2019

EPIC Electric Program Investment Charge

HIGHLIGHTS

California's premier public interest research program driving clean energy innovation and entrepreneurship to help meet the state's climate and energy goals

LETTER TO CALIFORNIA

California Energy Commission
Vice Chair Janea Scott

In 2019, California again faced the impacts of climate change, including devastating wildfires, while it continued to work diligently on both decarbonizing the energy system and on making that system more resilient. California is resolute in its commitment to decarbonizing our energy system—much of our electricity is already carbon-free—and the electric grid becomes cleaner every year. This progress does not simply happen, but rather it is the outcome of effective and thoughtful energy policy, strategic research investment, steadfast private efforts, and dedicated public efforts, like the Electric Program Investment Charge, or EPIC.

EPIC builds on a strong legacy of research and development and empowers innovation in key clean energy areas. EPIC's public-interest research investments are accelerating the pace and scale of adoption of California-grown innovation by (1) expediting the development and commercialization of breakthrough advancements, (2) driving down the capital costs of clean energy technology solutions, and (3) offering entrepreneurs reliable, stable funding opportunities. I highly recommend to you this highlights document and also the full **EPIC annual report** which provides the details on how EPIC is spurring these achievements.

While we have achieved much, there is still more to do. CALIFORNIA — with its world-class universities, engaged communities, national laboratories, technology, private-public partnerships, and entrepreneurial spirit — has an incredible capacity to deliver the technological advancements that will pave the way to a 100% clean energy future. I'm proud that, through EPIC, the California Energy Commission (CEC) has helped to frame, nurture, and mobilize this capacity for innovation. Even as we weather the global COVID-19 pandemic, our state continues to rise to the challenge of addressing climate change while investing in our future – a future built on cleaner, more affordable, and more-resilient energy for all Californians.

Sincerely,

Janea A. Scott

Vice Chair Janea Scott and CEC staff learn about the energy and water savings from an innovative heat exchanger at an EPIC-funded, UC Davis led project at Jackson Family Wines in Santa Rosa. (EPC-15-050)

CALIFORNIA'S INVESTMENT IN CLEAN ENERGY INNOVATION

EPIC is California's premier public interest research program investing over $130 million annually to unleash innovation in energy efficiency, energy generation, storage, grid resiliency, renewable integration, electrified transportation, and to bring breakthroughs from the lab to the market to benefit all Californians.

Entrepreneurial Ecosystem
$143 million invested

Through EPIC, the CEC is building a world-class ecosystem that provides the resources, expertise, and information to foster and support successful clean energy entrepreneurship across the state. California is the top destination for cleantech venture capital funding, attracting 53% of this funding since 2011.

Resiliency & Safety
$106 million invested

EPIC equips communities, businesses, and public agencies with breakthrough technology solutions and tools to build a safe and resilient energy system, providing essential services even during emergencies.

Building Decarbonization
$170 million invested

EPIC is investing in new energy technologies to improve the affordability, health, and comfort of California's residential and commercial buildings.

Grid Decarbonization & Decentralization
$154 million invested

California's policy goals envision a fully-decarbonized and more decentralized electric grid. To help realize this vision, EPIC is investing in new technologies that improve the cost competitiveness of renewable energy and increase adoption of low-carbon resources, such as energy storage, to improve grid reliability.

Industrial & Agricultural Innovation
$113 million invested

California's agricultural and industrial sectors have helped the state become the fifth largest economy in the world. Through EPIC, the CEC is helping to scale technology solutions that reduce electricity use while increasing production of goods and products on on which much of the world relies.

Transportation Electrification
$33 million invested

The CEC is advancing new technology solutions that reduce the cost of electric vehicle ownership and enable electric vehicles to support the larger electric grid.

