# 2018 EPIC SYMPOSIUM

*Accelerating Clean Energy Innovation*

STATE OF CALIFORNIA ENERGY COMMISSION

PG&E

SDGE
A Sempra Energy utility®

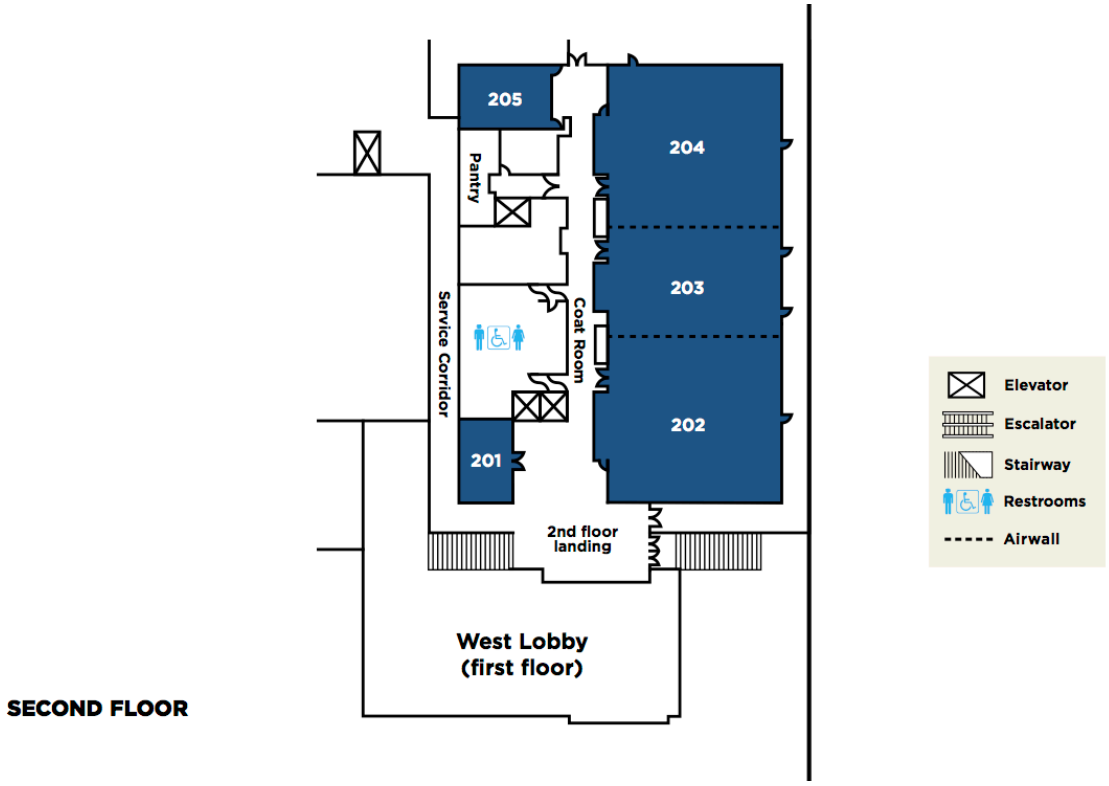
SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

# WELCOME

The California Energy Commission, Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company, are pleased to showcase new clean energy technologies, and bring together leading energy experts to discuss innovative strategies to help accelerate clean energy innovation.

The Electric Program Investment Charge (EPIC) Program provides approximately $160 million in funding to California's clean-energy entrepreneurs, researchers, and businesses each year. EPIC takes an energy pipeline approach to creating new energy solutions, fostering regional innovation, investing in cutting-edge emerging energy solutions that enhance safety, reliability and affordability, and bringing clean energy ideas to the marketplace.

## Map of Symposium Rooms




SECOND FLOOR

# GUEST SPEAKERS

**Dr. Robert Weisenmiller** is the Chair of the California Energy Commission. He first joined the Energy Commission in 1977, holding several positions including commissioner's assistant, manager of the Special Projects Office and director of the Office of Policy and Program Evaluation. He left in 1982, but returned in 2010 after being appointed as a commissioner by Governor Arnold Schwarzenegger. He was appointed as chair of the Commission by Governor Edmund G. Brown Jr. in 2011 and reappointed to the position in 2015.

Chair Weisenmiller brings more than 40 years of experience in energy issues including expertise in electricity and gas markets and California's regulatory policies. He is the lead commissioner on legislative and intergovernmental matters, international relations, military partnerships, energy research and development, climate change, and combined heat and power.

He holds a doctorate in chemistry and a master's degree in energy and resources from the University of California, Berkeley and a bachelor's degree in chemistry from Providence College.

