

Business Energy Professional Job Creation & Skills Retraining Program

A four week business energy course

- **140 Hour Minimum Training Program**
- **Skill Level: Business / Management**

The American Recovery and Reinvestment Act of 2009 (“The Stimulus Bill”) includes specific funding to provide “job training projects that prepare workers for careers in energy efficiency and renewable energy”. The four week business energy professional training program helps applicants develop skill sets needed for today’s energy marketplace and government energy efficiency initiatives.

The Association of Energy Engineers, a non-profit, 501c, is offering mid-level business energy professional training course is for professionals, technicians, consultants, engineers and people with documented energy experience to provide the tools for success jobs in energy management, utility and the green energy industry. At the conclusion of this program, the optional Business Energy Professional (BEP®) exam will be offered to attendees. The BEP® designation is widely sought after and often required by employers representing industry, utilities, government, institutions and when hiring energy professionals.

The program provides a recognizable affirmation of demonstrated competencies in a wide range of energy related principles and practices. This program helps an individual distinguish themselves and helps them obtain their career objectives. The board constantly reviews the program and makes modifications to the program’s content based on relevant industry standards, mandates, corporate greenhouse gas (GHG) reduction strategies, and Federal & regional policy changes and incentives. The Business Energy Professional designation and program is widely accepted both in the United States and internationally.

The Need for Business Energy Professionals & Energy Jobs

In the **U.S. Department of Labor Training and Employment Guidance Letter** 14-08 it indicates: “The energy efficiency and renewable energy industries offer workers new opportunities that may require additional training and certification. Through the Recovery Act, a number of other federal programs will receive large investments in programs and projects that could create “green jobs.” These include investments in renewable energy infrastructure, energy-efficiency home retrofitting, bio-fuel development, and advanced drive train/vehicle development and manufacturing. As states receive Recovery Act funding for the WIA and Wagner-Peyser programs and implement training and reemployment strategies, ETA encourages states to recognize opportunities to prepare workers for “green jobs” related to other sources of federal funding. States are also encouraged to expand existing training programs, such as registered apprenticeship programs that have the potential to prepare workers for careers in the renewable energy sectors and for other “green jobs.”

The complete TEN 14-08 is available on the Department of Labor website at http://wdr.doleta.gov/directives/corr_doc.cfm?DOCN=2728

Week 1: Energy Management Basics

Day 1: Introduction to Energy Management

THE NEED FOR BUSINESS ENERGY PROFESSIONALS

GREEN JOBS

- Salary Potential (entry, med-level, experienced)
- Employment Opportunities (Public & Private Sectors)

BASICS OF ENERGY MANAGEMENT

Basics of Energy Management includes a discussion of the need for energy management, and then moves on to an introduction of the basic concepts and terminology for energy in the form of heat, electricity, gas, oil, and coal. Common energy units are discussed, and calculations involving conversions from one form of energy to another are introduced. Basic forms of energy such as kinetic and potential energy are discussed, along with a simplified approach to the more advanced properties of energy including the First and Second Laws of Thermodynamics.

BASIC ARITHMETIC AND CALCULATOR SKILLS

This section contains a review of arithmetic and calculator skills and provides a large number of practice calculations and problems to help people who have been away from school and away from performing technical calculations for some time. There are a number of practice calculations.

ALGEBRA AND ANALYTICAL SKILLS

This section contains a review of algebra and analytical skills, and provides a large number of practice calculations and problems to help people who have been away from school and away from performing technical calculations for some time. There are a number of practice calculations and expression evaluations.

ENERGY UNITS AND UNITS OF CONVERSION

This section is devoted to energy units and energy unit conversions using the Railroad Track method. All common energy units are discussed, and calculations involving conversions from one form of energy to another are shown in detail using the Railroad Track method.

