

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298



July 18, 2019

Advice Letter 5478

Ronald van der Leeden
Director, Regulatory Affairs
Southern California Gas
555 W. Fifth Street, GT14D6
Los Angeles, CA 90013-1011

**SUBJECT: 2020 Joint Cooperation Memorandum (JCM) of 3C-REN, SoCalGas, SCE,
and PG&E Pursuant to Decision (D.) 18-05-041**

Dear Mr. van der Leeden:

Advice Letter 5478 is effective as of July 17, 2019.

Sincerely,

A handwritten signature in cursive script that reads "Edward Randolph".

Edward Randolph
Deputy Executive Director for Energy and Climate Policy/
Director, Energy Division



A  Sempra Energy utility

Ronald van der Leeden
Director
Regulatory Affairs

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June 17, 2019

Advice No. 5478

(Southern California Gas Company – U 904 G)

Advice No. 4109-G/5562-E

(Pacific Gas & Electric Company – U 39 M)

Advice No. 4018-E

(Southern California Edison Company – U 338 E)

Advice No. 3-E/2-G

(Tri-County Regional Energy Network)

Public Utilities Commission of the State of California

Subject: 2020 Joint Cooperation Memorandum (JCM) of 3C-REN, SoCalGas, SCE, and PG&E Pursuant to Decision (D.) 18-05-041

Purpose

Southern California Gas Company (SoCalGas), on behalf of itself, Tri-County Regional Energy Network (3C-REN), Southern California Edison Company (SCE), and Pacific Gas & Electric Company (PG&E) hereby submits to the California Public Utilities Commission (Commission) the 2020 JCM, as shown in Attachment A, pursuant to Ordering Paragraph (OP) 38 of D.18-05-041.

Background

On June 5, 2018, the Commission issued D.18-05-041 which adopted the Energy Efficiency Business Plans of Investor-Owned Utilities (IOUs) and Non-IOU Program Administrators (PAs) for the years between 2018 and 2025. D.18-05-041 acknowledged the potential overlaps between IOU PAs and non-IOU PAs and directed PAs with overlapping service areas to submit annual JCMs that show how the PAs plan to avoid or minimize duplication of programs that address a common sector in

overlapping service territories, specifically noting that the IOU PAs and Non-IOU PAs shall:

- (1) Summarize all the programs they intend to run and indicate which programs may overlap;
- (2) Describe how each will work with the other so that customers are informed of all options and not steered simply to their own programs; and
- (3) Describe how each will ensure customers are also aware of the others' programs, where that administrator does not have a similar offering.

OP 38 of D.18-05-041 directed the IOU PAs and Non-IOU PAs to submit their first annual JCMs for approval via Tier 2 advice letters no later than August 1, 2018. SoCalGas submitted the 2019 JCM on August 1, 2018 and was approved on August 30, 2018. OP 38 of D.18-05-041 further directed that the IOU and Non-IOU PAs must submit subsequent annual JCMs via Tier 2 advice letters no later than June 15, prior to submitting their annual budget advice letters.

2020 Joint Cooperation Memo

Attachment A of this advice letter submittal contains the 2020 JCM between 3C-REN, SoCalGas, SCE, and PG&E (collectively the "Joint PAs"). The JCM provides (1) a summary of all the programs 3C-REN intends to run and indicates which programs may overlap with SoCalGas, SCE and PG&E programs; (2) provides a summary of the coordination efforts between 3C-REN and SoCalGas, PG&E and SCE; (3) provides a summary of the IOU PAs 2020 comparable program offerings, if applicable (Appendix A); and (4) provides details regarding 3C-REN's program compliance with D.12-11-015.

The Joint PAs make note that the budgets and programs outlined in this memo are the best estimates of 2020 offerings at the time of submittal and are not assumed to be approved. Programs and budgets will be reviewed and approved as part of the Annual Budget Advice Letter.

Protest

Anyone may protest this advice letter to the Commission. The protest must state the grounds upon which it is based, including such items as financial and service impact, and should be submitted expeditiously. The protest must be made in writing and must be received within 20 days of the date of this advice letter, which is July 7, 2019. The address for mailing or delivering a protest to the Commission is:

CPUC Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

A copy of the protest should also be sent via e-mail to the attention of the Energy Division Tariff Unit (EDTariffUnit@cpuc.ca.gov). A copy of the protest should also be sent via both e-mail and facsimile to the address shown below on the same date it is mailed or delivered to the Commission.

For SoCalGas:

Attn: Ray B. Ortiz
Tariff Manager - GT14D6
555 West Fifth Street
Los Angeles, CA 90013-1011
Facsimile No.: (213) 244-4957
E-mail: ROrtiz@SempraUtilities.com

For PG&E:

Erik Jacobson
Director – Regulatory Relations
c/o Megan Lawson
Pacific Gas and Electric Company
77 Beale Street, Mail Code B13U
P.O. Box 770000
San Francisco, CA 94177
Facsimile: (415) 973-3582
E-mail: PGETarrifs@pge.com

For SCE:

Gary A. Stern, Ph.D.
Managing Director – Statewide Regulatory Operations
Southern California Edison Company
8631 Rush Street
Rosemead, CA 91770
Telephone: (626) 302-9645
Facsimile: (626) 302-6396
E-mail: AdviceTariffManager@sce.com

And

Laura Genao
Managing Director, State Regulatory Affairs
c/o Karyn Gansecki
Southern California Edison Company
601 Van Ness Avenue, Suite 2030
San Francisco, CA 94102
Facsimile: (415) 929-5544
E-mail: Karyn.Gansecki@sce.com

For 3C-REN:

Susan Hughes
Senior Deputy Executive Officer
Ventura County
800 S. Victoria Avenue
Ventura, CA 93009
Telephone: (805) 654-3836
Facsimile: (805) 654-5106
E-mail: susan.hughes@ventura.org

Effective Date

SoCalGas believes that this submittal is subject to Energy Division disposition and should be classified as Tier 2 (effective after staff approval) pursuant to General Order (GO) 96-B. SoCalGas respectfully requests that this submittal be approved on July 17, 2019, which is 30 calendar days from the date submitted.

Notice

A copy of this advice letter is being sent to SoCalGas' GO 96-B service list and the Commission's service list in R.13-11-005 and A.17-01-013 et. al. Address change requests to the GO 96-B service list should be directed via e-mail to Tariffs@socalgas.com or call 213-244-2837. For changes to all other service lists, please contact the Commission's Process Office at 415-703-2021 or via e-mail at Process_Office@cpuc.ca.gov.

Ronald van der Leeden¹
Director - Regulatory Affairs

¹ SCE, PG&E, and 3C-REN have authorized SoCalGas to sign and submit this advice letter on their behalf.



ADVICE LETTER SUMMARY

ENERGY UTILITY



MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.:

Utility type:

ELC GAS WATER
 PLC HEAT

Contact Person:

Phone #:
E-mail:
E-mail Disposition Notice to:

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas WATER = Water
PLC = Pipeline HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #:

Tier Designation:

Subject of AL:

Keywords (choose from CPUC listing):

AL Type: Monthly Quarterly Annual One-Time Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #:

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL:

Summarize differences between the AL and the prior withdrawn or rejected AL:

Confidential treatment requested? Yes No

If yes, specification of confidential information:

Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required? Yes No

Requested effective date:

No. of tariff sheets:

Estimated system annual revenue effect (%):

Estimated system average rate effect (%):

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected:

Service affected and changes proposed¹:

Pending advice letters that revise the same tariff sheets:

¹Discuss in AL if more space is needed.

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102
Email: EDTariffUnit@cpuc.ca.gov

Name:
Title:
Utility Name:
Address:
City: State:
Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

Name:
Title:
Utility Name:
Address:
City: State:
Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

ATTACHMENT A

**3C-REN, SoCalGas, SCE, AND PG&E
2020 JOINT COOPERATION MEMORANDUM**

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I. 3C-REN PORTFOLIO SUMMARY OF PROGRAMS OFFERED FOR 2020

Table 1. 3C-REN Summary of programs

3C-REN Program Unique ID	Sector	Estimated Annual Budget ¹	Eligible Measures
3C-REN WE&T (3C-WET-001)	WE&T	\$1,278,805	N/A
3C-REN C&S (3C-CC-001)	C&S	\$1,814,620	N/A
3C-REN RES DI (3C-R-001)	Residential	\$3,169,197	LED lighting, air sealing, insulation, HVAC measures, water flow controls, smart thermostat, power strip, plug load feedback device, duct system servicing, appliances, pool pumps, and water heating measures. ²

II. SUMMARY AND COORDINATION OF 3C-REN AND IOU(s) SoCalGas, SCE, AND PG&E PROGRAMS OFFERED FOR 2020 THAT ARE COMPARABLE

A. 3C-REN WE&T Program (3C-CC-001)

The 3C-REN will continue to offer a cross-cutting WE&T program designed to fill gaps in current investor-owned utilities³ (IOU) offerings for the 3C-REN territory, as the region is far from IOU training & resource hubs. The 3C-REN program offers career pathways and enrichment by providing access to in-person trainings, mentorship opportunities and cross promotion of IOU workforce trainings, including hard-to-reach (HTR) workers and those in identified disadvantaged communities (DACs).

