

**PG&E ENERGY CENTERS
FALL 2018 PREVIEW**

**Classes and
resources to help
you gain new
skills and fuel
your future**

pge.com/energyclasses

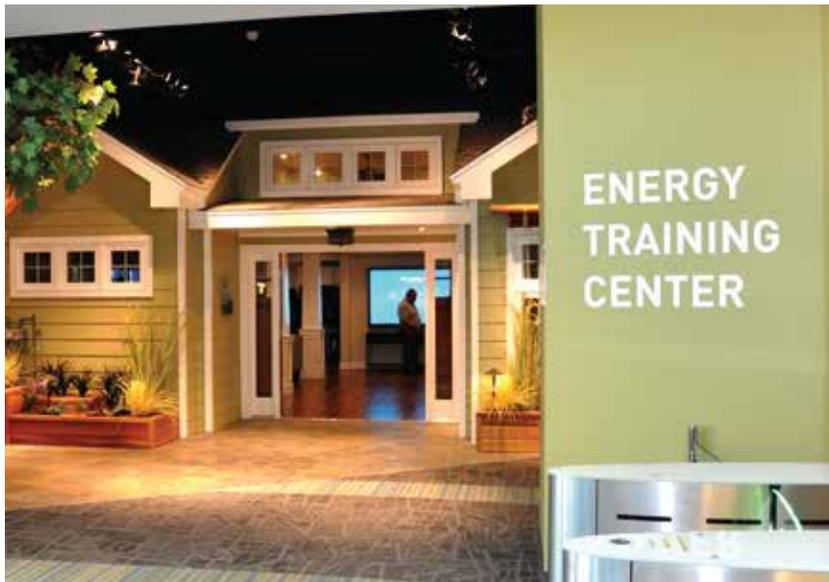


Open more doors with help from PG&E Energy Centers

At PG&E Energy Centers, we want to inspire and empower you to save energy in the buildings and equipment you design, build and maintain.

That's why we offer a wealth of free energy education resources to help expand your skills and expertise, whether you're a contractor, designer, architect or business owner. Benefit from:

- In-person training at multiple locations on a broad range of energy efficiency topics
- Web-based training, including on-demand classes, simulcasts and webinars
- Expert consultations for your energy-related projects
- Interactive labs for learning and project support
- A robust tool lending library of 5,700+ energy management tools



What this means to you

Get the active training and technical design know-how to compete in today's energy workforce and building market. Grow your network by meeting others in the industry and—just as importantly—create opportunity for higher energy savings and better performance for your business and your customers.

Close out 2018 strongly and prepare for 2019 by looking at our fall schedule now.

Where to find us

Pacific Energy Center
851 Howard Street
San Francisco, CA 94103
 415-973-2277
Fax: 415-896-1290



Energy Training Center
3136 Boeing Way
Stockton, CA 95206
 1-800-244-9912
209-955-7300
Fax: 209-955-7320



On-Demand Classes

Our new, on-demand classes bring the classroom to you.

These web-based, self-paced classes let you learn at the speed that's best for you and on your schedule. Choose from 30+ classes on topics ranging from air conditioning to zero net energy.



Go to pge.com/energyclasses and select "On-Demand" button.

Event and Meeting Facilities

Need to host a meeting, conference or training event?

Consider our Energy Centers your community center. We offer the amenities of a large conference center at a scale and cost more suited to regional business. We have private meeting spaces that can be configured to suit your needs, are equipped with high-quality audio/visual equipment and offer full-service catering.

Email energycenters@pge.com for more information, including rental rates and availability.

Evening Lecture Series

Come hear from, and interact with people who are transforming the marketplace and our boarder culture in sustainability and energy efficiency. These 90-minute evening conversations are intended to discuss "big picture" opportunities for change and encourage an exchange of ideas.

Pacific Energy Center, San Francisco

Doors open at 5:30 p.m. for networking, hors d'oeuvres and beverages

*Lectures begin at 6 p.m.

