

Community Colleges Leading the Way in Sustainability and Resiliency



Sara Sullivan
Program Director,
California Renewable Energy
Laboratory





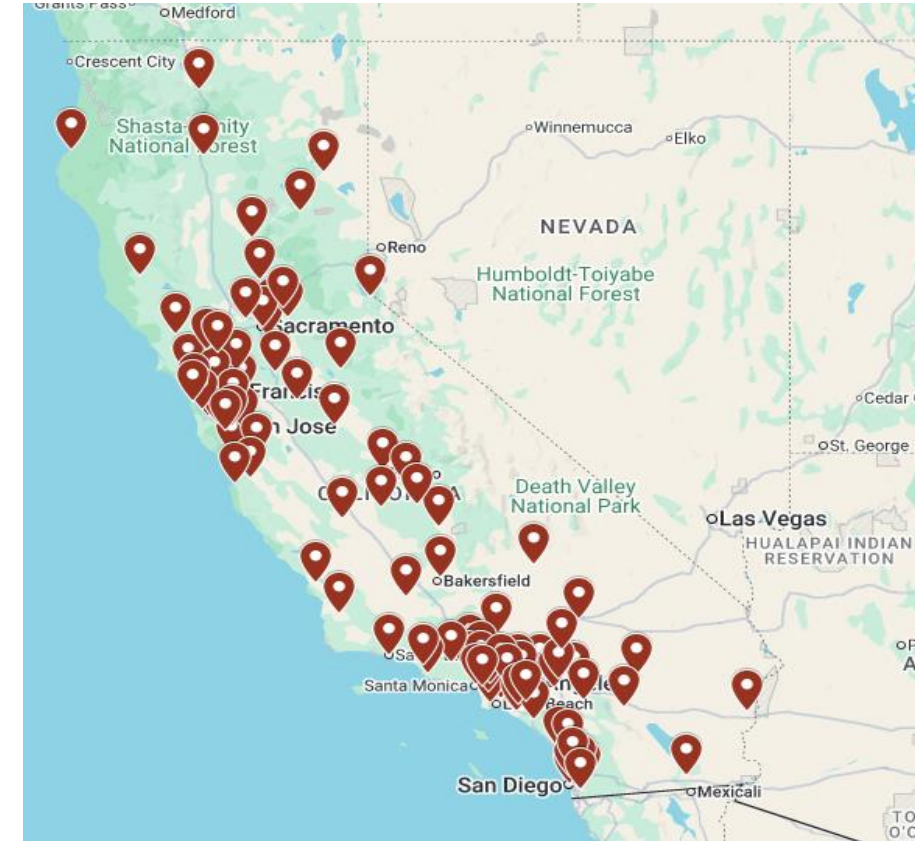
California
Community
Colleges



California Community Colleges



116 colleges
2.2 million students
25,000 acres of land
6,000 buildings



VISION 2030

A Roadmap for California Community Colleges

TAKING CARE OF OUR STUDENTS, OUR COMMUNITIES AND OUR PLANET



Four Fields of Climate Practice for Colleges

1

Sustainable Facilities and Operations

Projects that reduce carbon emissions from campus physical plant and operations, modeling best practices for communities.

Examples include:

Facilities upgrades that decrease energy demand, waste reduction and recycling programs, sustainable purchasing practices, and adoption of low-carbon transportation.

2

Workforce Development for Climate-Ready Careers

Initiatives that build the climate workforce to drive equitable transition to a low-carbon economy.

Training and education in:

Forest/fire management, decarbonization, renewable energy implementation, climate-wise farming, and zero-emission vehicle creation/maintenance.



Colleges as Assets to Communities

Work that builds on the roles of colleges as anchor institutions in diverse communities across the state, leveraging deep community ties to link climate resources with disinvested groups.

Assistance includes:

Disaster response, equitable climate program access, and outreach to less accessible communities.

Climate Literacy and Environmental Justice Curriculum

Forward-thinking curriculum that advances climate literacy and promotes environmental justice, while encouraging both faculty and students to learn and grow together in exploration of our changing circumstances.

Examples include:

Environmental studies courses and degrees; classes in all disciplines that embed relevant climate content (e.g., Environmental Ethics, Climate Fiction-themed English class, Sustainability unit in Nutrition Science).

3

4

“As we look to the future, we do so with urgency, creativity, and determination. California is a global leader in innovation, and so are our community colleges. The world is watching what we do next, and we are leading by example.”

— Dr. Sonya Christian
Chancellor, California
Community Colleges

California Renewable Energy Laboratory (CREL)

- **Serves as a trusted partner** for climate action and sustainability to community colleges and communities across the state
- **Provides access** to state-of-the art technologies and novel design approaches
- **Creates knowledge sharing** through workshops, seminars, workforce development, and technology showcases
- **Collaborates on research and deployment** of climate and energy technologies and experiential learning for the future workforce

CREL Centers of Excellence



**Clean Energy and
Grid Resilience**



**Advanced
Transportation**



**Carbon
Management**



**High-Performance
Buildings**

***Student
engagement***



***Statewide
reach***



***Economic
mobility***

High-Performance Buildings Centers of Excellence

1. Student centered applied research:

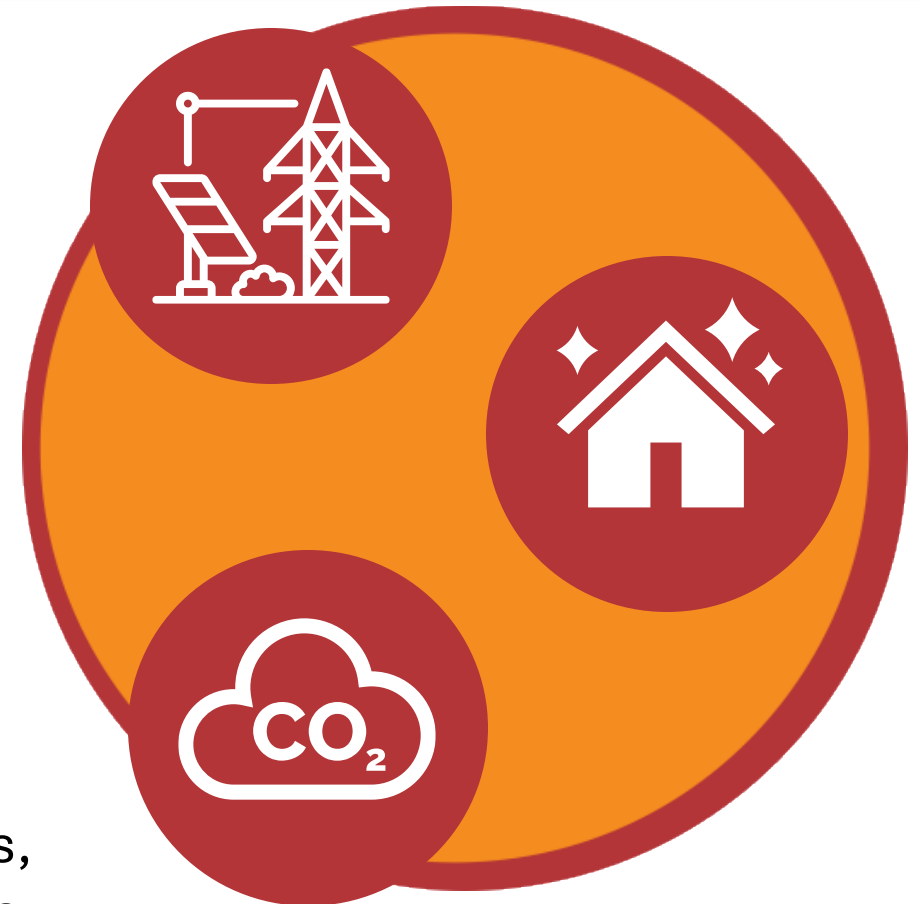
- Summer 2026 student research project
- Campus as a living laboratory

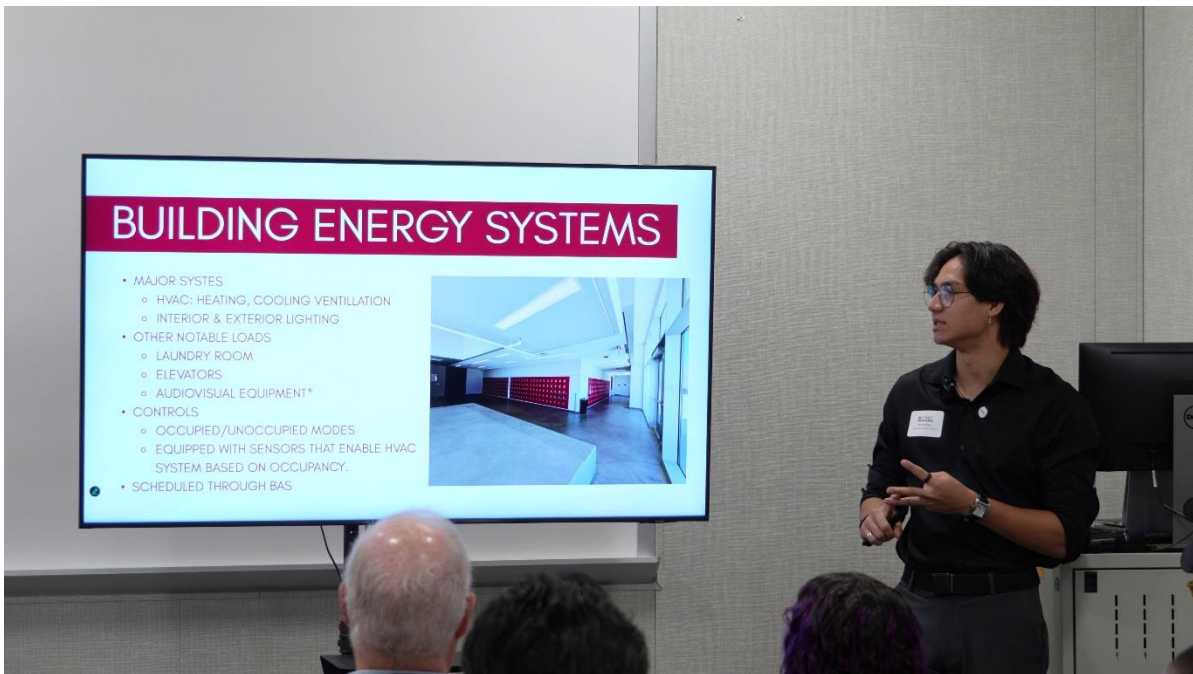
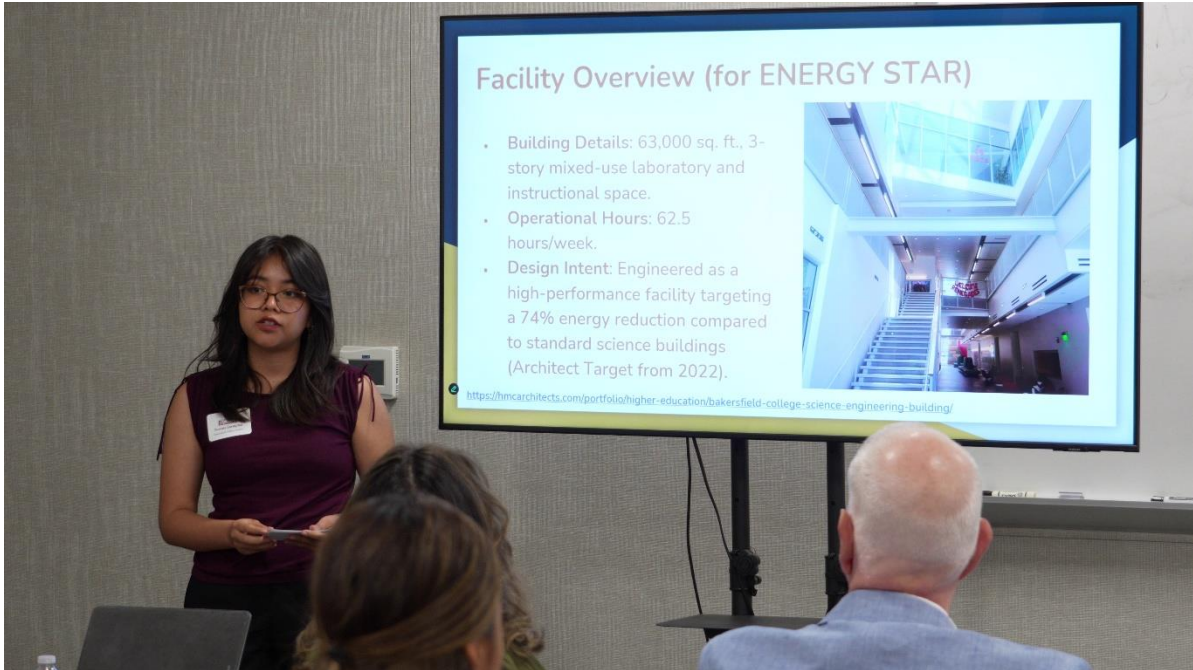
2. Technical assistance

- Established partnerships with Lawrence Berkeley National Laboratory and the Building Efficiency for a Sustainable Tomorrow (BEST) Center

3. Communities of practice and learning cohorts

- Foster collaboration among district leaders, facilities teams, sustainability coordinators, and faculty to share knowledge and best practices for sustainability planning.