Building professionals living and working in the 3C-REN territory face unique challenges given the dispersed nature of communities within the Tri-County

¹ Actual budget information will be provided in 3C-REN's Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

² Please note that this is a preliminary list of measure types, and that the final measures will be provided in the program Implementation Plan.

³ For the purposes of this Joint Cooperation Memorandum, the IOUs consist of SoCalGas, SCE and PG&E.

Central Coast Region. The region, and its building professional workforce, have historically struggled to fill key positions in energy efficiency, including the retrofit market and energy code compliant new construction. The 3C-REN WE&T activities address these challenges through collaboration with existing providers, programs, apprenticeship-style learning, targeted management, technical trainings for building professionals, and integrated resources for design and compliance professionals.

The 3C-REN territory has two primary needs for training and education in addition to local, in-person mentorship:

- Technical Code Compliance, Home Performance and zero net energy (ZNE);
- “Soft Skills” Training for better communications, sales and marketing training, and business management.

The 3C-REN leverages established contractor and program relationships to provide technical trainings, Energy Advisor in-field job and installation mentoring, construction firm specific trainings and certification opportunities. The 3C-REN’s partnerships and Residential Energy Advisor service provide a direct connection to the workforce to leverage and improve the existing labor force and provide apprenticeship-style trainings with real-time experience that business owners value most. This provides a network of building professionals and connection to the workforce seeking training and career development.

The 3C-REN applies a holistic approach to the market with highly targeted training events, using apprenticeship and mentoring style models to enhance the workforce within the 3C-REN territory. 3C-REN’s workforce training program goes beyond the classroom setting and skills are reinforced with real world on-the-job applications, while simultaneously influencing direct energy savings. As a result of a stronger workforce skills base, building departments will increase efficiency and efficacy with existing resources.

The proposed program budget for 3C-REN WE&T, 3C-WET-001 is \$1,278,805.

The program targets local building professionals needing more in-depth training, such as contractors, HVAC technicians, engineers, architects, designers, certified energy managers, local jurisdictions’ building & safety department staff, lighting professionals, real estate professionals, raters, including professionals in DACs and HTR areas, as well as other key market actors.

The 3C-REN’s WE&T program is non-resource and serves to support 3C-REN and IOU programs in the region by training the workforce that can deliver

resource programs and meet code compliance standards. The program is designed to be complementary to IOU programs and to fill gaps in existing IOU programs while integrating with C&S compliance support.

1. Comparable SoCalGas, SCE and/or PG&E Programs

Table 2: WE&T Program Comparison

WE&T	3C-REN	PG&E	SCE	SoCalGas
Non-Resource Program Name	3C-REN WE&T	PG&E WE&T Integrated Energy Education & Training (IEET) ⁴	SCE WE&T Integrated Energy Efficiency Training (IEET) ⁵	SoCalGas WE&T Integrated Energy Efficiency Training (IEET) ⁶
Eligible Measures	N/A	N/A	N/A	N/A
Estimated 2020 Budget⁷	\$1,278,805	\$8,508,957	\$4,800,000	\$2,808,149
Target Audience	Local building professionals needing more in-depth training, such as contractors, HVAC, engineers, architects, designers, certified energy managers, local jurisdictions' building & safety department staff, lighting professionals, real estate professionals, raters, and professionals in DACs and HTR areas, as well as other key market actors.	Any person who designs, builds, maintains, plan checks, inspects, and/or operates buildings including engineers, architects, contractors, lighting designers, HVAC technicians, real estate professionals, building operators, facility managers, energy consultants, plans examiners, building inspectors, and more. Additionally, this program supports other organizations' instructors who are training a similar audience.	Workforce needing technical residential, multi-family, and/or small business trainings at Energy Centers or online via simulcast or webinar.	Workers in, or pursuing occupations that can provide professional and technical capabilities needed by resource program sectors. Training will be conducted at Energy Center, alternative site locations and distribution channels in collaboration as appropriate with non-IOU sources, feasible for reaching target audiences.

⁴ The C&S Compliance Improvement subprogram is also a comparable program. More information on this program is listed in Section B.

Pacific Gas & Electric

The PG&E WE&T IEET subprogram (formerly Centergies) offers hundreds of technical workforce trainings per year with the goal of equipping a California workforce with the tools, resources, and skills to meet the State's climate goals. Appendix B includes a categorized list of the residential, multi-family, and/or small business trainings conducted in 2018 and 2019 scheduled to date as an illustration of our potential 2020 offerings in the three areas that appear of greatest interest to the 3C-REN—residential; multi-family, and small/medium business. Appendix B also includes a full list of approximately 219 in-person, simulcast, or webinar classes and 43 on-demand classes in the same period.

Some of the classes listed in Appendix B are restricted to PG&E's physical Energy Centers in Stockton, San Ramon for food service, or San Francisco, due to the need to use large teaching props or laboratories. However, the majority of classes can be offered at off-site locations and/or via online simulcast or webinar, especially if a local organization will assist with marketing and outreach to ensure good attendance from the appropriate target audience, assuming that the instructor is willing and able to travel. PG&E's WE&T program also has an online learning platform, where many classes are focused on residential construction and contractors. See Appendix B for a list of on-demand classes. Appendix B below also includes more information on additional C&S training provided by the IOUs.

PG&E has a tool lending library (TLL) with thousands of energy diagnostic tools available to borrow at no-cost to the borrower. The TLL addresses an up-front cost barrier faced by many small businesses and energy consultants. Tools are available for loan from our Stockton and San Francisco energy centers. PG&E can ship the tool anywhere in California if the borrower or 3C-REN covers shipping costs.

The PG&E WE&T team does not offer soft skills training such as interviewing skills, resume writing, etc. PG&E will coordinate with organizations that offer soft skills training as part of the Statewide Career and Workforce Readiness (CWR) program scheduled to launch in 2020 (See Section 3 below).

⁵ The C&S Compliance Improvement subprogram is also a comparable program. More information on this program is listed in Section B.

⁶ The C&S Compliance Improvement subprogram is also a comparable program. More information on this program is listed in Section B.

⁷ Actual budget information will be provided in 3C-REN's 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

PG&E WE&T does not offer the certifications listed in the 3C-REN Business Plan – BPI, HERS, or NATE; however, PG&E supports these certifications by providing classes that prepare students to take the tests and complete them successfully. Examples include PG&E’s IHACI NATE Series, an 8-part class that prepare technicians to take the test. IHACI is an approved NATE testing proctor. Another example is PG&E’s Combustion Safety and Depressurization class that prepares workers to take the BPI examination.

Southern California Edison

SCE WE&T Integrated Energy Education & Training Program – [SCE-13-SW-010A]

The SCE Workforce WE&T Integrated Energy Education & Training program (formerly Centergies), offers resources to help shape the future energy workforce through occupational, employer and technology focused workshops and seminars, along with workplace-based hands-on technical training. These programs aim to provide pathways and training for certifications and credentials in energy-related industries. Appendix B includes a list of trainings offered or schedule for 2019 as an example of potential offerings for 2020.

In addition to the trainings offered, the Foodservice Technology Center conducts standards-based equipment testing and evaluation that enhance commercialization of emerging energy-efficient technologies and programs. These services are delivered with technical integrity and scientific rigor in order to ensure our partners stay competitive and maintain cost effectiveness.

The Energy Centers provide additional value-added customer programs and services such as the Tool Lending Library, tours, and on-site energy audits at no-cost to the customer.

Southern California Gas Company

SCG3729 - WE&T Integrated Energy Education Training (IEET)

The SoCalGas WE&T Integrated Energy Education Training (IEET) subprogram (formerly Centergies) will offer both technical and foodservice workforce trainings that can leverage 3C-REN local contacts to inform and equip workforce talent with skills to assist in meeting the State’s energy and climate goals. Appendix B includes a list of trainings remaining for 2019.

