UC SANTA BARBARA

Introba

CAMPUS KICKOFF

UCSB Clean Energy Master Plan

October 25, 2023

UCSB Decarbonization Study Project Committee

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Chair, Santa Barbara Division of the Academic Senate; Distinguished Professor, Chemical Engineering and Chemistry & Biochemistry, Mellichamp Academic Initiative in Sustainability Chair in Sustainable Catalytic Processing

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Presenters

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Noah Zallen, PE
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Associate & Project Manager, Design Analytics
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How we got here?

2013 UC Sustainable Practices Policy

President Napolitano announced the UC Carbon Neutrality Initiative (CNI) in November 2013

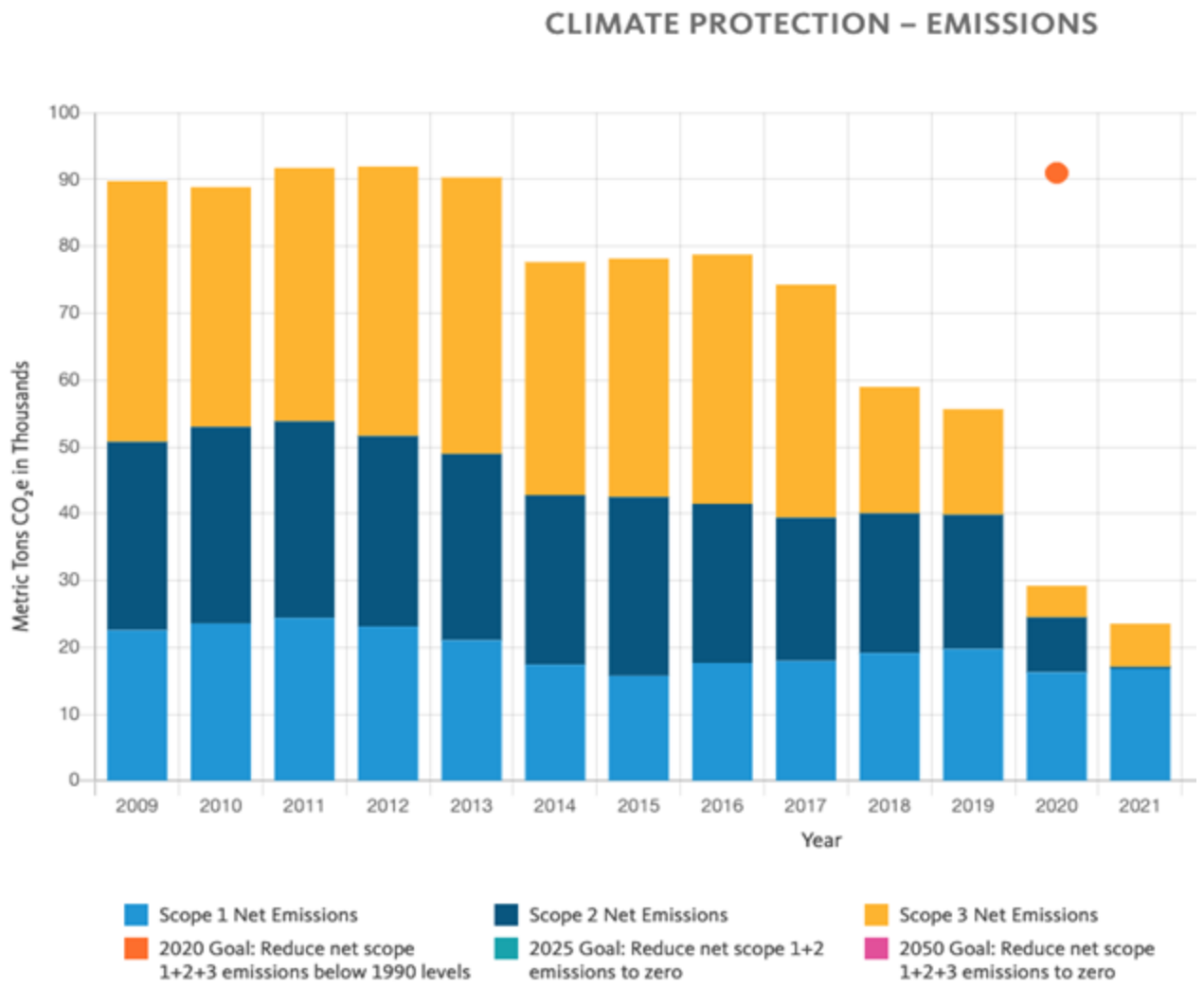
Each UC location will achieve climate neutrality from ***Scope 1 and 2 sources by 2025***

and

Achieve climate neutrality from specific ***scope 3 sources by 2050 or sooner***

UCSB is Already a Leader

In the **last decade**, UC Santa Barbara has reduced its CO_{2e} emissions by **two-thirds**