**The Honorable Nancy Skinner** was elected state senator in November 2016 representing California's 9th Senate District, which includes the cities of Alameda, Berkeley, El Cerrito, Emeryville, El Sobrante, Hercules, Kensington, Oakland, Piedmont, Pinole, Richmond, Rodeo, San Leandro and San Pablo.

Prior to that, she served three terms in the State Assembly where she chaired the Budget, Rules and Natural Resources committees. An environmental and climate protection champion, Skinner carried measures that doubled rooftop solar and renewable energy. Senator Skinner is currently the chair of the Public Safety Committee and of the Budget Subcommittee on Corrections, Public Safety, and the Judiciary, as well as a member of the Senate Committees on Budget and Fiscal Review, Environmental Quality, Transportation and Housing, and Energy, Utilities, and Communications.

Before beginning public service, she served as the executive director of the United States office of the International Council for Local Environmental Initiatives (ICLEI) and as the international director of ICLEI's Cities for Climate Protection program which engaged cities worldwide to take action to stop climate change.

She holds a bachelor's and master's degree from UC Berkeley.

# GUEST SPEAKERS

**The Honorable Autumn Burke** was elected to the California State Assembly in 2014, and is widely recognized as a champion for reproductive rights, environmental justice, and health care. She has authored bills to establish Transformative Climate Communities to help disadvantaged neighborhoods heavily impacted by pollution, expand access to quality maternal health care, and create greater accountability and transparency across all levels of government.

Assemblywoman Burke recently authored Assembly Bill 1082 and AB 1083 (Chapters 637 and 638, Statutes of 2017), which will significantly expand California's electric vehicle charging station network by supporting the installation of new car charging locations at public schools, state parks and beaches.

Assemblywoman Burke is the chair of the Assembly Select Committee on Career Technical Education and Building a 21st Century Workforce, as well as a member of the Assembly Committee on Utilities & Energy, and the Joint Legislative Committee on Climate Change Policies.

**Commissioner Martha Guzman Aceves** was appointed Commissioner at the California Public Utilities Commission by Governor Edmund G. Brown Jr. in 2016. She previously served as deputy legislative affairs secretary in the Office of the Governor since 2011, focusing on natural resources, environmental protection, energy and food and agriculture.

She was sustainable communities program director for the California Rural Legal Assistance Foundation from 2005 to 2011. From 2006 to 2008, she worked with Swanton Berry Farm on human resources issues including a new employee-stock ownership program. She was legislative coordinator for United Farm Workers from 1999 to 2005, working on labor and environmental issues. In 2010, she co-founded Communities for a New California, a charitable organization promoting increased civic engagement of underrepresented communities. Guzman Aceves earned a master of science degree in agricultural and resource economics from UC Davis.

**Secretary Karen Ross** was appointed Secretary of the California Department of Food and Agriculture by Governor Edmund G. Brown Jr. in 2011. Secretary Ross has deep leadership experience in agricultural issues nationally, internationally, and here in California.

Secretary Ross has strengthened partnerships across government, academia and the non-profit sector in the drive to maintain and improve environmental stewardship and to develop adaptation strategies for the specific impacts of climate change. She has initiated programs to provide greater opportunities for farmers and ranchers to engage in sustainable environmental stewardship practices through water conservation, energy efficiency, nutrient management and ecosystem services. Secretary Ross has a bachelor of arts degree from the University of Nebraska-Lincoln and is a graduate of the Nebraska Ag Leadership Program.

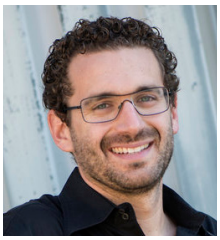
# FIRESIDE CHAT

**MODERATOR:**

**Matt Petersen**
*President and CEO of the Los Angeles Cleantech Incubator*

**PANELISTS:**

**Jason Anderson**
*President and CEO of Cleantech San Diego*



**Dr. Ilan Gur**
*Founder and Executive Director of Cyclotron Road*

**Dr. David Zoldoske**
*Former Director of the Center for Irrigation Technology and California Water Institute at California State University Fresno (retired)*

## FIRESIDE CHAT:

*Powering the Next Generation of Energy Innovation*

**9:45–10:30 a.m.**
**Room 202**

Transforming California's electricity system to meet the challenges and goals ahead will require technology innovation at unprecedented levels. For this to happen, the innovation ecosystem needed to foster and support clean energy entrepreneurship must mature to a stage closer to that of other technology sectors. In 2016, the California Energy Commission launched the California Energy Innovation Ecosystem to create a statewide network of technology incubators, investors, universities, federal laboratories, non-profits and corporate partners that collectively can accelerate the commercialization of new clean energy inventions across the state.