**Total investment, 2012-2019*

MAKING AN EPIC IMPACT

$1.8+ BILLION
private investment received by awardees after being selected for an EPIC project

39% OF SMALL BUSINESSES
have grown their employment numbers since receiving an EPIC award

580+ ORGANIZATIONS
across California have received EPIC funding

65% OF EPIC TECHNOLOGY
demonstration and deployment funds invested in projects located in a disadvantaged- or low-income community

1,300+ CITATIONS
in academic publications referencing research results from EPIC-funded projects

2019 EPIC YEAR IN REVIEW

11 start-up companies establishing their first manufacturing lines in California with EPIC investment in the RAMP program.

22 news articles and publications that mentioned EPIC-funded microgrids.

30 university and national lab testing facilities now open to start-up companies through CalTestBed.

1K+ members who have joined Empower Innovation since its launch in October 2019.

CALTESTBED

In 2019, the CEC established CalTestBed, a new program that provides start-up companies with access to the state's premier testing laboratories. Companies selected will receive a voucher they can bring to one of over 30 eligible testing facilities in California to validate performance.

RAMP

Also in 2019, the CEC created the **R**ealizing **A**ccelerated **M**anufacturing and **P**roduction program, **RAMP**. This new program supports clean energy entrepreneurs by providing technical and financial assistance to help set up initial manufacturing lines in California.

EMPOWER INNOVATION

The CEC has launched a new professional networking platform – Empower Innovation – to help technology companies, customers, communities and other organizations discover funding opportunities and partnerships to advance a clean energy future for all.

2019 EPIC SYMPOSIUM

Each year, the CEC, along with Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric holds an annual symposium to showcase cutting-edge technologies advanced through EPIC. The 2019 Symposium continued to surpass year-over-year attendance with over 800 people joining.

800+
Attendees at the 2019 EPIC Symposium

THE YEAR OF THE MICROGRID

2019 brought microgrids into the public spotlight.

After a decade of research, the CEC began a targeted effort to advance microgrid technology to the commercial stage by funding projects at critical facilities, such as hospitals, emergency response shelters, and fire stations.

Many of these projects gained national attention because the microgrids continued to provide power during the planned power outages in 2019.

THE EPIC ENTREPRENEURIAL ECOSYSTEM

Great ideas can come from anywhere, which is why the CEC has built a statewide innovation ecosystem and entrepreneurial-focused funding stream to help clean energy entrepreneurs and start-up companies overcome the barriers and challenges common in bringing innovations to market. The entrepreneurial ecosystem mobilizes and organizes a wide array of stakeholders and resources throughout the state to provide clean energy startups with the technical and business support needed to advance their technologies.

Over 200 clean energy startup companies have been supported by a network of:

9 University of California Campuses	**12** California State University Campuses	**2** Private Universities
2 National Labs	**6** Economic Development Organizations	**7** Nonprofit Organizations
6 Incubators/ Accelerators		

These companies have raised over $200 million in follow-on funding since entering an entrepreneurial ecosystem program.

> *Innovation does not happen in a vacuum. The entrepreneurial ecosystem catalyzes the connections between all the different players necessary to bring clean energy technologies to market.*
>
> – CEC Chair David Hochschild

EPIC PROJECT PROFILE

RESILIENCY AND SAFETY

Blue Lake Rancheria

10K Californians who still had power during a planned grid outage, thanks to EPIC investments in community microgrids

78 number of minutes the microgrid powered the central command center for fire crews during a wildfire in 2017

4 lives saved thanks to emergency power

3 awards for project excellence

> *Responding to public needs, the tribe transformed a hotel conference room into a newsroom so the local paper could publish. It used hotel guest rooms to take in…patients from the county's Health and Human Services Department. The reservation's gas station and mini-mart were among the only ones open, drawing a nearly mile-long line of cars.*
>
> – The Washington Post, January 1, 2020

California's rapidly evolving energy landscape and changed climate have made energy resiliency a core concern. Californians are living with the consequences of a longer, more destructive wildfire season, more weather extremes, and more frequent public safety power shut offs (PSPS).