Least carbon intensive of All UC Campuses

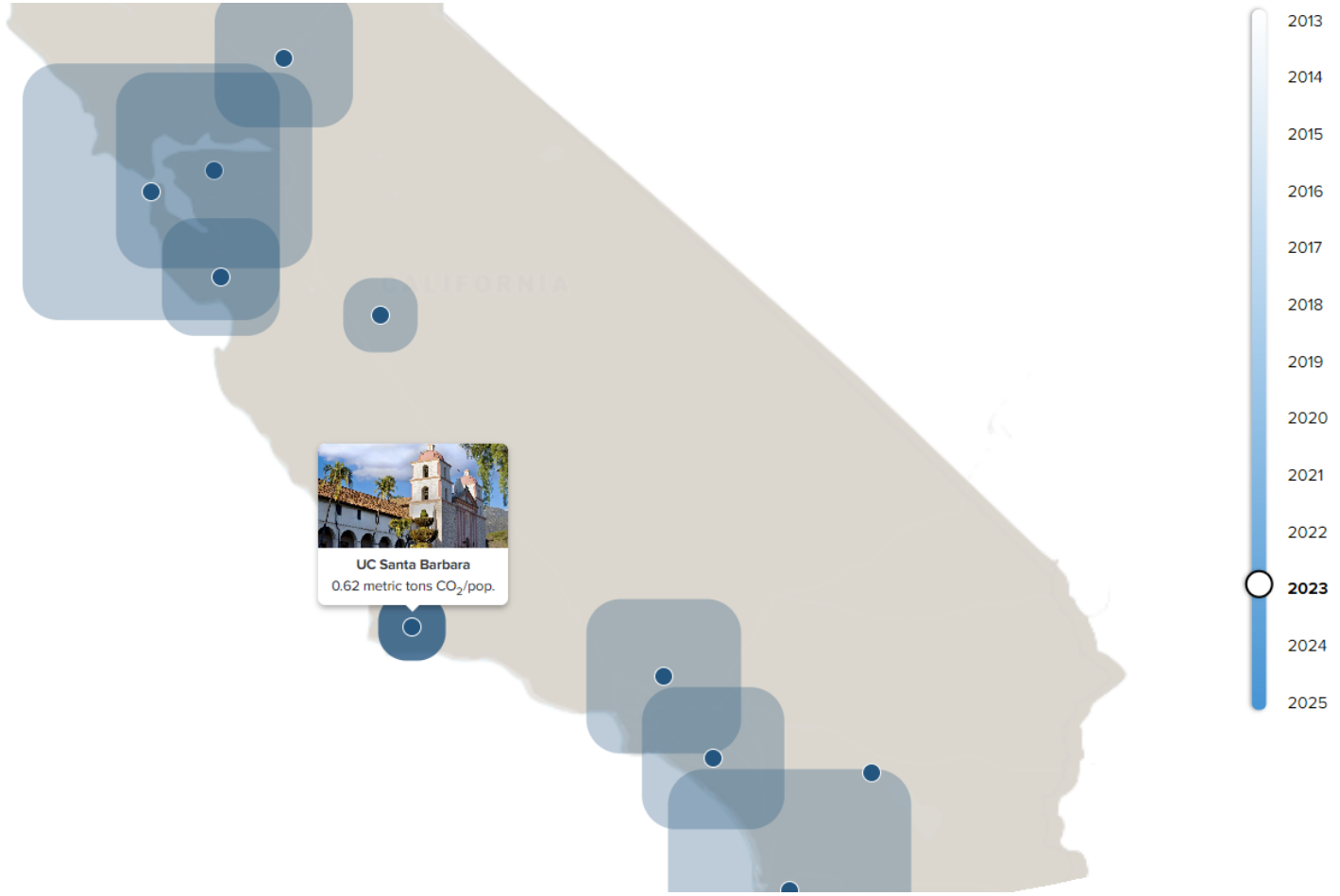
UCSB has the **lowest GHG emissions** of all UC campuses, both:

- **by area**

  0.002 MTCO2e per sf

- *And **relative to campus population***

  0.59 MTCO2e per capita



Maximizing Carbon-Free Electricity

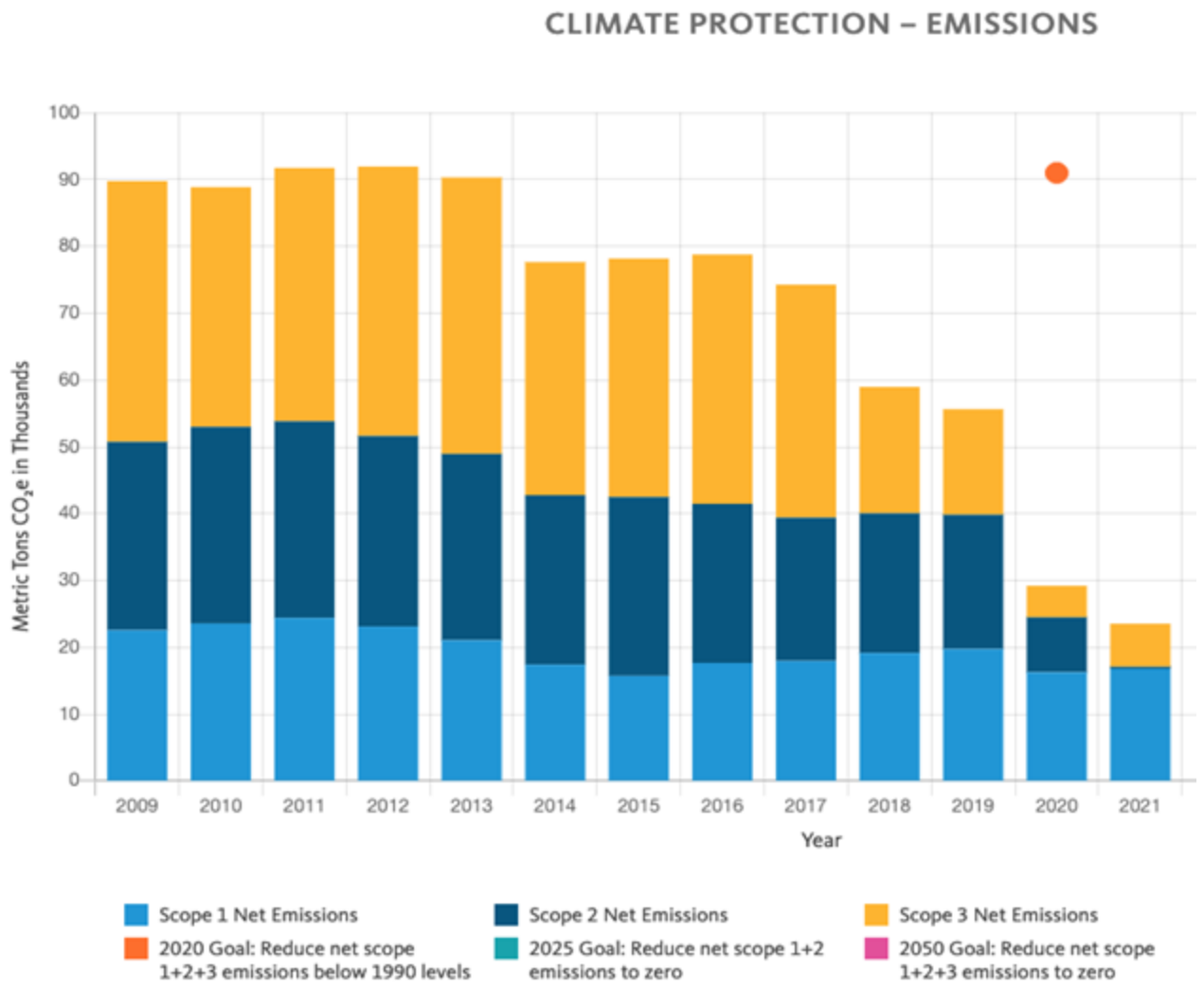
- Purchasing **carbon-free electricity** via UC's Clean Power Program (CPP) since 2020
- Largest overall share, as a percentage of energy consumption

