



**Building Efficiency for a
Sustainable Tomorrow**

2022

Annual Institute

Jan. 5th, 6th, & 7th.

8:00 AM - 2:00 PM PST (11:00 AM - 5:00 PM EST)

Register Here:

<https://best2022institute.vfairs.com>

NSF / ATE DUE: #2145990





Building Technician Education in a Time of Challenges & Innovation

**2022 Annual Institute
January 5th-7th, 2022
8:00 AM - 2:00 PM PST**



The urgency to reduce greenhouse gas emissions is growing internationally. What part will energy efficient buildings play in the wider campaign to curb energy demand and global warming? What new tools, technologies, and strategies are available to support reductions in emissions attributable to buildings? What are the new knowledge and skill requirements for building technicians and how will they be addressed?



Who we are



Event Co-hosts: BEST Center and Lawrence Berkeley National Lab

Building Efficiency for a Sustainable Tomorrow (BEST) Center is supported by the National Science Foundation's Advanced Technological Education program. Since 2012, its mission has been to create high-performance technicians who can help commercial buildings to save energy, maintain comfort, and keep occupants healthy. Among its efforts, BEST assists community and technical colleges with curriculum development in building science, building automation, and energy management.

Lawrence Berkeley National Lab (LBNL) is one of 17 national labs under the direction of the Department of Energy. LBNL's research includes energy science, biological & environmental sciences, computing & mathematics, high-energy physics, accelerator science, and energy technology. Improving energy efficiency in buildings and appliances (e.g. Energy Star program) is among its prime objectives.

Co-hosted by BEST and LBNL, the 2022 Annual Institute is the premier event for faculty, students, and technical professionals aspiring to improve the knowledge and practice of high-performance building operations. This year's theme is **Building Technician Education in a Time of Challenges & Innovation**.

Overview of the Institute

The impacts of the climate crisis are everywhere around us with severe droughts, wildfires without precedent, extreme weather, ruined crops and famines, and increasing numbers of climate refugees. Despite the global effort to align on environmental priorities, COP 26 ended with a mix of hope and disappointment. The ongoing COVID-19 pandemic weighs down recovery efforts with uncertainty, while eager anticipation surrounds the Build Back Better legislative initiative.

Escaping these realities is not an option but focusing on making buildings safe places to live and work while also being energy efficient is part of the solution. In the current situation the building sector faces two big challenges: how to ensure that buildings are safe for occupancy as workers return to their onsite jobs, and how to move forward with more energy efficient building operations. To address these challenges, ongoing technical innovations in the application of Building Automation Systems (BAS), building de-carbonization strategies, on-site energy generation and storage, grid interactive energy management—the list goes on—are also impacting building operations.

As the building sector pursues a greener and healthier future, the role and importance of the technician workforce operating these buildings will become steadily greater. Similarly, the scope and relevance of technical education will also be magnified.

The BEST Center 3-day National Institute will focus our attention on the sustainability challenges we face and the innovative solutions to pursue. We will highlight legislative and international efforts, innovations in the field of energy efficiency and Building Automation Systems, and strategies and opportunities for educators and industry.

Agenda

Strategic Initiatives for Decarbonization

Day I

8:00 AM - 8:30 AM

Welcome, Introductions, & Overview of the Institute

Peter Crabtree, BEST Center

Mary Ann Piette, LBNL

Strategic Initiatives for Decarbonization

8:30 AM -9:45 AM

Towards a Decarbonized Future

Mary Ann Piette (moderator)

Jennifer Holm, LBNL

Andrew McAllister, CEC, Commissioner

*COP26 and the Role of Nature in Global Decarbonization Pathways - Holm

*California's Path to Decarbonization - McAllister

This session will feature two talks. Dr. Jennifer Holm will describe her recent trip to Scotland for the COP26 meetings. This will include an overview of what happened in COP26, some highlights from how her research relates to evaluating climate change, and global strategies to decarbonize our energy systems. Commissioner Andrew McAllister will provide an overview of efforts in California to decarbonize the economy, with an overview of strategies to decarbonize the buildings sector.

9:45 AM -10:00 AM

Break

Strategies for Decarbonization

10:00 AM -10:30 AM

Federal Action in Building Decarbonization

Jessica Granderson, Director for Building Technology, White House Council on Environmental Quality

This talk will provide an overview of the national energy strategy related to decarbonization of the buildings sector. Dr. Granderson will present

highlights and updates to national priorities, technologies, and deployment programs.

10:30 AM - 11:00 AM

Decarbonization Modeling: Methods and Metrics

Jared Langevin, LBNL

Decarbonizing the U.S. buildings sector is a key pillar of achieving economy-wide net zero greenhouse gas emissions by 2050; therefore, the development of plausible pathways for deep reductions in building emissions is a pressing national need. Quantitative models of building energy use and emissions at scale are an important resource for such assessments; however, interpreting results from these models can be challenging without a broader understanding of the methods and metrics that they employ. This presentation introduces key concepts for decarbonization modeling through the lens of Scout (scout.energy.gov), an openly-available model that enables rapid assessment of building energy and emissions reduction scenarios at the regional and national scales. Topics include the definition of inputs and outputs of interest, representation of energy and emissions flows, and translation of results into useful decision-making insights. The presentation will also cover emerging modeling areas such as the coupling of models across the buildings and power sectors and accounting for new sources of building emissions. The presentation will conclude by discussing opportunities for advancing the scope and impact of building decarbonization modeling at a critical juncture for U.S. climate ambitions.

11:00 AM - 11:15 AM

Break

11:15 AM - 11:45 AM

Decarbonization with Grid Interactive Efficient Buildings

Mary Ann Piette, LBNL

This presentation will describe the need for grid interactive efficient buildings, what they are, and why they are important for decarbonization. This talk will also describe the opportunity for decarbonization with electrifying space and water heating. To ensure that the electric grid can

What to Expect?



Educational & Technical Research

See presentations & demonstrations by leading experts.