The WE&T Program contributes to the investor-owned utilities’ (IOUs’) energy efficiency goals by empowering customers and market actors with the knowledge to make energy reduction decisions. WE&T’s primary target audience includes

market actors who design, build, maintain, and operate buildings and building systems—engineers, technicians, building operators, designers, contractors, etc. Because these market actors have the potential to shape a building’s energy use, WE&T teaches them how to recognize energy savings and balanced energy solutions to address GHG-reduction, and then provides them skills, tools, and resources to act upon those opportunities. Additionally, WE&T supports Post-secondary institutions that are training future generations of the energy workforce by providing them energy efficiency, sustainability, and green career awareness classes, internships, materials and resources.

2. Coordination Protocol between Programs

The goal of coordination between 3C-REN and the IOU WE&T, Codes & Standards programs, including Local Government Partnerships⁸ programs, is to ensure that ratepayer funds deliver resources efficiently and effectively across the shared territories. The IOUs and 3C-REN will approach coordination with the goal of offering transparency through regular communication, efficiency through a collaborative approach to any shared resources, and support for the success of programs across the service area. The IOUs and 3C-REN will meet regularly to coordinate the WE&T and C&S programs.

3C-REN aims to provide workforce, education, and training not currently being provided by the IOUs, as well as services targeting hard-to-reach markets that may complement existing IOU resources. To ensure 3C-REN can meet these eligibility categories, the IOUs will provide 3C-REN with their list of scheduled WE&T trainings. Whenever feasible, 3C-REN will leverage existing IOU curriculum and training by communicating training needs via email or in regular coordination meetings with IOU partners. A clear chain of communication and identified contacts will be exchanged for each program and/or sub-program.

IOUs will provide their list of trainings to 3C-REN on a quarterly basis and will include the following information:

- Class name(s)
- Description(s)
- Instructor name(s)
- Whether IOUs owns content (as opposed to licensing it)
- Mode of access and location (ex: in-person, training center/city, online)

⁸ Local Government Partnership Programs in 3C-REN; Ventura County Regional Energy Alliance, San Luis Obispo County Energy Watch, North Santa Barbara Energy Watch Partnership and with South County Energy Efficiency Partnership in Santa Barbara.

- Class schedule (if one exists) and URL for online class schedule

Additionally, a standing agenda item at the quarterly meeting will be to discuss the topics of trainings in development, even if only at a high level. This will reduce the potential of duplication of efforts.

Once 3C-REN reviews this list, 3C-REN will determine which of the IOUs' existing offerings should be leveraged and coordinate with the IOUs to deliver these resources. If 3C-REN determines there is a training gap, 3C-REN will develop additional training resources and communicate that to the IOUs, working to avoid duplication by leveraging any existing resources. The IOUs and 3C-REN will administer a post-course evaluation to course participants to assess the quality of the courses.

3. Coordination between Statewide (SW) program(s)

With the change to PG&E as the single statewide administrator for the Career and Workforce Readiness (CWR) and Career Connections WE&T subprograms, the 3C-REN will leverage the coordination protocol described above to include any statewide considerations. The 3C-REN program does not include a traditional K-12 student component, so coordination on the Connections sub-program is likely not needed. PG&E will engage the 3C-REN after a vendor is secured for the CWR subprogram (likely mid-2020) to discuss a coordination strategy.

B. 3C-REN C&S PROGRAM 3C-CS-001

The 3C-REN will continue to offer a cross-cutting C&S program designed to fill gaps in current IOU offerings for the 3C-REN territory. The 3C-REN program offers local, person-to-person trainings and mentorship opportunities, as well as counter and on-call expert assistance for codes and standards. In addition to coordinating with the IOUs to leverage existing Statewide C&S resources, for classroom and online trainings the 3C-REN established a Code Coach offering to run concurrent to and alongside other training efforts.

Through this program, building departments in the Central Coast Region receive building performance support and mentoring for plan review and field compliance. All design-side stakeholders, from the architect to field inspector and from the mechanical engineer to the plan checker, are encouraged to attend trainings. The Code Coach approach, having local counter-to-counter and on-call experts for the region, fosters an environment where stakeholders have a

deeper understanding of building performance and interrelated concerns. The goal is to ensure consistency throughout the Central Coast Region, providing the workforce with a more stable business climate and known code compliance resources.

The proposed program budget for 3C-REN C&S, 3C-CS-001 is \$1,814,620.

The target audience is all construction design-side stakeholders, including building departments, architects, field inspectors, mechanical engineers, and plan checkers. This is a non-resource program.

1. Comparable SoCalGas, SCE and/or PG&E Programs

The IOU Compliance Improvement subprogram⁹ targets actors within the building and appliance energy code supply chains to maintain comprehensive statewide compliance with energy codes and appliance standards, such as: manufacturers, distributors, retailers, architects, energy consultants, contractors, plans examiners, building inspectors, etc. Whereas the Energy Commission is responsible for implementing state policy by establishing new C&S, others (architects, energy consultants, mechanical engineers, IOUs, builders, contractors, etc.) are responsible for interpreting the code and completing compliance forms and building officials (CALBO) are responsible for enforcing the code. Building codes and appliance standards can be difficult to understand and time consuming to implement, therefore some industry actors fail to comply with regulatory requirements.

Compliance improvement program needs are determined through a performance-based solutions approach to identify training, tools, resources and outreach necessary to narrow the gap between actual and desired performance, and principals of adult learning theory are employed to improve knowledge swings during training and increase long-term retention. Multiple training modalities are used to maximize student participation. One consistent curriculum is developed by the compliance improvement program and delivered statewide by a team of subject matter experts.

⁹ Note: The Compliance Improvement subprogram is a statewide program offered by all IOUs.

Table 3: C&S Program Comparison

C&S	3C-REN	PG&E	SCE	SoCalGas
Non-Resource Program Name	3C-REN C&S	Statewide C&S Compliance Improvement Subprogram	Statewide C&S Compliance Improvement Subprogram	C&S Compliance Enhancement Subprogram
Eligible Measures	N/A	N/A	N/A	N/A
Estimated 2020 Budget¹⁰	\$1,814,620	\$5,138,535	\$1,400,000	\$286,056
Target Audience	All design-side stakeholders	All stakeholders impacted by the energy code	All stakeholders impacted by the energy code	All stakeholders impacted by the energy code

2. Coordination Protocol between programs

The same coordination protocol as mentioned above for WE&T applies to C&S classroom and online trainings. Again, the goal of coordination between 3C-REN and utility programs is to ensure that ratepayer funds deliver resources efficiently and effectively across the shared territories. With that in mind, the IOUs and 3C-REN will approach coordination with the goal of offering transparency through regular communication, efficiency through a collaborative approach to any shared resources, and support for the success of programs across the service area. The IOUs and 3C-REN will meet regularly to coordinate the WE&T and C&S programs.

3C-REN aims to provide coverage not currently being provided by the IOUs, as well as services targeting hard-to-reach markets that may complement existing IOU resources. The majority of 3C-REN’s activities are related to the Energy Code Coach who conducts outreach to local building departments and market actors by offering on-demand, local, in-person and customized technical support.

The IOUs will provide 3C-REN with their respective lists of available C&S trainings including those in development stages. Whenever feasible, 3C-REN will leverage existing IOU curriculum and training by communicating training needs via email or in regular coordination meetings with the IOU. A clear chain

¹⁰ Actual budget information will be provided in the Program Administrator’s 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

of communication and identified contacts will be exchanged for each program and/or sub-program.

IOUs' Compliance Improvement team representative will provide a list of trainings to 3C-REN on a quarterly basis and will include the following information:

- Class name(s)
- Description(s)
- Instructor name(s)
- Whether IOUs owns content (as opposed to licensing it)
- Mode of access and location (ex: in-person, training center/city, online)
- Class schedule (if one exists)

Additionally, a standing agenda item at the quarterly meeting will be to discuss the topics of trainings in development, even if only at a high level. This will reduce the potential for duplication of efforts.

Once 3C-REN reviews this list, 3C-REN will determine which existing offerings should be leveraged and coordinate with the IOUs to deliver these resources. If 3C-REN determines there is a training gap, 3C-REN will develop additional training resources and communicate that to the IOUs, working to avoid duplication by leveraging any existing resources.