UPCOMING SERIES!

COMMUNITY OF PRACTICE FOR HIGH PERFORMANCE BUILDINGS



Application Open in October 2026

10-Month Series Launching in January 2027

- ▶▶▶ Build technical capacity within California Community Colleges
- ▶▶▶ Potential access to seed funding for small projects
- ▶▶▶ Support planning, implementation, AND education
- ▶▶▶ Create a statewide peer-learning network and working groups

INTERESTED?
SIGN UP HERE



Green Schools and California Community Colleges

09.15.26

Ida A. Clair, FAIA
State Architect

California Leads the Way

EXECUTIVE ORDERS BY BROWN ADMINISTRATION



B-16-12

Set goal of 1 million ZEVs by 2020



B-30-15

Greenhouse gas emissions 40% less than
1990 levels by 2030

AB 32 (2006) 1990 levels by 2020

B-55-18

Achieve statewide carbon neutrality by 2045

AB 1279 (2022) 85% below the 1990 levels





7,745,721
U.S. EV Sales



2,702,646
CA EV Sales



216,455
CA EV Chargers



68
CA Hydrogen Stations



137
CA Light-Duty Models
Available



1,507
CA Medium/Heavy-
Duty EV Trucks



2,555
CA EV Buses



1,795
CA EV Delivery Vans

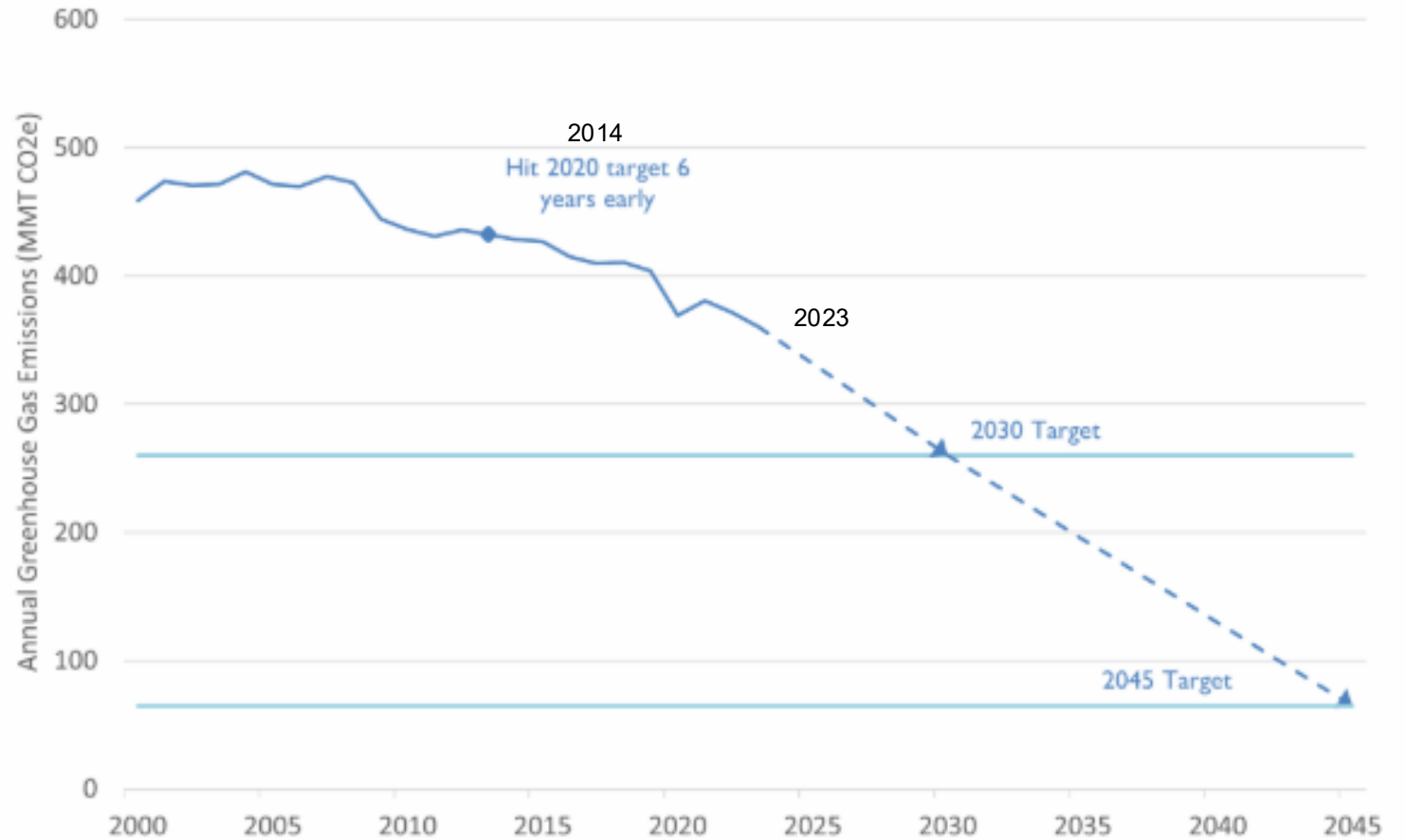
CALIFORNIA LEADS THE WAY

1990 Levels: 431 MMT CO₂e

2004 Levels: 492 MMT CO₂e (Highest Recorded)

2023 Levels: 360 MMT CO₂e (Equal to taking 26.2M cars off the road for 1 year)

Estimating 48% of 1990 levels by 2030.



AB 1279 (2022) Target:

85% below 1990 levels in 2045 and achieve carbon neutrality (the remaining 15% of emissions in 2045 will be addressed through carbon dioxide removal).

CALIFORNIA LEADS THE WAY



GOVERNOR NEWSOM'S EXECUTIVE ORDERS

N-19-19

Requires every aspect of state government to redouble its efforts to reduce greenhouse gas emissions and mitigate the impacts of climate change while building a sustainable, inclusive economy.

N-79-20

Sets a goal that 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035.



Benefits of climate action in California



Carbon-free electric
grid

On Track



52%

Decrease in greenhouse gas emissions from electric
power from 2008 - 2023

On Track



2,213,296

Zero-emission vehicle sales through 2024

On track



\$100 billion

In consumer savings from energy efficiency standards

Learn More



\$200 billion

Value of avoided health impacts in 2045

Learn More



544,604

Clean energy jobs in California in 2023

Learn More



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**DGS** CALIFORNIA DEPARTMENT OF GENERAL SERVICES **Division of the State Architect**

For example, how to sell to the state?SEARCH

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Sustainable School Facilities

Learn how schools can incorporate sustainability measures and achieve net zero energy and net zero carbon school facilities.



LEGISLATION & EXECUTIVE ORDERS	+
GETTING TO ZERO OVER TIME COHORT	+
TRAINING	+
CALIFORNIA SUSTAINABLE SCHOOLS SHOWCASE	+
SUSTAINABLE SCHOOLS & RESILIENCY RESOURCES	+
GRANTS & FUNDING RESOURCES	+
WATER CONSERVATION RESOURCES	+

Increase school facility energy efficiency and reduce greenhouse gas emissions with each new construction and modernization, leading to a zero net energy and zero net carbon future.

2016 CALGreen: Model Water Efficient Landscape Ordinance (MWELO)



Accomplishes large water savings by choosing climate adapted plants, improving soil conditions, using, and maintaining high efficiency irrigation equipment and managing the irrigation schedule to fit the plants water needs as they are influenced by local climate.



Requires Shade
Trees to provide
shade to:

50% of parking
areas
within 15 years

20% of landscape
areas within 15
years

20% of hardscape
areas within 15
years



Photo by [Ryan Jacobson](#) on [Unsplash](#)

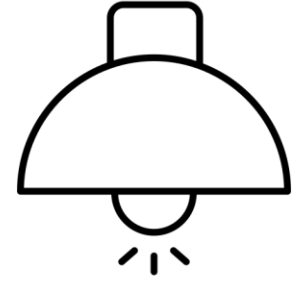
2019 CALGreen: Shade Trees



2019 Energy Code and CalGreen

Acceptance Testing Requirements for Lighting and HVAC systems:

- Ensures that the installed equipment is operating as designed and in compliance with the Energy Code.
- Requires certified Acceptance Testing Technicians (ATTs) to be used for
 - ✓ Indoor and Outdoor Lighting and Controls
 - ✓ HVAC Systems and Controls



Created by Made
from the Noun Project



Created by Ranah Pixel S

CO2 Monitors in new K-12 classrooms



Reduce Emissions through Electrification

Advance Resiliency & Equity



2022 Energy Code

- Heat Pump Technology
- Solar PV
- Battery Storage



2022 CALGreen: EV Charging

- 20% EV capable spaces (infrastructure)
- 25% of EV capable spaces provided with a charger

Photo by [myenergi](#) on [Unsplash](#)

Mandatory Measures

50,000 sf and greater for K-12 schools and community colleges

BUILDING REUSE

Reuse existing building, maintain 45% of the existing structure and enclosure.

WBLCA

Performance Path- Conduct a cradle-to-grave whole building life cycle assessment demonstrating at 10% reduction in global warming potential (GWP).

PRESCRIPTIVE PATH

Comply with product GWP limits established in the BCCA. Based on 175% of IW-EDP GWP values (weighted average alternate available for concrete).

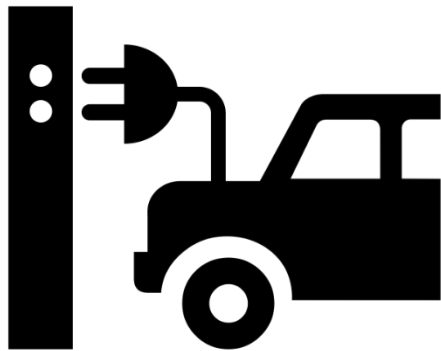
2022 Intervening Code Cycle Carbon Reduction Regulations

2022 INTERVENING CODE CYCLE: CALGREEN

EV Charging: Charging Power Alternative and Existing Facilities

New parking facilities:

Requires Level 1, Low Power Level 2 or Level 2, or any combination thereof, providing a minimum total power based on number of parking spaces in a facility.



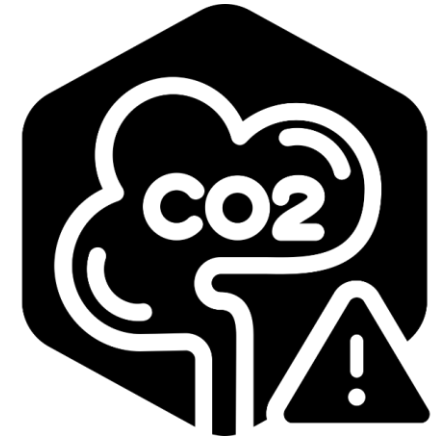
For existing facilities:

Required if installing new light fixtures in existing parking, adding to parking facilities, or installing solar PVs over parking. Requires chargers to be installed in EV capable spaces when a project is submitted to DSA.

Created by Luis Prado
from Noun Project

CO2 Monitoring: Existing Facilities

Requires CO2 monitors in existing K-12 classrooms when a building is modernized.



2025 CALGREEN:

Requires CO2 monitors in all classrooms and similar rooms including Community Colleges.



