

# Green Buildings Town Hall

April 18, 2023

UC San Diego

RESOURCE MANAGEMENT  
AND PLANNING

# Setting the Stage



**Stephen Jackson**

Associate Vice Chancellor, Resource Management & Planning

# Welcome



**Walt Kanzler**  
Senior Director, Project Quality Management

# Land acknowledgement

The UC San Diego community holds great respect for the land and the original people of the area where our campus is located. The university is built on the unceded territory of the Kumeyaay Nation. Today, the Kumeyaay people continue to maintain their political sovereignty and cultural traditions as vital members of the San Diego community. We acknowledge their tremendous contributions to our region and thank them for their stewardship.

# Agenda

1. UC Sustainable Practices Policy – Walt Kanzler
2. UC San Diego Green Buildings – Walt Kanzler
3. Green Building Design Features – Walt Kanzler + Kacy Wander
4. Sustainable Building Operations – Jason Kayne + Assistant Directors
5. Guest Faculty - Jan Kliessl – DER connect, etc.
6. Q+A – Jason Kayne

# Before We Begin

- This webinar is being recorded.
- Recordings and Q&A can be viewed on the Climate & Sustainability Town Halls webpage: <https://sustain.ucsd.edu/about/town-halls.html>
- This is a broad topic to cover in 60 minutes. We may have multiple questions about various sustainable strategies. We will follow up with Q+A and may do follow up town hall sessions to address all your questions.

# Questions

- Were submitted during registration
- Can be submitted in the Zoom Q&A feature

This is a broad topic and we will be covering a lot of information. We'll answer as many questions live as time allows.

