



## ESC Account Rep Training Program

### Electric Generation for Natural Gas Utility Employees

The Energy Solutions Center (ESC) has consistently prioritized enhancing energy utility marketing and sales professionals' core competencies, supporting new hires and seasoned staff in achieving excellence.

The primary goal of this program is to equip natural gas utility employees with a comprehensive understanding of the electric generation industry. Participants will gain in-depth knowledge of key topics such as terminology, processes, delivery mechanisms, and market fundamentals, enabling them to better adapt to and address the increasing demand for electric generation.

Each training unit includes a presentation handout and recorded presentation. These materials are accessible 24/7, year-round. Account representatives can complete the material individually at their own pace or participate in utility-organized group sessions offered on a regular schedule. Each training unit also includes a certificate of completion for Professional Development Hours (PDH) of learning.

**Cost:** The Electric Grid Sales Track costs **\$5,000** and provides access to an unlimited number of staff members for three years. Participation in the program requires the Local Distribution Company (LDC) to be an ESC member in good standing.

Electric Generation Training Curriculum
Introduction to Electric Generation
Terminology and Concepts
Electric Generation Processes
Electricity Delivery Mechanisms
Market Fundamentals
Integration of Natural Gas and Electric Generation
Practical Applications and Case Studies

**Availability:** The complete program is expected to be available to subscribers by the end of Q2 2025.

**Subscription:** Contact Eric Burgis at [eburgis@escenter.org](mailto:eburgis@escenter.org) if you are interested in subscribing to this track of the Account Rep Training Program

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#### Training Program Outline

##### **Unit 1: Introduction to Electric Generation**

This unit provides an overview of the electric generation industry, covering:

- Energy sources, electric generation, supply, transmission, distribution, and consumption
- Dispatchable vs. non-dispatchable power
- Brief description of standard contract terms, trading, and purchase of power sector mainstream fuel supplies
- Interconnections between U.S. and Canadian electrical systems, ISO regions, consumer interconnection, Qualifying Facility under PURPA, plus key differences between regulated and deregulated utilities
- eGRID sub-regions vs NERC regions
- Difference in producers- commercial, industrial, IPP, electric utilities and franchise agreements
- Importance of electric generation within the energy sector, historical generation mix and the necessity for electricity to be derived from other fuel sources
- A comparative analysis of natural gas and electric generation
- Gas & Electric Similarities: Grid networks and seasonal peak demand patterns
- Gas & Electric Differences: Energy sources, distribution methods, and gas pressure vs. electric voltage,

##### **Unit 2: Terminology and Concepts**

This unit introduces essential terminology in electric generation, such as:

- Kilowatts, megawatts, grid, load, volts, amps, phase, demand, usage, kilowatt-hours, and primary vs secondary energy
- Converting kW to BTU for comparisons to gas technologies



- Key concepts such as baseload, peak load, power quality, resiliency, and renewable integration
- Relationships between volts, amps, and phase, along with discussions on transformers (grid and customer), switch gear, and the customer side of the meter.
- Power factors, load factors & capacity factors
- AC vs DC voltage (PV and batteries are DC)
- Base load vs marginal power including back-up for intermittent renewable power
- Grid surge, voltage dips and spikes, frequency, reactive, true, and apparent power

### **Unit 3: Electric Generation Processes**

This unit provides an overview of various electric generation processes, including:

- Thermal, hydro, nuclear, renewable and geothermal generation methods
- Detailed processes for technologies such as turbine-driven generation, internal combustion engines, steam turbines, combined cycle systems, hydroelectric power, fuel cells, wind turbines, and photovoltaic systems
- The role of natural gas in electric generation, such as its use in combined and simple cycle plants
- An introduction to energy storage systems, such as hydro-pumped storage, compressed air, batteries, flywheels, natural gas generation as an electric storage method, hydrogen to power, and ice thermal storage

### **Unit 4: Electricity Delivery Mechanisms**

This unit focuses on the mechanisms involved in electricity generation, transmission, and distribution, including:

- Transmission vs. distribution lines, high-voltage vs. low-voltage systems and step up / step down transformers
- Grid infrastructure & management, substations, and T&D vulnerabilities (e.g., environmental, vandalism, cyber threats)
- Other management strategies (e.g., management of vegetation, automated distribution, asset inspection, fire protection, and grid hardening (e.g., undergrounding, structural upgrades)
- Smart grids and modern advancements in delivery systems, accurate grid modeling, and energy storage investments
- Interconnection independencies between regions, states, and provinces.
- Balancing the grid, source generation priorities to reduce grid congestion & constraints, brown outs, and over/undersupply events.

### **Unit 5: Market Fundamentals**

This unit introduces the fundamentals of electricity markets and pricing mechanisms, including:

- Wholesale and retail electricity pricing mechanisms across various regions, Green Power Market/RECs, Peak demand pricing, forecasted energy production, functions of electricity markets (e.g., cost recovery, resource allocation, reliability, technology integration and competition)
- Regulatory agencies and policies affecting electric generation regions,/subregions, DOE, Office of Electricity, EPA, EIA, ACEE NERC, FERC, Clean Air Act, Acid Rain Program
- Renewable supply dependencies, arrangements, priority, take or pay contracts
- Annual Energy Outlook, Annual Electric Power Industry Report: form EIA-861 (projected EIA retail energy price comparison)
- Incentives for Energy Efficiency: DSIRE – incentive programs by state, other federal and local market subsidies
- States establishing minimum requirements for clean energy generation or capacity for load serving entities within states as well as mandated annual electric savings for electric/gas utilities (Impacts on utility rates)
- Roles of various market players, including utilities, independent power producers, and regulators

### **Unit 6: Integration of Natural Gas and Electric Generation**

This unit explores the synergies between natural gas and electric generation, focusing on:

- Distributed generation and Combined heat and power (cogeneration) facilities
- Case studies highlighting successful integration
- Future opportunities for collaboration, such as off-grid facilities and data centers
- Source to site energy efficiency

### **Unit 7: Practical Applications and Case Studies**

The final unit applies concepts from the course to real-world scenarios including:

- Real-world examples of electric generation projects, analysis of market trends and their impact on the natural gas sector, commentary from industry experts and Onsite Energy Technical Assistance Partnerships (TAPs)

This comprehensive training ensures a deep understanding of the electric generation industry, its processes, challenges, and evolving trends. Email [eburgis@escenter.org](mailto:eburgis@escenter.org) if you have any questions.