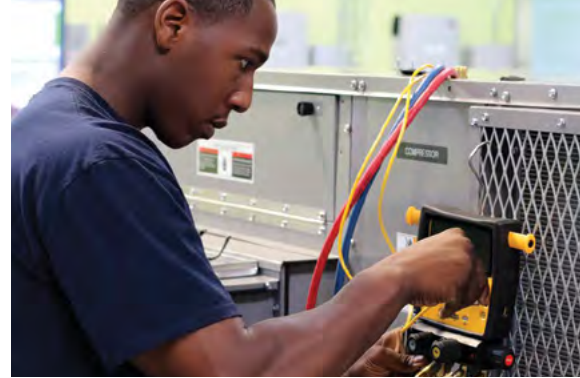


PG&E ENERGY CENTERS  
SPRING 2020 PREVIEW

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



# Open more doors this year with help from PG&E Energy Centers

We want to inspire and empower you to save energy in the buildings and equipment you design, renovate, build and maintain.

That's why we offer a diverse set of free energy education resources to help expand your knowledge and skills. Get hands-on training and technical design expertise to better compete in today's energy workforce and building market. Grow your network by meeting others in the industry. Just as importantly, create opportunity for greater energy savings and better performance for your business and your customers.

## 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
- An extensive tool lending library of more than 5,400 energy management tools
- Interactive tours of our Zero Net Energy (ZNE) home



## Where to find us

### Pacific Energy Center


851 Howard Street  
San Francisco, CA 94103

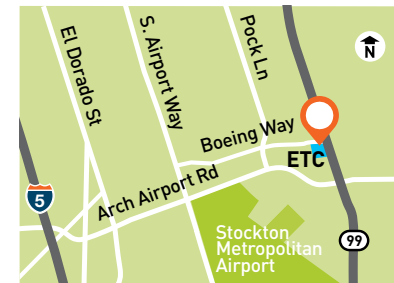
 1-415-973-2277  
energycenters@pge.com



### Energy Training Center


3136 Boeing Way  
Stockton, CA 95206

 1-800-244-9912  
energycenters@pge.com



### Food Service Technology Center

12949 Alcosta Boulevard  
San Ramon, CA 94583

 1-925-866-2844  
fstc@frontierenergy.com



## Tool Lending Library

Check out the redesigned Tool Lending Library website that makes your tool borrowing even easier! The improved tool descriptions include more technical information and links to important software and user resources. Browse our inventory of more than 5,400 energy management tools available to you at no cost.

Visit our Tool Lending Library at [pge.com/tools](https://pge.com/tools)  
For questions, email [pectools@pge.com](mailto:pectools@pge.com)

## Building Operator Certification

Building Operator Certification® (BOC) is the leading training and credential program for building engineers and maintenance personnel. It's also valuable to building owners and operators. Thanks to the skills they master in our classes, BOC graduates make buildings more comfortable, efficient and environmentally friendly, and they help their organizations cut operating costs by as much as \$20,000 per year.

Find out about BOC certification at [theboc.info](https://theboc.info)



## 17th Annual Water Conservation Showcase

Our 17th Annual Water Conservation Showcase at the Pacific Energy Center in San Francisco on April 7 features presentations and displays on water conservation strategies for building occupants, designers, managers and operators. Water saving opportunities are highlighted for both interior and exterior applications for a wide range of facility types. Registration is required for this free event.

Register for the 17th Annual Water Showcase at [waterconservationshowcase.com](https://waterconservationshowcase.com)

## After Hours Education

Our evening lectures feature well-known speakers with expertise that helps drive the adoption of quality, energy efficient buildings. These events are an opportunity to network, discuss and learn about topics important in a more energy efficient, low greenhouse-gas emitting future. Join others with an interest in shaping the way communities, energy and design professionals and businesses approach key energy issues.

Evening lectures are offered in person and as simulcasts and are scheduled for the first or second Thursday evenings through Spring 2020 at the Pacific Energy Center in San Francisco.

### Upcoming Evening Lectures

**March 12**

**Scott Shell: California's Race to Decarbonize—Steps to Get Carbon Out of Buildings**

Architect Scott Shell from EHDD will explain why we need to rapidly decarbonize new and existing buildings.