# University of California

## Policy on Sustainable Practices Green Buildings



# Policy History

University of California – Policy on Sustainable Practices



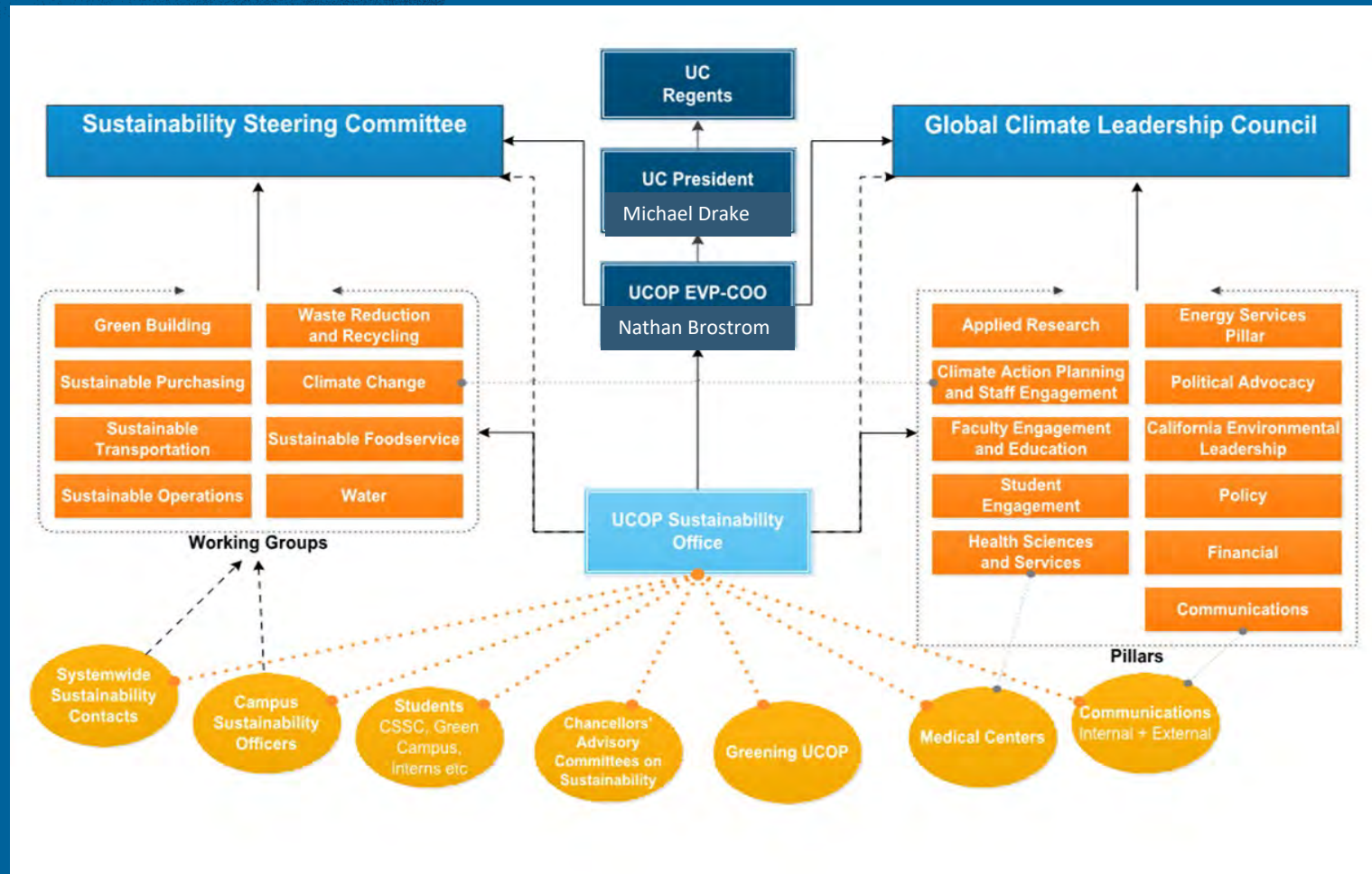
## Sustainable Practices

<b>Responsible Officer:</b>	EVP – Chief Financial Officer
<b>Responsible Office:</b>	ES – Energy & Sustainability
<b>Issuance Date:</b>	3/10/2022
<b>Effective Date:</b>	3/10/2022
<b>Last Review Date:</b>	2/16/2022
<b>Scope:</b>	All Campuses, Health Locations, and the Lawrence Berkeley National Laboratory

<b>Contact:</b>	Matthew St. Clair
<b>Title:</b>	Director of Sustainability, UCOP
<b>Email:</b>	<a href="mailto:Matthew.StClair@ucop.edu">Matthew.StClair@ucop.edu</a>
<b>Phone:</b>	(510) 287-3897

- In 2004 as a graduate student, Matthew St. Clair our current Chief Sustainability Officer and the University of California led a student campaign for the University of California system to adopt a comprehensive green building and clean energy planning policy. The University of California then hired Matt to implement this policy.
- The policy has grown to not only include LEED certified Green Buildings but also 8 other policy areas that are reviewed annually.
- <https://policy.ucop.edu/doc/3100155/SustainablePractices>

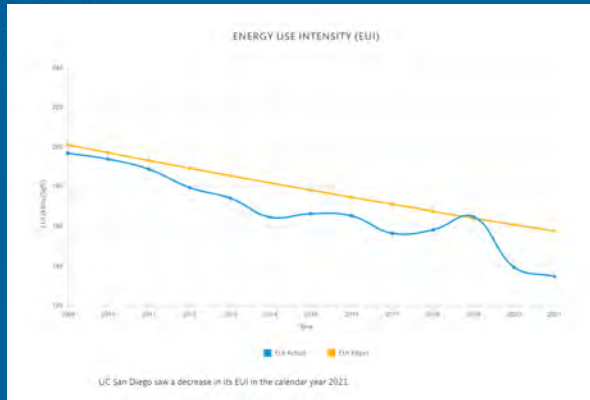
# UC System Sustainability Framework



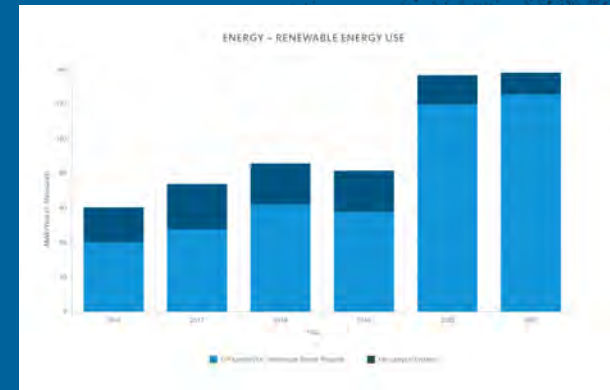
- Working groups make recommendations on an annual basis to the Sustainable Steering Committee which then consults with Staff and UC stakeholders to implement updates.
- A recent update included moving from LEED Silver to minimum to LEED Gold.

# Sustainability Practices Policy – Green Building Metrics

## Energy Use Intensity



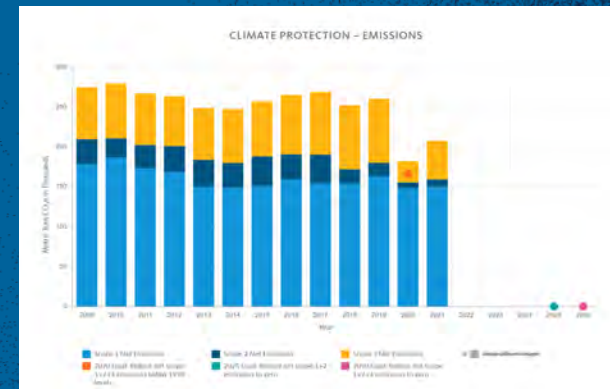
## Renewable Energy



## Water Usage



## Carbon Emissions



# Green Buildings

# Sustainability Reporting – UC System Wide Green Buildings



- UC system has 408 LEED certified projects totaling 35 million square feet.
- UC San Diego currently has 49 LEED certified projects on campus for a total of 6,125,000 square feet.