This year's Thought Leaders each head up regional efforts within the California Energy Innovation Ecosystem to mentor, support and connect clean energy start-ups to the strategic partners, physical space, equipment and funding opportunities they need to be successful in their entrepreneurial endeavors. The Thought Leaders will share their perspectives on what it takes for new entrepreneurial efforts to succeed, what exciting new technology advancements and opportunities they see in their respective regions, and what California needs to do to further its status as the global hub for energy technology innovation.

# AGENDA

## Morning Opening Session - Room 202

8:00–9:00 Check In & Registration

9:00–9:15 Opening Remarks – Dr. Robert B. Weisenmiller, Chair, California Energy Commission

9:15–9:45 Morning Keynote Address – Senator Nancy Skinner

9:45–10:30 Fireside Chat – Powering the Next Generation of Energy Innovation

**Moderator:** Matt Petersen, Los Angeles Cleantech Incubator

**Presenters:** Dr. Ilan Gur, Cyclotron Road; Dr. David Zoldoske, BlueTech Valley Innovation Cluster; Jason Anderson, Cleantech San Diego

## Networking Break & Poster Session - 10:30–10:45 - Room 201/Foyer

## Breakout Sessions - 10:45–11:45

Room 202 Zeroing in on Highly Efficient Buildings

**Moderator:** Mikhail Haramati, California Energy Commission

**Presenters:** Garth Torvestad, Consol; Dr. Max Wei, Lawrence Berkeley National Laboratory; Jack Clark, City of San Diego; Sean Armstrong, Redwood Energy; Lisa Schmidt, Home Energy Analytics

Room 204 Improving Power System Resilience to Weather-Related Events

**Moderator:** Dr. Susan Wilhelm, California Energy Commission

**Presenters:** Dr. Larry Dale, Lawrence Berkeley National Laboratory; Jim Morgenson, Eos; Jana Ganion, Blue Lake Rancheria; Dr. Tom Bialek, SDG&E

Room 205 Battery Storage for Grid Operations

**Presenters:** Mike Della Penna, PG&E; Morgan Metcalf, PG&E

## Boxed Lunch Pickup - 11:45–12:00 - Second Floor Foyer

## Lunch Sessions - Room 202

12:00–12:15 Afternoon Keynote Address – Assemblymember Autumn Burke

12:15–1:30 CalSEED Entrepreneur Pitch Session – Sherri Pittman & Danny Kennedy, CalCEF

## Networking Break & Poster Session - 1:30–1:45 - Room 201/Foyer

## Breakout Sessions 1:45–2:45

Room 202 — Scaling-Up Clean Energy Solutions for Low-Income Customers

**Moderator:** Commissioner Martha Guzman Aceves, California Public Utilities Commission

**Presenters:** Adam Boucher, Promise Energy; Andrew Brooks, Association for Energy Affordability; Dr. Andrew Coleman, Electric Power Research Institute; Dr. Stephanie Pincetl, UC Los Angeles; Stephanie Chen, Greenlining Institute; Maria Stamas, Natural Resources Defense Council

Room 204 — Accurate Forecasting to Support the Modern Grid

**Moderator:** Amber Motley, California Independent System Operator

**Presenters:** Dr. Hugo Pedro, UC San Diego; Dr. Thomas Hoff, Clean Power Research; Dr. John Zack, AWS Truepower; Dr. Francesco Avanzi, UC Berkeley

Room 205 — Cross-Cutting Demonstration: SCE's Integrated Grid Project

**Presenter:** Bob Yinger, Southern California Edison

## Networking Break & Poster Session - 2:45–3:15 - Room 201/Foyer

## Breakout Sessions 3:15–4:15

Room 202 — Energy Technology Solutions for Food Production

**Moderator:** Secretary Karen Ross, California Department of Food and Agriculture

**Presenters:** N. Ross Buckenham, California Bioenergy; Erich Kroll, Jackson Family Wines; Thomas Maulhardt, Campbell Soup; Dr. Sudeshna Pabi, Electric Power Research Institute; Andrew Campbell, UC Berkeley; Rob Neenan, California League of Food Producers

Room 204 — Increasing Uptake of Demand Response Technologies

**Moderator:** Dr. David Hungerford, California Energy Commission

**Presenters:** Matt Duesterberg, OhmConnect; Phillip Kopp, Conectric; Dr. Marshall English, Irrigation for the Future

Room 205 — Advancement of Distribution System Operations and Asset Management

**Moderator:** Dr. Frank Goodman, SDG&E

**Presenters:** Dr. Amin Salmani, SDG&E; Ngoc Bui, SDG&E; Molham Kayali, SDG&E

## Afternoon Closing Session & Poster Session - 4:15–5:00

Room 202 — Statewide Resources through EPIC to Help Develop and Scale New Energy Technologies