Upcoming Fall Lectures

September 18

Charles Eley:
The Architecture 2030
ZERO Code & California

November 8

Pierre Delforge:
Reducing Greenhouse Gas
Emissions for Buildings

October 11

William Leddy, FAIA:
Re-Designing Good Design:
High Performance Architecture
for a Low-Carbon World

December 6

Steven Taylor:
40 Years of Designing High
Performance HVAC

Go to pge.com/energyclasses and select "Evening Lecture" for more details and to register.

Follow us on LinkedIn

There is always a lot going on at PG&E Energy Centers, from our expert-led, no-cost classes and training, to job fairs, and evening lectures on topical energy issues. Keep up by following us on LinkedIn. This is a great way to be among the first to know about new developments and network with fellow energy professionals and small business owners.

To follow us, search for "PG&E Energy Centers" on LinkedIn.



Take a class. Advance your career. Grow your business.

Building Envelope

2019 Title 24: Where We're Headed with the Nonresidential Standards

These standards are scheduled to take effect January 1, 2020. Martyn Dodd summarizes the new and revised requirements, and directs participants to resources that provide more in-depth Title 24 information and training.

SKILL LEVEL 2

September 14 & December 7
Webinar

2019 Title 24: Where We're Headed With the Residential Standards

These standards are scheduled to take effect January 1, 2020. Martyn Dodd summarizes the new and revised requirements, including new rules for installing solar photovoltaic systems in newly constructed residential buildings.

SKILL LEVEL 2

September 14 & December 7
Webinar

Building Science 1.0: Overview and Introduction to Control Layers

This two-hour, on-demand program describes the role of building science in effective design of building enclosures, addressing requirements for control of rain and bulk water, air movement, thermal separation, and vapor diffusion.

SKILL LEVEL 1

On-Demand



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LOCATIONS:

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851 Howard Street
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Stockton

SKILL LEVELS:

- 1** Introductory
- 2** Intermediate
- 3** Advanced

Building Science 2.4: Introduction to Continuous Insulation and Cladding Attachment

This one-hour, on-demand program covers the in's and out's of this critical building system, with a focus on thermal bridging, cladding attachment, and continuous insulation in specific applications such as precast and concrete masonry unit buildings.

SKILL LEVEL 1

On-Demand

Daylight Metrics: An Overview for Designers and Building Professionals

Daylighting is important to both good energy performance and building occupants' health. Get an introductory overview in daylight metrics from expert Mudit Saxena—from required metrics in energy codes to newer climate-based metrics that consider energy savings and daylight quality.

SKILL LEVEL 1

September 14 & December 7
PEC, San Francisco



Find more information about these and similar expert-led classes at pge.com/energyclasses.



Lighting

Lighting Fundamentals

This class uses the Pacific Energy Center's lighting classroom to provide visual experiences of lighting terminology, vision, light and color theory, electric light sources, fixtures, controls, and calculations.

SKILL LEVEL 1

September 17 • PEC, San Francisco

Best Practices for Lighting Audits

This two-day, updated and expanded interactive class covers energy audits of lighting systems. Exercises include documenting the number and type of fixtures, light sources, hours of operation and controls.

SKILL LEVEL 2

October 9-10 • PEC, San Francisco

High Dynamic Range (HDR) Imaging for Assessing Human Visual Comfort and Evaluating Energy Efficiency Opportunities

The lecture and interactive, hands-on exercises allow participants to explore advanced High Dynamic Range (HDR) techniques for improved luminance accuracy, equipment calibration steps, visual comfort and glare analysis and visualization, and building automation.

SKILL LEVEL 2

October 11 • PEC, San Francisco

Lighting Controls: How Occupant Behavior Impacts Building Energy Performance and ZNE

A panel of experts will discuss pilot projects, behavioral program design, and behavioral economics and offer examples showing how behavior is a powerful tool to help achieve zero net energy performance.

SKILL LEVEL 2

October 25 • PEC, San Francisco

The Science and Application of Circadian Lighting

This half-day class explores how light may improve health through circadian entrainment and everyday lighting. We dive into the underlying science as well as the techniques to take advantage of these continually updated findings.