Maximizing Carbon-Free Electricity

- Added **6 megawatts** of **on-campus solar** between 2017-2019
- Currently generating **15% of UCSB's power needs** on site

Decarbonization Can Start Today

Primary challenge will be **remaining Scope 1** (combustion) **emissions**



No Gas-Fired Central Heating Plant or Cogeneration Plant

Recently Upgraded Electrical System

- UCSB's entire electrical grid was rebuilt **less than 20 years** ago
- Highly **reliable underground system** with dedicated 66kV feed from Southern California Edison
- Significant capacity to **support powering additional large pieces** of electric equipment

Topography and composition

Predominantly **flat terrain**,
concentrated energy **needs**

UCSB Clean Energy Plan

1. Produce a **strategy for a 90% or greater reduction in Scope 1 emissions from fossil gas use** in campus energy systems from a 2019 baseline

2. Provide **high level estimates of total capital and operational costs and savings**, to support funding requests as well as inclusion in the campus or health system's capital financial plan

3. Identify **environmental justice and equity considerations** related to the transition of to fossil fuel free infrastructure

4. Document **knowledge gaps, and subsequent studies and analyses** needed to conduct **Net-Zero** Campus

5. Identify **climate resiliency planning considerations**

Who is Introba?

Introba

MECHANICAL

ELECTRICAL

PLUMBING

ENERGY

LIGHTING DESIGN

DAYLIGHTING

SUSTAINABILITY

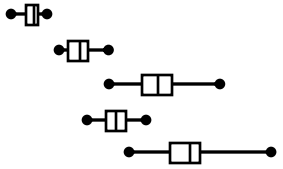
POLICY AND PLANNING: CLIMATE AND RESILIENCE

SECURITY & TECHNOLOGY

FIRE PROTECTION

COMMISSIONING

DESIGN ANALYTICS



29
Global Offices

1100+
Staff

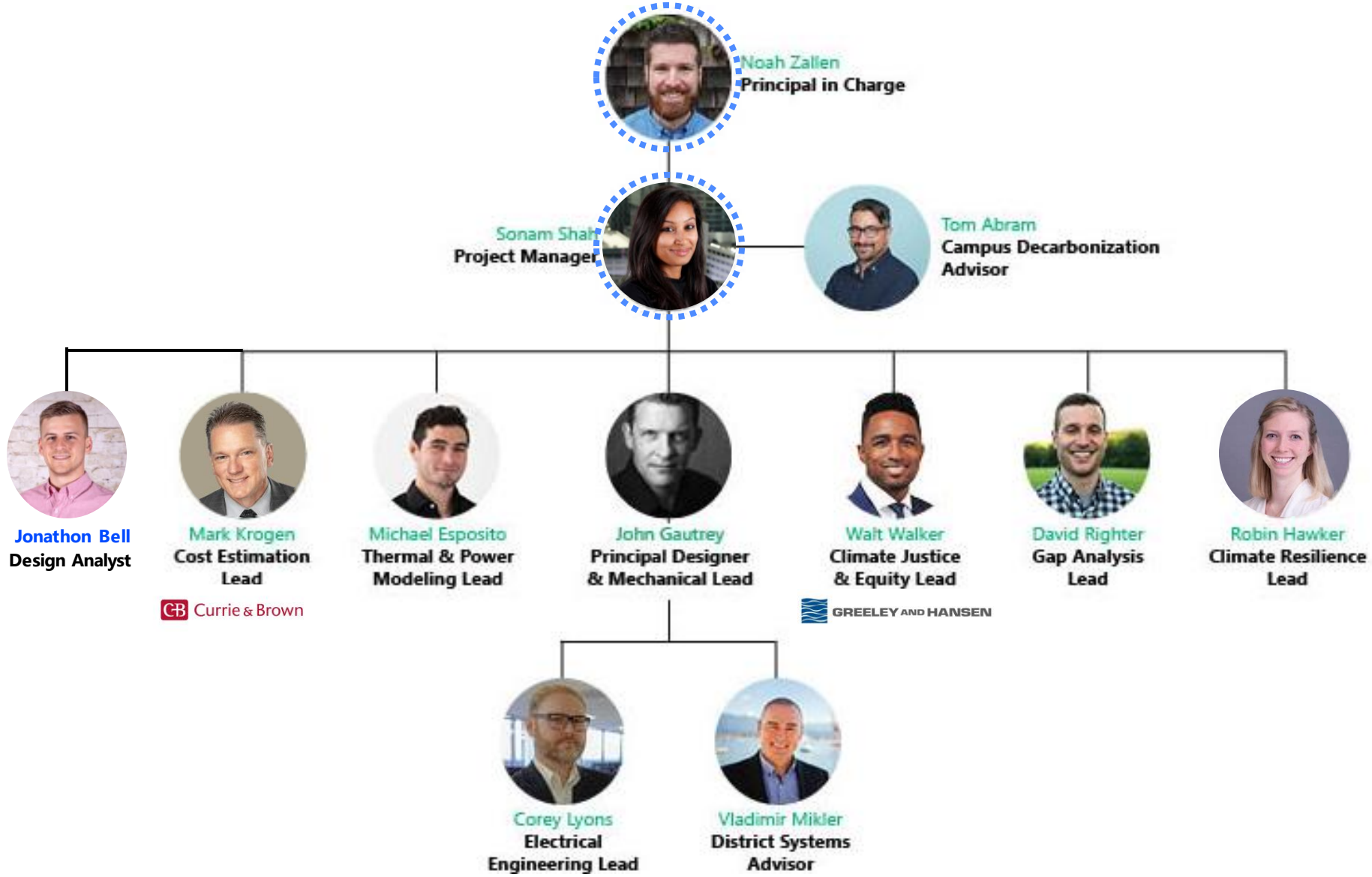
100+
Zero Net Energy and
Zero Net Carbon Projects