**April 9**

**Amber Mahone: The Challenge of Retail Gas in California's Low-Carbon Future**

Amber Mahone with the Clean Energy team at E3 will present recent work for the California Energy Commission that looks at the challenges of retail natural gas distribution in California's low-carbon future.

**May 7**

**Sage Renewables: Battery Energy Storage—An Overview of the Market**

Staff from Sage Renewables will provide an overview of the current market for battery storage, present example projects and discuss the changing face of Zero Net Energy (ZNE) and responsible grid citizenship.

Learn more by going to [pge.com/energycenterclasses](https://pge.com/energycenterclasses) and input "Evening lecture" in the Search box.



## Building Envelope

### Integrated Design Process: Overcoming Design and Management Challenges

A collaborative design/construction team can deliver a building that has greater value for its owner through thoughtful details, durable construction, better occupant environments, reduced energy use and greenhouse gas emissions. Staff from Integral Group discusses strategies that support a successful, integrated design/construction process.

**SKILL LEVEL 1**

March 17 • Webinar only

### Enclosure Systems and Materials: Architectural Precast

Colin Shane from RDH Science reviews building science fundamentals; provides local case studies; and summarizes standard practices, best practices and modes of failure and risk management considerations for architectural precast panels.

**SKILL LEVEL 2**

March 19 • PEC, San Francisco Online Simulcast

### Integrated Design Process: How to Establish Project Goals and Metrics, Assess Success and Stay on Track

This integrated design webinar focuses on setting goals and measuring and tracking progress. Presenters describe the role of the Owner's Project Requirements (OPR) and the BOD documents and review metrics to assess energy performance.

**SKILL LEVEL 1**

April 14 • Webinar only

### Enclosure Systems and Materials: Portland Cement Plaster on Framed Walls

Colin Shane from RDH Science reviews building science fundamentals; provides local case studies; and summarizes standard practices, best practices and modes of failure and risk management considerations for Portland cement plaster on framed walls.

**SKILL LEVEL 2**

April 16 • PEC, San Francisco Online Simulcast



### Integrated Design Process: Projects of All Sizes and Delivery Methods

Staff from Integral Group present case studies of teams working cooperatively to cost-effectively meet or exceed owner project requirements while achieving excellent energy performance. Learn how to use the knowledge and expertise of all team members.

**SKILL LEVEL 1**

May 12 • Webinar only

### Zero Net Energy (ZNE) Introduction and Project Showcase

In this twenty minute on-demand class we review case studies of nonresidential buildings that highlight the impact ZNE buildings are making today. We also discuss concepts and principles explaining how a ZNE building is achieved and performance documented.

**SKILL LEVEL 1**

On Demand

### 2019 Title 24 Residential Updates

Martyn Dodd summarizes new and revised requirements for low-rise residential buildings effective January 1, 2020. Topics include prescriptive requirements for solar electric systems; use of an Energy Design Rating in the performance approach; and changes to ventilation, wall U-factor, fenestration, water heating and residential HVAC.

**SKILL LEVEL 2**

On Demand

We offer more than 100 unique classes each year. Go to [pge.com/energycenterclasses](http://pge.com/energycenterclasses) for a complete list of our Spring 2020 classes.

#### LOCATIONS:

Pacific Energy Center (PEC)  
851 Howard Street  
San Francisco, CA 94103

Energy Training Center (ETC)  
3136 Boeing Way  
Stockton, CA 95206

#### SKILL LEVELS:

- 1 Introductory
- 2 Intermediate
- 3 Advanced



## Lighting Classes

### Lighting Fundamentals

This course provides an overview of lighting with live demonstrations of light and color theory. Lighting designer David Orgish explains terminology, human vision and lighting issues and exhibits light sources and fixture types.

**SKILL LEVEL 1**

March 10 • PEC, San Francisco  
June 11 • PEC, San Francisco

### Evaluating and Selecting Luminaires

The characteristics of luminaires, even in our LED-dominated market, should be compared to choose the best fixture for an application. In this class, you will review key lighting fixture features and view new lighting products with their documentation so you can evaluate and select appropriate luminaires.

