Existing Building Commissioning Workshop Series – 14
offered through the PG&E Pacific Energy Center,
851 Howard Street in San Francisco, CA

Training Description:
Building commissioning is a growing industry in need a qualified professionals with a specific skill set. Navigant Research has predicted that annual building commissioning revenue will double to $4.4 billion worldwide by 2020 and 35% of energy-efficiency-related job listings in the Bay Area mention “commissioning” (the most frequently used term). And building commissioning is now a required element of Title 24, California’s energy code, and sustainability rating systems like LEED. The challenge for most engineering firms is finding qualified candidates with commissioning field experience. The EBCX workshop series is designed to develop these required skills.

In June we will begin our 14th offering of this unique training opportunity. Each class meeting is structured with a morning lecture and afternoon lab. Typically the technical concepts introduced during the lecture are applied in the lab through defined exercises. Students are then asked to apply their newly-learned ability to a building they can access over the course of the year-long training series. We have found the application and re-application of the above skills one of the keys to the success of the EBCX trainings.

There are several unique aspects to the EBCX workshops. These trainings will include 14 sessions over a 12-month period with three meetings taking place at student project facilities. The training schedule is provided below (the 2019 dates will be set by the time the class commences in June). In order to insure that all participants are prepared for the elevated level of training content, we will test all EBCx candidates at the first meeting to insure that everyone possess basic HVAC, energy and excel knowledge. And students will be required to complete project work outside of class time; these assignments are almost always focused on one of the 10 skills outlined as learning objectives and require application at the students’ project facilities. People interested in participating must attend the class prerequisite, “RCx 101: Identifying and Assessing Common Retro-commissioning Opportunities, scheduled for June 6 at the PEC. An email will be sent to all EBCx class registrants in early-June with additional details on the class logistics. It will include notes about the pre-class exams and the student project facility. I encourage anyone interested in building commissioning to sign up for the training series and to attend the first class meeting. Questions about the training series can be directed to Ryan Stroupe at r2s2@pge.com.

First session on June 28, 2018, 8:30 am to 4:30 pm at PEC
Ten Key EBCx Technical Skills:

These skills are the abilities that EBCx training participants are expected to develop:

1. benchmark a facility and analyze its utility consumption patterns using billing and interval data.
2. scope a facility and identify obvious indicators of opportunities to improve performance and/or reduce resource consumption.
3. apply a fundamental knowledge of HVAC systems in the EBCx process, including an understanding of mechanical components, systems and controls.
4. apply the system concept and develop diagrams that illustrate key systems in a facility.
5. utilize trending capabilities of control systems to collect building performance data and supplement EMS trend data with data loggers.
6. apply functional testing techniques and develop and run tests targeted at providing the information needed to resolve operational issues.
7. analyze data collected from trends, data loggers and tests to support projects and resolve operational challenges.
8. utilize basic HVAC and energy calculations to assess the impact of proposed building improvements.
9. apply Return-On-Investment (ROI) calculations to determine the financial cost and benefit of EBCx projects and present this information to facility ownership.
10. apply an understanding of building control systems by developing monitoring points lists, narrative control sequences and logic diagrams, and then use these tools to identify control issues and pursue tuning opportunities.

Past Participants:

List of companies and organizations that have sent employees to EBCx Workshop series.

- Able Engineering
- ACCO Engineered Systems
- Arup
- Axiom Engineers
- BASE Energy, Inc.
- Beyond Efficiency
- CA Department of General Services
- Capital Engineering Consultants
- Carbon Lighthouse
- CB&I
- City of Berkeley
- City of Monterey
- City of San Francisco
- City of San Jose
- City of Santa Cruz
- Clovis Unified School District
- County of Sacramento
- CSU, East Bay
- CSU, Maritime Academy
- Cushman & Wakefield
- DNV GL
- EcoCosm Inc.
- Ecology Action
- EDesignC, Inc.
- EMCOR Energy Services
- EnerNOC Energy
- Enovity
- Guttmann & Blaevøet
- Integral group
- Jones Lang LaSalle
- kW Engineering
- Lawrence Berkeley National Labs
- Lockheed Martin
- Marriott International
- Nexant, Inc.
- P2S Engineering
- PG&E
- Premier Mushrooms Inc.
- Presidio of Monterey (US Army)
- RetroCom Energy Strategies
- Roseville Joint Union High School District
- San Francisco State University
- San Francisco International Airport
- San Jose State University
- San Mateo County
- Sherrill Engineering
- Siemens
- Stanford University
- STOK
- Taylor Engineering
- Travis Air Force Base
- UC Berkeley
- UC Davis
- UC San Francisco
- UC Santa Cruz
- United Parcel Service
- US Navy
- Western Allied Mechanical
Testimonials: Past participants have said this about the EBCx workshop series:

