar on Load Profile
- Study Case: Improved Methodology implemented by the CAISO

8. Variable Generation – Forecasting Uncertainty

- Variability of Wind and Solar Energy

9. Economic Dispatch for a Demand-Supply Balance

- Economic Dispatch Formulation
- Optimal Power Flow
- EMS in Industrial Applications
- Dispatchable Loads
- Case Study: Operating Scenarios with Dispatchable Generation and Load and Storage
- Operating Reserve in a system with Dispatchable Loads and Renewable Generation

10. Variability in Generation – Variability in Load

- Contingency Reserves
- Regulating Reserves
- Following Reserves

• **Day 05**

Economic Dispatch Instructions and Timeline

11. Dispatch Compliance: Generation side and Demand Response side

12. Examples of Market Design

13. Smart Grid Strategy

- Transactive Energy
- Intelligent Devices
- Intelligent Substation – Digital Substation
- Architectural Platform and IOT
- Integration SCADA-AMI- Demand Response
- IOT and IOT Reference Forum

- How IOT impacts the Conservation and Demand Response Programs-The Power of Virtual Devices
- Smart Devices
- The Smart Home of the Future: Telecom, Energy, Health/ The home as an enterprise
- The Smart City
- P2P
- Microgrids and Control Strategy
- Advanced Grid Controls and Sensors

14. Blockchain Platform in P2P Transactions

15.Concluding Remarks

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 16, 2025	June 20, 2025	5 days	4250.00 $	UAE - Dubai
Aug. 25, 2025	Aug. 29, 2025	5 days	4250.00 $	UAE - Dubai
Dec. 7, 2025	Dec. 11, 2025	5 days	4250.00 $	Qatar - El Doha
Nov. 16, 2025	Nov. 20, 2025	5 days	4250.00 $	oman - salalah