

Willdan Clean Energy Academy Training Course Syllabus

Course Overview

- Intense: 60-hour online course focused on energy efficiency of small commercial and residential facilities
- Comprehensive: Training covers technical aspects of energy efficiency, as well as the business and political aspects that characterize the NV market (i.e. incentive programs & bottlenecks)
- Energy Systems: Building Envelope, Heating Systems and Domestic Hot Water Systems: energy principles, system types & components, efficiency ratings, conservation measures, savings financial calculations
- Economic Incentives: Utility administered (ConEdison's) Small-Medium Business (SMB) & Demand-Side Management (DSM) programs, and government administered (NYSERDA's) FlexTech, Existing Facilities & GJGNY Programs
- Energy Auditing Process: Building inspection, data collection & input, equipment diagnostics, equipment use, cost and efficiency calculations, audit report generation
- Energy Efficiency & Conservation Strategies: Improved controls, operations & maintenance, retro-commissioning system, retrofits & upgrades, reduced consumption & conservation.

Course Objectives

By the end of these course offerings, participants shall able to:

- Demonstrate knowledge of industry-standard energy auditing and building performance analysis processes
- Perform ASHRAE level 1 and 2 energy audits for small commercial facilities
- Demonstrate proficiency in the use of ConEdison SBDI Excel tool software, Excel-based utility billing analysis, and energy benchmarking using the EPA Portfolio Manager
- Perform sales & marketing, financial analysis, and project management skills in tandem with their energy auditing proficiency
- Demonstrate knowledge in relevant economic incentives: including ConEdison's Small & medium Business [SMB, Commercial & Industrial [C&I] & Targeted Demand Management [TDM] programs, and NYSERDA's FlexTech, Existing Facilities & GJGNY Programs, and understand the connection between these incentive programs and career opportunities, specifically in commercial lighting sales, auditing and retrofitting
- Identify energy systems, including lighting, heating systems, domestic hot water systems, and envelope systems, specifically the system types and components, efficiency ratings, and conservation measures and more.

Course Description

These courses shall blend technical training on energy efficiency and building performance for small commercial facilities with broader green business training related to energy efficiency contracting, economic incentives, market drivers, certifications, institutions, policies and regulations. Students will be introduced to the latest software currently utilized by the SMB program, called the Subcontractor Management and Reporting Tool (SMART), to manage contractors' jobs from eligibility to energy savings.

With federal mandates for social distancing and geographical restrictions for traditional classroom training, GTL decided to diversify our services by providing online training via Cisco Webx. The web-based video conferencing technology allows for virtual synchronous training delivery with live interaction between students and the instructor. Virtual training enables instructors to carry collaborative operations with ease. In the virtual training course, trainers can show interactive electronic whiteboards; share computer screens, files and documents; play video and audio; as well as chat with students to make for a more lively and interesting training course. In an effort to ensure knowledge retention and provide lesson reviews, GTL instructors utilizes Kahoot!, which is a game-based learning platform used to survey, poll and quiz students in an engaging and interactive way.

Lesson Plans

| CLASS # | GREEN ECONOMY | CLASS # | BUILDING ENVELOPE | CLASS # | HEATING SYSTEMS | CLASS # | DOMESTIC HOT WATER |
|---------|--------------------------------------|---------|--------------------------------------|---------|---------------------------------------|---------|---------------------------------------|
| 1 | The Industrial Revolution | 8 | Construction Process Lesson | 15 | Heating Principles | 25 | Water Heating |
| 2 | Green Economy Overview | 9 | Air Movement Lesson | 16 | Heating: Building Science | 26 | Combustion Science |
| 3 | Green Training & Certifications | 10 | Heat Movement Lesson | 17 | Heating: Combustion Science | 27 | Heating Sources |
| 4 | NY Green Economy Players | 11 | Moisture Movement Lesson | 18 | Heating: Efficiencies | 28 | Water Heating System |
| 5 | Green Economy Market Drivers | 12 | Green Economy Market Drivers | 19 | Heating: Sources | 29 | Water Heating Analysis |
| 6 | Energy Efficiency Policy Initiatives | 13 | Energy Efficiency Policy Initiatives | 20 | Heating System Types | 30 | Combustion Safety Testing & Standards |
| 7 | Energy Efficiency Incentive Programs | 14 | Energy Efficiency Incentive Programs | 21 | Heating: Controls | 31 | Water Heating Efficiency |
| | | | | 22 | Heating: Analysis | | |
| | | | | 23 | Combustion Safety Testing & Standards | | |
| | | | | 24 | Heating Efficiency Measures | | |

Lesson #1: Green Economy

- The Industrial Revolution – 1hr
 - What is the Industrial Revolution?
 - Climate Crisis
 - Carbon Revolution >> Carbon Efficient Economy
- Green Economy Overview – 1 hr
 - Green Economy Overview
 - Green Sectors & Industries
 - Green Jobs
- Green Training & Certifications – 2hr
 - Green Accrediting Organizations Overview
 - Green Certifications by Accrediting Organization
 - Green Certifications by Industry
 - Green Certifications by NYC Employer Preference
- NY Green Economy Players – 2hr
 - Green Market Players Summary
 - Government / Public Sector
 - For-Profit Sector
 - Non-Profit Sector
- Green Economy Market Drivers – 2hr
 - Green Market Drivers Overview
 - Technology & Innovation
 - Economic Conditions
 - Policy Initiative Categories
- Energy Efficiency Policy Initiatives – 2hr
 - Energy Efficiency Policy Initiatives Overview
 - International Policy Initiatives Summary
 - Federal Policy Initiatives Summary
 - State Level Policy Initiatives Summary
 - City Level Policy Initiatives Overview
- Energy Efficiency Incentive Programs – 2hr
 - Incentive Program Acronym Summary
 - Small Business Incentive Program overview