24
AIA COTE Top 10
Projects Completed

70+
LEED Platinum Certified Projects

20+
Projects which have pursued
LBC Living and/or Petal certifications

The Clean Energy Master Plan Team



What we are talking about today

NOW

Clean Energy Master Plan

FUTURE

Getting To The Finish Line

CARBON

RESILIENCE

EQUITY

NOW
Clean Energy Master Plan

CARBON | Campus Services being Decarbonized

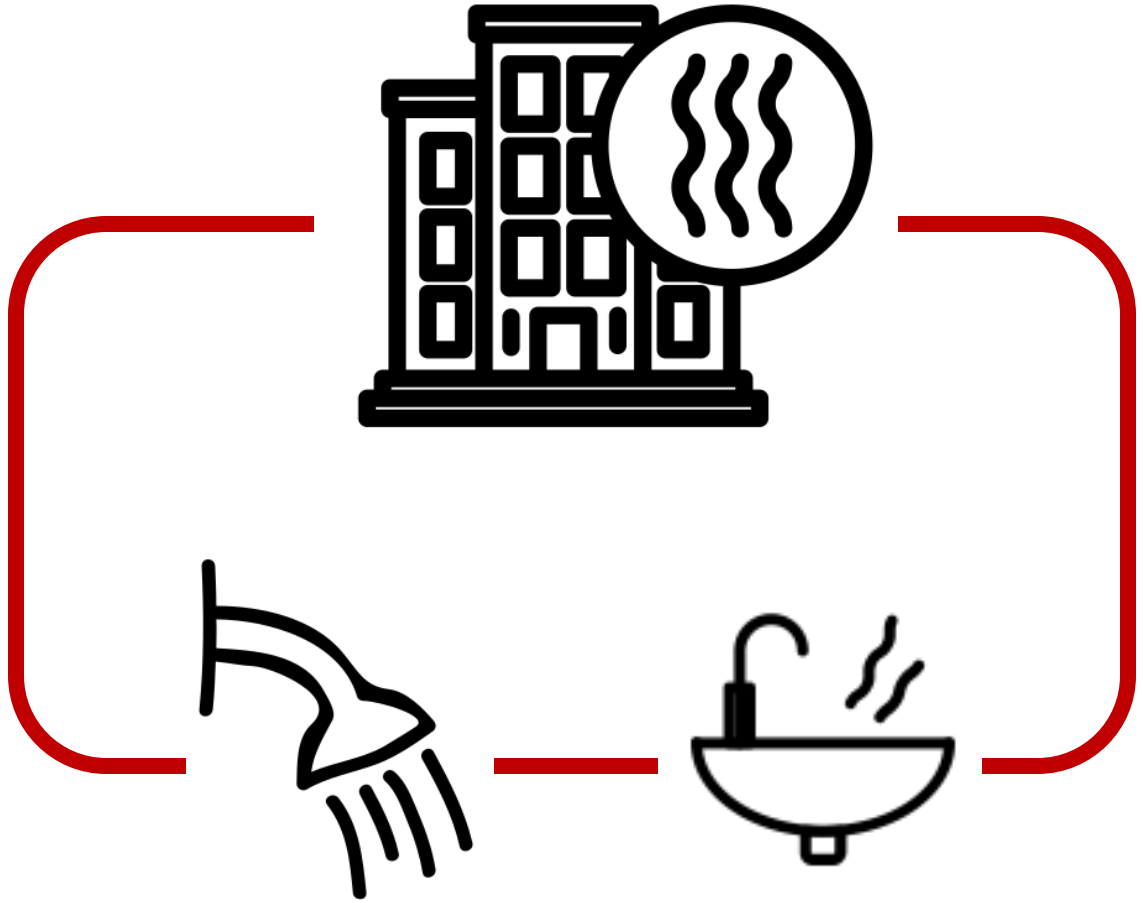
NOW

Heating

and

Hot Water

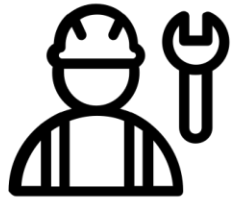
for every single UCSB building



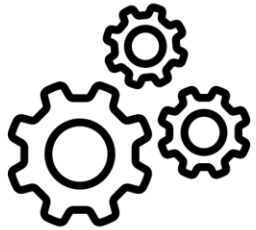
CARBON | Evaluating Ideas

NOW