**SKILL LEVEL 2**

March 17 • PEC, San Francisco Online Simulcast

### Design for Circadian Metrics Using AGI32

On March 26, we will be offering two classes on circadian lighting. The first class focuses on the use of circadian metrics when using AGI32 software, and the second class discusses new research on this topic.

**SKILL LEVEL 2**

March 26 • PEC, San Francisco Online Simulcast

### Calculating Photometric Lighting Solutions

Understand the factors used in photometric calculations through explanations and classroom exercises. Learn to design using target illuminance values or fixture quantities. Class includes an overview of lighting software package features.

**SKILL LEVEL 2**

April 14 • PEC, San Francisco Online Simulcast



### Preparation for Lighting Controls Success: Using Basis of Design (BOD) and Sequence of Operations (SOO)

Preparation before and during a lighting controls design ensures a successful, efficient system. Learn to articulate the BOD and establish operating parameters with a SOO that addresses energy codes and control strategies.

**SKILL LEVEL 2**

April 23 • PEC, San Francisco Online Simulcast

### Hands-On Lighting Controls Workshop

Four manufacturers use collaborative exercises with products and presentations to demonstrate lighting controls systems including wired and wireless, 0-10V dimming, single and multifunction sensors.

**SKILL LEVEL 2**

May 14 • PEC, San Francisco

## Heating, Ventilation and Air Conditioning (HVAC)

### Commercial Quality Maintenance and Installation of Economizers

This class combines interactive classroom lessons with hands-on training on a state-of-the-art rooftop unit built specifically for training. The instructor discusses the importance of indoor air quality, ventilation requirements and energy savings to provide a background for analysis of economizers.

**SKILL LEVEL 2**

March 25 • ETC, Stockton  
April 14 • ETC, Stockton

### Commercial ACCA Quality Installation Series

Are all those HVAC package units you plan to install in your building really the right size? Will they provide maximum comfort and energy efficiency? Come to our three day series and find out.

**SKILL LEVEL 2**

April 13-15 • ETC, Stockton

### Title 24 Proper Procedures for Charging Air Conditioners and Heat Pumps

Got charge and air flow? Join us for a fun day of learning using actual operating split systems to check what you learned in class.

**SKILL LEVEL 2**

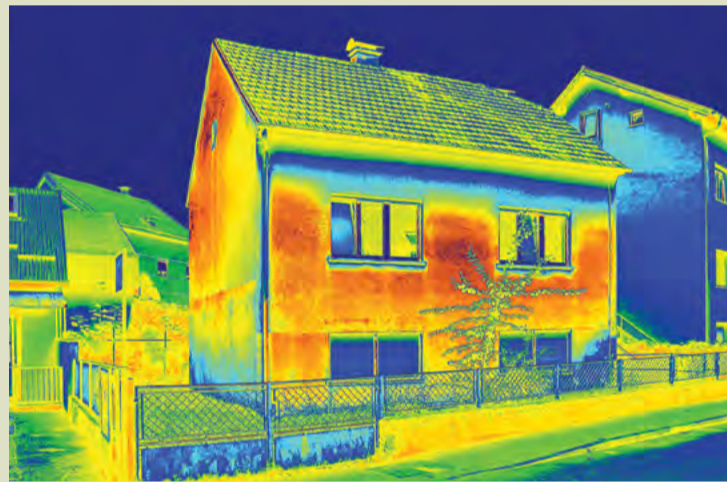
April 15 • ETC, Stockton

### MI-BEST Five Day Series

The Mobile Integrated Building Energy Science Training (MI-BEST) provides a complete residential building science education featuring hands-on practice with diagnostic equipment. Registrants are welcome to attend individual sessions or all five days.

**SKILL LEVEL 2**

August 17-21 • ETC, Stockton



## Home Performance

### Balanced Ventilation for Better Health, Comfort and Energy Efficiency

In this intermediate class, learn how to ensure occupant comfort by providing excellent insulation in homes with balanced ventilation through equipment selection as well as effective design and installation.

**SKILL LEVEL 2**

March 17 • PEC, San Francisco Online Simulcast

### Optimizing Residential Forced-Air HVAC Systems

Learn to optimize the actual performance of central forced-air heating and cooling systems in existing single-family residential buildings.