Mandatory Measures for Schools

- Bicycle parking
- Electric vehicle charging
- Light pollution reduction
- Grading to manage surface water flow
- Shade trees
- Water conserving plumbing fixtures
- Outdoor potable water use in landscape areas
- Water resistance and moisture management
- Building Reuse
- Construction waste disposal and recycling
- Recycling by occupants
- Pollutant control during construction
- Finish material pollutant control
- MERV-13 filters
- CO2 monitoring in classrooms
- Acoustical control and exterior noise transmission
- HVAC refrigerants without chlorofluorocarbons and halons
- Embodied Carbon of Materials



HOME » DIVISION OF THE STATE ARCHITECT » RESOURCES » CALGREEN CODE DEVELOPMENT

CALGreen Code Development

Learn about the role of DSA in proposing changes to the building code regulations related to green building standards for public K-12 schools and community colleges.

CONTACT CALGREEN CODE DEVELOPMENT

Headquarters Office
1102 Q Street, Suite 5100
Sacramento, CA 95811
(916) 445-8100

In order to promote sustainability, DSA collaborates with stakeholders, experts and public entities to develop green regulations that govern the construction of buildings in California. We propose changes to the California Building Standards Code ([Title 24 Overview](#)), as well as develop and publishing interpretations of code and policies and procedures necessary for stakeholder understanding and coordination of enforcement among the DSA regional offices.

The building code becomes law when it's formally enacted by the appropriate authority. We are one of several state agencies that propose changes to the California Building and Administrative codes through the Building Standard Commission's rulemaking process. The creation of regulation is directed through law. Regulations govern how the law will be enforced.

Some documents posted on this webpage use underline, strikethrough, italic, and ellipsis. If you use assistive technology, such as a screen reader, please adjust your settings to recognize these ASCII (American Standard Code for Information Exchange) characters.

Expand All

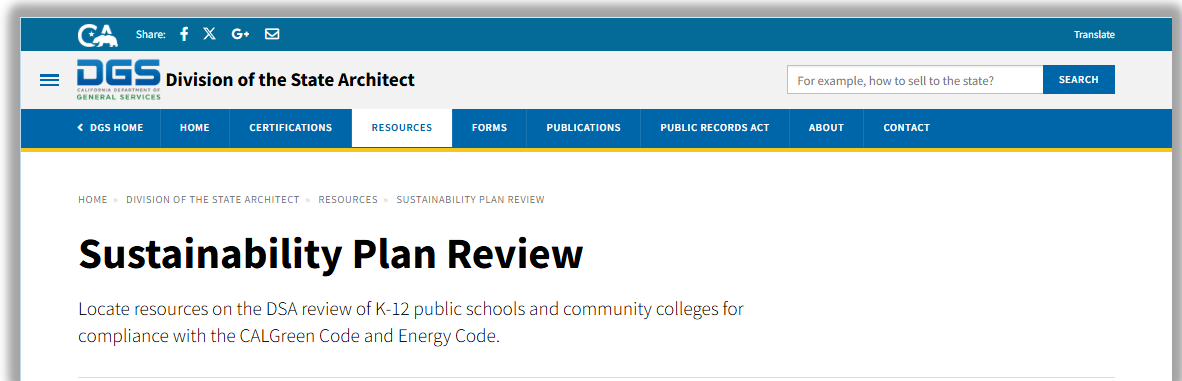
DSA CALGREEN (DSA-SS)	+
DSA-SS ACTIVE RULEMAKING	+
DSA-SS RULEMAKING ARCHIVE	+

Regional Sustainability Architect (RSA)

- New positions to support the DSA Sustainable Schools Program
- One in each DSA regional office:
 - Los Angeles – Barbara Gonzalez
 - San Diego – Somayeh Tabatabaee
 - Sacramento – May Lin Chan
 - Oakland – In Hiring Process



- Greater support at pre-application meetings
- Greater compliance of requirements
- Understanding of challenges in implementation
- Understanding of resources that need to be developed



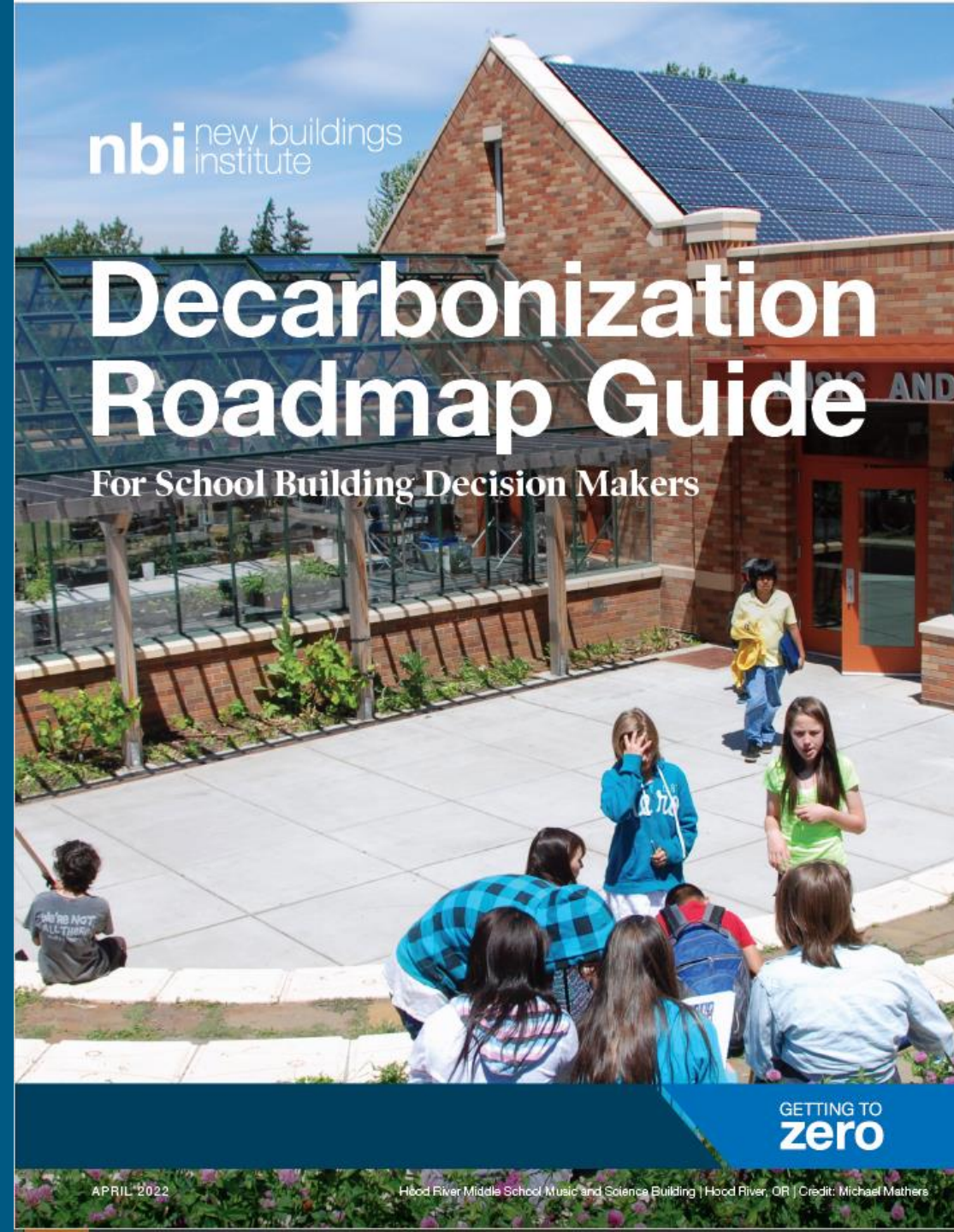
RSAs will:

- Assist with Plan Review of Pre Check Designs (PC) for:
 - CALGreen Compliance
 - Energy Compliance
- Perform Intake process for CGE Verification:
 - DSA 403, and 403-PC
- Review OPSC Supplemental Energy Efficiency Grant submitted to DSA

Decarbonization Toolkit

- Stakeholder Engagement
- Goals
- Resolution
- Facility Assessment
- RFP
- Interview Q's
- OPR
- Project Checklist
- Reporting Template
- Media Release
- ZNC Bond Criteria

Decarbonization Roadmap Guide for School
Building Decision Makers - New Buildings Institute





DSA 403 / 403-C

TRAINING FOR ENERGY CODE AND CALGREEN CHECKLISTS FOR SITE SPECIFIC DESIGNS

Curriculum

CALGreen & Energy Code Checklists for Site

1 hour





PR 18-02 / 403PC

CALGreen & Energy Code Procedures

Curriculum

CALGreen & Energy Code Procedures and





Video

Induction Cooking and the All-Electric,

2 hours, 5 minutes





Curriculum

California EVCS Accessibility:




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HOME > DIVISION OF THE STATE ARCHITECT > RESOURCES > DSA ACADEMY

DSA Academy

DSA Academy provides training on school construction plan review, building code application, accessibility requirements, and other related topics under DSA's jurisdiction.



Climate Fellow

California Community Colleges
Chancellor's Office

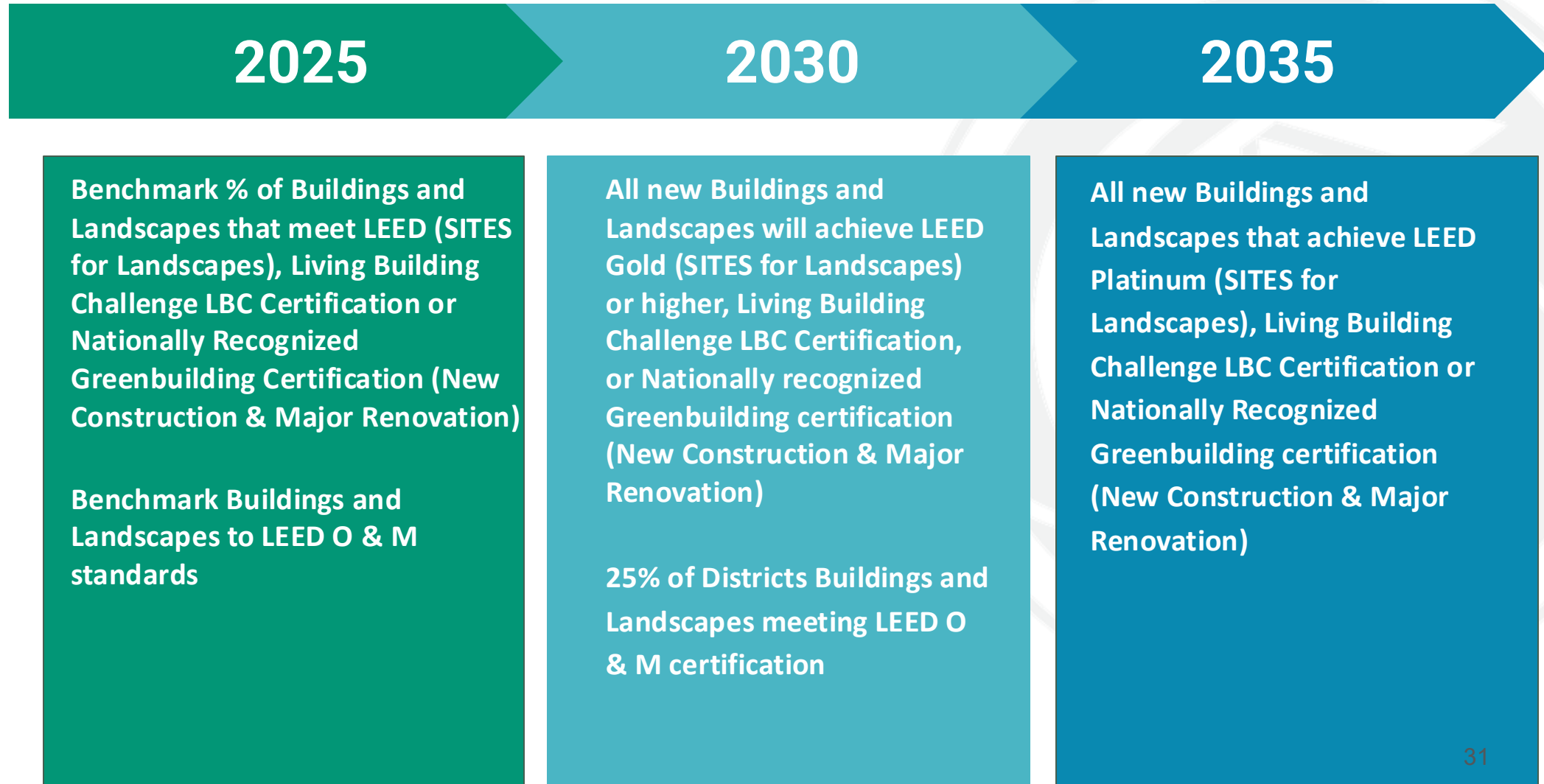
**Senior Strategic Advisor High-
Efficiency Buildings,**
California Renewable Energy Lab
(CREL)