UCSB Feedback and **buy-in** will be at the core of the evaluation



Maintenance



Engineering

Cost

Carbon

Stakeholders

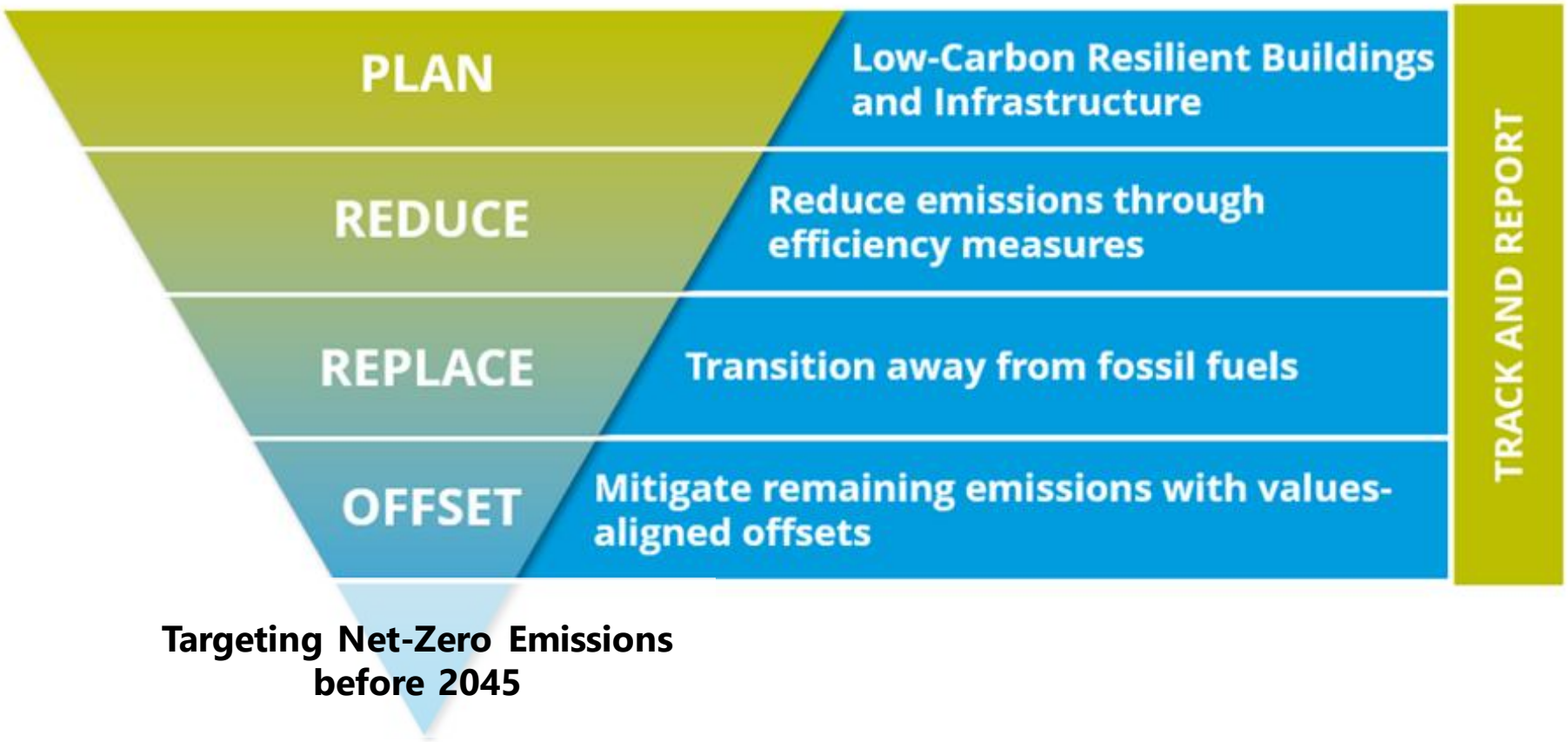
Constructability

Simplicity

CARBON | Setting Vision for Net-Zero Campus

NOW

A "Net Zero" Campus: by reducing first, and then offsetting all greenhouse gas emissions related to UCSB activities

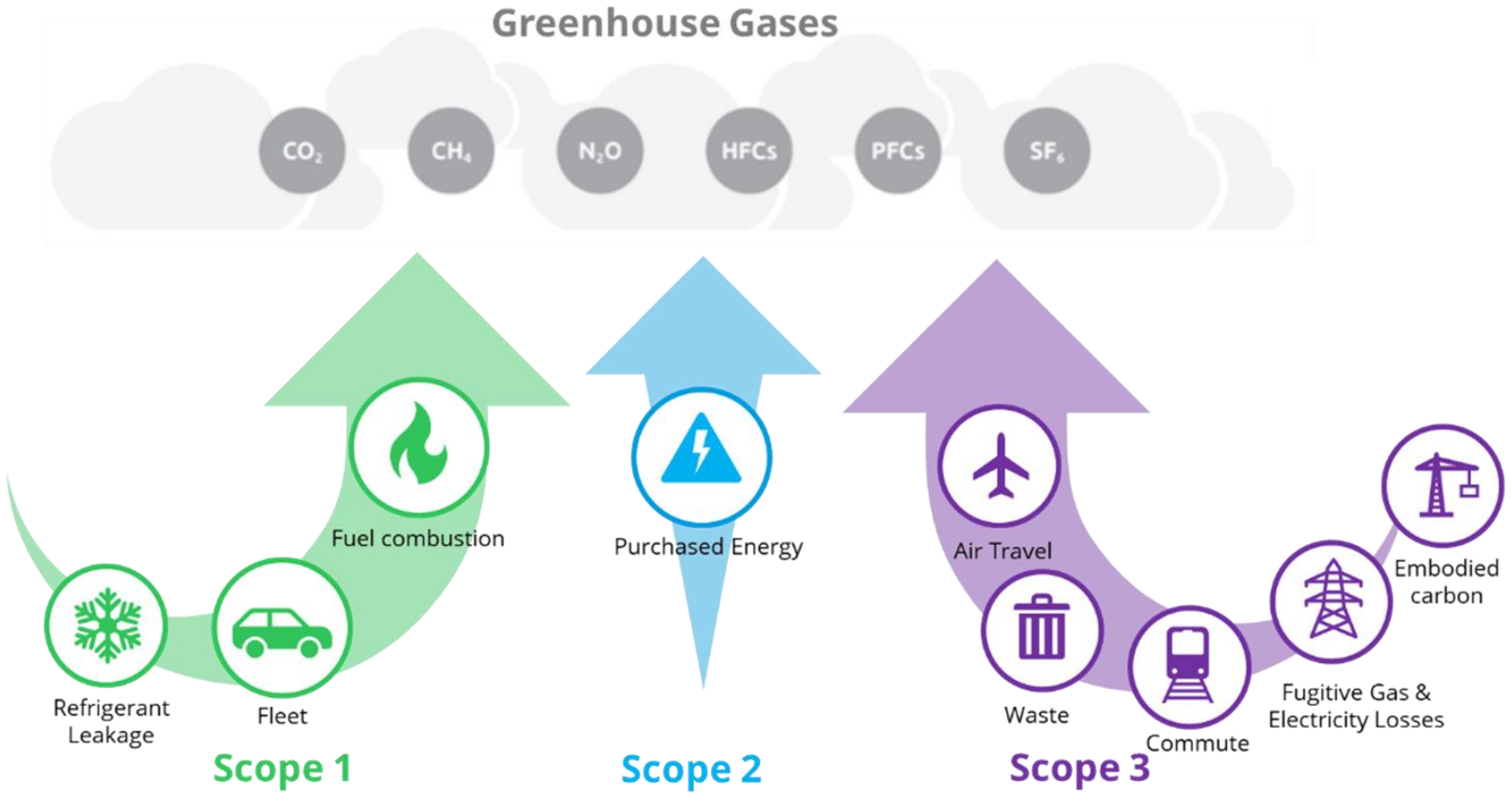


Targeting Net-Zero Emissions before 2045

CARBON | Emissions Scopes for Net Zero Planning

NOW

Setting aggressive interim targets for **all emissions** to focus net-zero efforts, and maintain momentum and action toward achieving this 2045 goal