**Presenter:** Erik Stokes, California Energy Commission

Room 201 — Poster Session

# SPECIAL SESSIONS

## PRE-SYMPOSIUM SESSION:
*Tour of Arch Nexus SAC Building*

**Tuesday, February 6 at 5:30 p.m.**
**Followed by a no-host reception**

Arch Nexus SAC is an adaptive reuse of an existing one-story structure, located at 930 R Street in Sacramento, California. The existing warehouse/ office was converted into a professional office space. The new building features many cutting-edge innovations to tackle the California water and energy crises, enabling the building to be part of a "visionary path to a restorative future" by embracing The Living Building Challenge. This certification program, administered by the International Living Future Institute, represents the most advanced measure of sustainability in the built environment and acts to rapidly diminish the gap between current limits and positive solutions. As such, some of the features of Arch Nexus SAC are:

**Net positive energy** - more than enough energy is generated onsite by solar panels
**Net positive water** - equipped to supply all the water it needs from rainwater
**No water discharge** - all of the water used in the building is treated on site
**Equity of Place** - all occupants and neighbors have access to abundant daylight and fresh air

## CalSEED Entrepreneur Pitch Session

**12:15–1:30 p.m.**
**Room 202**

Join Danny Kennedy and Sherri Pittman for a rapid-fire, cleantech pitch session featuring some of the first California Sustainable Energy Entrepreneur Development (CalSEED) entrepreneurs as they describe how their projects are advancing California's transition to a clean energy future, and how the CalSEED Initiative is helping to move their projects from idea to marketplace.

CalSEED

Last year, the Energy Commission launched one of state's most significant funding opportunities. The CalSEED Initiative supports early stage clean energy entrepreneurs by providing up to $150,000 in grants for proof of concept activities. Recipients can also pitch their ideas for up to $450,000 in follow-on funding.

## Statewide Resources through EPIC to Help Develop and Scale New Energy Technologies

**4:15–5:00 p.m.**
**Room 202**

Navigating the clean energy innovation landscape can be a daunting prospect – technology developers can spend significant time and effort searching for the right support services, mentors and funding opportunities best suited for their invention; and technology customers are often inundated with information about emerging technologies with no way to effectively pick the right one that meets their needs. In this session, Energy Commission staff will present tools and resources developed in-house and through EPIC to help both energy technology developers and customers navigate the clean energy landscape more efficiently.

# **BREAKOUT SESSION ONE** *PANELS*

*10:45 – 11:45 a.m.*

## Zeroing in on Highly Efficient Buildings

**Room 202**

Will California be able to meet its goal for zero net energy (ZNE) buildings and doubling the efficiency of existing buildings? What advanced or new technologies are needed to help make this goal a reality?

This panel of building experts and researchers will discuss advanced technologies and strategies being deployed in their projects and the critical elements of success in designing ZNE buildings.

**Moderator: Mikhail Haramati,** California Energy Commission

**Presenters:**

**Jack Clark**, Deputy Director for Energy and Sustainability for the City of San Diego, will discuss how strategies such as retrofitting existing buildings can help city facilities to become highly efficient or even zero net energy.

**Garth Torvestad**, Senior Technical Consultant at ConSol, Incorporated, will discuss the challenges and market for ZNE single family homes.

**Dr. Max Wei**, Program Manager at Lawrence Berkeley National Laboratory, will discuss his current research analyzing all electric versus mixed fuel housing developments.

**Sean Armstrong**, Principal and Project Manager at Redwood Energy, will discuss challenges associated with going all electric in low-income, multifamily properties.

**Lisa Schmidt**, President and CEO of Home Energy Analytics, will explain how the company's Dr. Power mobile app can help residents make better energy decisions at the plug and save money.

## Improving Power System Resilience for Disaster Recovery

**Room 204**

The world has seen an increase in the frequency and intensity of extreme weather events in recent years and along with it, largescale and oftentimes devastating power outages. As a result, there has been an increased awareness of the need to enhance the power grid to make it more resilient to the effects of climate change.

This panel will examine the impact of extreme weather events such as heatwaves, floods and other climate disturbances and look at California's ongoing efforts to make the grid more resistant to catastrophic events.

**Moderator:** **Dr. Susan Wilhelm**, California Energy Commission

**Presenters:**

**Dr. Larry Dale**, Economist at Lawrence Berkeley National Laboratory, will discuss the increasing threat of wildfires brought on by climate change, their impact on the transmission, and distribution grid and the need for predictive modeling.