Forum of Ideas

Converse with speakers & attendees and engage in video breakout discussions.



Virtual Expo Hall

Meet industry sponsors to learn about products, training & discounts.



Professional Networking

Expand your connections & career potential in building operations and facilities

Agenda

Day I Continued...

accommodate these new loads, we need to ensure that they are grid interactive.

11:45 AM -12:45 PM

Indoor Air Quality Management After COVID-19

William Bahnfleth, Prof. of Architectural Engineering Penn. State University

At the 2021 Institute, Professor Bahnfleth discussed ASHRAE's recommendations for HVACR operations in order to mitigate the indoor transmission of the COVID virus. He will provide an update and also look ahead at how indoor air quality (IAQ) can continue to be improved to enhance the well-being of building occupants.

12:45 PM -1:00 PM

Break

Concurrent discussion sessions

1:00 PM -2:00 PM

Teaching Sustainability & Energy Literacy to Technicians

Facilitated discussion with Ted Wilinski, CO-PI

Bob Clark, COD

Technicians have a critical role to play in improving building performance to save energy and reduce greenhouse gas emissions. This session will examine how students and technicians can better understand this role and its impact on daily routines and long-term sustainability goals.

1:00 PM -2:00 PM

Why Real Estate Companies Voluntarily Make Energy Efficiency & Sustainability a Core Part of their Business Strategy

Carlos Santamaria, Optimal Building

Moderated by industry leader and subject matter expert Carlos Santamaria – Principal, Optimal Building, this panel discussion will look within the “Why” certain corporate commercial real estate leaders decide that Voluntary Energy Efficiency & Sustainability investments and actions are necessary with their organization. The panel discussion will involve

national & international commercial real estate company leaders who are responsible for proactive, voluntary energy efficiency commitments and investments throughout their entire portfolios. Reducing carbon, energy and transforming their properties into “High Performing Building Operations” is a choice and can be replicated by other companies and organizations small and large. We will discuss and show you how this Roadmap to High Efficiency Building Operations can be started at your building, facility and or organization.



Agenda

Building Decarbonization: Technologies & Applications

Day 2

8:00 AM - 8:20 AM

Preview of Day 2

Peter Crabtree, BEST Center

Mary Ann Piette, LBNL

Building Decarbonization: Strategies & Applications

8:20 AM - 9:00 AM

Connecting Communities with Grid Interactive Buildings
and Integrated Distributed Energy Resources

Cindy Regnier, LBNL

As renewable energy supply continues to grow and create a cleaner power grid, we see new challenges in managing electricity supply emerge, and a role for buildings and distributed energy resources to play offering demand flexibility to mitigate variable power conditions. Connected Communities is a \$61M multi year program by the U.S. Dept of Energy demonstrating coordinated controls strategies across multiple buildings and DERs to provide grid services while benefiting customers and providers. Highlights will be shared, including LBNL's role as National Coordinator, researching and developing resources to allow the technologies, controls, programs and business models to scale.

9:00 AM - 9:15 AM

Break

New Strategies for Sustainability and Resilient Cooling

9:15 AM - 9:35 AM

Cool Retrofits for Homes: Top Strategies to Save Energy,
Improve Comfort, and Boost Resilience to Extreme Heat

Ronnen Levinson, LBNL

Many homes are neither designed nor equipped to stay cool in heat waves,

especially during a blackout or public safety power shutoff. Berkeley Lab researchers are investigating passive and low-energy strategies to keep residents cool and safe in extreme heat events. This talk will describe international efforts to promote resilient cooling of buildings, share recommendations to help disadvantaged communities in California's Central Valley adapt to higher temperatures, and show how one solution can be as simple as picking up a paint brush.

9:35 AM - 9:55 AM

Overview of the Global Cooling Efficiency Program: Improving Efficiency during the Refrigerant Transition

Nihar Shah

The phasedown of high global warming potential (GWP) refrigerants under the Kigali Amendment to the Montreal Protocol offers a key opportunity to simultaneously improve energy efficiency of cooling equipment globally. It is estimated that improvement of energy efficiency in tandem with the refrigerant phasedown would more than double the CO2 equivalent climate benefit of the Kigali Amendment. This talk will provide an overview of Berkeley Lab's Global Cooling Efficiency Program aimed at maximizing cost, energy and climate benefits of improving cooling equipment energy efficiency affordably.

9:55 AM - 10:15 AM

Variable Refrigerant Flow Systems -- Changing the Face of Heat Pumps

Eugene Silberstein, HVAC Excellence

Probably the one segment of the HVACR industry that has undergone the greatest rate of technological advancement over the last 20 years has been heat pumps. In this brief session, we will discuss how inverter technology has taken the heat pumps of our father's generation and transformed them into dynamic, highly-efficient and effective systems with load-matching capabilities. From domestic water heating to in-floor and in-wall radiant heating, to forced air heating and cooling applications, the heat pump has taken its place as the go-to technology. Topics covered in this session include: How inverters work, what makes heat pumps so efficient, and how the inverter enhances heat pump system performance and broadens its effective operating range.





Agenda

Day 2 Continued...

10:15 AM - 10:30 AM

Break

Innovative Building Technologies and Energy Systems

10:30 AM - 11:00 AM

Paths to Residential Decarbonization

Iain Walker

We are currently facing the biggest challenge in residential construction there has ever been – the need to decarbonize our home energy consumption. Using cost breakdowns and energy/CO₂ savings estimates from over 1,700 energy retrofit projects and the results of an industry survey, this session will provide insights on paths to effective home decarbonization.

11:00 AM - 11:30 AM

Applications of Phase Change Material (PCM) -Integrated Hybrid HVAC Systems in Commercial Buildings

Spencer Dutton

Grid-interactive HVAC and HW systems, with integrated active thermal energy storage, are one potential solution that can enable electrification of heating and DHW; advance grid-interactive efficient building systems; support broader use of renewables; improve grid and building resilience by reducing peak HVAC loads by over 50% and reduce energy costs & emissions. LBNL has developed the software tools needed to design, evaluate and develop controls for these complex systems, and has developed and is currently building two physical demonstrations. The first of these is a shovel-ready prototype ready for field deployment, and the second is currently being deployed in a residential home, in the heating dominated climate of Massachusetts.