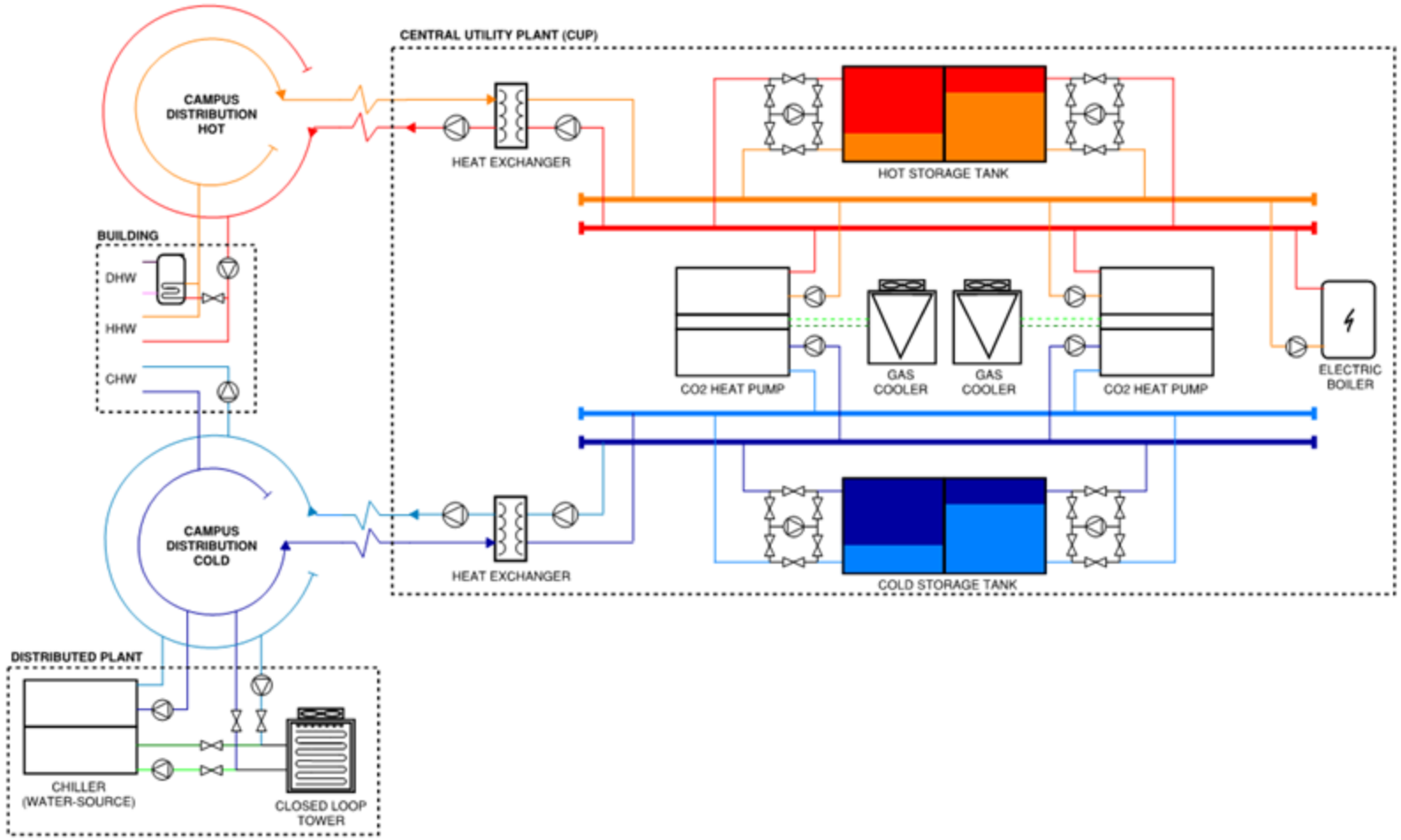
CARBON | Preview Of Some Potential Solutions

NOW

Central Heating Plant piped to buildings on campus

High temperature CO2 heat pumps specifically designed for existing building retrofits

Thermal Storage – so the same energy that makes hot water for showers and meals can be used for “free” to cool the buildings any time



RESILIENCE | Building on Strong Foundations

NOW

The University of California system is a recognized leader in equity-centered climate action planning

- The new UC Climate Policy establishes UC schools as **national leaders** in climate action

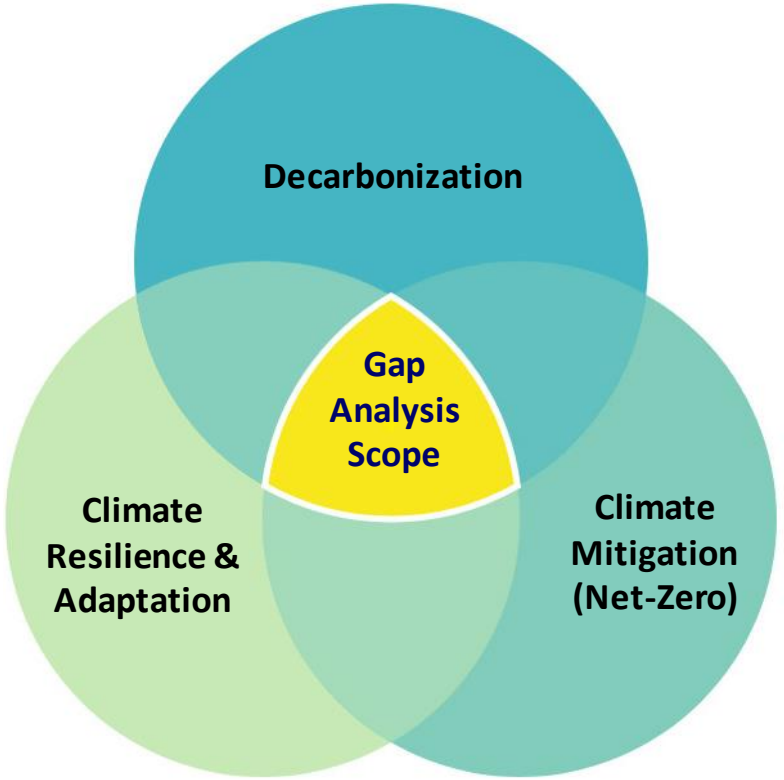
- **UCSB** played a role in developing the **UC Equity-centred Framework for Climate Resilience Planning**