**Jim Morgenson**, Vice President of Sales for Eos Energy Storage, will discuss the importance of using diverse storage technologies to achieve higher resiliency of the power grid.

**Jana Ganion**, Energy Director for the Blue Lake Rancheria in Humboldt County, will discuss the value of islanding functions at critical facilities, and the cost savings that microgrids provide on a regular basis.

**Dr. Tom Bialek**, Chief Engineer with SDG&E, will discuss the development of a utility-owned community microgrid at Borrego Springs.

## Battery Storage for Grid Operations

**Room 205**

PG&E will provide an overview of two recently completed projects that utilize battery storage to enhance grid operations.

**Presenters:**

**Mike Della Penna**, a Principal with PG&E's Transmission Project Development Department, will discuss the utility's ability to use energy storage to delay capacity expansions while maintaining and improving grid reliability.

**Morgan Metcalf**, Senior Program Manager with PG&E, will discuss demonstration and test field results and how behind the meter storage resources can be utilized by the utility to reduce electric load or to absorb distributed generation on a utility distribution feeder.

# **BREAKOUT SESSION TWO** *PANELS*

*1:45 - 2:45 p.m.*

## Scaling-Up Clean Energy Solutions for Low-Income Customers

**Room 202**

California has several major energy-related programs providing financial support to low-income customers and disadvantaged communities. Program administrators and affordable housing developers are often hesitant to incorporate unproven new energy technologies into their programs and projects despite the potential benefits over existing solutions. Demonstration projects can help alleviate these concerns by providing independent data on a new technology's performance and economics, and provide insights on the technology features customers and communities prefer.

This panel will discuss strategies for moving new energy technologies from the demonstration stage into funding programs that can offset the costs of commercially-available technologies for low-income customers.

**Moderator**: **Commissioner Martha Guzman Aceves,** California Public Utilities Commission

**Presenters:**

**Andrew Brooks**, West Coast Director of Operations for the Association for Energy Affordability, will provide insight on some of the unique measures used to achieve ZNE in multifamily building demonstration projects.

**Dr. Andrew Coleman**, Government Leader with the Electric Power Research Institute, will discuss customer-centric and technology-friendly approaches to multifamily buildings and detail how solar energy and storage can provide community scale solutions.

**Dr. Stephanie Pincetl**, Professor and Director of the California Center for Sustainable Communities at UCLA's Institute of the Environment and Sustainability, will discuss how big data is being used in her EPIC-funded work to inform better program development and implementation for low-income customers.

**Stephanie Chen**, Energy and Telecommunications Director for the Greenlining Institute, will provide insight on options available for combining community based organization and government funding to increase access to clean energy for low-income customers.

**Maria Stamas**, Energy and Climate Program Attorney with the Natural Resources Defense Council will detail the patchwork quilt programs providing clean energy solutions to low-income customers and those in disadvantaged communities.

**Adam Boucher**, Founder and CEO of Promise Energy, will discuss how market disruption led by changes in utility rate tariffs and advancements in technology will place Energy Management on center stage to develop and validate new programs serving low-income, disadvantaged communities and the emerging energy cloud economy.

## Accurate Forecasting to Support the Modern Grid

**Room 204**

Forecasting has been made more difficult in recent years by the rapid scale-up of renewable energy sources and increases in distributed energy resources. But improved renewable forecasting tools are on the horizon that avoid over-procurement and increase the value of renewable generation.

This panel will explore how California is addressing data, sensor, and model gaps to ensure that operators can manage the grid reliably under changing circumstances.

**Moderator:** **Amber Motley**, California Independent System Operator

**Presenters:**

**Dr. Hugo Pedro**, Assistant Project Scientist at UC San Diego's Center for Energy Research, will discuss how high-density telemetry is being used to improve short-term forecasting

**Dr. Thomas Hoff**, Founder and Chief Research Officer of Clean Power Research, will provide insight on improving solar generation forecasts, and discuss the costs and benefits of improved power production forecasts for photovoltaic systems.

**Dr. John Zack**, Global Director of Grid Solutions for AWS Truepower, will discuss improvements in atmospheric field measurements, short-term wind ramp modeling, and solar energy forecasting.

**Dr. Francesco Avanzi**, Postdoctoral Scholar at UC Berkeley, will discuss how advanced modeling is reducing uncertainty in predicting hydropower generation in a changing climate.

## Cross-Cutting Demonstration: SCE's Integrated Grid Project

**Room 205**

SCE will provide an overview of its Integrated Grid Project (IGP), which seeks technical and operational solutions to better integrate, manage and optimize ever increasing amounts of renewable energy and distributed energy resources to the grid.