Amid these shutoffs, the microgrid at Blue Lake Rancheria, a casino resort in a tribal community and disaster-prone region, is keeping the community energized and out of the dark. During the public safety power shutoffs last year, the system islanded for periods exceeding 24 hours and provided energy to 10,000, including powering life-sustaining medical equipment to four very-ill residents. This customer-owned microgrid also reduced energy costs by $200,000 in a single year, shaved peak demand, and seamlessly islanded during outages. The system has won awards from the U.S. Department of Energy, Federal Emergency Management Agency, and was named 2018 DER Integration Project of the Year by POWERGRID International

CEC investments in microgrids like Blue Lake save operating costs and safeguard California's communities, making outages rare and minimally disruptive.

EPIC PROJECT PROFILE

BUILDING DECARBONIZATION

Nativus, Inc.

2.5 MILLION

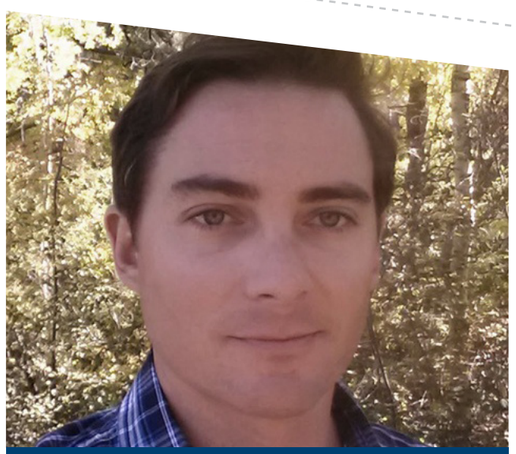
room air conditioners expected to be sold in US in 2020

67%

reduction in energy costs for a Nativus room air conditioning unit compared to a standard room air conditioning unit

$0

cost for electric panel upgrades and professional installation needed to install Nativus' room air conditioning unit



The Navy instilled an obligation in us to take on the biggest challenge. Climate change is that challenge.

– Matt Miller Co-founder of Nativus, Inc.

As the number of room air conditioners in the world is expected to nearly quadruple by mid-century, Matt Miller and Dan Poirier of Nativus, Inc., are hoping their breakthrough AC technology innovations can be instrumental in what Miller calls "the war on climate change." A fitting mission for the two, who met during their time at the U.S. Naval Academy.

With their low-energy air conditioner, Nativus' goal is to reduce the environmental damage caused every time you run your air conditioner – a hefty battle. "Last summer, with our air conditioners in the United States, we burned more energy than Africa did as a continent all year," Miller explains.

Window air conditioners are part of what's heating our environment.

So, with an air-conditioning unit no bigger than an old desktop PC, and "light enough to be shipped directly to a home and installed in minutes" Nativus is positioning itself as a plug-and-play solution for the masses.

EPIC PROJECT PROFILE

GRID DECARBONIZATION AND DECENTRALIZATION

Lancaster Advanced Energy Community

One virtual power plant to manage, control, and optimize the performance of:

5
City Facilities

13
School Facilities

422
New and Affordable Zero Net Energy (ZNE) Homes

> *The Lancaster Advanced Energy Community is not only building new energy technologies that will help reduce energy costs and lower emissions but also building a new plan and model that other communities can look to emulate.*
>
> – Kathy Wells, Lancaster Clean Energy Project Coordinator

A 100% clean energy grid will require more dynamic control over the supply and demand of electricity than today's system. This need accelerates as local renewable generation and the electrification of buildings and vehicles increases.

The ZNE Alliance is deploying a first-of-its-kind virtual power plant in the city of Lancaster that integrates residential homes, commercial businesses, schools, and city facilities into a single point of control.

This integration allows for the dynamic control of the generation and use of electricity to maximize the use of clean energy resources while keeping costs low and maintaining reliability.

This project offers a glimpse of how future communities can effectively deploy clean energy technologies, and meet climate goals, while lowering operating costs.