Eera Babtiwale, LEED AP BD+C, LFA

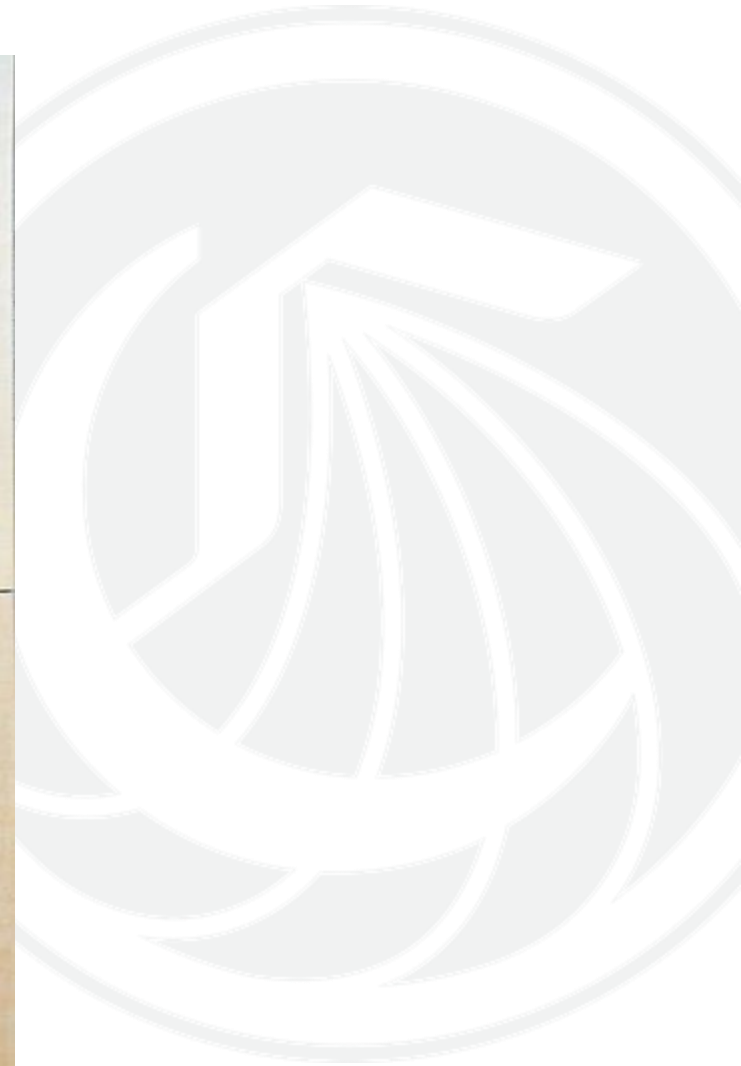
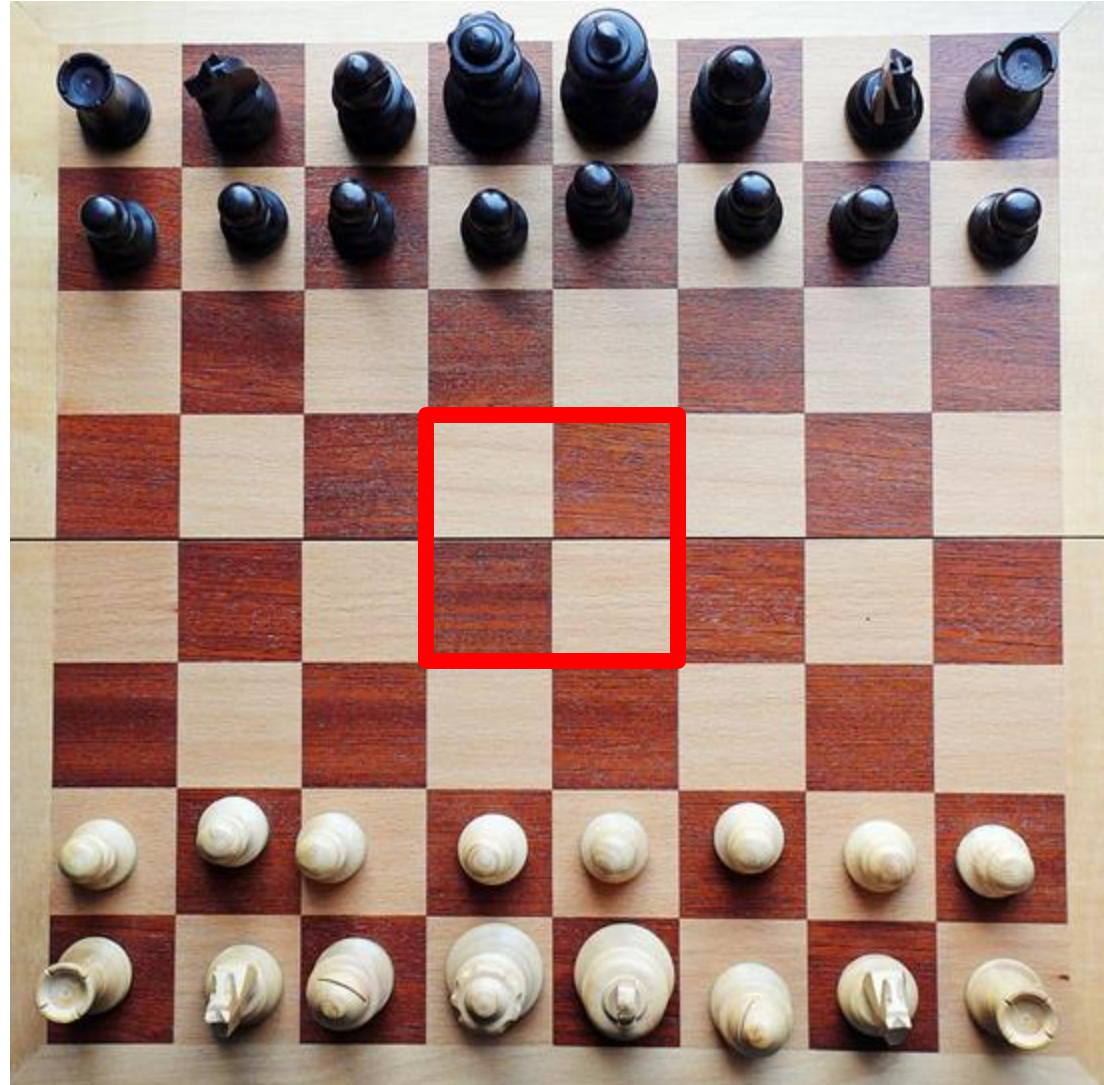
Strategizing with Competing Demands and Timelines



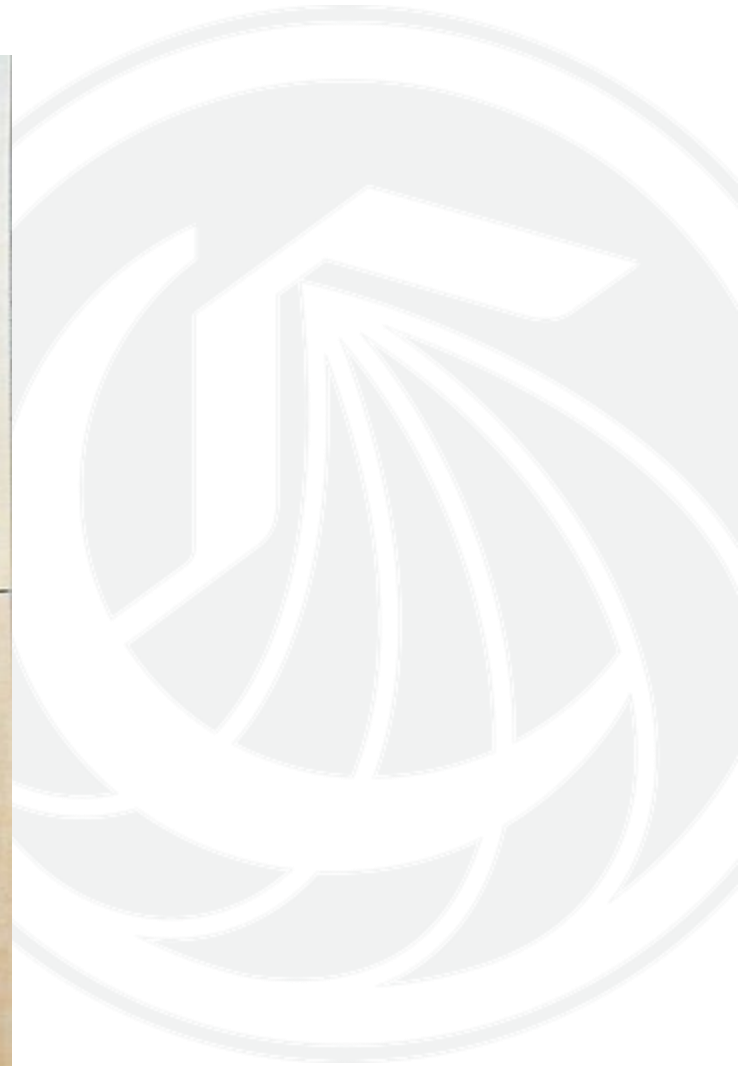
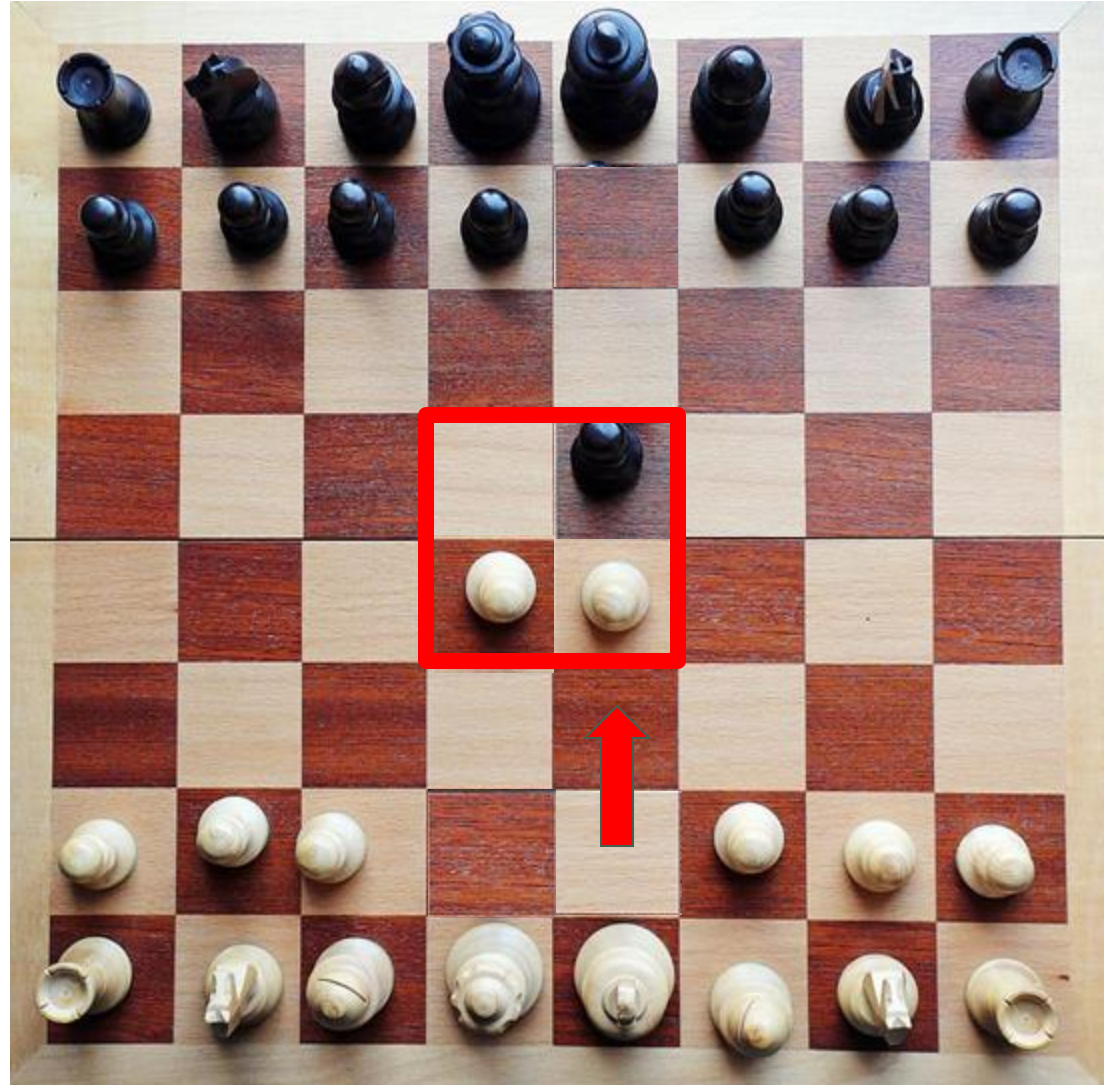
CCC BOG Sustainability + Climate Action Goals (Green Buildings)



Control the Center = FUSION



Think Ahead = What Goal/Milestone is Ahead?