Lesson #2: Building Envelope

- Construction Process Lesson – 2hr
 - Construction Overview
 - Construction Process
 - Construction Process Lesson Review
- Air Movement Lesson – 2hr
 - Air Movement Principles
 - Blower Door Testing
 - Ventilation
 - Air Sealing
 - Air Movement Review
 -
- Heat Movement Lesson – 2hr
 - Heating Principles
 - Conductive Heat Movement
 - Radiant Heat Movement in Buildings
 - Convective Heat Movement in Buildings
 - Heat Movement Review
- Moisture Movement Lesson – 2hr
 - Moisture Movement Principles
 - Measuring Moisture
 - Moisture Sources
 - Controlling Moisture
 - Moisture Problems
 - Moisture Movement Review

Lesson #3: Heating Systems

- Heating Principles – 2hr
 - Thermodynamics
 - Measuring Heat
 - Relative Humidity
- Heating: Building Science – 2hr
 - Pressure & Thermal Boundary
 - Air Movement in a Building
 - Heat Movement in a Building
- Heating: Combustion Science – 3hr
 - Combustion Process
 - Combustion Plant System
 - Combustion Heating Distribution System Draft
- Heating: Efficiencies – 3hr
 - Burn Efficiency
 - Steady State Efficiency (SSE)
 - Annual Fuel Utilization (AFUE)
- Heating: Sources – 2hr
 - Combustion
 - Solar Thermal
 - Geothermal
- Heating System Types – 3hr
 - Packaged Systems
 - Mini-Split Systems
 - Heat Pumps Split Systems
- Heating: Controls – 3hr
 - Types of Thermostat Controls
 - Analog & Mechanical Contact
 - Digital & Electronic Programmable
- Heating: Analysis – 3hr
 - Nameplate Data Collection
 - Heating & Cooling Degree days
 - Conductive & Convective Heat Loss
- Combustion Safety Testing & Standards – 3hr
 - Test Procedure for Vented Appliances
 - Gas Leak Test
 - Combustion Safety Action
- Heating Efficiency Measures – 3hr

Lesson #4: Domestic Hot Water

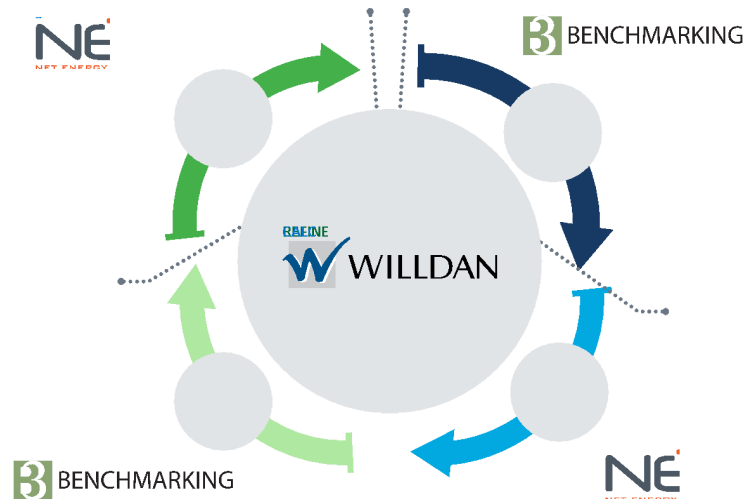
1. Water Heating – 1hr
 - a. Measuring Temperature
 - b. Phase Change
 - c. Dew Point Temperature
2. Combustion Science – 2hr
 - a. System Components
 - b. Open vs. Sealed-Combustion
 - c. Draft & Venting
3. Heating Sources – 1hr
 - a. Refrigeration Cycle
 - b. Electric Resistance
 - c. Passive Solar
4. Water Heating System – 2hr
 - a. Indirect Fired Water Heater
 - b. Heat Pump Water Heaters
 - c. Instantaneous Water Heaters
5. Water Heating Analysis – 1hr
 - a. Auditing Strategies
 - b. Data Collection
 - c. Water Heating Calculations
6. Combustion Safety Testing & Standards – 2hr
 - a. Test Procedure for Vented Appliances
 - b. Gas Leak Test
 - c. Combustion Safety Action
7. Water Heating Efficiency – 1hr
 - a. Energy Conservation Strategies
 - b. Energy Star Equipment
 - c. Heat Pump Water Heater

Energy Software Overview

For the purposes of this training, we plan to utilize the following two energy efficiency software:

B3 Benchmarking

B3, which stands for Buildings, Benchmarks, and Beyond, puts the power of building energy data in consumers hands. Using basic building and meter information, the online tool summarizes energy consumption, costs, and carbon emissions in easily digestible monthly and annual reports for Con Edison Small-Medium Business Customers. B3 Benchmarking helps you ensure your building is operating and performing as expected, and the tool screens buildings that would provide the greatest return on investment from any building improvements.



Net Energy Optimizer [NEO]

NEO is a vetted, licensable software that is rooted in industry standards and uses whole building energy modeling to find the best energy-saving measures for maximizing ROI in new construction and retrofits.

NEO is a building energy simulation tool built on a DOE2 platform that analyzes the building's energy use for each hour of the year. Analysis includes lighting, loads on the building due to weather, the performance of thermal shell, HVAC system, plug loads, internal loads, and occupancy schedules. NEO also has the ability to run quickly, provide economic analysis of an efficiency measure bundle and display up to three different efficiency bundle options and three different mechanical systems, allowing for real-time iterations with a participant design team.