RESILIENCE | Taking Stock of Where We're at today

NOW

A "Climate Resilient" Campus: preparing for climate-related hazards (e.g. flooding, drought, wildfire)

The Clean Energy Master Plan process will include a **gap analysis** to compare the policies and initiatives **UCSB already has** against **best practices** being led by other US universities



RESILIENCE | Community Engagement

NOW

Workshop happening in **Q4**

Introba **working with the** Decarbonization Study Project **Committee**

Outcomes from the workshop **will be shared**

RESILIENCE | Some Areas Of Focus

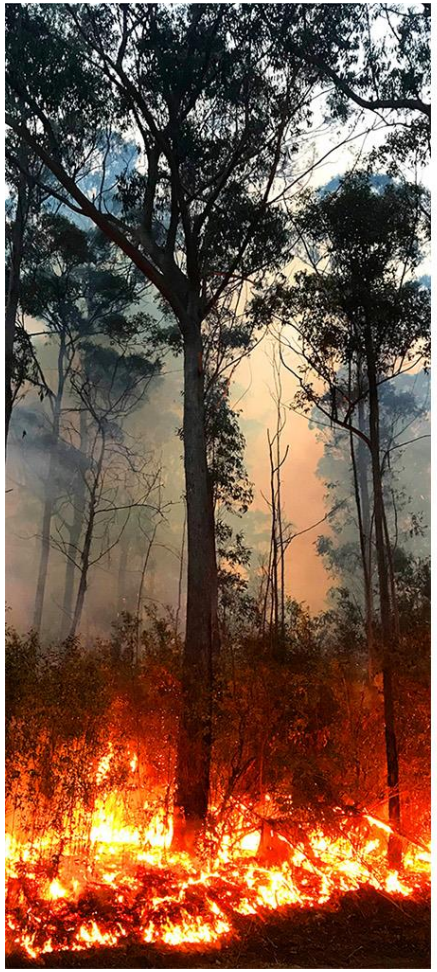
NOW

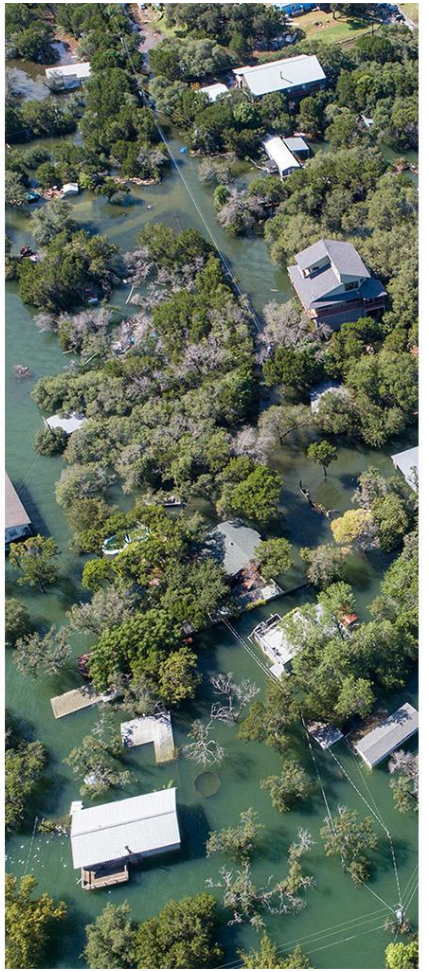
Air Conditioning considered/ targeted for **extreme heat** from the new climate normal

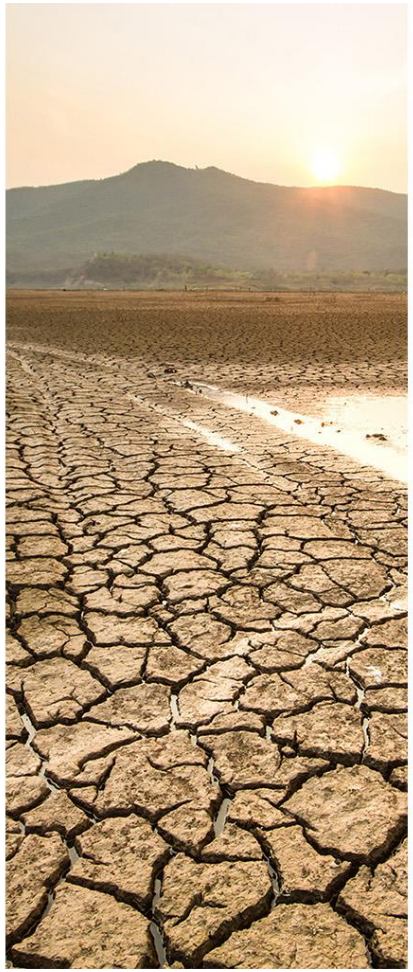
Indoor Air Quality during **wildfires**

Power Reliability

Close consideration of Sea Level Rise for where **not to build**







EQUITY | Community Engagement

NOW

Workshop happening in **Q4**

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EQUITY | Some Areas Of Focus

NOW

Job Equity

New and different jobs- retraining and creating opportunities

Financial Equity

Who bears the cost?