Day 2: Energy Economics, Alternative Financing and Energy Service Companies

<p>ECONOMIC ANALYSIS OF ALTERNATIVE INVESTMENTS</p> <ul style="list-style-type: none"> • Economic decision analysis • Simple economic measures • The time value of money • Present and future values • Cost and benefit analysis • After tax cash flows 	<p>ALTERNATIVE FINANCING</p> <ul style="list-style-type: none"> • Role of performance contracting • Different sources (loans, stock sales, bonds, etc.) • DOE FEMP and alternative financing • True lease, capital lease, bonds, etc.
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Day 3: Introduction to Energy Auditing

<p>INTRODUCTION TO ENERGY AUDITING</p> <ul style="list-style-type: none"> • Energy auditing fundamentals • Energy units, estimating energy usage, conversion factors • Energy auditing procedures and planning • Data required for energy analysis • Prioritization of energy efficiency measures • Audit tools, energy audit software 	<p>ENERGY AUDIT INSTRUMENTATION</p> <ul style="list-style-type: none"> • The need for instrumentation • Light level meters • Electric meters – Voltages, current, power, energy, power factor • Temperature-measuring instruments • Combustion efficiency measurement • Air flow and air leak measurement • Data logging
<p>CONDUCTING AN ENERGY AUDIT</p> <ul style="list-style-type: none"> • Purpose of the energy audit • Facility description and data needs • Major systems in the facility • Data forms for recording information • Collecting the actual data • Identification of preliminary energy management opportunities 	<p>BUILDING ENVELOPE</p> <ul style="list-style-type: none"> • Heat flow concept • R and U values • Walls, roofs, windows, Low E glass • Infiltration • Energy management opportunities
<p>LIGHTING SYSTEMS</p> <ul style="list-style-type: none"> • Measurement of light • Efficiency / efficacy • Light color-CCT/CRI • Lamp lumen depreciation 	<p>Business Energy Professional Q & A</p>

<ul style="list-style-type: none"> • Lamp types and characteristics • Controls • Energy management opportunities 	
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Day 4: Energy Auditing: Air Conditioning, Heating and Motors and Drives

<p>AIR CONDITIONING</p> <ul style="list-style-type: none"> • HVAC basics • Load estimating • Efficiencies • Components • Chillers — electric, gas-driven, absorbers • Piping arrangements • Energy savings opportunities 	<p>HEATING SYSTEMS</p> <ul style="list-style-type: none"> • Boilers: fire tube, water tube, cast iron • Distribution systems • Terminal Units • Boiler energy management opportunities • Furnaces — electric, gas, pulse, condensing • Furnace energy management opportunities
<p>MOTORS AND DRIVES</p> <ul style="list-style-type: none"> • Types of motors • Squirrel cage induction motors • Operating characteristics • Efficiencies • Variable frequency drives • Energy management opportunities 	

Day 5: Energy Audits: Heat Pumps, Ventilation Systems, Domestic Hot Water, Water Conservation and Utility Analysis

<p>HEAT PUMPS</p> <ul style="list-style-type: none"> • Operation • Efficiencies • Classifications • Energy management opportunities 	<p>VENTILATION SYSTEMS</p> <ul style="list-style-type: none"> • Types • Characteristics • Heat recovery methods • Energy management opportunities
<p>DOMESTIC HOT WATER SYSTEMS</p> <ul style="list-style-type: none"> • Types • Efficiencies 	<p>WATER CONSERVATION AND AUDITS</p> <ul style="list-style-type: none"> • Rate structures • Water conservation methods

<ul style="list-style-type: none"> • Circulating pumps • Heat pump water heaters • Energy management opportunities 	<ul style="list-style-type: none"> • Irrigation and landscaping • Leak detection • Water audit
<p style="text-align: center;">UTILITY ANALYSIS</p> <ul style="list-style-type: none"> • Demand and energy • Rates classifications • Identifying billing errors • Energy accounting 	

WEEK 2 of 4

Week 2: Basics of Building Commissioning

Day 1: Introduction to Building Commissioning

<p>WHAT IS BUILDING COMMISSIONING?</p> <ul style="list-style-type: none"> • New Buildings • Retro- and Re-Commissioning Existing Buildings • Continuous Commissioning • Total Building Commissioning • Understanding the Big Picture/Paying Attention to the Detail 	<p>WHY WE NEED COMMISSIONING – ALIGNING THE OWNER/DESIGNER/ CONTRACTOR/OPERATOR</p> <ul style="list-style-type: none"> • The Existing Paradigm • What Needs to Change • What are the Motivators Toward Creating Change • The Opportunities
<p style="text-align: center;">THE PROJECT TEAM</p> <ul style="list-style-type: none"> • Roles and Responsibilities <ul style="list-style-type: none"> -Owner/Developer -Construction Manager -Architect/Engineer -Construction Contractors -Controls Contractor -Equipment Supplier -Agency Official -Commissioning Professional -Commissioning Technician -Operations and Maintenance Staff 	<p style="text-align: center;">Basics of Building Commissioning</p> <p style="text-align: center;">Q & A</p> <p style="text-align: center;">Examples</p>