EPIC PROJECT PROFILE

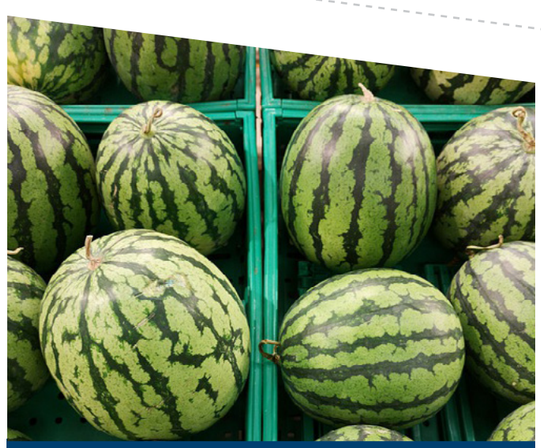
INDUSTRIAL AND AGRICULTURAL INNOVATION

Porifera

30% reduction in energy use required to treat industrial wastewater using the PFO Recycler

80% of wastewater reused onsite because of the PFO Recycler

100+ customers currently using the PFO Recycler



The Commission's initial investment in Porifera has been invaluable to our growth. It built up our credibility and helped us show [customers] the value of our environmentally-friendly solutions.

– Olgica Bakajin, CEO, Porifera

Olgica Bakajin, CEO, Porifera

Drought conditions are expected to become the norm under climate change and threaten the economic competitiveness of California's industrial and agricultural businesses.