SKILL LEVEL 2

December 5 • PEC, San Francisco

Advanced Lighting Control Systems: Hands-On Workshop

This class uses collaborative activities to introduce four advanced lighting control systems. Demonstrations include wired and wireless, 0-10-volt dimmer, single and multi-function sensors, plus room- and network-based control systems.

SKILL LEVEL 2

December 11 • PEC, San Francisco

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"I took this class two years ago and I use the information at least twice a week."

Lyn Gomes,
kW Engineering

Attended "Advanced Lighting Controls" class





Agricultural/Industrial

Introduction to Automation of Buildings and Industrial Facilities using PLCs

This class introduces management, operations and maintenance professionals to the basics of Programmable Logic Controllers (PLCs). It covers how PLCs operate in industrial processes, and their use in energy efficiency and electric demand response (kW) applications.

SKILL LEVEL 1
September 24 • ETC, Stockton

Automation of Buildings and Industrial Facilities using PLCs, Level 1

This course uses a lecture and hands-on workshop to review Programmable Logic Controller (PLC) terminology, hardware components use, and the basics of relay ladder logic programming.

SKILL LEVEL 1
September 25 • ETC, Stockton

Automation of Buildings and Industrial Facilities using PLCs, Level 2

Participants learn how to establish communication with Programmable Logic Controllers (PLCs), retrieve existing files, and modify programming for manufacturing process changes. Participants also learn how to program, move and compare data statements using control applications.

SKILL LEVEL 2
September 27 • ETC, Stockton

Automation of Buildings and Industrial Facilities using PLCs, Level 3 & 4

Participants learn the concepts and use of data manipulation instructions, data compare instructions, data arrays, "one shots" and logical functions. Exercises include programming energy-saving scenarios into the Programmable Logic Controller (PLC).

SKILL LEVEL 2
October 29 & 31 • ETC, Stockton

"The EBCx workshop series was the most practical and useful professional development course I've ever completed. In addition to being engaging and fun, the expert instruction and hands-on practice are crafted to develop your capability to identify and fix the root causes of energy waste found in unique buildings everywhere. This course covers an impressive breadth and depth of topics and provides a strong technical foundation for a building energy systems practitioner."

Geoff Hancock,
Director of Engineering, Verdera

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Existing Facilities

Energy Auditing Techniques for Small and Medium Commercial Facilities

During this three-day workshop, instructors focus on the audit process, and foster participants' ability to identify energy efficiency, demand response, and operations and maintenance opportunities in existing facilities.

SKILL LEVEL 1
September 5-7 • PEC, San Francisco

HVAC Fundamentals: New Ideas for Novices (2-Day Class)

This class covers thermal comfort, heat transfer, load calculations, psychrometrics, mechanical system components and systems, low-energy strategies, control systems, code compliance and building commissioning.

SKILL LEVEL 1
November 15-16
PEC, San Francisco



Graphic Representation of Data: Making Charts that Matter

Instructors share data representation best practices and dissect graphic successes and failures. Using energy efficiency performance data, participants create data graphics through in-class exercises.

SKILL LEVEL 1
October 30 • PEC, San Francisco
Online Simulcast

Model Water Efficient Landscape Ordinance (MWEL0) and the New Normal for California Landscaping

Training includes an expansive look at the Model Water Efficient Landscape Ordinance (MWEL0) and explores design strategies that meet the standard, as well as active design activities where participants apply the covered concepts.

SKILL LEVEL 1
November 28 • PEC, San Francisco
Online Simulcast



A Class for Control Freaks: Getting the Most from Your Building Automation System

This class explores common control strategies including schedules, setbacks, resets, vacancy controllers, demand control ventilation, carbon monoxide (CO) controllers, economizer operation, and the control of variable speed equipment.

SKILL LEVEL 2
September 10 • PEC, San Francisco
Online Simulcast

Control Systems: Design, Performance, and Commissioning

This class uses a case study format to explore the features of successful control system design and operation, including lab sessions working with demonstrators to reinforce key concepts. This class also explores pneumatic and digital control systems.