**SKILL LEVEL 2**

March 18 • ETC, Stockton Online Simulcast

### How to Design High-Performance Walls & Attics

This interactive class sorts through the myriad of insulation system options to match the best one to the type of structure and explains installation and air barrier requirements by code.

**SKILL LEVEL 2**

March 24 • ETC, Stockton Online Simulcast

### Air Sealing to Achieve ZNE—New Techniques and Applications

Review real-world examples to understand the importance of air sealing, how to incorporate it into building design and construction, and which materials and techniques are most effective at tightening the building envelope.

**SKILL LEVEL 2**

April 1 • PEC, San Francisco Online Simulcast

### Retrofitting Crawl Spaces for Health, Comfort and Energy Efficiency

Learn to apply building science principles to California crawl spaces. Topics include moisture management, air and thermal control layers, converting vented crawl spaces to unvented, conditioned crawl spaces and more.

**SKILL LEVEL 3**

April 1 • ETC, Stockton Online Simulcast

### Electric Heat Pumps for Domestic Space and Water Heating

This class provides an overview of:

- Electric heat pumps for space and water heating
- Ducted and ductless systems
- Air, ground and water source

It covers technology and operation, efficiency and metrics, advantages and disadvantages and optimal installation factors.

**SKILL LEVEL 1**

April 15 • ETC, Stockton Online Simulcast

### BPI Combustion Safety

This class provides supervised hands-on practice with BPI-specific combustion safety protocols needed to prepare for the Building Analyst field test.

**SKILL LEVEL 2**

May 8 • ETC, Stockton



## Existing Facilities

### Packaged HVAC: Economizers, Compressors, Analysis

This class begins with an overview of packaged unit components, code compliance requirements and operation optimization opportunities. Special attention is paid to the expected performance of airside economizers, compressor operation and control sequencing. Attendees use the PG&E Pacific Energy Center's Universal Translator data analysis tool to examine package unit performance data.

**SKILL LEVEL 2**

March 10 • PEC, San Francisco Online Simulcast

### HVAC Fundamentals: New Ideas for Novices Two Day Class

Using equipment samples, classroom activities and other interactive teaching techniques, this class introduces mechanical system concepts to building professionals with little or no previous training. Topics include thermal comfort, heat transfer, load calculations, psychrometrics, mechanical components and systems, low-energy strategies, control systems, code compliance and building commissioning.

**SKILL LEVEL 1**

March 17-18 • PEC, San Francisco

### Power, Energy and Therms: Fundamental Concepts, Monitoring Techniques and Load Disaggregation

An aspect of energy efficiency and load management projects is to understand which equipment within a facility are the greatest contributors to energy use, peak demand and overall utility costs. This class explores methods to identify significant electric and natural gas loads using utility meters, sub meters, dataloggers and building control systems.

**SKILL LEVEL 2**

March 24  
Environmental Innovation Center,  
San Jose

### Commissioning With Data

Building commissioning is evolving to incorporate the wealth of building performance data now available at most facilities, including trend data from energy management systems, interval (smart meter) data from utility meters and weather data from local meteorological sources. This training also explores dataloggers and other recording meters that can be leveraged for these projects.

**SKILL LEVEL 2**

March 31 • PEC, San Francisco Online Simulcast

### Graphic Representation of Data: Making Charts That Matter

Learn to create clear, compelling graphics. This training explores advantages and disadvantages of different graphic images and identifies appropriate applications for specific types of charts. Instructors share best practices in data representation and evaluate a number of successes and failures. Participants create graphics in class using data from energy efficiency and building performance measures.

**SKILL LEVEL 2**

April 10 • PEC, San Francisco Online Simulcast

### Water Audit Basics for Small to Medium Size Businesses

Reducing water use can yield water, sewer and energy savings. Learn basic skills to perform interior and exterior water evaluations, including the ability to identify water waste, use of proper tools and techniques, and analysis of water use data. This class explores the latest water-saving technologies and includes a mock water audit.