“The EBCx series is the best educational experience I have ever attended including all my college courses”
- Jay Tulley, Energy Manager, Presidio of Monterey

“The EBCx series helped me operate my building more efficiently and provided added value to the owner through no to low cost solutions. It was also a jumping off point to upgrade my career; I now manage the operations for a portfolio of facilities and use the skills I learned in the class almost daily.” –Erik Carlson, Engineering Manager, Able Services

“This class definitely opened doors to a new career for me. David Sellers’ experience is incredibly vast and he's so generous with his time and knowledge! I loved the hands-on learning doing functional tests in mechanical rooms. It's the best way to learn.” - María García-Álvarez, Regional Asset Manager, UC Berkeley

“The EBCx class has given me the tools necessary to expand our market and successfully address some of our firm’s toughest challenges. The instructors are able to perform the most difficult job in teaching – explaining very complex technical subjects in a way that students will remember.” - Richard Thorne, Project Engineer, Axiom Engineers

“The EBCx training encouraged me to dig into the details of energy using systems, discover issues, and determine energy and cost savings. The experience has set me apart from my colleagues.”
- Tracy Marcial, Energy Manager, Contra Costa Community College District

“I hired two recent college grads that I needed to bring up to speed in HVAC efficiency and Cx knowledge. This course fulfilled that need in a better way than I imagined. It’s been great.” - Justin Lewis, Senior Energy Project Manager, UC Davis

Workshop Schedule (in brief):

<table>
<thead>
<tr>
<th>Training Dates</th>
<th>Lecture Topics</th>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, June 28, 2018</td>
<td>Utility data, benchmarking and scoping</td>
<td>EBCx treasure hunt</td>
</tr>
<tr>
<td>Thursday, September 20, 2018</td>
<td>Measures lists and Issues logs</td>
<td>System diagrams and excel</td>
</tr>
<tr>
<td>Thursday, October 25, 2018</td>
<td>Data loggers and trend analysis</td>
<td>ECAM and dataloggers</td>
</tr>
<tr>
<td>Thursday, November 08, 2018</td>
<td>Resets and common control strategies</td>
<td>Functional test labs</td>
</tr>
<tr>
<td>Friday, November 09, 2018</td>
<td>Site visit to student project facility</td>
<td>Facility exploration</td>
</tr>
<tr>
<td>Thursday, December 13, 2018</td>
<td>Control logic diagrams</td>
<td>Functional test labs</td>
</tr>
<tr>
<td>January (date TBD), 2019</td>
<td>Site visit to student project facility</td>
<td>Facility exploration</td>
</tr>
<tr>
<td>January (date TBD), 2019</td>
<td>Site visit to student project facility</td>
<td>Facility exploration</td>
</tr>
<tr>
<td>February (date TBD), 2019</td>
<td>Universal Translator demonstrations</td>
<td>Functional test labs</td>
</tr>
<tr>
<td>March (date TBD), 2019</td>
<td>Data graphing best practices</td>
<td>Lighting functional tests</td>
</tr>
<tr>
<td>April (date TBD), 2019</td>
<td>Energy savings calculations</td>
<td>Energy savings calculations</td>
</tr>
<tr>
<td>May (date TBD), 2019</td>
<td>Perspectives from the field</td>
<td>Escape room and valve types</td>
</tr>
<tr>
<td>June (date TBD), 2019</td>
<td>Project documentation</td>
<td>Financial calculations</td>
</tr>
<tr>
<td>July/August (date TBD), 2019</td>
<td>Final project presentations</td>
<td>Project &amp; student next steps</td>
</tr>
</tbody>
</table>

*All training dates will be set by the first session on June 28, 2018.

Speaker Bios:

David Sellers, a Senior Engineer at Facility Dynamics, is leading new and existing building performance projects. Mr. Sellers’ experience includes 40 years of system design, fabrication, operation, and analysis focusing on HVAC systems, control systems, plumbing systems, and fire protection systems. He has been involved in all aspects of project design from schematics through construction documents. In addition, he has worked as a mechanical and control systems contractor and a facilities engineer, a background that exposed him to the practical issues associated with system installation and operation in addition to the theoretical issues associated with the design process.

For the past 21 years Ryan Stroupe has been the Building Performance Program Coordinator at the PG&E Pacific Energy Center. He teaches classes and consults with building professionals on a variety of issues including energy audits, building commissioning, measurement tool applications and architectural design. Ryan is also the lead developer of the Universal Translator, a software tool for managing and analyzing building performance data.