The IOUs will make the 3C-REN aware of resources available as courses are scheduled for delivery and new job aides (Energy Code Ace "resources") are developed. A portion of the Statewide C&S Team's training schedule is set at the beginning of the year while the rest remains flexible since most courses are offered upon request as a result of the team's outreach efforts. All offerings are posted on the Energy Code Ace website training page as courses are scheduled.

3. Coordination between SW program(s)

The majority of 3C-REN's C&S activities are related to the Energy Code Coach as noted above. However, the Code Coach may provide referrals to customers who will benefit from statewide programs.

There is an extensive list of classes offered by the Statewide C&S team. The IOU Compliance Improvement team representative will provide their list of trainings to 3C-REN per the protocol listed above.

Should the need to coordinate efforts arise, 3C-REN will follow similar protocols as defined under the coordination protocol between programs. Specifically, 3C-REN will work with the statewide administrator to identify appropriate program contacts, confirm existing resources, and collaboratively determine if resources should be jointly offered or if 3C-REN should build upon statewide resources.

C. 3C-REN RES DI PROGRAM 3C-R-001

The 3C-REN will continue offering a RES DI program designed to fill a gap in current IOU offerings for the 3C-REN territory. The 3C-REN program delivers a direct install (DI) program that targets hard-to-reach (HTR) residential customers, including single family, multifamily, and mobile homes, renters and owners, and DACs in Ventura, Santa Barbara and San Luis Obispo Counties, offering a single, unified program to regional residents.

The program provides energy and behavior change education, installation of simple energy saving measures to build customers' trust and interest, and delivery of a pathway to deeper savings by offering co-pay options for more substantial upgrades. 3C-REN partners with local non-profits, who currently deliver the Energy Savings Assistance (ESA), utility Residential Direct Install, and Low-Income Home Energy Assistance Programs (LIHEAP) to leverage their experience and infrastructure to provide 3C-REN program services to a broader audience than they currently serve.

Qualifying customers receive an in-home visit from a trained assessor who collects information on the home, provides consumer education, and installs DI measures. Education focuses on behavioral changes and easy actions the customer can take to reduce energy use. The program employs digital education tools such as energy education videos that customers can watch while DI measures are being installed to reduce time spent in the home. Assessors also cross-promote utility bill management tools (e.g., Green Button) and relevant utility programs (e.g., SCE Summer Rate Program). Additionally, assessors provide initial information on co-pay options for more substantial upgrades.

A WE&T and C&S overlay is included in this program as 3C-REN works with local non-profit low-income providers to help build their staffing capacity and provide training, as well as code coaching for permitted projects. Some projects may also be used as hands-on, in the field training opportunities that results in increased quality assurance. Partnering with local non-profit and low-income service providers also provides an opportunity to create career pathways for disadvantaged workers as many of the crew members and contractors live in the DACs that they serve.

The proposed program budget for 3C-REN RES DI, (3C-R-001) will be \$3,169,197.

The 3C-REN Residential DI program targets hard-to-reach (HTR) residential customers, including single-family, multifamily, and mobile homes, renters and owners, and moderate-income families not currently being served by, nor meeting the criteria of current ESA and LIHEAP in Ventura, Santa Barbara and San Luis Obispo Counties.

This resource program includes measure types such as lighting, air sealing, insulation, HVAC, water flow controls, smart thermostat, power strip, plug load feedback device, duct system servicing, appliances, pool pumps, and water heating measures.¹¹ Single measures will be allowed and savings will be deemed per measure.

1. Comparable SoCalGas, SCE and/or PG&E Programs

Table 4: RES DI Program Comparison

DI	3C-REN	PG&E	SCE	SoCalGas
Resource Program Name	3C-R-001 RES DI	PGE210011 – Moderate Income Direct Install (MIDI) Program	SCE-13-SW-001G – RES DI (formerly Energy Upgrade California – MIDI)	SCG3820 – RES-Direct Install Program
Eligible Measures	LED lighting, air sealing, insulation, HVAC measures, water flow controls, smart thermostat, power strip, plug load feedback device, duct system servicing, appliances, pool pumps, and water heating measures. ¹²	Home energy education, smart thermostats, advanced power strips, HVAC tune-ups, LED lighting, and water savings measures.	HVAC Measures (Efficient Fan Control, Brushless Fan Motor, Air Flow Adjustment, Condenser Coil Cleaning, Refrigerant Charge Adjustment, Duct Test and Seal, Window Evaporative Cooler), Variable Speed Pool Pump Residential Smart (Communicating) Thermostat.	Exhaust Venting (Kitchen/Bath) – cut opening with vent (Done in conjunction with attic insulation), Vent – Eave (Done in conjunction with attic insulation), Duct Repair – (Done in conjunction with attic insulation), Duct Testing, Duct Sealing, Duct Board Installation, Low Flow Kitchen Faucet Aerator, Low Flow

¹¹ Please note that this is a preliminary list of measure types, and that the final measures will be provided in the program Implementation Plan.

¹² Please note that this is a preliminary list of measure types, and that the final measures will be provided in the program Implementation Plan.

DI	3C-REN	PG&E	SCE	SoCalGas
				Bathroom Faucet Aerator, Low Flow Showerhead, Low Flow Handheld Showerhead, Showerhead adaptor, Shower Diverter Valve (in conjunction with Low Flow Showerhead), Thermostatic Shower Valve, Smart Thermostat, Natural Gas Appliance Testing (NGAT) (done in conjunction with Duct Sealing).
Estimated 2020 Budget¹³	\$3,169,197	2019 Filed budget is \$14.9 Million by Program Code with \$7.4 Million allocated to the MIDI sub-program	\$15,600,000	\$2,515,590
Target Audience	Will target hard-to-reach (HTR) residential customers, including single-family, multifamily, and mobile homes, renters and owners, and moderate-income families not currently being served by, nor meeting the criteria of current ESA and LIHEAP in Ventura, Santa Barbara and San Luis Obispo Counties.	The MIDI program serves moderate income and disadvantaged and/or hard-to-reach communities across the PG&E service territory. Eligible customers include those with incomes under 400% of the federal poverty level, renters and lessors, customers whose primary language is other than English, and customers residing outside of the San Francisco and Sacramento Metropolitan regions.	Residential single-family home customers within SCE's service territory.	Mainstream, market rate homeowners.

¹³ Actual budget information will be provided in the Program Administrator's 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

Pacific Gas & Electric

PGE210011 – Moderate Income Direct Install (MIDI) Program

The MIDI program targets hard-to-reach and moderate income residential customers. Program outreach conducted both independently as well as through integration with the ESA Program to serve those customers who do not qualify for ESA because the customer's income level falls above the income guidelines or because the customer cannot produce the appropriate, ESA required documentation.

Through the MIDI program, the ESA Energy Efficiency Services ("EES") Contractors, and other approved contractors will serve these hard-to-reach and moderate income customers in order to avoid a missed opportunity to provide energy efficiency services. MIDI customers will be offered an energy assessment, energy education, and low or no-cost installation of measures.

Southern California Edison

SCE RES DI (formerly Energy Upgrade California – Middle Income Direct Install [MIDI]) – [SCE-13-SW-001G]

The RES DI program targets single-family residential customers. The program allows customers to realize the value of energy efficiency through a variety of no-cost products and services to meet individual customer needs and enable continuous energy management. Additionally, the services offered through the RES DI program are leveraged by various Water District agencies that deploy water conservation program offerings to deliver a comprehensive water energy nexus solution.

Target marketing is performed in select areas to create customer awareness and engagement. Customers are provided with education on the measures installed in their homes, other measures that could further improve their energy savings, and a general understanding about the importance of saving energy and the large impact everyday behavior has on conservation.

Southern California Gas Company

SCG3820 - RES-Direct Install Program

The RES DI Program provides no-cost energy improvements to eligible customers to help make their homes more comfortable and help conserve energy, which could lead to lower utility bills. Should the customer decide to further their energy savings efforts, the Program reduces the amount of money a customer needs to invest in order to participate in the single-family or multifamily home upgrade programs.

The program is available to renters and homeowners living in single-family and multifamily dwellings. Program services are provided by authorized vendors who are not employees of SoCalGas® or Sempra Utilities, but are under contract to SoCalGas to deliver program services. A qualified contractor will assess eligible homes for energy-saving services and program eligibility, a minimum of 3 must be installed.