SKILL LEVEL 2
September 19 • PEC, San Francisco
Online Simulcast

Understanding and Applying the M&V Concepts and Options of the International Performance Measurement and Verification Protocol (IPMVP)

This course provides an overview of measurement & verification (M&V) and defines key terms. It also presents M&V options A, B, C and D as defined in International Performance Measurement and Verification Protocol (IPMVP) and reviews savings calculation examples for each option.

SKILL LEVEL 2
October 9 • PEC, San Francisco
Online Simulcast

Logic Diagrams and Control Sequences

Logic diagrams are critical design and diagnostic tools. This class explores techniques used to develop logic diagrams.

SKILL LEVEL 2
October 24 • PEC, San Francisco

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Basic Excel for Energy Auditors

This hands-on training covers Microsoft Excel fundamentals, including navigating the program, key-pad shortcuts, formatting data, creating graphs and performing calculations with formulas.

SKILL LEVEL 1
October 5 • PEC, San Francisco

An Overview of the Commissioning Process for New and Existing Buildings

This training explores the benefits of building commissioning and includes in-class exercises and links to publicly available resources. Instructor contrasts the process for commissioning for both new and existing facilities.

SKILL LEVEL 1
October 3 • San Jose
Environmental Innovation Center



Home Performance

Electric Heat Pumps for Domestic Space and Water Heating: Applications and Considerations

This class focuses on efficiency gains and emissions reductions from electric heat pumps, including the advantages and limitations of these systems, available technology and refrigerant types.

SKILL LEVEL 1

November 15 • PEC, San Francisco

Advanced Framing for Energy and Resource Efficiency

This class covers advanced design and construction methods for optimizing wood-framed building enclosures. It is ideal for architects, designers, engineers and builders seeking to overcome common obstacles when implementing advanced framing in low-rise residential and small commercial buildings.

SKILL LEVEL 3

September 10 • PEC, San Francisco

Air Sealing to Achieve Zero Net Energy—New Techniques and Applications

This class uses real-world examples to provide an understanding of the importance of air sealing, how to incorporate air sealing into building design and construction, and the materials and techniques most effective at tightening the building envelope.

SKILL LEVEL 2

November 27 • ETC, Stockton

Air Sealing and Insulating Existing Homes

This class explains best practices for air sealing and insulating attic, primarily, but also addresses floors and walls on existing single-family homes. Topics include diagnostic equipment; appropriate tools, materials, and methods; site constraints and potential hazards; and evaluating costs and benefits of insulation options.

SKILL LEVEL 2

September 18 • PEC, San Francisco

Balanced Ventilation for High Performance Homes

This class focuses on optimizing the performance of central forced-air heating and cooling systems in existing single-family residential buildings, and explains the factors needed to minimize operating costs and optimize indoor comfort.

SKILL LEVEL 2

December 11 • ETC, Stockton

How to Design and Build High Performance Walls and Roofs

This interactive class is designed to sort through the myriad of insulation system options in order to match the best insulation systems to the type of structure, and explain installation and air barrier requirement by code.

SKILL LEVEL 2

October 19 & December 6
ETC, Stockton

Window Selection for New and Existing Homes

This training explains how to evaluate and select the most appropriate window technology for a given California climate to save on heating and cooling costs and increase occupant thermal comfort.

SKILL LEVEL 2

October 18 & December 5
PEC, San Francisco

High Performance Crawl Spaces: A Practical Approach to Air Sealing and Insulating

This class focuses on applying building science principles to California crawlspaces. Topics include moisture management, air and thermal control layers, converting vented crawlspaces to unvented and conditioned crawlspaces and others.

SKILL LEVEL 3

November 7
PEC, San Francisco

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Optimizing Residential HVAC System Performance

This class focuses on optimizing the actual performance of central forced-air heating and cooling systems in existing single-family residential buildings.