**Bob Yinger**, Consulting Engineer in the Advanced Technology Group of the Transmission and Distribution Business Unit at SCE, will discuss the IGP, including a project overview, use cases, controls testing, customer engagement, and lessons learned.

# **BREAKOUT SESSION THREE** *PANELS*

*3:15 - 4:15 p.m.*

## Energy Technology Solutions for Food Production

**Room 202**

California leads the nation in agricultural production and exports with annual sales of about $47 billion. That would seem to make food production operations ripe for new energy and water saving innovations. The industry, however, has been slow to embrace these new technologies and concepts because of seasonal operations, uncertainties about new technologies, concern about crop production and quality, and water availability.

During this discussion, presenters will show how their EPIC-funded projects are demonstrating solutions to reduce energy and water use, the challenges with new technologies and what's needed to de-risk these technologies.

**Moderator:** **Secretary Karen Ross**, California Department of Food and Agriculture

**Presenters:**

**N. Ross Buckenham**, Chairman and CEO of California Bioenergy, will discuss approaches to make energy recovery from dairy manure financially attractive while supporting dairy operations.

**Erich Kroll**, Director of Engineering at Jackson Family Wines, will discuss new technologies to concentrate fruits for juice, produce water for reuse, and reduce energy use in winemaking.

**Andrew Campbell**, Executive Director of the Energy Institute at Haas at UC Berkeley, will discuss UC Berkeley's project on increasing the energy efficiency of compressed air systems, potential savings and benefits, and enlisting the participation of food processors.

**Thomas Maulhardt**, Environmental Supervisor – Ag Ops at Campbell Soup Supply Company, will discuss his experience in implementing new efficiency measures, such as compressed air system optimization.

**Dr. Sudeshna Pabi**, Project Manager at the Electric Power Research Institute, will discuss an innovative irrigation system that can reduce energy and water use, while maintaining crop yield and quality.

**Rob Neenan**, President and CEO with the California League of Food Producers, will provide insights on the technologies presented and provide insights and challenges facing food producers when implementing advanced technologies to reduce energy use and greenhouse gas emissions.

## Increasing Uptake of Demand Response Technologies

**Room 204**

Demand response (DR) shares the top spot with energy efficiency as California's preferred resource. Though the participation in DR programs has increased slightly, it is still an underutilized grid resource capable of providing flexibility and resiliency. Field trials are underway testing customer interest and motivations for participation in demand response programs.

This panel will share the experiences of different customer groups and program designs and will look at the potential energy reductions and grid benefits, the challenges of creating an attractive value proposition for DR, and the role of technology innovations.

**Moderator:** **Dr. David Hungerford**, California Energy Commission

**Presenters:**

**Matt Duesterberg**, CEO of OhmConnect Programs, will discuss his company's approach in using social media platforms to crowd-source reliable wholesale DR resources from tens of thousands of individual utility customers.

**Phillip Kopp**, Founder and CEO of Conectric, will describe his company's work in using detailed data collection, equipment automation and ongoing strategy development to assist large hotels in participating in wholesale grid resource markets while reducing customer energy costs and meeting strict customer hospitality requirements.

**Dr. Marshall English**, CEO of Irrigation for the Future, will discuss how his research will help irrigation managers identify and implement economically optimal irrigation strategies under currently-available program and tariff options.

## Advancement of Distribution System Operations and Asset Management

**Room 205**

SDG&E will provide an overview of three recently completed EPIC pre-commercial projects.

**Moderator:** **Dr. Frank Goodman**, SDG&E EPIC Program Manager

**Presenters:**

**Dr. Amin Salmani**, SDG&E EPIC Technical Project Lead, will discuss demonstration work performed to assess value and adoption issues for grid support functions of distributed energy resources (DER).

**Ngoc Bui**, SDG&E Engineer, will discuss demonstration of tools that ingest and analyze data collected by means of Unmanned Aerial Systems (UAS).

**Molham Kayali**, SDG&E Project Technical Lead, will discuss pre-commercial demonstrations of promising utility communications architecture components.

# POSTER SESSION

*Posters highlighting EPIC-funded projects will be on display in Room 201 and in the foyer.*

### 1. Charge Bliss

*An Advanced Renewable Energy Microgrid for a Critical Facility*

Charge Bliss, Inc. installed a renewable microgrid for the Kaiser Permanente Hospital in Richmond, California that is scalable and can be utilized in more hospitals to provide critical services during emergency situations.

### 2. Gridscape Solutions, Inc.

*Fremont Fire Stations Microgrid*

Gridscape installed and manages microgrids at three fire stations serving the City of Fremont, California. These microgrids save on electricity costs, increase resiliency, and provide critical services during power outages.