Olgica Bakajin and her company Porifera, Inc, are looking to help change that.

Porifera, using its novel membrane technology, is developing a line of technology solutions for food and beverage manufacturers, including the Porifera Forward Osmosis (PFO) Recycler.

The PFO Recycler allows beverage manufacturers to treat industrial wastewater onsite for reuse in their facilities, reducing both their water consumption and the costs to treat and discharge the wastewater that results from their operations.

EPIC PROJECT PROFILE

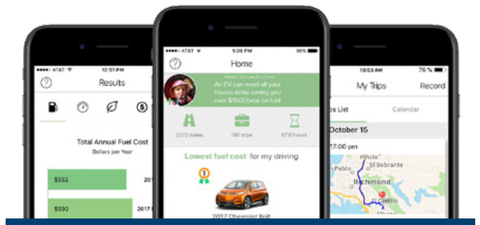
TRANSPORTATION ELECTRIFICATION

Green Light Labs

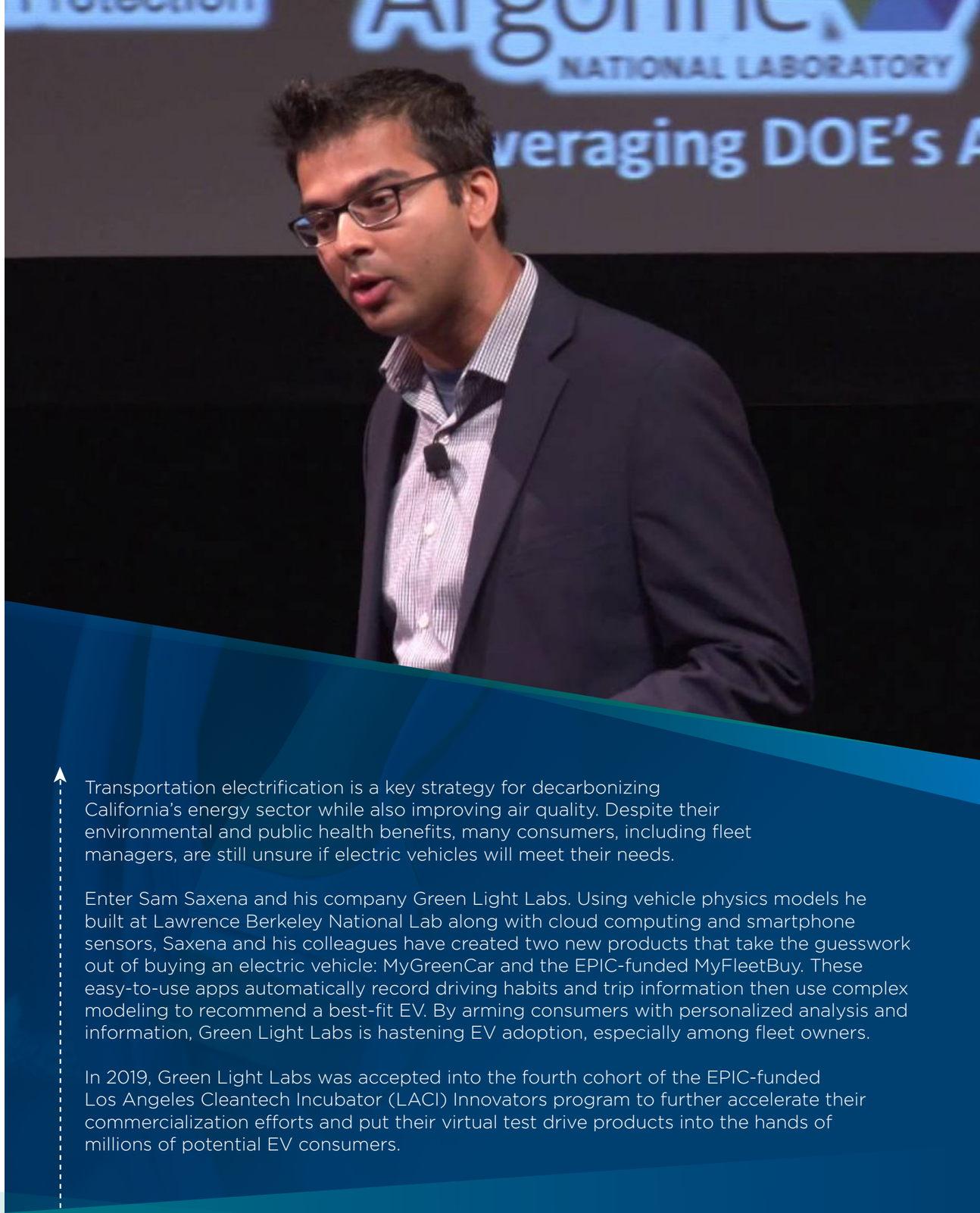
4 fleet operators using MyFleetBuy, including the California Department of Transportation, County of Alameda, City of Oakland, and the City of Fremont