11:30 AM -12:15 PM

Ecoblock: A New Model for Multi-customer Microgrids

Peter Crabtree (moderator), BEST Center

Alexandra “Sascha” von Meier,

Therese Pepper

In this presentation, Drs. Therese Pepper and Sascha von Meier will describe a first-of-its-kind retrofit residential microgrid to span a city block. Funded by the California Energy Commission, the EcoBlock project combines energy and water efficiency retrofits and electrification with community solar power and storage to address the triple challenges of climate, resilience and equity.

12:15 PM - 12:30 PM

Break

12:30 PM -1:15 PM

Promoting Diversity in the Buildings Workforce

Larry Chang (moderator), BEST Center

Armando Casillas, LBNL

Madeline Salzman, LBNL

DOE; Phyllis Barthel, Tolin Mechanical

As traditionally male-dominated fields, building construction and operations continue to be underrepresented by women and ethnic minorities. In this session, we will look at the current labor demographics of HVACR and related industries. Then strategies for improving diversity, equity, and inclusion will be discussed.

1:15 PM -2:15 PM

Continuous Program Improvement & Opportunities for Resource Development

Brian Lovell

Lovell will assist colleges with an overview of building technician educational and funding resources to enhance classroom pedagogy, program development, and student performance.



Agenda

Building Automation Systems: Promise & Applications

Day 3

8:00 AM - 8:15 AM

Preview of Day 3

Peter Crabtree, BEST Center

Mary Ann Piette, LBNL

Building Automation Systems: Promise & Applications

8:15 AM - 9:15 AM

The Role of Commissioning in Successful Building Operations

Jay Santos

The commissioning process has addressed a need in delivering more functional and operable buildings. Buildings and systems are becoming more complex. Tremendous commitments are being made to deliver energy to buildings from more renewable sources and make buildings more sustainable. More tools are available to facility managers and operations to run their buildings as efficiently as possible. Our industry needs to focus on operating our buildings effectively, more efficiently, and more persistently. Metrics, motivations, and incentives need to be developed to focus on performance persistence in buildings.

9:15 AM - 9:30 AM

Break

Applying Controls for Building Optimization

9:30 AM - 10:15 AM

Data Analytics for Smart Buildings: What's in Your Toolbox?

Eliot Crowe

Building technicians are being faced with ever-increasing goals for energy & cost savings, while building mechanical systems become more complex, and building occupants demand a comfortable working environment. Taking a data-driven approach to managing these three challenges makes sense, but requires a shift in working practices and selection of the right tools.

In this presentation you will learn about the benefits of building commissioning and the array of building data analytics tools available to building technicians (for both large and small buildings). Through success story highlights and reference to industry guidance, attendees will gain a range of resources to help them justify, select, and successfully implement building data analytics.

10:15 AM - 11:00 AM

Improving Scalable Solutions for Fault Detection and Controls in Commercial Buildings

Marco Pritoni

Commercial buildings are now expected to have more dynamic operations, in order to react to unexpected weather (storms, wildfires, extreme heat waves) and exceptional events (COVID-19). Building managers and contractors are asked to achieve these goals with increasingly tight budgets and a shrinking workforce. For this reason, the building industry is ripe for novel and disruptive approaches. This talk describes new research and industry efforts to bring these new technologies to market, including two new ASHRAE standards: 223p (Semantic Interoperability) and 231p (Control Language Digitization). These technologies have the potential to rapidly scale up controls and analytics to thousands of buildings and are going to be essential to understand for the next generation of building engineers and technicians.

11:00 AM - 11:15 AM

Break

11:15 AM - 12:15 PM

Making Data Actionable for Building Operations (Panel discussion)

Robert Nirenberg (moderator)

Paul Ehrlich,
John Elliott,

Raphael Vitti,

As humans we're told to get an annual checkup by/with our doctor; how often do we give our buildings a checkup? What would the exam look like? What kind of tests would we run? What if we could collect the test data numerous times a day in the months or years leading up to an exam instead of just the data on the day of? The collection of this type of information and its analysis is commonly referred to as Building Data Analytics; and it is both realistically attainable and incredibly useful!

This panel will examine some of the processes and implementation of Building Data Analytics, as well as explore what this data can tell us about a building and how we can use it to teach our operators to better run and repair the spaces they are responsible for.

12:15 PM - 12:30 PM

Break

12:30 PM - 1:30 PM

Integrating Building Automation Systems (BAS) into Technician Education: Updates from Community Colleges

Robert Nirenberg (moderator)

Ted Wilinski (moderator),

Colleges from BEST's network and beyond will convene to share ideas and recommendations from various BAS programs. Attendees from industry are also welcome to join and help educators understand current workforce needs.

1:30 PM - 2:15 PM

Wrap-up & Announcements

Peter Crabtree, BEST Center

Colette Flood, LBNL Education Director

Nakeiah Harrell, LBNL Internship Program Manager

Robert Nirenberg

Larry Chang BEST Center Director

LBNL to speak for 10 mins, 1:35-1:45 pm



Speakers

BEST Center Annual Institute • January 5th, 6th, & 7th, 2022

A SPECIAL THANK YOU TO OUR SPEAKERS FOR SHARING THEIR KNOWLEDGE & EXPERTISE!