Health Equity

Improving outcomes

Internships

NOW

Internship #1: Data Collection and Analysis

help with gathering and analyzing data from onsite audits and building management system, work on closing gaps in measured data, assist in synthesizing energy modeling result data to inform evaluation

Internship #2: Student Engagement and Outreach

enhance Introba's communications with the UCSB student community and help get the best ideas, feedback, and ultimately buy-in

Internship #3: Climate Justice and Equity

work with our Environmental Justice team to help discover, solicit, and strategize on opportunities to ensure the plan is just and equitable

Internship #4: New Technologies Research

work with our engineering teams to research new thermal technologies and energy storage technologies that could be part of our decarbonization strategies

Internships

NOW

- **contribute** meaningfully towards the creation of Clean Energy Master Plan deliverables
- actively **participate** in townhalls and lectures and other community facing engagements
- **develop** an action plan and participate in weekly check-ins
- problem solving, community-based work, boots on the ground work with facilities and independent research
- **produce** a report at the end of the internship

FUTURE
Getting to the Finish Line

CARBON | The Entire Campus will be Decarbonized

FUTURE

- **Heating**
- **Hot Water**
- **Electricity (Offset-free)**
- **Transportation**
- **Waste**
- **Cooking**
- **Laundry**
- **Refrigerants**

CARBON | Road to decarbonization

FUTURE

Clean Energy Master Plan Development

Design New District Infrastructure and Building Systems

Build New Central (District) and Distributed (Buildings) Infrastructure

Short-Term Actions

Mid-Term Actions

Long-Term Actions

Ideate, Calculate and Recommend electrification strategies

Revise equipment replacement **standards**

Electrify all campus infrastructure for net zero emissions

CARBON | Pathways towards a Net Zero Campus

FUTURE

Conduct gap analysis for a net zero campus

Establish guidelines to help all buildings to be **all-electric**

Partner with Santa Barbara to **improve mass transit service**

Short-Term Actions

Mid-Term Actions

Long-Term Actions

Track commute emissions through student and staff surveys

Conduct ongoing **energy efficiency retrofits**

Electrify transit bus fleet and **replace all university vehicles** with EV's

RESILIENCE | Laying the Groundwork for Climate Resilience

FUTURE

Build on local climate change research & academic leadership

Update campus **planning & policy documents** to consider climate resilience

Track implementation & impacts of climate adaptation actions

Short-Term Actions

Mid-Term Actions

Long-Term Actions

Complete a campus-wide climate resilience **assessment**

Leverage community partnerships to support adaptation

Retrofit existing critical & high-risk facilities to be resilient to future climate change conditions such as extreme heat and wildfire smoke

EQUITY | Leading an Equitable and Just Transition

FUTURE

Identify solutions for an environmentally just, and equitable transition to fossil fuel- free systems

Identify and **prioritize** potential program initiatives

Measurement and verification of metrics

Short-Term Actions

Mid-Term Actions

Long-Term Actions

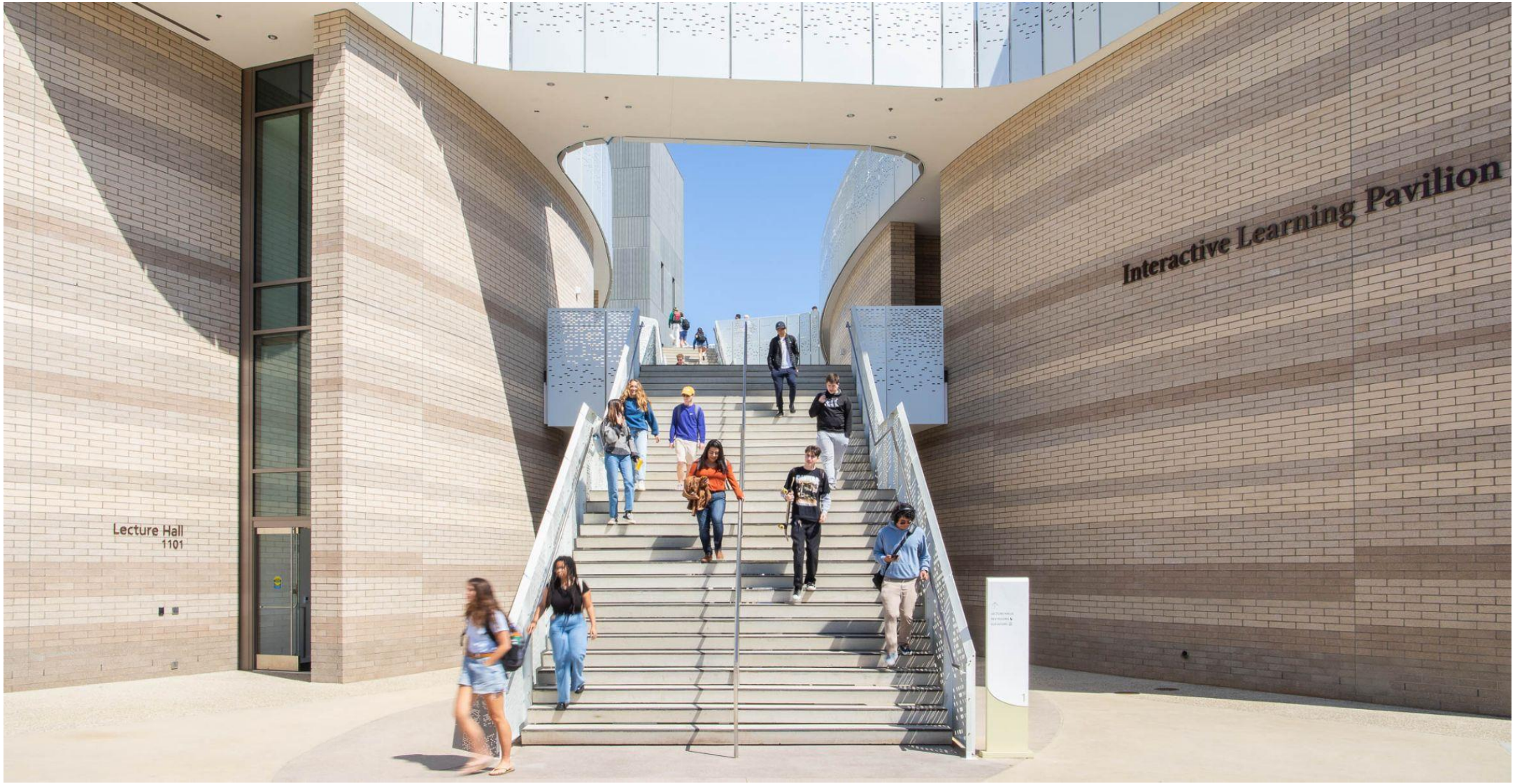
Conduct a **campus-wide assessment** to identify obstacles, facilitators & resources

Integrate approach with existing plans

Development of new policies

CONTINUED ENGAGEMENT WITH THE COMMUNITY

This Is An Exciting Time



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Thank You

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