Don't Move Same Piece 2xs = Don't Duplicate Effort



Connect Your Rooks = Find Synergies



Strategizing with Competing Demands and Timelines



Applying Chess Strategy to the Process

Principles



Tools



Center



Checkmate

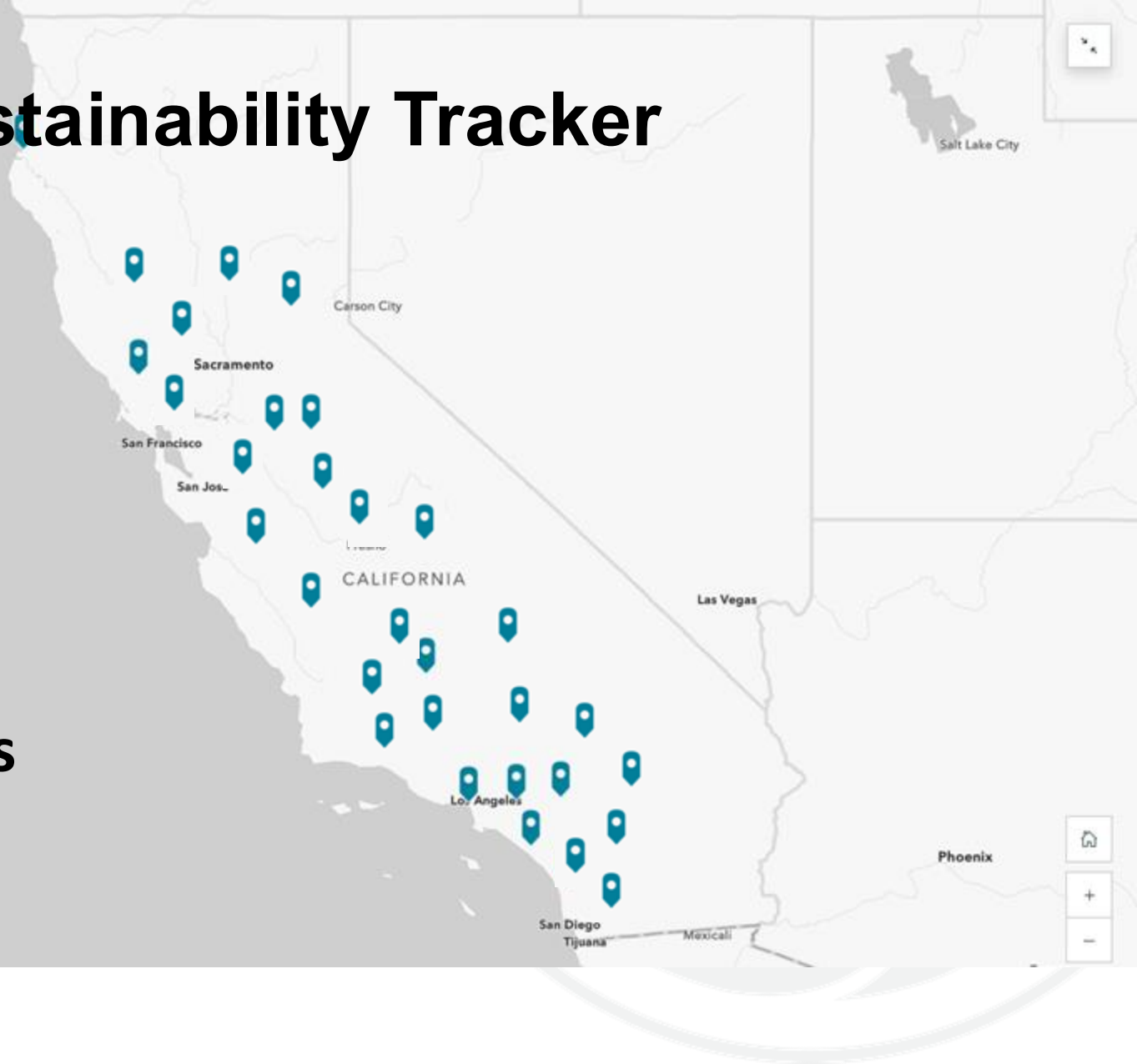


CCC Climate Action + Sustainability Analysis

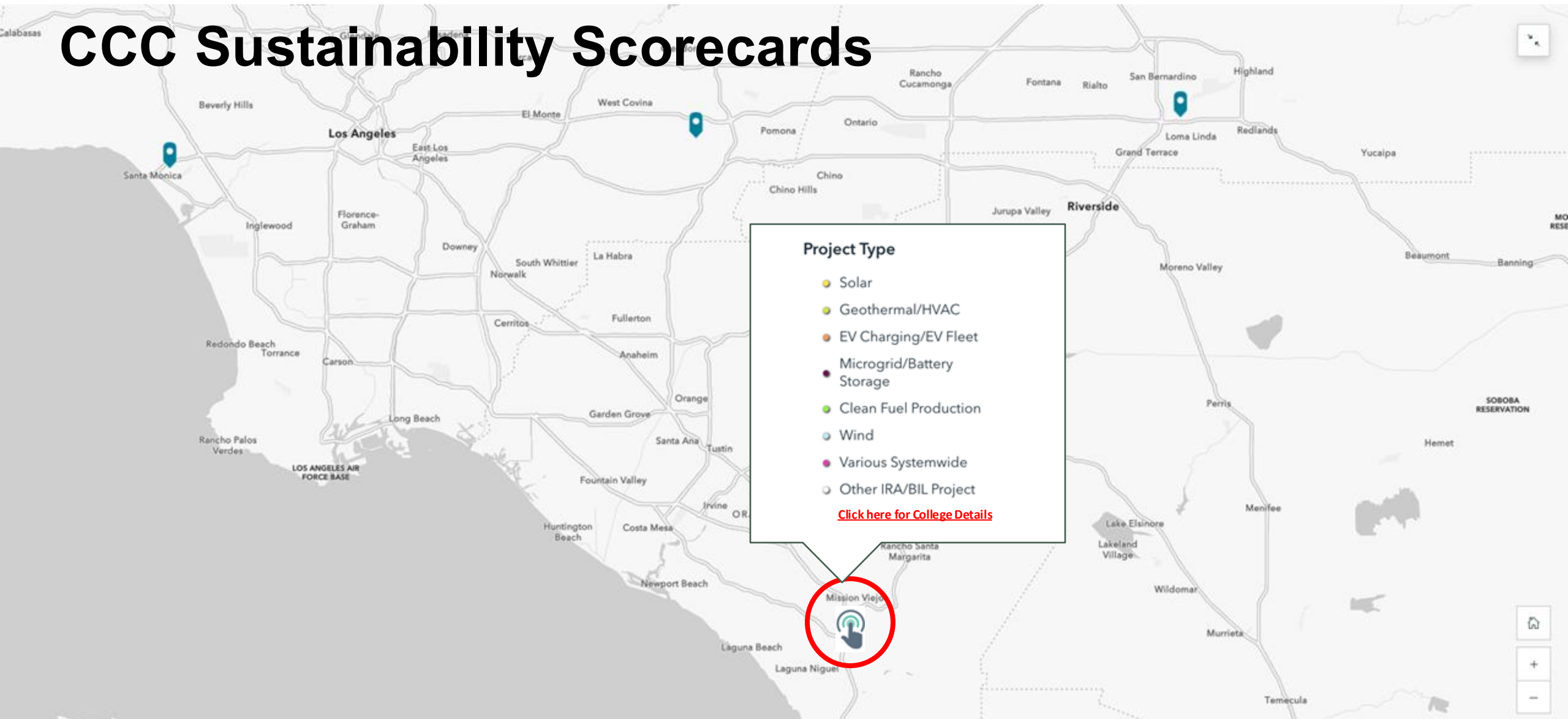
Energy	Solid Waste	Water	Building & Grounds	Food Systems	Procurement & Purchasing	Greenhouse Gas Emissions	Transportation
6,000 (2.5mW) solar panels across multiple parking lots at the Santa Maria	using carpets made from recycled materials, using low VOC paints and Current Projects/Status: Campus Events & Operations responsible for campus	Current Projects/status: waterless urinals, installing automatic controls on Current Projects/status: (near decade-old statistics) water usage for	Campus standard- all future designs of buildings are drought Current Projects/Status: AVC has 120 acres of which includes turf	Goals- included in procurement	Goals: create a community garden for organic produce: purchase	Goals: encourage landscape design clean air strategies:	Current Projects: Updating from older vehicles to more efficient vehicles. Free transit through Kern Transit for all students
N/A	N/A	N/A	N/A	N/A	N/A	do not have sustainability department, so it is not currently	As of July 1 2025, BCC has partnered with Victor Valley Transit Authority to provide fare
Current Projects/Status: variable air volume air handling units, variable N/A	Current Projects/Status: annual college operations waste stream recycled N/A	Current Projects/status: on well water; water and lavatory sensors, low-flow N/A	Current Projects/Goals: Butte College has exceeded Title 24 N/A	N/A	facilities is separate department but tries to be as efficient as N/A	do not have sustainability department, so it is not currently N/A	Current Projects/Status: operates one of the largest student-funded community college N/A
Current Projects/Status: used Prop 39 money to commission various LED Current Projects/Status: California Community Colleges/Investor Owned Current Projects/Status (LPC): 2.4 mW of photovoltaics on campus: Science Current Projects/Status: exterior building lighting fixtures and bulbs were Current Projects/Status: campus has undergone three retro-commissioning Current Projects/Status (OCC): 4 MW capacity photovoltaic array: energy install PV shade structures, further EV charging stations, carpooling incentives Current Projects/Status (DVC): photovoltaic shelter/roof systems in the	Current Projects/Status: "Plastics to Fuel" program- goal of the program is to Current Projects/Status: Board of Trustees adopted "Break Free From Current Projects/Status (Chabot): school has reduced the number of hardcopy Current Projects/Status: quantities and types of materials recycled are tracked. Current Projects/Status: paper (bound material, packing and newspaper). Current Projects/Status: 3-acre, publicly available OCC Recycling Center- has all N/A Current Status/Plans (Los Medanos): plans to increase information to the N/A	Current Projects/status: Water and lavatory sensors, low-flow fixtures. Current Projects/Status: redeveloped the landscaping with native Current Projects/Status (LPC): refillable water bottle stations, reclaimed water Current Projects/Status: two water bottle filling stations installed at the Current Projects/Status: the college has implemented two xeriscaping projects Current Projects/Status: Centralized Control System for landscaping saves Create Landscaped storm water detention areas Current Projects/Status (DVC): use of recycled water in DVC's lavatories and N/A	Leed Certified Projects: Industrial Training Edu Building Leed Certified Projects: Performing Arts Center, Health & Wellness Leed Certified Projects: Chabot College Biological Sciences Annex Current Projects/Status: college contracts with a local shepherd to Current Projects/Status: synthetic turf at the football stadium, softball Leed Certified Projects: Recycling Center, Consumer & Science Lab Enhanced building entrances and increased landscaped buffer for Current Projects/Status (DVC): The Commons and Student Services Current Status/Projects: Habitat Conservation Plan (HCP)	Looking at programs to reinstate organic food N/A Informal efforts to share and reuse food are ongoing Rancho Cucamonga campus (main campus)- only campus Expanding efforts towards composting and food waste Current Projects/Status (OCC): Pirates' Cove Food N/A Culinary Art departments at CCC and DVC have N/A	Cabrillo Sustainability Council introduced and implemented purchasing policy that eliminates campus and food vendor Plastic Reduction Pledge in procurement, Avoided bulk Created priority listing of local vendors to support locally grown Adopted sustainable purchasing policies to meet environmental N/A N/A N/A N/A district is starting to work with director of procurement to N/A	Reduce GHG emissions 2% annually and achieve carbon Invested in solar power to offset 85% of campus energy use Increasing EV Charging, bike infrastructure, pursuing LEED semi-relevant- signed college president's climate commitment- Reduce annual GHG emissions to 1990 levels and achieve neutrality N/A N/A N/A Districtwide- Scope 1 & 2 (2 partially complete), not 3 N/A	Current Projects/Status: Electric Vehicle charging infrastructure was installed in GoPass Program for unlimited transit use /implemented at a variety of CCs in LA Current Projects/Status (LPC): buses are free for students and staff /student Current Projects/Status: college has installed electric vehicle charging stations Conducting commuter surveys to understand student transit needs. Current Projects/Status: Campus in close proximity to residential neighborhoods and Increasing EV chargers + carpooling incentives. Free Metro GoPass for all N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Solar array has been employed since 2013- though half has been turned off for Solar Power Generation: Conducted feasibility studies for photovoltaic (PV) Current Projects/Status: solar panels on campus hatchery, solar heating system Current Projects/Status (De Anza): LED lighting: sensors that turn off lights in Contracted Sizer(?) Co. energy solutions to help with BMS systems	there was a trash inventory with Burrtec local waste agency Bottle Refill Stations: Installed in new buildings, including the Behavioral Social Current Status/Projects: dorm waste diversion project: campus recycling Current Status/Projects (De Anza): campuswide recycling operation: Dining On-site composting, mandated recycling, & yard waste (from	Non potable water used for most irrigation on campus Reclaimed Water Systems: Installed around the Art and Behavioral Social Initiated efforts with a water recirculation system, reducing storm water runoff to Current Projects/Status (De Anza): low-flow showers and irrigation All new hunter HCC controllers for irrigation- weather sensing feature to	LEED certified buildings: Nursing and Health Sciences, Silver (Operations): Green Cleaning Products: Integrated Hilliard green working with NTD architects to renovate buildings with optimum Current Projects/Status (De Anza): landscaping around campus Current Projects/Status: Gavilan College Arboretum (opened in achieve Silver LEED certification when it is complete	N/A N/A Exploring food waste composting with Current Projects/Status (De Anza): green vegetables New food vendor uses compostable ware- set them	N/A N/A Increasing use of reusable and compostable products and	CoD has not done any GHG inventory scope 1, 2, or 3 N/A Working with PG&E to identify energy saving initiatives: Has not	- 2 charge ports on campus, owned by the city of Palm Desert- 150 being planned for Safe Drop-Off/Pick-Up Locations: Established near the Student Services Expanding bike use on campus with Bicycle Barn 15 EV chargers on site (went thru chargepoint on new site 5 chargers, 10 Glendale Beeline Student passes can be purchased in the ASGCC Business Office