Bahnfleth, William

Professor of Architectural Engineering,
The Pennsylvania State University

William Bahnfleth is a professor of architectural engineering at the Pennsylvania State University. He held previous positions as Senior Consultant for ZBA, Inc. in Cincinnati, OH and Principal Investigator at the U.S. Army Construction Engineering Research Laboratory in Champaign, IL. He holds BS, MS, and PhD degrees in Mechanical Engineering from the University of Illinois and is a registered professional engineer. At Penn State, Dr. Bahnfleth teaches undergraduate courses in HVAC fundamentals and system design, and graduate courses in district cooling systems and indoor air quality. His research interests cover a wide variety of indoor environmental control topics including chilled water pumping systems, stratified thermal energy storage, protection of building occupants from indoor bioaerosol releases, and ultraviolet germicidal irradiation systems. He is the author or co-author of more than 170 technical papers and articles and 14 books and book chapters. Dr. Bahnfleth is a fellow of ASHRAE, the American Society of Mechanical Engineers (ASME) and the International Society for Indoor Air Quality and Climate (ISIAQ). He served as President of ASHRAE in 2013-2014. His ASHRAE honors include the Louise and Bill Holladay Distinguished Fellow Award, E.K. Campbell Award, and F. Paul Anderson Award. He is also a recipient of the Penn State Engineering Alumni Society's World-Class Engineering Faculty Award.



Barthel, Phyllis

Service Technician at Tolin Mechanical
Systems UA Local 208

Ms. Barthen has a broad range of experience in the HVACR industry.



Casillas, Armando

Scientific Engineering Associate

Armando has been a Scientific Engineering Associate, at LBNL since 2019. He works in a number of projects related to building energy efficiency, grid-interactiveness and flexibility and HVAC fault detection and diagnostics. During his undergraduate years, Armando worked as an Energy Analyst at UC Merced Facilities Management for two years where he was exposed to highly automated building systems, including HVAC, and has also worked for the Energy Conservation Office at UC Davis performing continuous commissioning. His Masters work was conducted at the Wester Cooling Efficiency Center, which involved wireless sensing for building leakage diagnostic applications. Armando holds a M.S in Energy Systems from UC Davis and a B.S in Mechanical Engineering from UC Merced.



Chang, Larry

BEST Center Director

Larry Chang is Director of the Building Efficiency for a Sustainable Tomorrow (BEST) Center, which is funded by the National Science Foundation's Advanced Technological Education program. BEST's mission is to boost the technician workforce in high performance building operations through education and professional certification. Since helping to establish BEST in 2012, Larry has worked with U.S. community and technical colleges to develop certificate/degree programs in environmental control technology, building automation, and energy management. He is also part of a team creating a new technician-level certification which will standardize skills and knowledge for advanced commercial building operations.

In addition, Larry is a registered architect who earned his B.S.E. in Architecture and Engineering from Princeton University and his M.Arch. from Yale University. He has worked across the U.S. on both commercial and residential projects with a focus on sustainability, accessibility, and healthy buildings. On the academic side, he has taught design at the University of Louisiana at Lafayette, Savannah College of Art & Design, and City College SF.



Clark, Bob

College of DuPage HVACR Coordinator

Clark earned an associate degree in Electrical and Electronic Automated Systems, Industrial Maintenance Technology and HVACR; a bachelor's degree with a double major of Business and Communications; an MBA in Energy and Sustainability; and a doctorate in Career and Technical Education. He also holds multiple building automation certifications, including an electrical license and Chicago Stationary Engineers License; and numerous other certifications, including EPA Universal, HAZWOPER OSHA 40, Industrial Firefighting, NFPA 70E, Solar Energy, Sporlan Valve, VRF, and Bell & Gossett certifications in chilled water design, hydronic design and steam design. Clark is president of the Illinois Council of Air Conditioning and Refrigeration Educators (ICARE) and works with educators at state and national levels to improve HVACR education.

Before he became an instructor in the HVACR program at College of DuPage, Clark worked in industrial maintenance and industrial refrigeration and ran his own HVACR business. He said he was attracted to the HVACR industry because of the opportunities for learning and working available in the field.



Crabtree, Peter

Principal Investigator, BEST Center

Peter Crabtree is the PI for the NSF ATE Building Efficiency for a Sustainable Tomorrow (BEST) Center now based at the California Institute of Energy and Environment (CIEE) and the Center for Information Technology in the Interest of Society (CITRIS) at UC Berkeley. After 17 years as the Dean of Instruction for Career Education at Laney College, Mr. Crabtree joins CIEE as a Visiting Project Scientist. The BEST Center provides resources and professional development for college faculty to support the education of the technical workforce in Building Science, BAS, and EE. BEST is completing development of a national certification for high performance building technicians, benchmarking industry-validated knowledge and skills in the sector.

With 35+ years of experience in workforce development and community engagement, Mr. Crabtree has directed numerous workforce focused and applied research projects including 18 years as an NSF PI with BEST Center and its predecessor projects as well as PI or PD for projects for the Department of Energy, the Department of Labor, the Investor Owned Utilities, the Bechtel Foundation, and the Microsoft Foundation.

He has an MA in Political Science with an emphasis in environmental policy and political economics from UC Riverside. He was a Lincoln-Juarez Graduate Fellow at the Universidad Nacional Autónoma de México.



Crowe, Eliot

Program Manager

Eliot Crowe is a Program Manager at Lawrence Berkeley National Lab, supporting technical research on energy management and information systems (EMIS), measurement & verification (M&V), commissioning, and other related areas. Prior to joining LBNL Eliot spent 10 years working on utility program implementation, technical research, outreach, and training program management for PECI and CLEAResult. Eliot supported management of the nonprofit California Commissioning Collaborative from 2009-2016, including a period as Executive Director from 2015-2016. Prior to joining the energy efficiency field Eliot held an engineering project management position in a global battery manufacturing corporation for 10 years.



Dutton, Spencer

Principal Scientific Engineering Associate

Spencer Maxwell Dutton, PHD, completed his doctorate at the University of Nottingham, UK, on the topic of balancing energy use and IAQ in naturally ventilated commercial buildings, which included a school-based study of occupant window use behavior and IAQ. He worked as a building energy and daylighting consultant in London, before returning to Berkeley in 2010. His research at the Lawrence Berkeley National Laboratory includes modeling the potential energy savings of low energy cooling strategies, including natural ventilation; assessing how ventilation strategies affect human health outcomes; and model development of various novel HVAC systems and control strategies.