<ul style="list-style-type: none"> • Leadership and the Commissioning Professional • Commissioning Diplomacy 	
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Day 2: New Building Commissioning

<p>CONCEPT/PROGRAMMING PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Design intent • Basis of design • Preliminary commissioning plan 	<p>DESIGN PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Dynamic Documentation (changes in design) • Comprehensive design review • Commissioning specifications • Budgeting • Testing specialist
<p>CONSTRUCTION PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Dynamic documentation (as-builts, TAB results, etc.) • Updating commissioning plan • Construction observations • CX team meetings • Testing adjusting and balancing • Controls • Submittals / RFIs 	<p>ACCEPTANCE PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Acceptance and warranty • Continuous testing • Changes • Indoor environmental quality • Energy use • Operations & maintenance and Training

Day 3: Retro-Commissioning (Includes Re-commissioning)

<p>CONCEPT/PROGRAMMING PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Retro-commissioning, recommissioning, and building tune-ups • Developing, planning and communicating • Budgeting 	<p>INVESTIGATION PHASE OBJECTIVES</p> <ul style="list-style-type: none"> • Communication • Occupant impact • Operation and maintenance • Commissioning documents • Retesting and remonitoring • Training
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<ul style="list-style-type: none"> • Choosing the commissioning professional for retro-commissioning • Reviewing and updating building • Commissioning plan • Team meeting • Original design intent vs. current use 	
<p>PROJECT TURNOVER OBJECTIVES</p> <ul style="list-style-type: none"> • Final Report 	

Day 4: Total Building Commissioning

<p>WHAT NEEDS TO BE COMMISSIONED AND HOW ARE THESE SYSTEMS COMMISSIONED?</p> <ul style="list-style-type: none"> • Structural, Envelope, Interior, Conveying systems • Environmental and energy systems (lighting/M/E/P) • Communications systems • Site and landscape systems • Protective systems 	<p>COMMISSIONING GUIDELINES AND BENCHMARKING</p> <ul style="list-style-type: none"> • SMACNA • ASHRAE/NIBS – Guideline 0 – 2005 • AABC • BCA • PECI • NEBB • ENERGY STAR
<p>TAB AND VERIFICATION, SYSTEM BY SYSTEM</p>	<p>COMMISSIONING AND THE LEED RATING SYSTEM</p>
<p>ECONOMIC ANALYSIS</p>	<p>COMMISSIONING PROCUREMENT</p>
<p>BUILDING CODES</p>	<p>COMMISSIONING AND THE FEDERAL GOVERNMENT</p>
<p>COMMISSIONING TOOLS AND TECHNOLOGY</p>	

Day 5: Review

QUESTION AND ANSWER

Week 3: Carbon Reduction & Sustainable Development

Day 1 - Introduction, Executive Briefing & High-Level Strategies

<p>INTRODUCTION AND THE NEED FOR CARBON REDUCTION</p> <ul style="list-style-type: none"> • Trends and data the global challenges we face (data students can apply) • Why monitor and reduce your organization's carbon footprint? • History, legislation, and terminology • Examples of successful programs: profits, results, and benefits 	<p>REVIEW SELECTED STUDENT OBJECTIVES & PROFILES, LOCAL CHALLENGES, PROBLEMS & BARRIERS</p>
<p>CLASS MEMBER INTRODUCTIONS (STUDENTS' GOALS)</p>	

Day 1 - Introduction To the Carbon Reduction Process

<p>PROTOCOL OVERVIEW AND TERMINOLOGY</p> <ul style="list-style-type: none"> • Kyoto's 6 listed greenhouse gases, GWP factor, control vs. equity share approaches, De-Minimis, base year and adjustments, transitional periods, tier quantification system. ISO 14064 and 14065 as well as trading term like CCX, CDM, JI, VER, etc. • Emissions types: direct, indirect, fugitive and mobile; Scope I, II, III, and biogenic 	<p>OVERVIEW – CARBON AUDIT AND REPORTING PROCESS (GETTING CREDIT FOR WHAT YOU DO)</p> <ul style="list-style-type: none"> • Identify boundaries (tenant vs. communal areas), sources • Quantify, report and verify emissions
<p>CARBON REDUCTION PROCESS OVERVIEW</p> <ul style="list-style-type: none"> • Reduce, reuse, recycle, and apply energy efficiency/management 	<p>INSIGHTS FROM CLASS/INSTRUCTOR</p>