CCC Climate Action + Sustainability Tracker

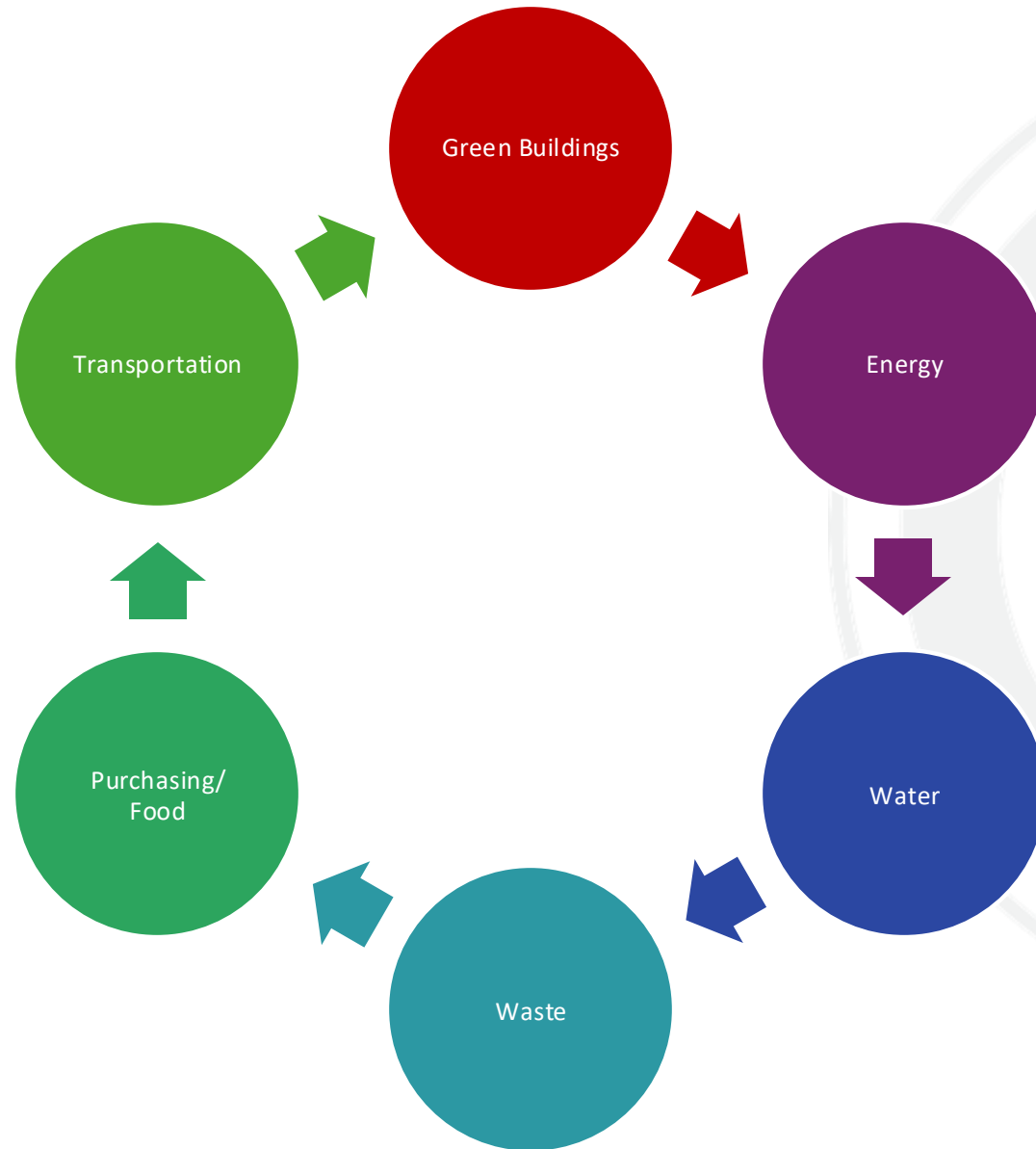
116 California Community Colleges



CCC Sustainability Scorecards



Fusion Sustainability Module



Fusion Sustainability Module

Energy					
Verified EUI, natural gas and renewable-energy metrics					
CCC Goal: Benchmark EUI, % of energy from natural gas and % of energy from renewable energy; by 2030 reduce EUI 25%, reduce natural gas use 30%, and reach 50% renewable energy; by 2035 reach 50% EUI reduction, 75% natural-gas reduction and 100% renewable energy.					
2026 Benchmark					
Metric / Question	Recommended data source	Verified credit / reference	Reporting unit	Guidance / crosswalk notes	Verification
Campus / district EUI	ENERGY STAR Portfolio Manager; FUSION energy + FUSION floor area; AASHE STARS report if available	AASHE STARS 3.0.1 – OP 5.1 Energy consumption per square meter; ENERGY STAR Portfolio Manager – Site EUI	CCC recommended: kBtu/ft ² /year; STARS: kWh/m ² /year	Use Site EUI for operational benchmarking. STARS and ENERGY STAR use different units, so convert rather than mixing values.	Verified
% of total energy from natural gas	FUSION annual natural gas + electricity data; district utility data	CCC 2025 Climate Action & Sustainability Goals; AASHE OP 5 total site energy methodology as supporting reference	% of total site energy	Convert electricity and natural gas to a common energy unit (e.g., MMBtu or MWh-equivalent) before dividing natural-gas energy by total site energy.	Verified
% of total energy from renewable energy	AASHE STARS report if available; district renewable generation/purchase data	AASHE STARS 3.0.1 – OP 5.3 Percentage of energy from renewable sources	% of total annual energy consumption	This is the closest direct match to the CCC goal. Do not use OP 5.4 unless the intended metric is specifically renewable electricity.	Verified
Ongoing Tracking					
Metric / Question	Recommended data source	Verified credit / reference	Reporting unit	Guidance / crosswalk notes	Verification
EUI reduction from baseline	ENERGY STAR Portfolio Manager or standardized CCC calculation	ENERGY STAR – Site EUI; AASHE OP 5.1 supporting benchmark	% reduction from baseline; underlying kBtu/ft ² /year	Apply the same floor-area boundary and site-energy conversion methodology each year.	Verified
Natural gas consumption	FUSION annual Energy Usage / ENERGY STAR natural gas meter / utility records	CCC FP 26-05 Energy Usage; ENERGY STAR – Natural Gas meter; SIMAP Scope 1 stationary combustion	therms/year or MMBtu/year	Use actual annual gas consumption as the activity metric; calculate % reduction from the fixed 2026 benchmark.	Verified
Renewable energy share	District renewable generation/purchase records; AASHE STARS; ENERGY STAR green power as supporting source	AASHE OP 5.3; ENERGY STAR Green Power (onsite solar/wind and qualifying offsite green power)	% total annual energy	Portfolio Manager's Green Power functionality is strongest for renewable electricity and REC ownership; it is not a complete substitute for STARS OP 5.3 where renewable thermal fuels are relevant.	Supporting / partial

Future Metrics Tracking

116 Colleges



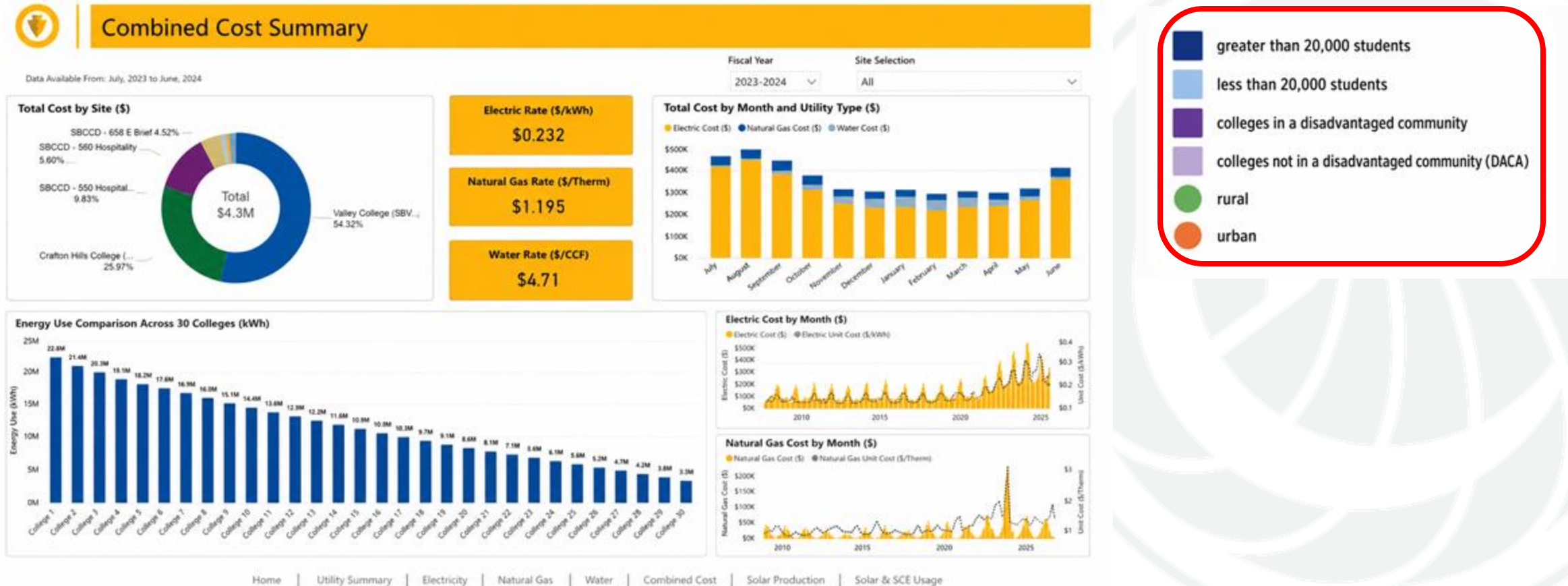
Future Metrics Tracking

116 Colleges

CO



Contextualizing the Data



Thank you!