Ehrlich, Paul

Founder and President
Building Intelligence Group

Paul Ehrlich is a well-known advocate of sustainable buildings. In 2004, he formed Building Intelligence Group (BIG) LLC, an independent consultancy to support high performance buildings. Services include systems assessment, master planning, training, and design for intelligent and sustainable building systems with a focus in the areas of integrated systems, facility operations and enterprise management. Projects include major universities, corporations, and developers worldwide. BIG also provides market research and strategic planning services. Prior to forming BIG, Mr. Ehrlich held positions with Trane and Johnson Controls.

Throughout his career, Mr. Ehrlich has been active in the creation of new automation standards and technologies. Previous roles include chairing the ASHRAE Guideline 13 committee on how to specify DDC controls, chairing the BACnet sub-committee on interoperability, and acting as the inaugural chair for the oBIX committee to establish XML standards for building controls.

Mr. Ehrlich has a BS in Mechanical Engineering from the University of Wisconsin and an MBA from the University of St. Thomas. He is a licensed professional engineer in the State of Wisconsin.



Elliott, John

Chief Sustainability Officer, LBNL

John Elliott is Chief Sustainability Officer at Lawrence Berkeley National Laboratory. With broad and detailed experience across a wide range of sustainability topics, he is responsible for directing and implementing the Lab's sustainability strategy. He was previously Director, Energy and Sustainability at UC Merced and has done prior work in energy efficiency program design, strategy consulting to utilities, advancing efficiency and renewables with native American tribes, and leading a professional services team implementing energy software solutions. He holds a masters degree in Energy and Resources from UC Berkeley and a bachelors in civil and environmental engineering from Stanford University.



Flood, Colette

Berkeley Lab (LBNL) Education Director

Colette Flood, Berkeley Lab (LBNL) Education Director for the Department of Energy Office of Science, Workforce Development for Teachers and Scientists (WDTS) programs; Manager of Workforce Development & Education (WD&E) — stewards all of the programs for WD&E. She is the main point of contact for LBNL divisions, community partners, faculty interns, and mentors.



Granderson, Jessica

Director for Building Technology, White House Council on Environmental Quality

Dr. Jessica Granderson is the Director for Building Technology at the White House Council on Environmental Quality. Dr. Granderson is on leave from her work as a Staff Scientist and Deputy Division Director of Building Technology and Urban Systems Division at the Lawrence Berkeley National Laboratory. She holds a PhD in Mechanical Engineering from UC Berkeley, and an AB in Mechanical Engineering from Harvard University. Her research focuses on building energy performance monitoring and diagnostics, advanced measurement and verification, and intelligent controls. She is the recipient of the 2015 Clean Energy Education and Empowerment (C3E) Award for Leadership in Research and the 2020 Federal Laboratory Consortium Award for Excellence in Technology Transfer.



Harrell, Nakeiah

Internship Program Manager

Nakeiah Harrell manages internship programs and supports undergraduate, post baccalaureate, graduate, and faculty STEM education programs. Collaboratively works with the WD&E Manager to provide support and coordination in program development and new initiatives for WD&E.



Holm, Jennifer

Research Scientist, Terrestrial Ecosystem
Scientist

My main area of research is terrestrial ecosystem modeling. Within this area my research topics include forest disturbance and recovery processes, dynamic vegetation processes, model sensitivity and uncertainty, and understanding tropical and boreal forest response to changing climates. Current projects include improving global simulations of the demographic model FATES (Functionally Assembled Terrestrial Ecosystem Simulator) which is coupled to the Earth System Model E3SM, application of a gap model for a tropical forest to evaluate forest response to elevated disturbance regimes, improving modeling predictability of gradients in tropical tree growth, reproduction, and mortality across the Amazon Basin and Puerto Rico. Previous projects have included improving modeling capacity to accurately represent biogenic volatile organic compounds (BVOCs) emissions from tropical ecosystems, and working with a multi-lab team to create a first generation earth system model with a fully integrated human systems component, representing human activities affecting land use and greenhouse gas emissions. Jennifer Holm received a B.S. in Environmental Studies from Emory University, M.S. in interdisciplinary ecology, with a focus on Tropical Conservation Development and forest resources and conservation, from University of Florida, and a Ph. D. in environmental sciences from University of Virginia.



Langevin, Jared

Research Scientist

Jared Langevin is a Research Scientist at Lawrence Berkeley National Laboratory, where he models the national impacts of building efficiency on long-term energy use and CO₂ emissions, develops decision support algorithms for energy flexible building operations, and researches human-building interactions. Based in Washington, D.C., Jared was previously a Science and Technology Policy Fellow at the U.S. Department of Energy's Building Technologies Office (BTO), where he co-created BTO's Scout program for national building efficiency impact analysis. Jared holds a Ph.D. in Architectural Engineering from Drexel University, where his research focused on measuring and modeling the adaptive interactions between building occupants and their surrounding thermal environments, examining the links between these interactions and building energy use. Before entering into his graduate studies at Drexel, Jared received a Bachelor's degree in Architecture from Carnegie Mellon University.



Levinson, Ronnen

Staff Scientist and Leader of the Heat Island Group

Dr. Ronnen Levinson is a Staff Scientist and Leader of the Heat Island Group at Lawrence Berkeley National Laboratory (LBNL) in Berkeley, California. Within his research portfolio he develops cool roof, wall, and pavement materials; improves methods for the measurement of solar reflectance; and quantifies the energy and environmental benefits of cool surfaces. He serves on the boards and technical committees of the Cool Roof Rating Council and the Global Cool Cities Alliance, and advises policymakers, code officials, utilities, and building rating programs about cool surfaces. He holds a B.S. in engineering physics from Cornell University and an M.S. and a Ph.D. in mechanical engineering from the University of California at Berkeley. He has authored or co-authored over 100 publications, and serves on the editorial boards of Energy & Buildings, Solar Energy, Solar Energy Advances, and Scientific Reports. He received the 2016 Marty Hastings Award for outstanding contributions to the Cool Roof Rating Council, and a 2016 R&D 100 Award for invention of the Cool RoofTime Machine.