<ul style="list-style-type: none"> • Implement green power/renewable energy sources • Implement offset/trade strategies 	
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Day 2: Carbon Footprint Measurement & Monitoring

<p>COMPONENTS OF A CARBON AUDIT</p> <ul style="list-style-type: none"> • Identify carbon intensity • Electricity, gas, and fuel usage (Scope I and II emissions) • Scope III emissions: extended audit components (travel, personal travel, “cradle to cradle” products and processes) • Class exercise on a carbon audit/carbon map of their operations 	<p>EXACT STEPS TO SETTING UP A CARBON REDUCTION PROGRAM AND REPORTING SOFTWARE</p> <ul style="list-style-type: none"> • Protocols and timelines to calculate, certify, and report your emissions • Establishing reduction goals as well as monitoring and reporting tools • Verification process tools • Direct, indirect, mobile, and fugitive source management
<p>REPORTING SOFTWARE/REPORTING FORMATS</p> <ul style="list-style-type: none"> • Reporting content must include <ul style="list-style-type: none"> -Info on organization, emissions, offsets (and locations) -New goals to further reduce GHG emissions 	<p>EMISSIONS CONVERSION FACTORS AND WHERE TO FIND THEM</p>
<p>VERIFICATION PROCESS</p>	

Day 2 - PM: Practical Strategies & Tactics to Reduce Your Carbon Footprint

<p>PROVEN TACTICAL MEASURES TO REDUCE YOUR CARBON FOOTPRINT</p> <ul style="list-style-type: none"> • Re-engineer processes to reduce carbon <ul style="list-style-type: none"> -Design, materials, manufacturing/process changes • Resources for building it “right” (LEED plus more) • Energy efficiency and management • Energy procurement and green power 	<p>QUICK REVIEW, INSIGHTS FROM CASE STUDIES</p>
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<ul style="list-style-type: none"> Emissions conversion exercises – <i>to help students convert energy savings into avoided carbon emissions</i> 	
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Day 3 - More Practical Strategies & Tactics To Reduce Your Carbon Footprint and Environmental Impact

<p>QUICK REVIEW, INSIGHTS FROM CASE STUDIES</p> <ul style="list-style-type: none"> Renewable and other sustainable technologies Tax benefits Green janitorial Water management/reuse/recycling Reduce, reuse, recycling practices + waste minimization Green transportation and administrative functions Greening your suppliers and distributors 	<p>LOCAL STRATEGIES AND TECHNIQUES</p>
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Day 3 -Carbon Credits, Trading and New Revenue Tactics

<p>CARBON TRADING AND CREDIT TERMINOLOGIES</p> <ul style="list-style-type: none"> Renewable energy certificates Green and white certificates, offsets explained <ul style="list-style-type: none"> -Wind, solar, methane recovery...certified credits -Fleet management -Bulk purchasing credits Additional profit-generating as well as bartering strategies 	<p>CREATING AN ONGOING GREEN PROGRAM</p> <ul style="list-style-type: none"> Justification for a “green” manager
<p>PROCESS FOR FINDING PROFITABLE GREEN STRATEGIES</p>	

Day 4: Management and Policy Aspects of Developing a Sustainability Plan

<p>SUSTAINABLE DEVELOPMENT – DEFINITIONS AND APPLICATIONS</p> <ul style="list-style-type: none"> • Development of the concept in the 1970s • Growing interest in the 1980s - Sorting out the agenda • Why sustainability has numerous definitions and what it means today. • Rio Conference and Agenda 21 - the development of international protocols • Linkages between energy and sustainability • Energy systems and their importance in achieving sustainability • Why a systems approach is key to achieving sustainability 	<p>LOCAL SUSTAINABILITY POLICY PROGRAMS</p> <ul style="list-style-type: none"> • Features of local sustainability programs • Recycling programs, first step to sustainability • Schools and universities have taken the lead • Discussion about local governmental solutions to sustainable cities • Sunbelt cities and their sustainability programs • Sustainable cities in Europe
<p>BUILDING SUSTAINABILITY</p> <ul style="list-style-type: none"> • The importance of building systems • Green buildings - material and components in green construction • Energy Star • International energy conservation code • LEED buildings - new construction and existing buildings 	<p>INTRODUCTION TO SUSTAINABLE DEVELOPMENT</p> <ul style="list-style-type: none"> • How did the concept of sustainability evolve? • What were the drivers and events? • Theories of sustainable development
<p>CORPORATE AND INDUSTRIAL SUSTAINABILITY PROGRAMS</p> <ul style="list-style-type: none"> • How some corporations are developing internal sustainability programs • Commercial case studies: Home Depot and Disney 	<p>IMPACT OF SUSTAINABLE DEVELOPMENT POLICIES ON PLANNING</p> <ul style="list-style-type: none"> • Brief history of why planning processes are important • What planning techniques are being used to achieve sustainable development