2. Coordination Protocol between Programs

As described for previous programs, the IOUs and 3C-REN approach coordination with the goal of offering transparency through regular communication, efficiency through a collaborative approach to any shared resources, and support for the success of programs across the service area.

For its residential DI program, 3C-REN and the IOUs will communicate via email or in regular coordination meetings. A clear chain of communication and identified contacts will be exchanged for each program. 3C-REN and the IOUs have also developed a protocol to verify customer eligibility and will use this protocol going forward.

The IOUs will make the 3C-REN aware of programs and resources available. 3C-REN will determine whether resources, such as those for low and moderate-income families, should be jointly offered or if the 3C-REN will build upon IOU resources to offer such programs independently. This will assist with market penetration and afford both the IOU and 3C-REN cross promotion and continuity of services.

There may be instances where a customer may contact 3C-REN for resources, and 3C-REN may identify that the customer would be best served by an IOU program. 3C-REN and the IOUs have established a protocol for customer handoff should either program identify a referral opportunity for another organization's resources. The handoff protocol minimizes the number of

customer touchpoints to maximize the potential for program participation. Ideally, 3C-REN will be able to provide a “warm” or immediate handoff to the IOUs while the customer is actively engaged by email/phone, so that the customer experiences a seamless service offering between 3C-REN and the IOUs.

3. Coordination between SW program (s)

The 3C-REN residential DI program offering is not substantially similar to any statewide program and therefore the parties to this JCM have determined that regular coordination to avoid duplication is unnecessary. However, there are some portions of the program that may allow for and require coordination among programs. In particular, 3C-REN will provide referrals to statewide financing programs to program participants when appropriate. 3C-REN will follow similar established coordination protocols for coordination with utility programs to ensure coordination with statewide programs.

III. 3C-REN PROGRAM COMPLIANCE WITH D.12-11-015

A. 3C-REN UNDERTAKING ACTIVITIES THAT UTILITIES CANNOT OR DO NOT INTEND TO UNDERTAKE.

Although the IOUs do offer C&S and WE&T resources, the IOUs are not currently delivering localized, hands-on services in the 3C-REN service area. The majority of the IOU in-person trainings are offered at IOU training facilities, which are not located in 3C-REN service area. As noted in D.18-05-041 “3C-REN’s proposed activities for WE&T and code compliance have value in terms of the significant distance of its service area to the IOUs’ training centers.”¹⁴

For WE&T, the 3C-REN program offers regional, on-the-ground resources to address this gap. As noted in the 3C-REN Business Plan, “the current IOU training and education programs require substantial travel to energy centers outside of the area and are often not designed to meet the needs of a residential home performance workforce.” Specifically, the 3C-REN program helps build career pathways by providing access to in-person trainings and mentorships, including HTR workers and those in identified DACs. This includes local Energy Advisor services for in-field training to build capabilities and on-the-job skills, a service not offered by the IOUs. Separately, 3C-REN offers in-person training on technical and soft skills, a service not offered locally by the IOUs.

¹⁴ D.18-05-41, Finding of Fact 63.

For C&S, the 3C-REN established a regional Code Coach offering to run concurrent to and alongside other training efforts. This approach is more hands-on and locally relevant than existing IOU resources. Building departments in the Central Coast Region receive building performance support and mentoring for plan review and field compliance. All design-side stakeholders, from the architect to field inspector and from the mechanical engineer to the plan checker, are encouraged to attend trainings. The Code Coach approach, having local counter-to-counter and on-call experts for the region, fosters an environment where stakeholders have a deeper understanding of building performance and interrelated concerns.

B. 3C-REN UNDERTAKING PILOTS ACTIVITIES WHERE THERE IS NO CURRENT UTILITY UNDERTAKING, AND WHERE THERE IS A POTENTIAL FOR SCALABILITY TO A BROADER GEOGRAPHIC REACH, IF SUCESSFUL.

At this time, 3C-REN is not proposing a program using this threshold criteria for compliance with D.12-11-015. Instead, 3C-REN is proposing programs that both fill in gaps to IOU services and that target HTR markets.

C. 3C-REN UNDERTAKING PILOT ACTIVITIES IN HARD TO REACH MARKETS, WHETHER OR NOT THERE IS A CURRENT UTILITY PROGRAM THAT MAY OVERLAP.

As noted in D.18-05-041, the CPUC intends to “authorize 3C-REN’s proposed business plan activities for residential direct install programs that target hard-to-reach customers.”¹⁵ Through its residential program, the 3C-REN program delivers a DI program that targets hard-to-reach residential customers, including single family and multifamily, renters and owners, and DACs in Ventura, Santa Barbara and San Luis Obispo Counties. As noted in the Business Plan, “reported IOU residential savings in the Tri-Counties is not substantial” and “could be due the hard to reach elements on the geographic area and lack of ability to effectively reach customers consistently.”

3C-REN addresses this hard-to-reach market through its intervention strategies of “Strategy 1.” Build trust and interest in energy savings over time,” and “Strategy 2.” Apply neighborhood approaches to achieve scale in reach and

¹⁵ D.18-05-41, Conclusion of Law 54.

savings.” Under the first strategy, activities include offering a direct install program targeting hard-to-reach customers, as well as simple upgrade packages offered for cost to streamline easy installation and adoption of deeper retrofits in hard-to-reach customers. Under the second strategy, 3C-REN deploys a neighborhood-based approach to engage hard-to-reach customers and integrate workforce development opportunities to build skills and community buy-in.

As noted in the Business Plan, “the 3C-REN intends to offer services to all residents in the three counties, however, the hard to reach populations of moderate income and rural areas will be targeted in marketing and outreach, as well as in program design.” There may be instances where a customer may contact 3C-REN, but the customer would be best served by an IOU program. 3C-REN and the IOUs established and use a protocol for customer handoff, as described above.

Table 5. 3C-REN CROSS-CUTTING & RESIDENTIAL D. 12-11-015 Compliance, by program

D.12-11-015 Threshold Criteria that apply for each program.	Comparable IOU Program if applicable.	1. Activities that utilities cannot or do not intend to undertake.	2. Pilot activities where there is no current offering, and where there is potential for scalability to a broader geographic reach, if successful.	3. Pilot activities in hard to reach markets, whether or not there is a current utility program that may overlap.
<p>3C-REN WE&T 3C-WET-001</p>	<p>PG&E Integrated Energy Education & Training (IEET)</p> <p>SCE WE&T IEET (SCE-13-SW-010A)</p> <p>SoCalGas WE&T Integrated Energy Efficiency</p>	<p>Strategy 3. Establish local, targeted training for building professionals.</p> <ul style="list-style-type: none"> • Local Energy Advisor for in-field training to build capabilities and on-the-job skills • In-person training, hosted locally, on 		

	Training (SCG3729).	technical and soft skills.		
3C-REN C&S 3C-CS-001	Statewide C&S Compliance Improvement Subprogram	<p>Strategy 4. Provide Regional assistance to Building Departments and Jurisdictions to help comply and adjust to Codes and future updates.</p> <ul style="list-style-type: none"> Local Energy Code Coach service to provide ongoing technical training for building departments 		
3C-REN Residential DI 3C-R-001	<p>PG&E Moderate Income Direct Install Program (PGE210011)</p> <p>SoCalGas RES DI (SCG 3802)</p> <p>SCE RES DI (Formerly Energy Upgrade California – MIDI) (SCE-13-SW-001G)</p>			<p>Strategy 1. Build trust and interest in deeper energy savings over time.</p> <ul style="list-style-type: none"> Offer Direct Install program targeting hard-to-reach customers Develop simple upgrade packages to streamline and offer easy installation and adoption of deeper retrofits <p>Strategy 2. Employ neighborhood approaches to achieve scale in reach and savings.</p> <ul style="list-style-type: none"> Integrate workforce development into neighborhood programs to build skills and

				community buy-in
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APPENDIX A - IOU(s) PORTFOLIO SUMMARY OF PROGRAMS OFFERED FOR 2020

For information on IOUs portfolio of programs, please refer to the California Energy Data and Reporting System <https://cedars.sound-data.com/programs/list/>.