Lovell, Brian

Founder, GPTC's BAS Program, President, Association of Controls Professionals

Brian Lovell has been working in the building automation systems (BAS) field for over 25 years in every role from technician to BAS contracting firm business owner in the Atlanta area. Experiencing the need for more trained BAS technicians first-hand, he led the development of the nation's first BAS Associate's Degree of Applied Sciences, and has disseminated that program to several dozen colleges around the country through his on-going work with the National Science Foundation, Department of Energy and others.

In response to the need for better training and definition of skills standards in the BAS industry, Brian co-founded the Association of Controls Professionals in 2014, and has served as its president. He holds various technical degrees, industry certifications and licensures, and post-graduate degrees in education.



McAllister, Andrew

Commissioner at California Energy
Commission

Commissioner Andrew McAllister is serving his second term on the California Energy Commission. At the Energy Commission, he leads the policy area of energy efficiency, including the Building Energy Efficiency Standards, appliance efficiency, and load management and flexibility. More broadly, he is focused on enabling modern, data-rich analytical tools to support strong clean energy policy development and program implementation.

Commissioner McAllister has worked on energy deployment and policy since the early 1990s. He has worked across the world to deploy clean, cost-effective energy solutions with counterparts ranging from tiny remote communities to the largest of utilities. He administered two of California's signature renewable energy programs, developed and operated energy efficiency programs for utilities, and conducted a broad range of policy-related research for California and the federal government.



Nirenberg, Robert

Faculty, HVACR Program, MCC

Since 2017, Robert has taught in Metropolitan Community College's HVACR department and is currently the Program Coordinator. His background in both computer science and energy management helped to inform MCC's building automation-related project titled AUTOMATE! (funded by National Science Foundation). Prior to this, he served as the college's Energy Management Systems Coordinator and worked as both a Systems Programmer and Application Technician..



Peffer, Therese

Associate Director, CITRIS

She works on demand response, smart grid and building-to-grid research projects based at CITRIS and the Lawrence Berkeley National Laboratory. Her current areas of focus are energy consumption displays, thermostats, and consumer behavior, including developing metrics for the EPA's EnergyStar specifications on climate controls and other user interface usability research.

Therese has a Ph.D. in Architecture with an emphasis on building science at UC Berkeley, a master's degree in Architecture at the University of Oregon, and a B.A. in neurobiology and psychology from UC Berkeley.



Piette, Mary Ann

Senior Scientist and the Director of the Building Technology and Urban Systems (BTUS) Division

Mary Ann Piette is a Senior Scientist and the Director of the Building Technology and Urban Systems (BTUS) Division in the Energy Technologies Area at Lawrence Berkeley National Laboratory.

She oversees Berkeley Lab's building technology research activities for the U.S. Department of Energy which covers appliance standards, technology analysis and tools to accelerate deployment, new building technologies, modeling and analysis, commercial and residential building systems integration, grid interactive communications, and integration with EVs, storage and PVs. Her most recent work is exploring how to accelerate decarbonization while ensuring equity and affordability. The BTUS Division also conducts research in data center energy efficiency, industrial energy efficiency, and federal energy management programs. BTUS partners with dozens of public and private sector partners around the US and internationally, including universities, control and HVAC companies, windows manufacturers, utilities, state agencies, aggregators, non-profits, and many others.



Pritoni, Marco

Research Scientist

Marco Pritoni is a Research Scientist at Lawrence Berkeley National Laboratory where he conducts research in the area of advanced controls, data-driven modeling and data analytics applied to buildings. He leads a team of researchers working on optimization of building operation and building-to-grid interaction. Marco has a multidisciplinary background spanning mechanical engineering, building science, data science and human behavior. He holds a PhD and MS in Mechanical and Aeronautical Engineering from UC Davis and MS in Industrial Engineering from the University of Bologna, Italy.



Regnier, Cindy

FLEXLAB Executive Manager; Technical Leader - Commercial Building Systems

Cindy Regnier is the Technical Leader for Commercial Building Systems and FLEXLAB Executive Manager at Lawrence Berkeley National Lab. FLEXLAB (Facility for Low Energy eXperiments in Buildings) is Berkeley Lab's series of experimental testbeds dedicated to integrated and low carbon building, DER and grid systems integration research and development. She also manages several research projects focused on community scale deployment of coordinated grid interactive efficient buildings, and deployment of low energy systems and technologies. These include the development of integrated systems incentive programs for utilities, and solutions focused on small commercial buildings and schools. Prior to joining LBNL in 2009, she spent 13+ years on design of innovative, integrated HVAC systems, including AIA COTE Top 10, LEED Platinum buildings, and a 200,000sf carbon neutral science museum. Her Bachelor's degree is in Mathematics and Mechanical Engineering from Queen's University, Canada, and she holds professional engineering licenses in California, USA and Ontario, Canada.



Salzman, Madeline

Workforce Lead, Building Technologies
Office, Department of Energy

Madeline Salzman is a Management and Programs Analyst in the U.S. Department of Energy's Building Technologies Office. Madeline joined U.S. DOE in 2015 to support programs that increase access to energy efficient technologies, including through the Home Energy Score program and Better Buildings Workforce Accelerator. These efforts include conducting strategic analysis on how to increase affordability of and access to efficiency retrofits in US housing across income groups, regions, and housing types. She also advises on clean energy workforce development strategy for the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. Prior to joining the Building Technologies Office, Madeline received her Master of Public Service from the University of Arkansas Clinton School of Public Service and worked on residential efficiency and solar in Missouri, Arkansas, and rural India.