<ul style="list-style-type: none"> • Manufacturing case studies: UPS, Toyota, and BMW • Service sector case studies: Microsoft 	<ul style="list-style-type: none"> • Case study: a sample development designed for sustainability • Transportation systems - alternative fuel technologies available to reduce the energy and environmental impacts of transportation systems. • Clean Cities program • Kyoto Treaty and the Montreal Protocol
<p>MANAGEMENT APPROACHES TO DEVELOPING AND IMPLEMENTING SUSTAINABILITY PROGRAMS</p> <ul style="list-style-type: none"> • Management components of a sustainability plan • Policies associated with sustainability programs • Designing corporate sustainability programs (roundtable workshop) • Resources and websites • Approaches to implementing sustainability programs. 	<p>Review</p> <p>Q & A</p> <p>Examples</p>

Day 5: Technical and Financial Aspects of Developing a Sustainability Plan

<p>INTRODUCTION TO TECHNICAL AND FINANCIAL ASPECTS OF DEVELOPING A SUSTAINABILITY PLAN</p> <ul style="list-style-type: none"> • Real "value" vs. sustainability "drivers" • Technical limitations vs. opportunities • Sustainability cost issues 	<p>RENEWABLE ENERGY SOLUTIONS</p> <ul style="list-style-type: none"> • Wind energy • Solar energy • Geothermal systems • Bioenergy <ul style="list-style-type: none"> -Ethanol and biofuels -Bio Power -Bio-based products • Geothermal energy • Hydrogen, hydropower and ocean energy
<p>ZERO ENERGY FACILITIES AND DISTRIBUTED GENERATION</p> <ul style="list-style-type: none"> • Combined heat and power • Fuel cells 	<p>BUILDING SUSTAINABILITY</p> <ul style="list-style-type: none"> • ASHRAE Standard 90.1 • Climate Action Registry: certification protocol

<ul style="list-style-type: none"> • Everything "green" 	
<p>ENVIRONMENTAL ISSUES ASSOCIATED WITH SUSTAINABLE DEVELOPMENT</p> <ul style="list-style-type: none"> • Air and water quality issues and prevention • Waste minimization • Global warming - local, state, national, international concerns and efforts toward international cooperation <p>DEVELOPING <u>YOUR</u> SUSTAINABILITY PLAN</p>	<p>ENERGY AND EMISSIONS CREDITS, OFFSET AND TRADES</p> <ul style="list-style-type: none"> • The Chicago Climate Change Index • Green tag, white tag and carbon offset purchasing • Renewable energy credits (REC's) • Emissions trading processes • Carbon offset aggregators • Carbon offset providers and verifiers

WEEK 4 of 4

Week 4: Business Energy Professional Program

Day 1

INTRODUCTION to BEP Certification and its application in the job market

The Business Energy Professional Program certification awards special recognition to those business/marketing and energy professionals who have demonstrated a high level of competence and ethical fitness for business/marketing and energy management related disciplines, as well as laws governing and affecting energy professionals.

WHAT ARE BEP OBJECTIVES?

To raise the professional standards of those engaged in business/marketing, energy management, utility account management and customer service representative.

To improve the practice of energy management by encouraging energy business professionals in a continuing education program of professional development.

To identify persons with acceptable knowledge of the principles and practices of business/marketing and energy management related disciplines and laws governing and affecting energy professionals through completing an examination and fulfilling prescribed standards of performance and conduct. To award special recognition to those business/marketing and energy professionals who have demonstrated a high level of competence and ethical fitness for business/marketing and energy management.