Table 1. PG&E Summary of Comparable Programs

IOU Program Unique ID	Sector	Annual Budget ¹⁶	Eligible Measures
PG&E Integrated Energy Education & Training (formerly Centergies) [PGE21071]	Cross-cutting: WE&T	\$8,508,957	Not applicable. Non-resource program
PG&E Compliance Improvement Program [PGE21053]	Cross Cutting: C&S	\$5,138,535	Not applicable. Non-resource program
PG&E Energy Fitness (Middle Income Direct Install) [PGE210113]	Residential	2019 Filed budget is \$14.9 Million by Program Code with \$7.4 Million allocated to the MIDI sub-program	Home energy education, smart thermostats, advanced power strips, HVAC tune-ups, LED lighting, and water savings measures

Table 2. SCE Summary of Comparable Programs

IOU Program Unique ID	Sector	Annual Budget ¹⁷	Eligible Measures
SCE WE&T Integrated Energy Education & Training Program (formerly Centergies) [SCE-13-SW-010A]	Cross-cutting: WE&T	\$4,800,000	Not applicable. Non-resource program
SCE C&S – Compliance Improvement [SCE-13-SW-008C]	Cross Cutting: C&S	\$1,400,000	Not applicable. Non-resource program
SCE RES DI Program	Residential	\$15,600,000	HVAC Measures <ul style="list-style-type: none"> • Efficient Fan Control

¹⁶ Actual budget information will be provided in the Program Administrator’s 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

¹⁷ Actual budget information will be provided in the Program Administrator’s 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

[SCE-13-SW-001G]			<ul style="list-style-type: none"> • Brushless Fan Motor • Air Flow Adjustment • Condenser Coil Cleaning • Refrigerant Charge Adjustment • Duct Test and Seal • Window Evaporative Cooler Variable Speed Pool Pump Residential Smart (Communicating) Thermostat
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Table 3. SoCalGas Summary of Comparable programs

IOU Program Unique ID	Sector	Annual Budget ¹⁸	Eligible Measures
SCG3729 – WE&T-Integrated Energy Education Training (IEET)	Cross Cutting	\$2,808,149	Not applicable.
SCG3726 – C&S-Compliance Enhancement	Cross Cutting	\$286,056	Not applicable.
SCG3820 – RES-Direct Install Program	Residential	\$2,515,590	<ul style="list-style-type: none"> • Exhaust Venting (Kitchen/Bath) – cut opening with vent (Done in conjunction with attic insulation) • Vent – Eave (Done in conjunction with attic insulation) • Duct Repair – (Done in conjunction with attic insulation) • Duct Testing • Duct Sealing • Duct Board Installation • Low Flow Kitchen Faucet Aerator • Low Flow Bathroom Faucet Aerator • Low Flow Showerhead • Low Flow Handheld Showerhead • Showerhead adaptor

¹⁸ Actual budget information will be provided in the Program Administrator’s 2020 Energy Efficiency Annual Budget Advice Letter submittal on September 3, 2019.

			<ul style="list-style-type: none">• Shower Diverter Valve (in conjunction with Low Flow Showerhead)• Thermostatic Shower Valve• Smart Thermostat• Natural Gas Appliance Testing (NGAT) (done in conjunction with Duct Sealing)
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APPENDIX B - IOU Workforce, Education, and Training Class list

Classes in Alignment with 3C-REN Focus Areas, Full Class List and On-demand Class List

2018 and 2019-to-date

A. Building Envelope
1. Advanced Framing for Energy and Resource Efficiency
2. Advanced Framing Saves Energy, Material and Labor Rebuilding for Greater Comfort and Affordability
3. Advanced Wood Framing, Plus Walls from Straw Bale, Hempcrete and Earth
4. Air Sealing and Insulating Existing Homes
5. Air Sealing to Achieve Zero Net Energy - New Techniques and Applications
6. Building Enclosures: Continuous Exterior Insulation and High R-Value Walls
7. Building Science Principles for High Performance Nonresidential Building Enclosures
8. Building Science Principles for High Performance Residential Building Enclosures
9. Continuous Exterior Insulation & Moisture Management Applied Building Science for Residential Building Enclosures
10. Design Thinking for Zero Net Energy - Rebuilding for Comfort, Efficiency, and Affordability
11. High Performance Crawl Spaces: A Practical Approach to Air Sealing and Insulating
12. High Performance Enclosures: Air Tight, Well-Insulated, Properly Ventilated - Rebuilding for Comfort, Efficiency, and Affordability
13. How to Design and Build High Performance Walls and Roofs
14. Passive Building - A Path to Zero: Principles, Standards & Local Case Study
15. The Benefits of Airtightness Testing for Multi-Family and Nonresidential Buildings: Lessons from Seattle
16. Window Selection for New and Existing Homes
B. Energy Code and Standards
17. Title 24 Proper Procedures for Charging Air Conditioners and Heat Pumps
C. HVAC/R
18. ACCA Manual D - Duct Design
19. ACCA Manual J - Equipment Sizing and Selection
20. Advanced ACCA Manual D
21. Air Conditioning and Heat Pump Refrigeration Module by IHACI: Session 1-4
22. Air Distribution Module by IHACI: Session 1-4
23. Air Flow Measures and Static Pressure - MI-BEST Series, Day 2
24. Balanced Ventilation for High Performance Homes
25. BPI Combustion Safety and Depressurization
26. BPI Overview of Combustion Safety Testing
27. Building Envelope and Duct Testing - MI-BEST Series, Day 1
28. Building Pressures and Ventilation Verification - MI-BEST Series, Day 4
29. CREIA Gas Appliance Safety and Efficiency Training

30. Electric Heat Pumps for Domestic Space and Water Heating: Applications and Considerations
31. Electric Module by IHACI: Session 1-4
32. Gas Heating Module by IHACI: Session 1-2
33. Hands-on Blower Door Duct Testing and Combustion Appliance Safety
34. Heat Pumps
35. Heat Pumps: Residential Applications and Comparison with Solar Energy Systems
36. HVAC/R New Hire Module by IHACI: Session 1-4
37. NATE HVAC/R Support by IHACI: Session 1-4
38. NATE Training Series by IHACI: Session 1-8
39. Optimizing Residential HVAC System Performance
40. PG&E Rates and Tariffs: Essential Information for Energy Projects
41. Refrigerant Charge Verification - MI-BEST Series, Day 3
42. Residential Heat Pumps: Quality Design and Installation
43. Residential Heating, Ventilation, and Air Conditioning (HVAC): Small Heat Pumps and Small Furnaces for High Efficiency and More Affordability
44. Thermal By-Pass, Quality Insulation Installation, Advanced Building Envelope - MI-BEST Series, Day 5
45. Title 24 Duct Installation Standards and Diagnostic Testing
46. Water Heaters Efficiency
47. Water, Energy and Time Efficient Hot Water Systems for New Homes - Rebuilding for Comfort, Efficiency, and Affordability

D. Other: Integrated Building Design, Renewable Energy, Software, Water and Energy
48. 15th Annual Water Conservation Showcase
49. 16th Annual Water Conservation Showcase
50. Basic Excel for Energy Auditors
51. Basics of Photovoltaic (PV) Systems for Grid-Tied Applications
52. CBECC-Res: Under the Hood
53. Circadian Lighting Design with ALFA (Adaptive Lighting for Alertness)
54. Commercial PV Systems: Key Concepts and Best Practices in Design, Commissioning and Maintenance
55. Commercial QI ACCA Manual D, Q and T
56. Commercial QI ACCA N,CS
57. Commercial QI Advanced ACCA Manual N
58. ElumTools for Revit Software Training: Lighting Documentation and Simulation
59. Energy Modeling for LEED Using IESVE Software
60. Energy Plus EMS Controls
61. Energy Plus for Energy Modeling Practitioners
62. Graphic Representation of Data: Making Charts that Matter
63. Innovators Evening Lecture Series: WRNS Studio - Finding the Story Line with Clients for ZNE
64. Innovators Evening Lecture: Charles Eley - The Architecture 2030 ZERO Code & California
65. Integrated Design: Mastering the Project Management Process
66. Microgrids: Basic Applications, Technologies, Value and Economics

67. Model Water Efficient Landscape Ordinance (MWELo) and the New Normal for California Landscaping
68. National Association of Realtors (NAR) Green Certification Workshop
69. Pumps and Piping Systems: Design, Performance, and Commissioning
70. Savings By Design Energy Modeling Using IESVE Software
71. Solar + Batteries: Basic Information for Homeowners
72. Solar Basics for Homeowners
73. Solar PV: Technology and Valuation
74. Universal Translator (UT3) Workshop: Software Demonstration and Interactive Lab
75. Water Audit Basics for Small to Medium Size Businesses
76. Wind Energy + Storage for Commercial and Agricultural Applications