Email: eerawati.babtiwale@kccd.edu



Sustainability Initiatives for Bakersfield College

Marcos A. Rodríguez

MSci., MBA, PCA, QAL, CA, TRAQ, UCMG

*Executive Director for
Facilities & Operations*

Embodied Carbon Projects



Cool Surface Projects



Facades

Agriculture Sciences Building

New Construction



Cool Roofs

Campus Wide



Concrete Surfaces

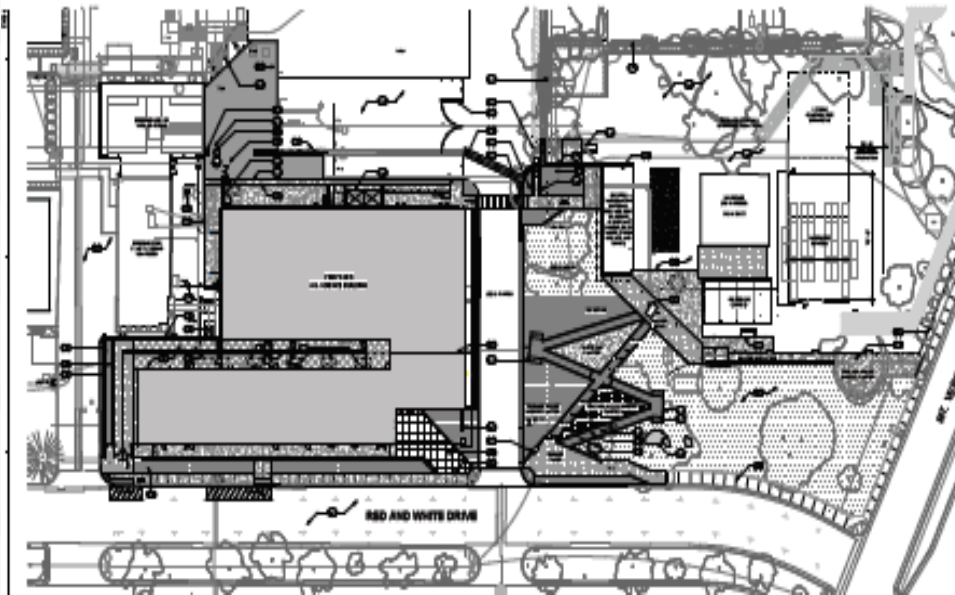
Polymer Coatings



Tree Placement

Adjacent to Buildings

Agriculture Sciences Building



- Analyze the Fundamental Principles
- Solar Heat Index Properties –
 1. Solar Reflectance (SR)
 2. Emissivity
 3. Solar Reflectance Index (SRI)
- Investigate the Specific Heat Reflective Properties
 1. Different Metals
 2. Various Finishes
- Impacts on Building Cooling Loads

Concrete Polymer Overview – Campus Center

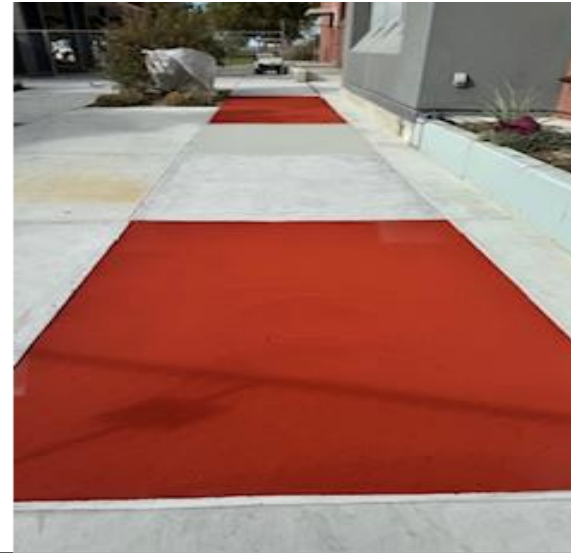


Site Preparation

Repair All Cracks
Ensure All Drains are
Functioning Properly

Caring for the Surfaces
Keeping Vehicles Off

Staff Education



Reducing The Heat Island Effect

Extreme Temperatures
Making It Tolerable

Student & Staff
Enjoyment

Why We Did It



**BAKERSFIELD
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Tree Plantings – Welcome Center

Analyze the principles of strategic tree planting for energy savings

Explain the specific mechanisms for energy savings in this climate: primarily summer shading to reduce cooling loads, and secondarily, the role of windbreaks.

Considering their growth habits, canopy size, and overall suitability for energy conservation.

Detail optimal tree placement and distances from a building to maximize shading and cooling benefits while mitigating risks from root systems and branches.



Tree Activities In Our Urban Forest



Eight Utility Arborist Classes

Four Tree ID Classes

Three Tree Care Seminars

One ISA TRAQ Certification Course

Four ISA Arborist Certification Classes with TFOK



Tree Plantings

Trees Planted Since 2021 - **655**

Transplanted Trees
(Spaded/Craned/Dug) - **85**

Arvin – **110** & BCSW – **150**

Delano – **80** & Panorama - **1675**

Total BC Tree Inventory –
2015/10.39 per acre

Tree Classes



Recognition



2021

2022

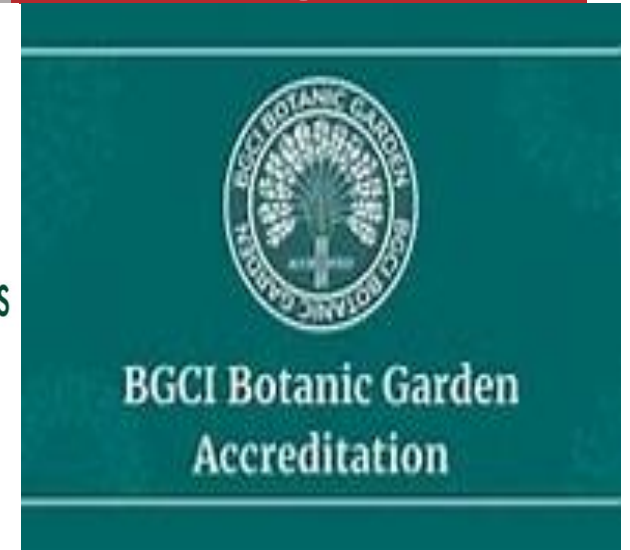
2023

2024

2025



Future Recognition



Renewable Energy

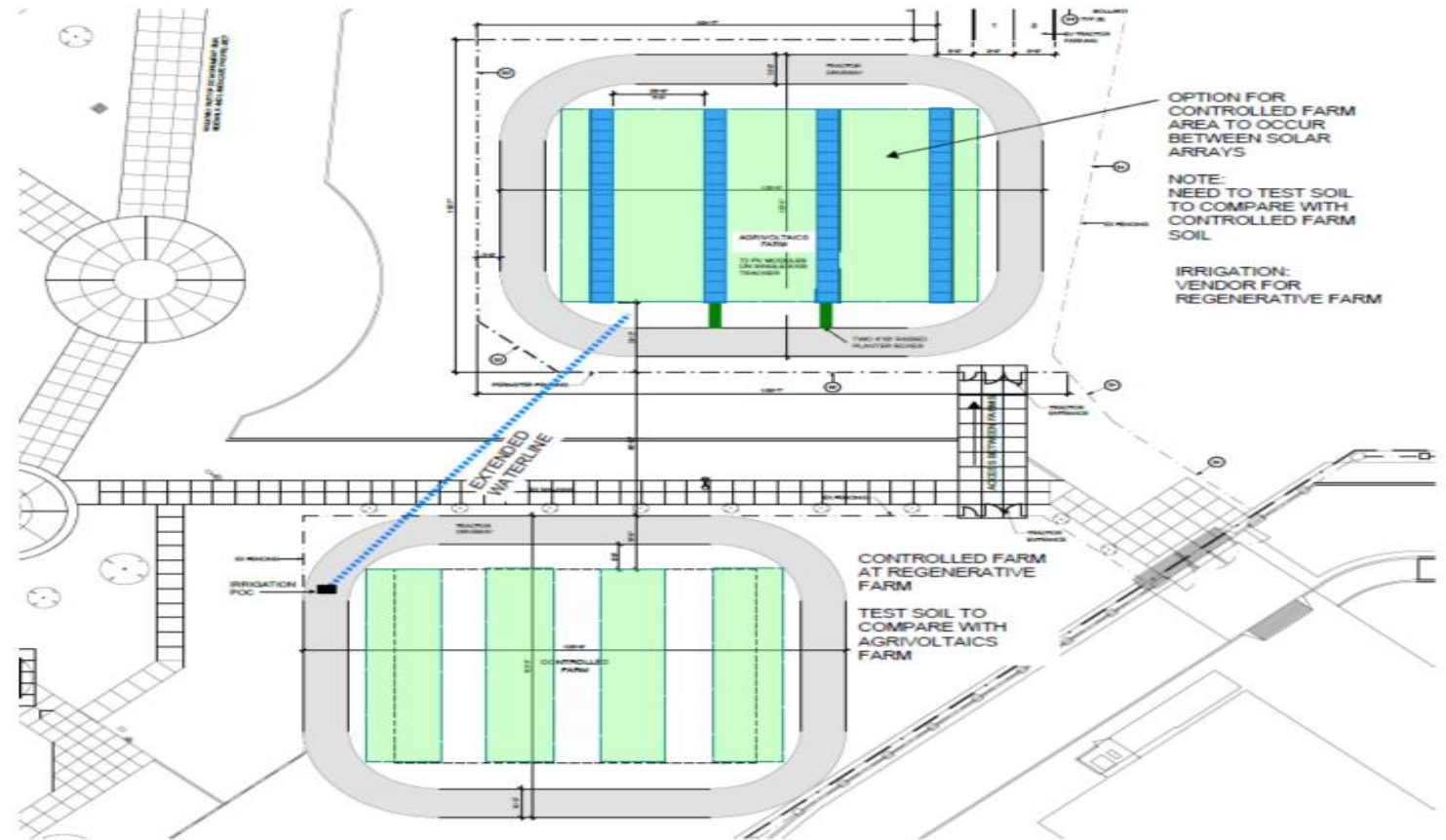
- Delano Campus – Timmons: A 252-kWh static panel system, operational since December 2023.
- Panorama Campus: A 1.1 MW tracker system in Parking Lot 3 (operational since October 2010) and a 2.5 - MW static panel system in Parking Lot 8 (December 2026).
- Battery Energy Storage Systems (BESS) to complement solar production, including a 752 - kWh system (April 2026).
- Southwest Campus: A 560 - kWh static panel system, operational since September 2022.
- Weill Institute: A 452 - kWh static panel system, operational since September 2023. and a 382 - kWh system at the Weill Institute (December 2026). First Microgrid in the District.



The total solar energy production capacity across all campuses amounts to 4.8 MW.