SKILL LEVEL 2

October 29 • ETC, Stockton
December 12 • PEC, San Francisco

Commissioning Residential Building Enclosures

This full-day class reviews the verification steps required at the end of a project to ensure performance targets have been achieved and covers the practical steps to take at the end of building performance retrofits to ensure success.

SKILL LEVEL 2

October 23 • ETC, Stockton

Go to pge.com/energyclasses for more information on these and other no-cost classes.





Heating, Ventilation and Air Conditioning (HVAC)

Air Conditioning Contractors of America Design Series (ACCA Manuals J, D, Advanced D, and Residential Heat Pumps: Quality Design and Installation)

This a four-day series which combines classroom and hands-on instruction in the use of blower doors, digital manometers, flow hoods, and other verification devices. Participants can sign up for the entire four-day series or register for individual classes.

SKILL LEVEL 2

September 25-28 • ETC, Stockton
October 1-4 • Folsom

High Performance Chilled Water Plant Design Workshop

This class provides hands-on-training on chiller design, distribution system selection and control sequences.

SKILL LEVEL 3 with Prerequisite

December 5 • ETC, Stockton

Title 24 Proper Procedures for Charging Air Conditioners and Heat Pumps

This training uses live split systems to mirror Title 24 charge and air flow requirements for the current code cycle.

SKILL LEVEL 2

November 7 • ETC, Stockton

Commercial Quality Maintenance and Installation of Economizers

This class discusses key aspects of economizers including maintenance, installation, control, indoor air quality, and ventilation requirements. It also includes a hands-on workshop.

SKILL LEVEL 2

October 2 • ETC, Stockton

MI-BEST Series #1-5

This five-day curriculum allows home energy rating system raters, Building Performance Institute contractors, energy auditors, builders, and HVAC contractors to use their skill sets and equipment in non-verification procedures. It includes:

- Building Envelope and Duct Testing #1
- Air Flow Measures and Static Pressure #2
- Refrigerant Charge Verification #3
- Building Pressures and Ventilation Verification #4
- Thermal By-Pass, Quality Insulation Installation, Advanced Building Envelope #5

SKILL LEVEL 2

September 10-14 • ETC, Stockton

“Was interesting to get this training with a mix of concepts and details on how heat pumps are installed. It is a good gut check for my future work.”

Nicholas Blair

Attended “Electric Heat Pumps for Domestic and Water Heating” class

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Integrated Demand Side Management

Basics of Photovoltaic (PV) Systems for Grid-Tied Applications

This class is a high-level overview of the basic concepts of grid-tied solar electric systems. It is ideal for people new to solar, those who are familiar but want to broaden their knowledge, and homeowners who are considering going solar.

SKILL LEVEL 1

September 18 • PEC, San Francisco

Photovoltaic (PV) Site Analysis and System Sizing

This course assists participants in evaluating the technical feasibility of a potential PV project, including estimating the available solar resource, system orientation, and module tilt angles; planning for shade, and evaluating space requirements. Participants are also introduced to relevant site analysis and sizing tools.

SKILL LEVEL 2

October 3 • PEC, San Francisco

PV + Batteries: Integrating Storage with Grid-Tied Photovoltaic Systems

This course covers the latest in battery technology and how batteries of various sizes are integrated into photovoltaic (PV) systems. It explores basic concepts, design criteria, and financials, and outlines various ways batteries can improve PV output and deliver benefits to the utility grid.

SKILL LEVEL 2

October 23 • PEC, San Francisco

Gain the energy-efficiency skills and expertise companies and customers right now. Enroll in a no-cost Energy Center class today. Go to pge.com/energyclasses for a complete list of classes.

No-Cost Classes

Tool Lending Library

Expert Consultations



“More than my PE, CEM, LEED AP, CPMP or even Master’s Degree, when it comes to understanding how facilities systems work, I value what I learned and practiced in the EBCx Workshop above all other training experiences. You really do learn how to talk with buildings.”

Brian Clark

Mechanical Engineer
US Army Construction Engineering
Research Laboratory