**SKILL LEVEL 2**

April 28 • PEC, San Francisco

### Energy Efficiency Update: Strategies for Reducing Energy Use, Operating Costs and Carbon Emissions at Commercial Facilities

This one day primer on energy efficiency strategies is intended for building professionals familiar with the basic concepts who want an update on new and emerging technologies and controls. Class also includes modules on utility incentives, financial return calculations, interactive measures, incremental cost opportunities, and operations and maintenance considerations.

**SKILL LEVEL 1**

May 13  
Environmental Innovation Center,  
San Jose

### Centrifugal Pumps: Principles and Opportunities for Hydronic Systems

This class leverages interactive exercises, demonstration equipment, operating hydronic loops and building controls to explore pump system concepts and optimization strategies. Topics include plotting data on pump curves, pump affinity laws, primary only vs. primary/secondary pumping, trimming impellers, variable speed opportunities, net positive suction head and cavitation.

**SKILL LEVEL 2**

June 16 • PEC, San Francisco

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

This class explores common control strategies including schedules, setbacks, resets, lockouts, vacancy controllers, demand control ventilation, CO controllers, economizer operation, and the control of variable speed equipment. We also review strategies for diagnosing improper operation of building automation systems using graphics from these systems, trend data and data from loggers.

**SKILL LEVEL 2**

June 18  
Environmental Innovation Center,  
San Jose

### Chilled and Condenser Water Systems: Design, Performance and Commissioning

This class uses the "system concept" to focus on the integrated design and operation of chilled and condenser water systems. We cover opportunities beyond simply selecting a high efficiency chiller and lowering the condenser water temperature.

**SKILL LEVEL 2**

June 24 • PEC, San Francisco Online Simulcast



### Existing Building Commissioning Workshop Series—16

This unique training opportunity is designed to develop participants' commissioning skills from scoping a facility to calculating the financial return of specific measures. The series includes 14 sessions over a 13 month period, and every class meeting in this series is structured with a morning lecture and afternoon lab.

**SKILL LEVEL 3**

June 25 • PEC, San Francisco

### Advanced Tool Day Workshop

This full day workshop focuses on some of the advanced tools in the tool lending library including blower doors, combustion analyzers, infrared cameras, inspection cameras, luminance meters, color temperature meters, ultrasonic leak detectors, and circuit tracers. The class will cover measurement concepts and building science fundamentals before the tools are demonstrated.

**SKILL LEVEL 1**

June 30 • PEC, San Francisco



We offer more than 100 unique classes each year. Go to [pge.com/energycenterclasses](http://pge.com/energycenterclasses) for a complete list of our Spring 2020 classes.

## Renewable Energy Systems

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

Did you know solar is the fastest-growing energy technology? Learn the basics of PV in a convenient on-demand format. This course is ideal for people who are just curious or even thinking about going solar themselves.

**SKILL LEVEL 1**

On Demand

### PV Site Analysis and System Sizing

This intermediate class is for anyone who wants to understand the specific issues associated with PV site analysis and system sizing. Participants should have a basic understanding of PV basics and will learn about tools for solar site analysis (Solar Pathfinder, Solmetric SunEye) through hands-on demonstrations, field exercises and project samples.

**SKILL LEVEL 2**

March 11 • PEC, San Francisco Online Simulcast

### PV + Batteries

This course covers the latest battery technology including how batteries of various sizes are integrated into PV systems. Instructors cover basic concepts, design criteria and financial implications. They also outline various ways batteries can improve PV output and deliver benefits to the utility grid.

**SKILL LEVEL 2**

April 15 • PEC, San Francisco Online Simulcast

### Economics of Rooftop Solar and Storage

PV systems and energy-storage systems are exceptional financial investments under the right circumstances. This class teaches you how to confidently communicate financial value to the most discerning prospects, covering all economic factors.

**SKILL LEVEL 1**

April 29 • PEC, San Francisco Online Simulcast



### Inspecting PV Systems for Code Compliance

Instructors for this advanced class detail issues pertaining to permit-to-install and inspections of PV grid-tied systems in all sectors, including commercial, industrial, small business, multifamily and residential.

**SKILL LEVEL 3**

May 19 • PEC, San Francisco



No-Cost Classes  
Tool Lending Library  
Expert Consultations



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