Agrovoltaics
Demonstration
Project

Bakersfield
College
Project
In Design



Water Conservation

To address water scarcity, BC has implemented advanced water reduction strategies, including:

- Replacing outdated irrigation systems with weather data- tracking irrigation control systems:
- **Arvin Campus:** One Central Clock - 16 Stations
- **BCSW Campus:** One Central Clock – 28 Stations
- **Delano Campus:** Two central systems – 140 Stations
- **Panorama Campus:** 28 Clocks (978stations)
- Installed over two acres (87,120 sq. ft.) of synthetic turf, and decomposed granite significantly reducing water and maintenance demands.
- Domestic Water Systems Fixture Replacement



Project Overview



SB 350

(SB 100) and heating electrification, which are causing the state's electrical grid to experience more pronounced load fluctuations (e.g, the duck curve) and new winter morning system peaks



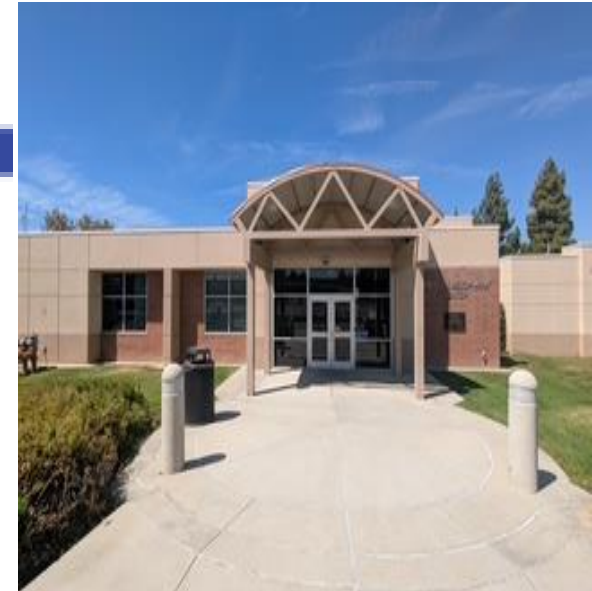
Research Collaboration

*Lawrence Berkeley
National Labs*



Research Collaboration

*CA Institute for Energy &
Environment, UC Berkeley*



Child Development Center

*Modernization System
HVAC Upgrades*



Basic Definitions

- HP-Flex is an open-source building energy management system that controls the operation of heat pumps (HPs) and other equipment in small/medium commercial (SMC) buildings to provide load flexibility (LF) while meeting occupant needs and minimizing operating cost.
- Heat pumps are highly efficient electric heating and cooling systems that move heat rather than generating it. They are a key technology in building electrification and decarbonization efforts, as they can significantly reduce energy consumption and greenhouse gas emissions compared to traditional fossil fuel-based systems.

Research Initiatives

HP-FLEX: Control Algorithms (T2)

- A model-based predictive control approach
- Open-source code

System Identification

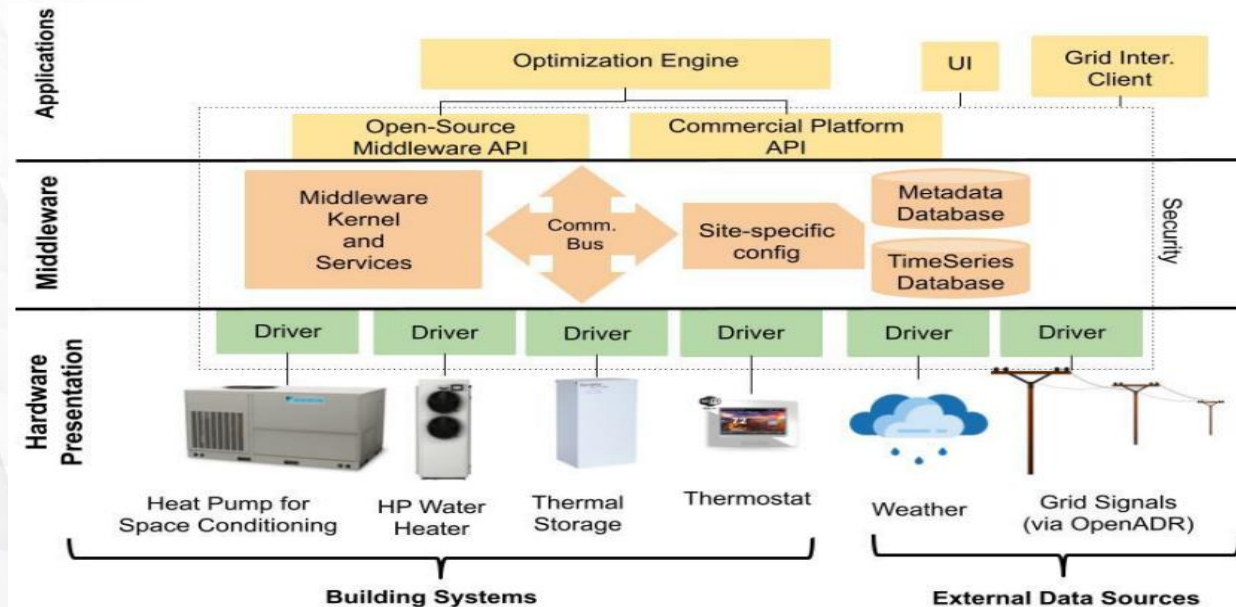
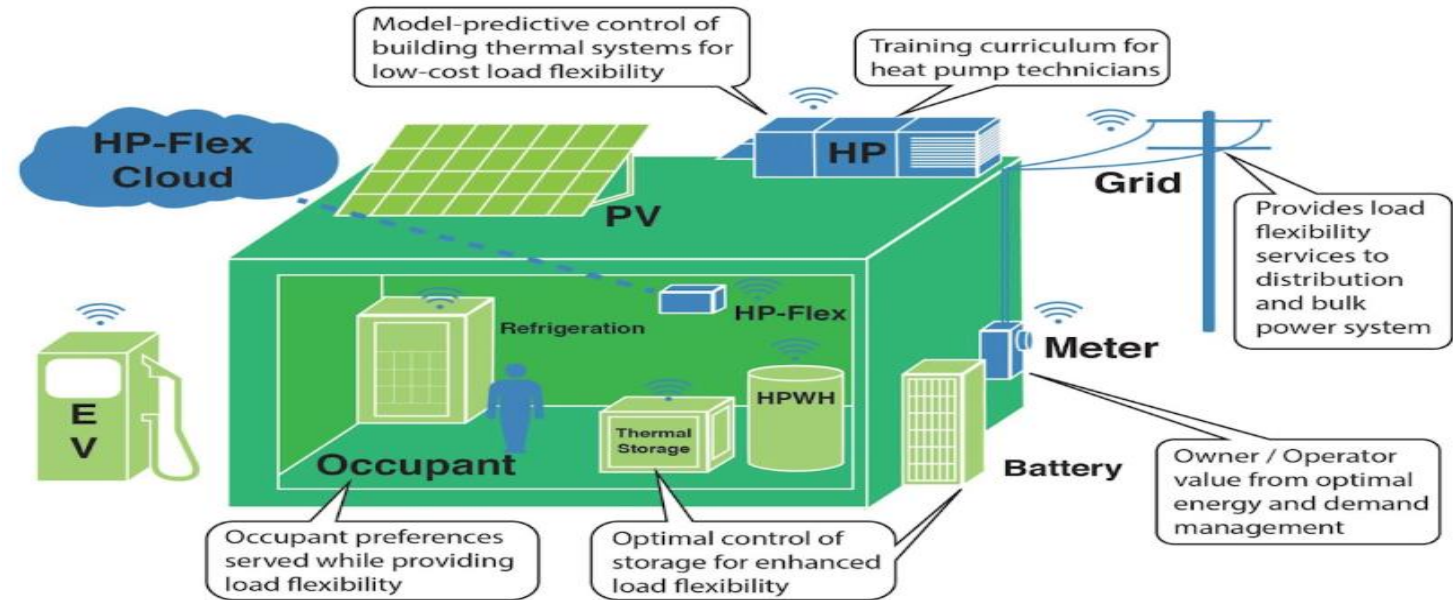
Identify building envelope characteristics using measurements

Machine Learning

Compensate for model and forecast uncertainties

Optimization (MPC)

What's the optimal temperature setpoint schedule to minimize utility cost in response to grid signal and weather forecast while maintaining room temperature within a user-defined band?



CDC Project Overview



Pre & Post Occupant Surveys
HVAC Staff Learning Curve



Moving Forward
Through Challenges

Modernization Protocols

The upgrade of all wiring to power the two heat pump units, thermostat replacements, and system integration to the campus energy management system

Staff Education



Energy Management

Centralized data collection and review

Automated grid-responsive strategy (e.g., demand response, load shedding, and shifting)

Future Projects



Research Initiatives

EPC-25-027 California Campus Load Flexibility: CC-FLEX Kickoff Meeting Slides

Building & Industrial Energy Systems



BUILDING TECHNOLOGY & URBAN SYSTEMS DIVISION
Energy Technologies Area

1

Project Overview: Transform California Campuses into VPPs

- California higher education campuses possess significant MW-scale DERs, which remain underutilized
- Propose CC-FLEX to transform the CA campuses into VPPs
 - Highly cost-effective
 - leveraging existing large-scale DERs without the need for costly new DER procurement
 - Utilizing established campus EMS as VPP control infrastructure.
 - Leveraging vast private and/or the state's prior investments (say, multi-million dollars each)

University of California, Merced



5000 ton chiller plant, 2 M gallon TES

University of California, San Diego

10MW BESS



4 MW solar farm



Sample PowerFlex
EV Charging Stations



BUILDING TECHNOLOGY & URBAN SYSTEMS DIVISION
Energy Technologies Area



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Research Initiatives



Using AI for Facilities Workforce Training

Building automation systems generate enormous volumes of data: alarm logs, fault codes, sensor readings, maintenance records. LLM tools can process all of this in natural language, helping engineers and operators:

- Identify patterns in recurring faults and equipment failures
- Diagnose root causes faster than manual log review

- Summarize complex system behavior in plain, actionable language

Research Initiatives

Super-GX Demand Flexibility



Project Overview

Super-GX is a California Energy Commission funded project to demonstrate the benefits of demand flexibility in building energy systems in a campus setting, using control strategies and market signals to make energy and cost saving decisions.

HVAC, lighting, and EV charging can all be strategically controlled to save peak energy at opportune times, without sacrificing indoor air quality. This is called demand flexibility



Campus Recognition

Bakersfield College has been honored for its environment, sustainable construction projects, including:

- Veteran's Resource Center – CMMA Award (2021)
- Science & Engineering Building CMMA Award (June 2022)
- Science & Engineering Building - Beautiful Bakersfield Award for Architecture & Design (June 2023)
- ABC Campus Center Buildings: National Construction Management Association of America Design Award (May 2024)
- Welcome Center – CMMA Award (June 2024)
- Welcome Center - Lawrence Berkeley National Laboratory Smaller Smart Buildings Campaign Winner: Recognized for Sustainable Practices (August 2024)
- Arvin General Education Center – CMMA Award (June 2025)
- Renegade Athletics' Center – CMMA Award (May 2026)
- Association of Sustainability in Higher Education – Sustainability Tracking, Assessment & Ratings System (STARS) Applicant (September 2026)



Questions



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COMING SOON!

Stay tuned for program details,
dates, and registration information!

ROAD TO VISION 2030

Turning California's Climate Goals into Campus Action

A collaborative program from DSA and CREL for
California Community College facilities and
sustainability professionals.

PARTICIPANTS WILL:



Understand state policy, DSA requirements,
and Vision 2030 priorities



Explore strategies for energy efficiency,
renewables, electrification, resilience,
and sustainable planning



Use practical tools to assess needs,
prioritize projects, and plan implementation



Learn from state experts, technical
professionals, and campus peers



Build a customizable
campus sustainability toolkit



Designed for California
Community College
facilities and sustainability
professionals.



Learn. Connect.
Collaborate. Build a
sustainable future
together.



Advance your campus
and support California's
climate and sustainability
goals.

SCAN TO LEARN MORE!



<https://forms.gle/uPhGGrjbBEyBXdUF9>

Be the first to
know when
registration
opens!



STRONGER CAMPUSES



CLEANER FUTURE



TOGETHER.