Full Class List

1. 0-10V Dimming: Technology, Techniques & Applications
2. 0-10V vs DALI Dimming - Choosing the Right Controls for Your Project
3. 15th Annual Water Conservation Showcase
4. 16th Annual Water Conservation Showcase
5. 2018 Foodservice Forecast
6. 2019 Food Service Forecast
7. A Class for Control Freaks: Getting the Most from your Building Automation System
8. A Look at Trends that are Shaping the Future of Luminaires and Lighting
9. ACCA Manual D - Duct Design
10. ACCA Manual J - Equipment Sizing and Selection
11. Advanced ACCA Manual D
12. Advanced Framing for Energy and Resource Efficiency
13. Advanced Framing Saves Energy, Material and Labor Rebuilding for Greater Comfort and Affordability
14. Advanced Lighting Control Systems: Hands-On Workshop
15. Advanced Wood Framing, Plus Walls from Straw Bale, Hempcrete and Earth
16. Ag./Industrial Refrigeration Systems Efficiency
17. Ag./Industrial Steam Boiler Efficiency
18. Air Conditioning and Heat Pump Refrigeration Module by IHACI: Session 1
19. Air Conditioning and Heat Pump Refrigeration Module by IHACI: Session 2
20. Air Conditioning and Heat Pump Refrigeration Module by IHACI: Session 3
21. Air Conditioning and Heat Pump Refrigeration Module by IHACI: Session 4
22. Air Distribution Module by IHACI: Session 1
23. Air Distribution Module by IHACI: Session 2
24. Air Distribution Module by IHACI: Session 3
25. Air Distribution Module by IHACI: Session 4
26. Air Flow Measures and Static Pressure - MI-BEST Series, Day 2
27. Air Sealing and Insulating Existing Homes
28. Air Sealing to Achieve Zero Net Energy - New Techniques and Applications
29. Airside Economizer: Design, Performance, and Commissioning
30. An Overview of the Commissioning Process for New and Existing Buildings
31. Automation of Buildings and Industrial Facilities using PLCs, Level 1
32. Automation of Buildings and Industrial Facilities using PLCs, Level 2

33. Automation of Buildings and Industrial Facilities using PLCs, Level 3
34. Automation of Buildings and Industrial Facilities using PLCs, Level 4
35. Balanced Ventilation for High Performance Homes
36. Basic Excel for Energy Auditors
37. Basics of Photovoltaic (PV) Systems for Grid-Tied Applications
38. BCxAs Commissioning Laboratory
39. Best Practices for Industrial Lighting
40. Best Practices for Lighting Audits - 2 Day Class
41. Best Practices for Lighting Retrofits
42. Best Practices for Outdoor Lighting
43. BPI Combustion Safety and Depressurization
44. BPI Overview of Combustion Safety Testing
45. Building Enclosures: Continuous Exterior Insulation and High R-Value Walls
46. Building Envelope and Duct Testing - MI-BEST Series, Day 1
47. Building Pressures and Ventilation Verification - MI-BEST Series, Day 4
48. Building Science Principles for High Performance Nonresidential Building Enclosures
49. Building Science Principles for High Performance Residential Building Enclosures
50. CALCTP Installer Certification
51. CALCTP Systems Course
52. Calculating Photometric Lighting Solutions
53. Case Studies in Advanced Lighting Controls: Learning from Exemplary Projects
54. CBECC-Res: Under the Hood
55. Chilled and Condenser Water Systems: Design, Performance, and Commissioning Issues
56. Circadian Lighting Design with ALFA (Adaptive Lighting for Alertness)
57. Commercial HVAC Inspection Training for CIP
58. Commercial HVAC/R Introduction Module by IHACI: Session 1
59. Commercial HVAC/R Introduction Module by IHACI: Session 2
60. Commercial HVAC/R Introduction Module by IHACI: Session 3
61. Commercial HVAC/R Introduction Module by IHACI: Session 4
62. Commercial PV Systems: Key Concepts and Best Practices in Design, Commissioning and Maintenance
63. Commercial QI ACCA Manual D, Q and T
64. Commercial QI ACCA N,CS
65. Commercial QI Advanced ACCA Manual N
66. Commercial Quality Maintenance and Installation of Economizers
67. Continuous Exterior Insulation & Moisture Management Applied Building Science for Residential Building Enclosures
68. Control Systems: Design, Performance, and Commissioning
69. Control the Flow: A Comprehensive Look at Demand Controlled Commercial Kitchen Ventilation
70. CREIA Gas Appliance Safety and Efficiency Training
71. Daylight Metrics - An Overview for Designers and Building Professionals
72. Demand Control Ventilation (DCV) and Variable Speed Fans
73. Demand Response: Basic Concepts, Programs, and Site Assessment
74. Design Excellence and Climate Change | AIA COTE® Top Ten Toolkit and Bay Area Case Studies

75. Design Thinking for Zero Net Energy - Rebuilding for Comfort, Efficiency, and Affordability
76. DLC Advanced Lighting Control Systems Training
77. EBCx Workshop and Project Review
78. Electric Heat Pumps for Domestic Space and Water Heating: Applications and Considerations
79. Electric Module by IHACI: Session 1
80. Electric Module by IHACI: Session 2
81. Electric Module by IHACI: Session 3
82. Electric Module by IHACI: Session 4
83. ElumTools for Revit Software Training: Lighting Documentation and Simulation
84. Energy Audit Skills: Tools, Data Collection Techniques, & Calculations
85. Energy Auditing Techniques for Small & Medium Commercial Facilities (3 Day Class)
86. Energy Efficiency for Data Centers: New Construction and Retrofit
87. Energy Efficiency Update: Strategies for Reducing Energy Use, Operating Costs and Carbon Emissions at Commercial Facilities
88. Energy Efficient Design and Control of Chilled Water Plants
89. Energy Efficient Design and Retrofit of Laboratory Buildings
90. Energy Modeling for LEED Using IESVE Software
91. Energy Plus EMS Controls
92. Energy Plus for Energy Modeling Practitioners
93. Evaluating and Selecting Luminaires
94. Evening Lecture Series: Designing Resilient Buildings in a Changing World
95. Evening Lecture Series: Pathways to 2050 - Decarbonization in a High Renewables Future
96. Existing Building Commissioning Workshop Series XIV
97. Existing Building Commissioning Workshop Series: Year XIII
98. Fans, Ductwork, and Air Handling Components: Design, Performance, and Commissioning
99. Farm to Fork: Greener Restaurants
100. Financing Fundamentals for Energy Projects
101. Fire Safety in the Kitchen
102. From Concept to Plate
103. Gas Heating Module by IHACI: Session 1
104. Gas Heating Module by IHACI: Session 2
105. Graphic Representation of Data: Making Charts that Matter
106. Green Point Rater, Existing Homes training
107. Hands On Advanced Lighting Controls: Introduction to Eaton
108. Hands On Advanced Lighting Controls: Introduction to WattStopper
109. Hands On Advanced Lighting Controls: Introduction to Acuity nLight
110. Hands On Advanced Lighting Controls: Introduction to Encelium
111. Hands On Advanced Lighting Controls: Introduction to Enlighted
112. Hands On Advanced Lighting Controls: Introduction to Lutron
113. Hands On Advanced Lighting Controls: Introduction to Philips EasySense & SpaceWise DT
114. Hands-on Blower Door Duct Testing and Combustion Appliance Safety for Laney College