<p style="text-align: center;">ENERGY SITUATION</p> <ul style="list-style-type: none"> • LEED and Energy Star • EAct 2005 	<p style="text-align: center;">ENERGY FUNDAMENTALS</p> <ul style="list-style-type: none"> • BTUs and therms • kJ • Energy balance basics • Fan laws (non-technical overview)
<p style="text-align: center;">WHY ENERGY MANAGEMENT?</p>	<p style="text-align: center;">CODES AND STANDARDS OVERVIEW</p>
<p>ENERGY AUDITING (Non-Technical)</p> <ul style="list-style-type: none"> • Purpose • Procedure • Equipment useful to BEP 	<p style="text-align: center;">RATE SCHEDULES</p> <ul style="list-style-type: none"> • General • Gas • Electric • Other (coal, fuel oil) • Development of Rates

Day 2

FUELS PROCUREMENT	
<ul style="list-style-type: none"> • Gas <ul style="list-style-type: none"> -Understanding Systems -Brokers -Marketers -Hedging 	<ul style="list-style-type: none"> • Electricity <ul style="list-style-type: none"> -Understanding Systems -Wholesale deregulation -Retail deregulation
<ul style="list-style-type: none"> • Contingency planning 	<ul style="list-style-type: none"> • Financials
<ul style="list-style-type: none"> • Fuel oil & coal 	<ul style="list-style-type: none"> • Hybrid fuel systems
<ul style="list-style-type: none"> • Point of use cost <ul style="list-style-type: none"> -Efficiency and Purchase 	

Day 3

ECONOMIC ANALYSIS		
<ul style="list-style-type: none"> • Payback 	<ul style="list-style-type: none"> • After-tax cash flows 	<ul style="list-style-type: none"> • Internal rate of return
<ul style="list-style-type: none"> • Time value of money 	<ul style="list-style-type: none"> • MACRS (Maximum Accelerated Cost Recovery Scheme) 	<ul style="list-style-type: none"> • Alternative financing <ul style="list-style-type: none"> -Bonds -Borrowed Money -Capital lease -True lease

<ul style="list-style-type: none"> • Present worth 	<ul style="list-style-type: none"> • Software <ul style="list-style-type: none"> -DOE package -Excel -Calculators, etc. 	<ul style="list-style-type: none"> • Measurement & verification <ul style="list-style-type: none"> -IPMVP -Third Party -Arbitration, etc.
<ul style="list-style-type: none"> • Metering & submetering 	<ul style="list-style-type: none"> • Cost center metering, reporting, & budgeting 	

IT FOR ENERGY MANAGEMENT

Day 4

<p style="text-align: center;">COMMISSIONING</p> <ul style="list-style-type: none"> • What to Expect • What to Commission • Why Do It? 	<p style="text-align: center;">ELECTRICITY SYSTEMS</p> <ul style="list-style-type: none"> • HVAC • Lighting • Electric motors • Compressed air systems • Intelligent/Smart Grids • Distribution system operations and impacts
RETRO-COMMISSIONING	REVIEW
REAL TIME COMMISSIONING (MMS)	

Day 5

GAS, FUEL OIL, COAL		
<ul style="list-style-type: none"> • Combustion processes 	<ul style="list-style-type: none"> • Coal & fuel oil 	<ul style="list-style-type: none"> • Gas/diesel engines
<ul style="list-style-type: none"> • Furnaces (heat treating, drying, etc.) 	<ul style="list-style-type: none"> • Boilers <ul style="list-style-type: none"> -Steam -Hot water -Fire tube -Water tube 	

REVIEW

Instructors Business Energy Professional Training Program

PAUL BANKS, P.E., C.E.M., C.B.C.P., a LEED accredited mechanical engineer, is a founding partner of B2Q, an engineering/project management consulting firm located in the Boston area. B2Q, specializes in assisting facility owners, developers, contractors and design team professionals in achieving their goals in the design, construction, and commissioning of safe, efficient, and productive buildings. Prior to founding B2Q, Mr. Banks served as CEO of Vanderweil Engineers, a leading MEP engineering firm specializing in the design of new and retrofit building systems for large commercial and industrial projects. Mr. Banks led Vanderweil's Facility Services Group, which provided master planning, as well as the design and commissioning of utility infrastructure, energy, central plant, and MEP building systems. *(Week 2: Days 1-5)*