### 3. Lawrence Berkeley National Lab

*Solar-Reflective "Cool" Walls: Benefits, Technologies, and Implementation*

This project examined cool wall technology performance as well as its benefits to air quality, urban cooling, and building and grid efficiency.

### 4. Lawrence Berkeley National Lab

*Energy Reporting*

This project aims to implement energy use reporting in plug-load devices to allow users to identify and rectify inefficient, malfunctioning, or poorly operating devices.

### 5. UCLA

*Accelerating AEC Deployment around Existing Buildings in Disadvantaged Communities through Unprecedented Data Analysis and Comprehensive Community Engagement*

This project is piloting innovative new deployment and financing strategies that combine "big data" with targeted community outreach efforts to expand access to clean energy technologies in disadvantaged communities.

### 6. Sunfolding, Inc.

*Next Generation Infrastructure for PV Systems*

Sunfolding installed and is validating the performance of a new air driven tracker that increases reliability and simplifies PV plant infrastructure and maintenance, significantly lowering the levelized cost of electricity.

### 7. Local Government Commission

*Energize Fresno*

This project piloted a technical and community planning process focused on developing a roadmap for an "Energy Opportunity Zone" along the Blackstone Corridor and downtown area of Fresno.

### 8. UCLA

*Smart PEV Charging and Energy Storage for Fleet and Grid Services*

The Smart Grid Energy Research Center at UCLA incorporated smart charging, vehicle-to-grid, and battery energy storage technologies with software to create a user-friendly plug-in electric vehicle charging infrastructure.

### 9. Center for Sustainable Energy

*Applying Social Science Research to Increase Energy Efficiency Adoption: Hispanic Households and the Energy Pipeline*

This project is a three-year study of the social and cultural factors that influence California's Hispanic households' perspectives on, motivations for, and barriers to adopting energy efficient technologies.

### 10. Frontier Wind

*Wind Turbine Rotor-Mounted Bat Impact Deterrence System*

Frontier Wind has designed and is testing a system, easily retrofitted onto existing wind turbines, to deter bats from flying and foraging near the blades of wind energy generators.

### 11. Lawrence Berkeley National Lab

*Advanced VGI Controls to Maximize Battery Life and Use of Second-life Batteries to Increase Grid Services and Renewable Power Penetration*

This project developed uses for second life electric vehicle batteries in a scalable energy storage solution for electric vehicle fleets and a grid and building energy demand stabilizing system, along with control methods to minimize battery degradation.

### 12. Lawrence Berkeley National Lab

*Zero-Standby Power Solutions*

This project is developing technologies that enable personal electrical devices and appliances to draw zero standby power while plugged in, while still providing the functionality consumers are used to.

### 13. Lawrence Berkeley National Lab

*High-Performance, Integrated Window and Façade Solutions for California Buildings*

This project is developing novel window technologies and improved modeling capabilities that enable the building industry to more easily develop, design, and operate fenestration technologies that lower energy use while improving occupant comfort.

### 14. Lawrence Berkeley National Lab

*Building Better Attics: Energy and Peak Demand Savings from Innovative Attic Construction*

This project investigates the use of sealed and insulated attics and the impact on the HVAC distribution system in new homes. The goal is to improve heating and cooling efficiency without compromising indoor air quality, health and durability of homes.

### 15. UC Irvine

*Assessing Climate Change Impacts on Resource Planning for Low-Carbon Energy System Development*

UC Irvine is studying how climate change could affect electricity generation, renewable capacity potential, and demand and how that would affect California's ability to meet GHG emission reduction and renewable energy targets.

### 16. Antelope Valley Water Storage, LLC

*Water/Energy Bank "Proof-of-Concept"*

This project analyzes the potential to reduce summer peak electric demand by delivering water from the State Water Project to Southern California outside of the summer months and storing the water in a groundwater bank until needed.

# POSTER SESSION

*Posters highlighting EPIC-funded projects will be on display in Room 201 and in the foyer.*

**17. Electric Power Research Institute**

*Evaluation of the Next-Generation Residential Space Conditioning System for California*

This project evaluates the Next Generation Space Conditioning System, an integration of multiple advanced HVAC technologies, for efficiency, utility, integration, and homeowner comfort.

**18. Lawrence Berkeley National Lab**

*Direct Current (DC) Power Distribution as an Integrating Technology for Zero-Net Energy Buildings*

This project evaluates DC and AC-DC hybrid applications for existing and new buildings to determine market segments that are technically and economically feasible. Guidelines and templates are being developed to help building developers incorporate these systems into their designs.