Santamaria, Carlos

Principal, Optimal Building, (Formerly
CEES-Advisors)

Carlos Santamaria is Founder and Principal of Optimal Building, (formerly CEES-Advisors) & Board of Trustee of the IFMA Foundation. Currently, he is acting Regional Director for the Bay Area Region - Energy, Utilities & Construction Sector and FM Statewide Liaison for the California Community Colleges. As former Vice President of Engineering Services for Glenborough, he provided technical assistance and was responsible for transforming the company's real estate portfolio towards being one of the most Energy Efficient & Sustainable companies in the U.S. Mr. Santamaria has worked in the commercial real estate industry concentrating on energy efficiency, construction and operational best practices being recognized as a top performer and leader in energy efficiency.



Santos, Jay

Founder and Principal, Facility Dynamics

J. Jay Santos, P.E. has more than 30 years of experience in controls design, controls Master Planning, commissioning, retro-commissioning, and training. Jay is a recognized expert with a preeminent record of conceiving and implementing innovative, energy and cost-efficient designs in the fields of DDC controls, Building Controls Master Planning, and Building Automation Systems (BAS). He is also a renowned lecturer, educator, and author. Jay's specialty is in developing BAS user guides covering interoperability concerns, architecture, hardware and software issues, and assisting owners and engineers in designing and selecting systems that best meet their BAS needs. Additionally, Jay teaches commissioning and DDC controls classes, conducts on-site training programs, provides technical consulting, and presents papers and lectures on commissioning, controls, and HVAC diagnostics. As principal-in-charge, Jay oversees review processes and identifies commissioning, retro-commissioning, and energy-conservation strategies based on his in-depth knowledge of the commissioning process and building optimization. He also supervises numerous commissioning and retro-commissioning projects, manages the implementation of PACRATM, and oversees contract administration and project quality control/quality assurance.



Shah, Nihar

Presidential Director of the Global Cooling Efficiency Program

Nihar Shah is Presidential Director of the Global Cooling Efficiency Program(link is external) at Lawrence Berkeley National Laboratory, leading research on alternate refrigerants and energy efficiency for Heating, Ventilation, Airconditioning and Refrigeration (HVAC&R) equipment, including Berkeley Lab's research in support of the Clean Cooling Collaborative(link is external) (formerly the Kigali Cooling Efficiency Program or K-CEP) in China, India, ASEAN and various emerging economies. His other research interests include corporate disclosure of climate risk, anti-fragile(link is external) strategy, circular economy, advanced manufacturing and water technology and policy.

Prior to joining Berkeley Lab, Nihar worked at the California Public Utilities Commission's Office of Ratepayer Advocates. He received a Ph.D. in Mechanical Engineering from the University of California, Berkeley, an M.Tech. in Thermal and Fluids Engineering and a B.Tech. in Mechanical Engineering, both from the Indian Institute of Technology, Bombay. He is a licensed Professional Mechanical Engineer in the State of California.



Silberstein , Eugene
M.S., B.E.A.P., CMHE

Director of Technical Education and
Standards, HVAC Excellence/ESCO Group

Mr. Silberstein has over 35 years of experience in the HVACR industry.

He holds a Master of Science in Energy and Environmental Science from the State University of New York, and dual Bachelor degrees. He is a Certified Master HVACR Educator (CMHE), and Building Energy Assessment Professional (BEAP).

Mr. Silberstein has worked in education at both the secondary and post-secondary levels, having served as an instructor, professor, program coordinator and department chair. He worked as a field technician, system designer, administrator, consultant and is the author/co-author of several text books.



Vitti, Raphael

Senior Energy and Data Engineer

Raphael Vitti, PE is a Senior Energy and Data Engineer at Berkeley Lab. He is part of the Sustainable Berkeley Lab team working to minimize the Lab's greenhouse gas emissions and environmental impact. He leads and supports activities to improve energy, water and operational performance in buildings at Berkeley Lab. He also develops analytics to identify energy and water savings opportunities, investigate building operations, support the implementation of improvements, and verify savings. Raphael previously was an energy efficiency engineer at kW Engineering. He is a licensed Professional Mechanical Engineer in California and earned his M.S. in Electronics and Communications Engineering from École nationale supérieure d'électronique, informatique et radiocommunications de Bordeaux (France).



Reale, Paul

Director of Building Operations Research

Paul Reale manages projects with key enabling technologies that improve building operational energy efficiency. Before joining BPL, Paul's private consulting practice involved a wide range of issues regarding building sustainability and energy efficiency, including specific building projects, free cooling of electronics, green leasing techniques and extensive work as an instructor. Among many audiences and topics, Paul has taught building operators about sustainable and energy efficient practices, as well as having taught architects and engineers about energy code. He also guides teachers in enhancing their instruction techniques, and over the years he has spoken publicly on related issues and at countless venues.

Paul also founded a unique energy efficiency start-up that he ran for several years that focused on residential energy with utilities as his clients. Paul's experience started at Bell Laboratories, where he assumed varied engineering and managerial roles. He holds a Masters of Mechanical Engineering from Stevens Institute of Technology, and he is a LEED AP. Given his knowledge of building performance and by teaching literally thousands of building operators, Paul finds that the extent of opportunities for no-cost energy savings boggles the mind.



Von Meier, Alexandra

Director, Electric Grid, California Institute for Energy and Environment (CIEE) ; Adjunct Professor, UC Berkeley

Alexandra "Sascha" von Meier is the director of the California Institute for Energy and Environment's electric grid program area, which focuses on power distribution systems, smart grid issues, and the integration of distributed and intermittent generation. Her current research projects center on the use of high-precision micro-synchrophasor measurements for situational awareness, diagnostics and control applications in distribution grids.

Von Meier is also an adjunct professor in the Department of Electrical Engineering and Computer Science at UC Berkeley, where she teaches a course on electric power systems. She is the author of the textbook *Electric Power Systems: A Conceptual Introduction*.

Von Meier received a B.A. in physics in 1986 and a Ph.D. in energy and resources in 1995, both from UC Berkeley. In addition to studying all things related to electric energy, she loves cycling, rock climbing and being in the mountains.