10K fleet vehicles analyzed using MyFleetBuy

$1.1 million in fuel cost savings identified by MyFleetBuy



> *The entrepreneurial ecosystem developed and fostered by the Energy Commission has been an extremely valuable entrepreneurial resource for us.*
>
> – Sam Saxena, Green Light Labs



Transportation electrification is a key strategy for decarbonizing California's energy sector while also improving air quality. Despite their environmental and public health benefits, many consumers, including fleet managers, are still unsure if electric vehicles will meet their needs.

Enter Sam Saxena and his company Green Light Labs. Using vehicle physics models he built at Lawrence Berkeley National Lab along with cloud computing and smartphone sensors, Saxena and his colleagues have created two new products that take the guesswork out of buying an electric vehicle: MyGreenCar and the EPIC-funded MyFleetBuy. These easy-to-use apps automatically record driving habits and trip information then use complex modeling to recommend a best-fit EV. By arming consumers with personalized analysis and information, Green Light Labs is hastening EV adoption, especially among fleet owners.

In 2019, Green Light Labs was accepted into the fourth cohort of the EPIC-funded Los Angeles Cleantech Incubator (LACI) Innovators program to further accelerate their commercialization efforts and put their virtual test drive products into the hands of millions of potential EV consumers.

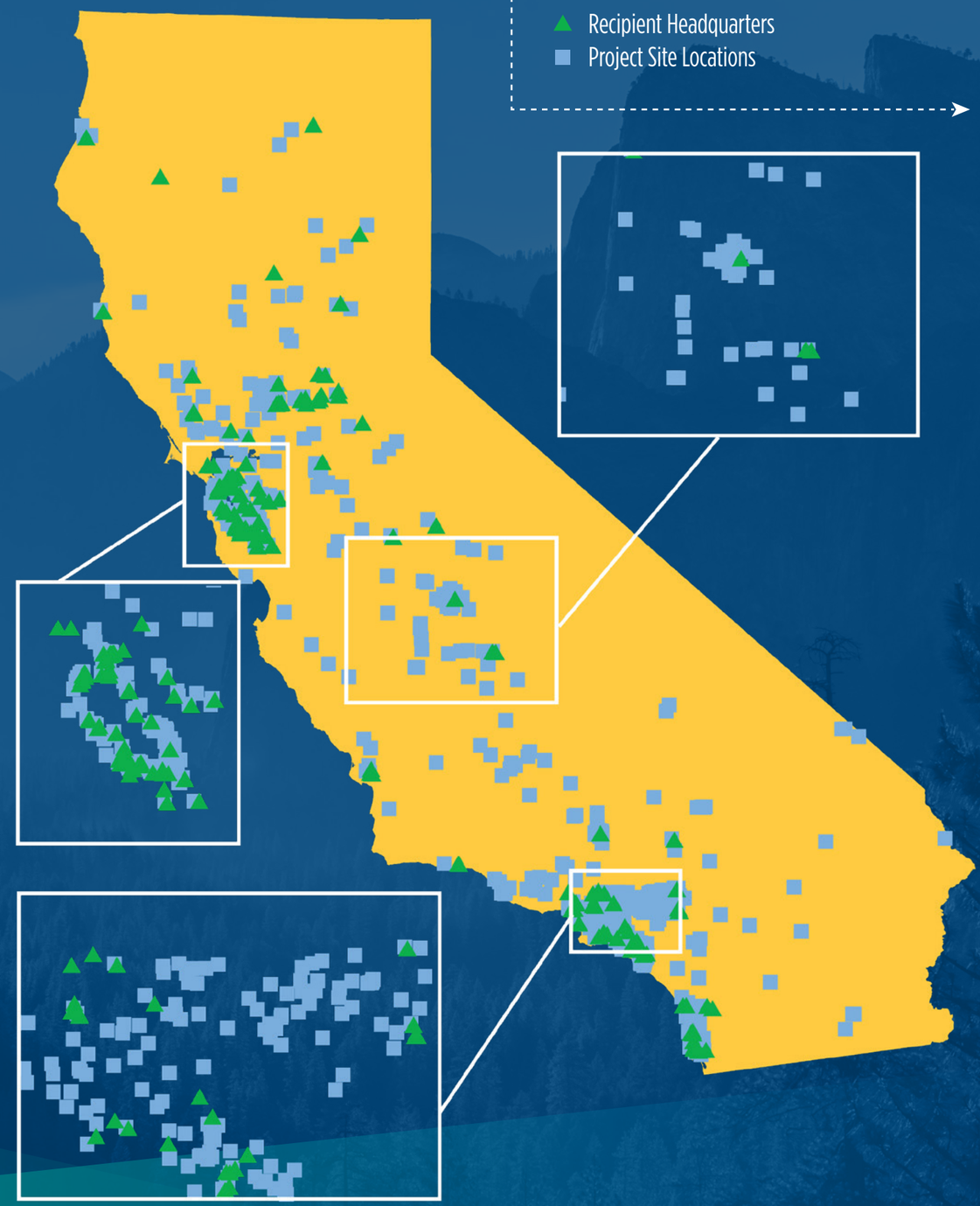
2020 WHAT'S NEXT FOR EPIC

EPIC's investment priorities align with California's climate and energy goals, accelerating their achievement and nurturing innovation from early research and development to market-ready maturity. In the coming year, EPIC will again provide critical funding to the next generation of clean energy solutions and technology such as:

- The Next EPIC Challenge: Reimagining Affordable Mixed-Use Development in a Carbon-Constrained Future
- Scaling up California's medium - and heavy-duty electric vehicle market and smart charging infrastructure
- Portable, affordable heat pumps for renters
- Super-efficient prefabricated building facades
- Improved wildfire modeling deployment
- Lithium extraction in the Salton Sea
- Increasing load flexibility in buildings
- Diverse long-duration energy storage
- Mobile solar + storage for emergencies

EPIC RECIPIENT HEADQUARTERS AND PROJECT SITE LOCATIONS

- Recipient Headquarters
- Project Site Locations



MAY 2020