115. Heat Pumps
116. Heat Pumps: Residential Applications and Comparison with Solar Energy Systems
117. Heating & Cooling Load Calculations and HVAC Equipment Sizing Using IESVE Software
118. High Dynamic Range Imaging for Assessing Human Visual Comfort and Evaluating Energy Efficiency Opportunities
119. High Performance Chilled Water Plant Design Workshop
120. High Performance Crawl Spaces: A Practical Approach to Air Sealing and Insulating
121. High Performance Enclosures: Air Tight, Well-Insulated, Properly Ventilated - Rebuilding for Comfort, Efficiency, and Affordability
122. How to Design and Build High Performance Walls and Roofs
123. How to Prepare a Control Intent Narrative (CIN) and Sequence of Operations (SOO) for Advanced Lighting Controls
124. How to Write the Owner's Project Requirements (OPR) and Basis of Design (BOD) for Lighting and Advanced Lighting Controls
125. HVAC Fundamentals: New Ideas for Novices - 2 Day Class
126. HVAC/R New Hire Module by IHACI: Session 1
127. HVAC/R New Hire Module by IHACI: Session 2
128. HVAC/R New Hire Module by IHACI: Session 3
129. HVAC/R New Hire Module by IHACI: Session 4
130. Identifying and Improving the Energy Performance of Historic Homes - Part 1: Identification - Energy Audits for Historic Homes
131. Identifying and Improving the Energy Performance of Historic Homes - Part 2: Intervention Cost, Benefits & Methods for Improving Energy Performance
132. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 1 of 10
133. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 10 of 10
134. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 2 of 10
135. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 3 of 10
136. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 4 of 10
137. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 5 of 10
138. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 6 of 10
139. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 7 of 10
140. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 8 of 10
141. IES Intermediate 10-Class Series: Quality Energy Efficient Lighting - Module 9 of 10
142. Innovators Evening Lecture Series - What I Learned on My Summer Vacation; Crossing the US by Bicycle for Climate Action
143. Innovators Evening Lecture Series: WRNS Studio - Finding the Story Line with Clients for ZNE
144. Innovators Evening Lecture Series: Project Drawdown - A Comprehensive Plan to Reverse Global Warming
145. Innovators Evening Lecture Series: SERA and Cutler Anderson Architects Create a Landmark Federal Building in Downtown Portland
146. Innovators Evening Lecture Series: Taylor Engineering - 40 years of Designing High Performance HVAC
147. Innovators Evening Lecture Series: William Leddy - Re-designing Good Design: High-performance Architecture for a Low-carbon World

148. Innovators Evening Lecture: Charles Eley - The Architecture 2030 ZERO Code & California
149. Innovators Evening Lecture: Pierre Delforge - Reducing Greenhouse Gas Emissions from Buildings
150. Inspecting Photovoltaic (PV) Systems for Code Compliance
151. Integrated Design: Mastering the Project Management Process
152. Introduction to Automation of Buildings and Industrial Facilities using PLCs
153. Kicking Carbon Out of Buildings - Building Design for Decarbonized Buildings
154. Kicking Carbon Out of Buildings - Heat Pump Design for Decarbonized Buildings
155. Light! Design Expo 2018
156. Lighting Controls: How Occupant Behavior Impacts Building Energy Performance and ZNE
157. Lighting for Commercial Foodservice
158. Lighting Fundamentals
159. Logic Diagrams and Control Sequences
160. Mastering the Art of Sustainable Brewing
161. Microgrids: Basic Applications, Technologies, Value and Economics
162. Mission College Fe3 Class
163. Model Water Efficient Landscape Ordinance (MWELo) and the New Normal for California Landscaping
164. NATE HVAC/R Support by IHACI: Session 1
165. NATE HVAC/R Support by IHACI: Session 2
166. NATE HVAC/R Support by IHACI: Session 3
167. NATE HVAC/R Support by IHACI: Session 4
168. NATE Training Series by IHACI: Session 1
169. NATE Training Series by IHACI: Session 2
170. NATE Training Series by IHACI: Session 3
171. NATE Training Series by IHACI: Session 4
172. NATE Training Series by IHACI: Session 5
173. NATE Training Series by IHACI: Session 6
174. NATE Training Series by IHACI: Session 7
175. NATE Training Series by IHACI: Session 8
176. National Association of Realtors (NAR) Green Certification Workshop
177. Optimizing Residential HVAC System Performance
178. Passive Building - A Path to Zero: Principles, Standards & Local Case Study
179. PG&E Rates and Tariffs: Essential Information for Energy Projects
180. Photovoltaic (PV) Site Analysis and System Sizing
181. Practical Guidance for Data Center Energy Efficiency - Part 1: HVAC Systems
182. Practical Guidance for Data Center Energy Efficiency - Part 2: IT and Electrical Considerations
183. Pumps and Piping Systems: Design, Performance, and Commissioning
184. Putting Health and Wellbeing Research Findings into Practice
185. Putting the Kitchen of the Future to the Test
186. PV + Batteries: Integrating Storage with Grid-Tied Photovoltaic Systems
187. Radiant Cooling and Heating Systems for Large Commercial Buildings
188. RCx101: Identifying and Assessing Common Retro-Cx Opportunities
189. Refrigerant Charge Verification - MI-BEST Series, Day 3

190. Residential Heat Pumps: Quality Design and Installation
191. Residential Heating, Ventilation, and Air Conditioning (HVAC): Small Heat Pumps and Small Furnaces for High Efficiency and More Affordability
192. Savings By Design Energy Modeling Using IESVE Software
193. Solar + Batteries: Basic Information for Homeowners
194. Solar Basics for Homeowners
195. Solar PV: Technology and Valuation
196. Solar Water Heating Systems
197. Solar Water Heating Systems: Residential and Commercial
198. Steam Boiler Efficiency
199. System Diagram Workshop
200. Take Your BBQ to the Next Level
201. The Benefits of Airtightness Testing for Multi-Family and Nonresidential Buildings: Lessons from Seattle
202. The Changing Face of ZNE and Responsible Grid Citizenship
203. The Promise of Progress for Lighting and the Return to Design: Adapting to Change
204. The Science and Application of Circadian Lighting
205. Thermal By-Pass, Quality Insulation Installation, Advanced Building Envelope - MI-BEST Series, Day 5
206. Title 24 Duct Installation Standards and Diagnostic Testing
207. Title 24 Proper Procedures for Charging Air Conditioners and Heat Pumps
208. Tool Day Training
209. Tools for Efficient Kitchen Design
210. Understanding and Applying the M&V Concepts and Options of the International Performance Measurement and Verification Protocol (IPMVP)
211. Universal Translator (UT3) Workshop: Software Demonstration and Interactive Lab
212. Variable Air Volume (VAV) Systems: Design, Performance, and Commissioning
213. Variable Speed Drives (VSDs): Design, Performance, and Commissioning
214. Wasting Away: Reducing Food Waste in Restaurants
215. Water Audit Basics for Small to Medium Size Businesses
216. Water Heaters Efficiency
217. Water, Energy and Time Efficient Hot Water Systems for New Homes - Rebuilding for Comfort, Efficiency, and Affordability
218. Wind Energy + Storage for Commercial and Agricultural Applications
219. Window Selection for New and Existing Homes

On-Demand Class List

1. ACCA (Air Conditioning Contractors of America) Residential Quality Installation Series
2. Air Sealing for an Efficient New Home
3. Airtight Buildings
4. Attic-Roof Insulation and Air Sealing
5. Basics of Solar Electric Systems
6. Best Practices in Residential Water Heating
7. Blower Door Testing

8. Building Envelope Retrofit Strategies
9. Building Science 1.0 - Introduction and Overview of Control Layers
10. Combustion Safety and Efficiency
11. Deep Energy Retrofits
12. Design Strategies for New Buildings
13. Duct Airtightness Testing
14. Duct Efficiency Improvement
15. Electric Vehicles (EVs): What you need to know
16. Energy Efficient Windows
17. Energy Math
18. Forced-Air Systems: Quality Control
19. Home Heating and Cooling Basics
20. HVAC Quality Service
21. Insulation Overview: Selection & Installation
22. Low Cost Cooling
23. Moisture Management for Buildings
24. Residential Energy Auditing
25. Residential Indoor Air Quality (IAQ) & Ventilation
26. Selling Home Performance for Contractors
27. The Building as a System
28. Using Building Energy Simulation
29. Wall Insulation: Methods and Materials
30. Window Selection and Replacement
31. Building Science 2.1 - Introduction to Heat Transfer
32. Building Science 2.2 - Airtightness and Air Barriers
33. Building Science 2.3 - Understanding and Limiting Thermal Bridging
34. Building Science 2.4 - Introduction to Continuous Insulation and Cladding Attachment
35. Building Science 2.5 - Introduction to Windows, Curtain Walls, Window Walls and Shading Design
36. Building Science 2.6 - Introduction to Moisture and Buildings
37. Building Science 2.7 - Introduction to Psychrometrics and Condensation
38. Building Science 2.8 - Introduction to the Control of Rain and Groundwater Penetration
39. 2019 Title 24: Where We're Headed with the Non-Residential Standards
40. 2019 Title 24: Where We're Headed with the Residential Standards
41. Heat Pump Technologies for Space Conditioning and Water Heating (coming mid-2019)
42. Introduction to Programmable Logic Controllers (coming mid-2019)
43. Zero Net Energy Introduction & Project Showcase (coming mid-2019)