Walker, Iain

Staff Scientist and Engineer

Dr. Iain Walker is a scientist at Lawrence Berkeley National Laboratory. He has more than 30 years of experience as a building scientist, conducting research on indoor air quality, ventilation, and reducing the energy and CO₂ impacts of buildings. He is an ASHRAE Fellow and currently serves on the Residential Team of the ASHRAE COVID-19 Epidemic Task Force. He works on standards and technical committees for ASHRAE, ASTM, RESNET, the IEA and other national and international organizations. His current work focuses on residential ventilation and home decarbonization.



Ted Wilinski

Program Coordinator Automated Building Systems, MATC

Mr. Wilinski has had a career of working on energy management and facilities operations, including as a consulting engineer and educator specializing in facilities and energy management. At Milwaukee Area Technical College (MATC) Mr. Wilinski has developed over 20 courses and currently teaches in the Automated Building Systems program, which includes controls, M&V, Energy Auditing, and Commissioning. In addition to teaching at MATC, he works on an NSF ATE grant, the BEST Center, and still does work as a consultant for his firm, Wilinski Associates Inc.



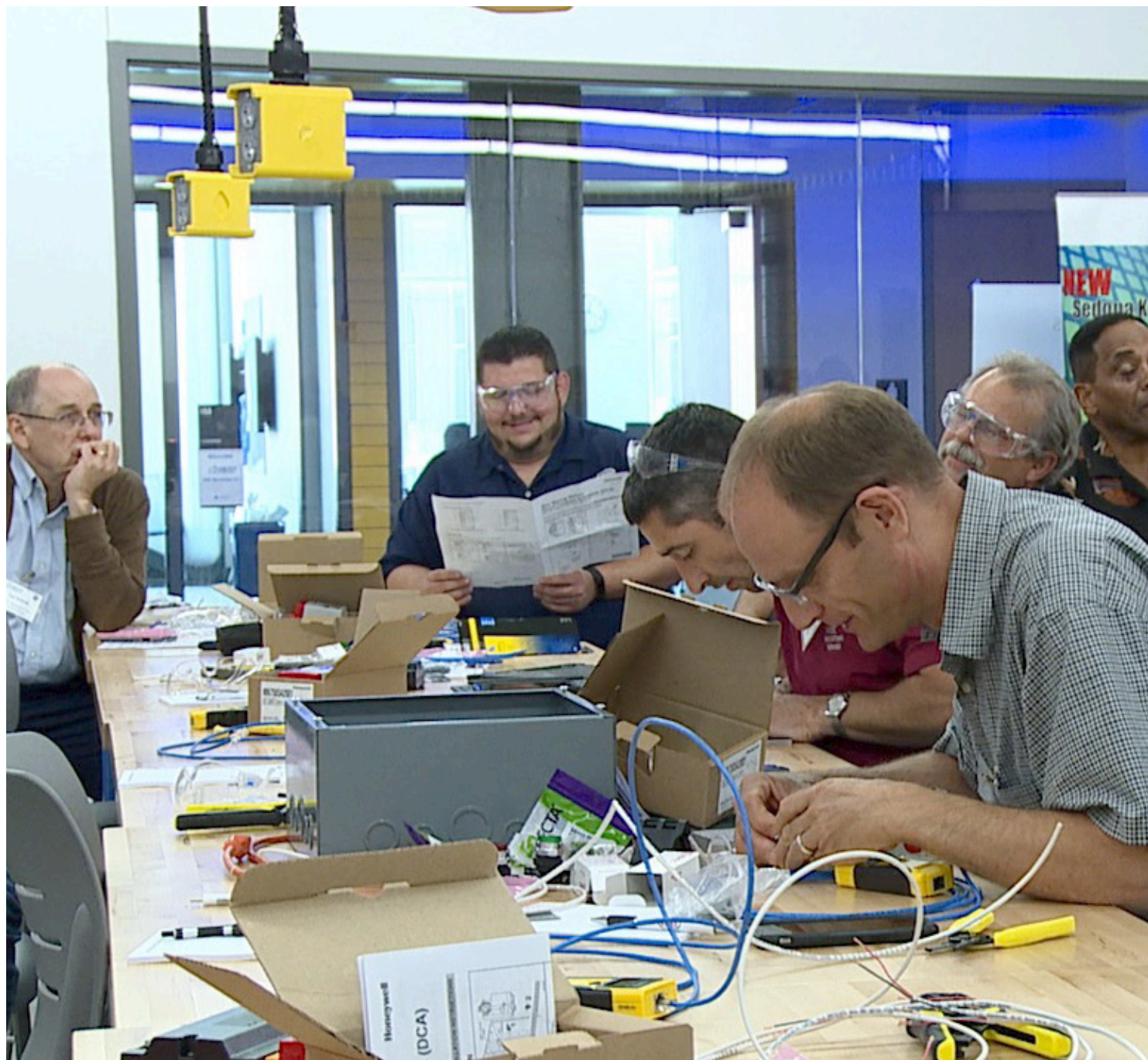
Why should you attend?

Come and learn about research, innovative technology, and education at the intersection of sustainability, energy conservation, clean energy, and healthy building operations. A dynamic line-up of speakers and interactive sessions will help you to:

- Find out about international, national, and regional strategies for decarbonization.
- Learn about the latest trends in building automation systems and building data analytics.
- Learn about new technical innovations, grid interactions, and cutting-edge research, teaching methods, and resources.
- Exchange ideas with speakers and attendees in video breakout rooms or the Networking Lounge.
- Meet educational and industry partners in the Expo Hall for information and resources.
- Expand your professional connections and career potential in building operations and facilities.









Who should attend?

- College educators and students in building science, HVAC, energy management, and building automation programs.
- Teachers of high school physics, technical, and engineering courses.
- Building engineers, technicians, and facilities managers.
- Design and construction professionals.
- Decision-makers and anyone interested in making their buildings greener and healthier!
- Climate change activists seeking the latest information on decarbonization strategies and national and regional opportunities for positive change.





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