BARNEY L. CAPEHART, Ph.D., C.E.M., is a professor emeritus of industrial and systems engineering at the University of Florida in Gainesville. He has broad experience in the commercial/industrial sector having served as director of the University of Florida Industrial Assessment Center from 1990 to 1999. He personally conducted over 100 audits of industrial facilities, and has helped students conduct audits of hundreds of office buildings, small businesses, government facilities, and apartment complexes. He regularly taught a University of Florida course on energy management to about 50 engineering students each year, and currently teaches energy management seminars around the country for the Association of Energy Engineers (AEE). A fellow of IEEE, IIE, and AAAS, and a member of the Hall of Fame of AEE, he has contributed to several well-known texts in the field. *(Week 1: Days 1 and 2)*

RICHARD J. COSTELLO, P.E., C.E.M., C.D.S.M., C.L.E.P., is president of Acela Energy Group, an energy consulting group specializing in energy procurement and load management, as well as energy conservation training and auditing. Mr. Costello brings to this program broad experience in the fields of energy conservation, load management, utility services, and negotiations/agreements related to power, natural gas, and tariffs. *(Week 4: Days 1-5)*

TERRY NIEHUS, P.E., C.E.M., is the founder of Lakeshore Consulting, a firm specializing in technical training and energy auditing. Mr. Niehus has extensive experience as a trainer, having taught courses on a broad spectrum of topics in addition to energy auditing, including commercial building energy systems, motors and drives, HVAC, compressed air, cogeneration and thermal energy storage. He has also authored training and technical resource manuals in areas related to his training programs. As a consultant, he has performed over 1,000 energy analyses for governmental, commercial, and industrial facilities. *(Week 1: Days 3-5)*

MARK R. ROCHE, C.E.M., C.E.P., B.E.P., C.I.A.Q.P., has more than 20 years experience in power generation, energy delivery, energy management, utility marketing, and customer service. He has developed and presented a number of instructional programs on energy management, and also serves as a core instructor for AEE's BEP program. He is the current chair of the BEP board

and a member of the CEM board. Mr. Roche is currently supervisor of meter operations for Progress Energy Florida. *(Week 4: Days 1-5)*

STEPHEN A. ROOSA, Ph.D., is an account executive with Energy Systems Group in Louisville, KY. He has over 25 years' experience in commercial energy management and performance contracting. He is considered internationally to be an expert in energy conservation, energy management, and urban sustainability. Past experience includes energy studies for over 3,500 buildings with over \$50 million in energy conservation and management projects developed for various customers. Dr. Roosa is a Certified Sustainable Development Professional, Certified Energy Manager, a Certified Indoor Air Quality Professional, a Certified Measurement & Verification Professional, a Certified Energy Monitoring and Control System Designer, a Certified Demand Side Management Specialist, a Certified Building Energy Management Professional, and a LEED Accredited Professional. He holds a Ph.D. from the University of Louisville in Planning and Urban Development, and his dissertation concerned sustainable development policies for urban environments. *(Week 3: Days 4-5)*

ERIC A. WOODROOF, Ph.D., C.E.M., is a trainer and writer, widely recognized both nationally and internationally for helping energy/environmental projects get approved and implemented. His focus is to help clients benefit financially and simultaneously help the environment. He has over 15 years of experience, 20 publications and has identified profit-improvement strategies at over 200 facilities. He has also been a Board Member of the Certified Energy Manager Program since 1999. *(Week 3: Days 1-3)*

Eligibility

The candidate must have one of the following:

- A four-year degree from an accredited university or college in business/marketing, engineering or architecture, or be a registered Professional Engineer (P.E.) or Registered Architect (R.A.). In addition, the applicant must have at least two years of experience in business / marketing / management / sales in the energy field.
--OR --
- A four-year non-technical degree from accredited university with at least three years experience in business / marketing / management / sales in the energy field.
--OR --
- A two-year technical degree from an accredited college with at least five years experience in business / marketing / management / sales in the energy field.
--OR --
- Eight years of experience in business / marketing / management / sales in the energy field.
--OR --
- The current status of Certified Energy Manager (CEM®).

Tuition

- \$8,500 per student. A minimum of 20 students is required.
- Included: Exam application fee, books, 1 year AEE membership, 1 year placement service on www.aeecenter.org/jobs
- Client will provide training facilities and A/V equipment expenses.