**19. Altex Technologies Corporation**

*Small-Scale Forest Waste Power System*

Altex is developing a modular biomass power system that converts forest slash into electricity, reducing fire hazards and improving sustainability while reliably and cost-effectively producing clean energy.

**20. Lawrence Berkeley National Lab**

*Enabling Anaerobic Digestion Deployment for Municipal Solid Waste Biogas*

LBNL is scaling up a dry anaerobic digestion and composting facility to identify optimum pathways and mitigate the challenges impeding environmentally and economically sustainable deployment and scale-up of electricity production from waste-derived biogas, such as financial barriers and air-quality concerns.

**21. UC San Diego**

*Stabilizing Next Generation Perovskite PV Modules*

UC San Diego is integrating innovations in materials, manufacturing and bifacial module design approaches in improving perovskite solar module durability with stability advancements, enabling unprecedented low-cost renewable energy generation.

**22. UC Irvine**

*Low-Cost NOx Sensor for Optimization of Dispatchable Distributed Generation Systems*

UC Irvine is evaluating the viability of integrating low-cost automotive nitrogen oxide sensors with engine control systems to ensure low emission performance.

**23. Universal Devices, Inc.**

*RATES (Retail Automated Transactive Energy System) is Making an EPIC Impact!*

This project is creating a Retail Automated Transactive Energy System (RATES) and energy management solution that advances the ability of customers to participate in demand response markets.

**24. Public Health Institute**

*Public Health Research Roadmap on Emerging Electricity Generating Systems*

The Public Health Institute established a public health research roadmap aimed at anticipating and preventing potential unintended health impacts of emerging electricity generation, storage, and distribution systems.

### 25. Sunpreme, Inc.

*High Performance Cu-Plating for Heterojunction Silicon Cells, Based on Ultra-Low-Cost Printed Circuit Board (PCB) Technology*

Sunpreme is developing a next generation manufacturing tool for copper patterning on solar photovoltaic cells using technologies from printed circuit board manufacturing, reducing costs by up to 35 percent and increasing cell efficiency by 15 percent.

### 26. Lawrence Berkeley National Lab

*Cost Effective Net Zero Retrofits for Small Commercial Offices – CBES, An Online Assessment Tool*

This project is developing approaches on how to achieve zero net energy for existing, small commercial office buildings cost effectively with lessons learned being incorporated into a publicly-accessible online tool to facilitate adoption of energy efficient technologies throughout the state.

### 27. Electric Power Research Institute

*StorageVET*

Learn about StorageVET® - a free, publicly-available, web-hosted energy storage simulation tool to inform the design, siting, and operation of energy storage systems.

### 28. California State University, Long Beach Research Foundation

*IoT-Based Smart Building Design*

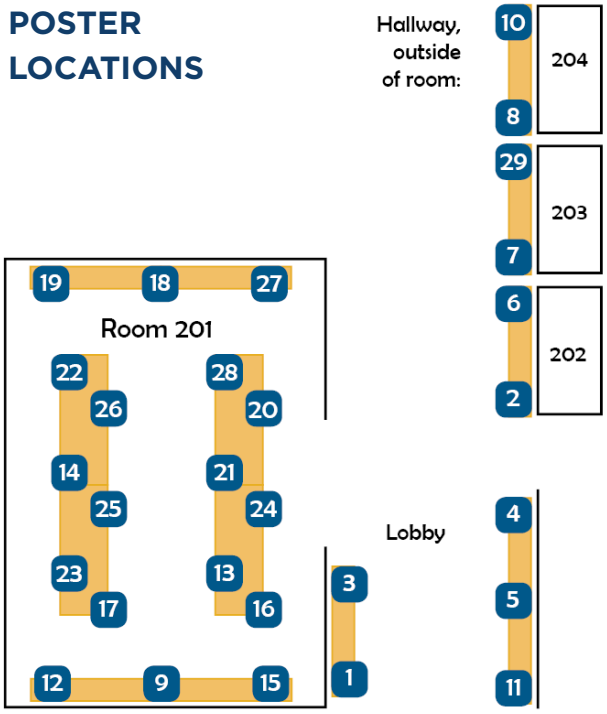
This project is developing and evaluating a unique integrated energy management system that will help transform existing buildings into smart infrastructures with high energy efficiency objectives and demand response capability, lowering energy costs while improving system reliability and occupant comfort.

### 29. UCLA

*Low-Cost Thermal Energy Storage for Dispatchable CSP*

UCLA is developing a low-cost thermal energy storage fluid, elemental sulfur, and demonstrating it in a thermal battery system that will enable overall low system cost, long lifetime and scalability for a wide range of concentrating solar power applications.

## POSTER LOCATIONS





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