# LEED Rating System – Building Design & Construction Certifications



Certified: 40-50

Silver: 50-60

Gold: 60-80

Platinum: 80+

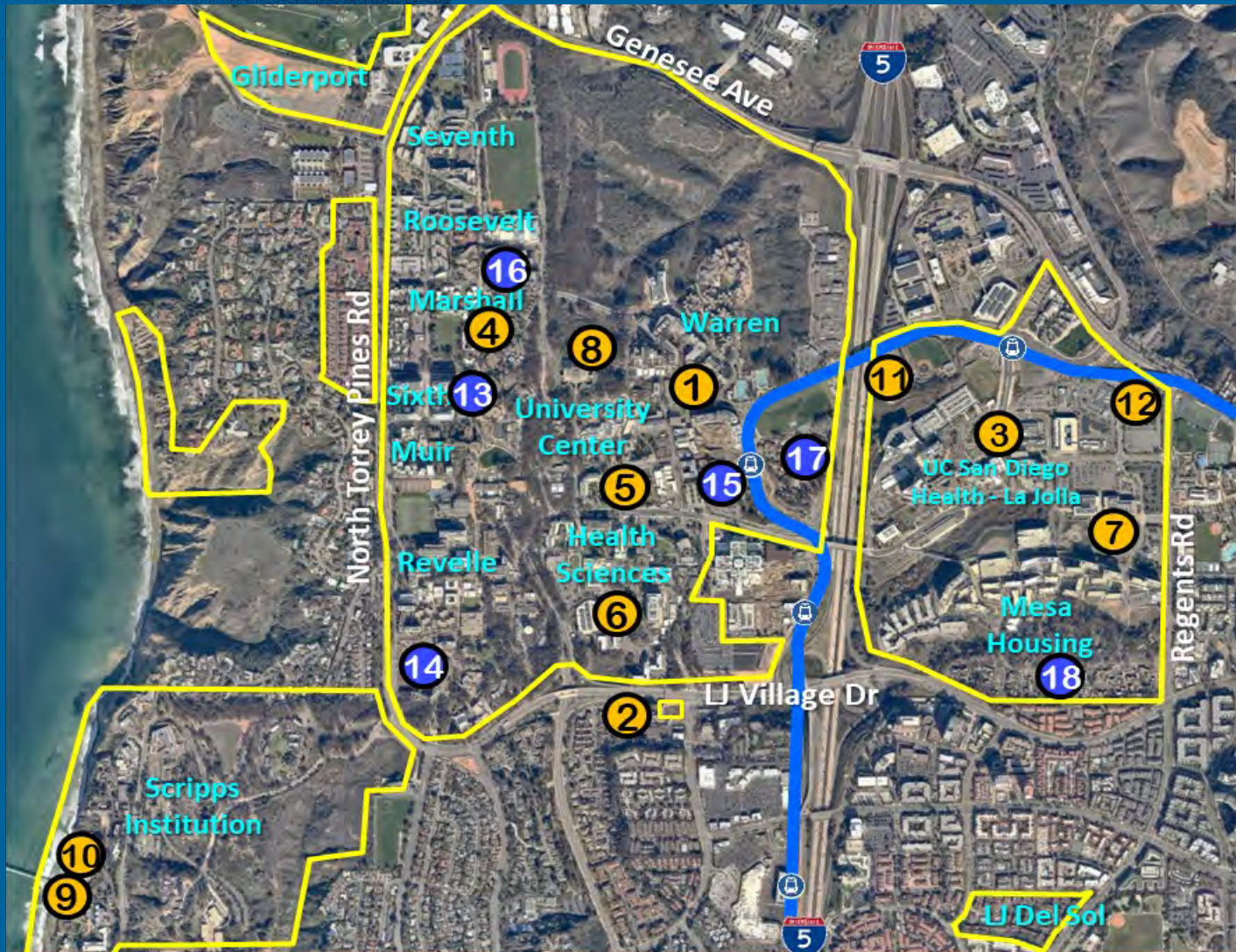
# Map of Existing LEED Certified Projects

## Green Building by the Numbers

- 50 LEED Certified Projects
  - 3 Certified / UC
  - 15 Silver
  - 28 Gold
  - 4 Platinum
- 18 projects in progress
- 6,125,000 square feet of certificated space



# UC San Diego Planning Design & Construction



## NON-HOUSING PROJECTS

1. Halicioğlu Data Science Institute (2023)
2. 8980 Villa La Jolla (2024)
3. Viterbi Family Vision Research Center & Shiley Eye Center Renovation (2025)
4. Economics Building (2025)
5. Triton Center (2026)
6. Multidisciplinary Life Sciences Building (2027)
7. Science Research Park (2026-2030)
8. Geisel Library Improvements (TBD)
9. SIO Biomedical Automation Facility (TBD)
10. Scripps Oceanography Human Health Research Building (TBD)
11. Voigt Electric Mobility Hub (TBD)
12. Hotel/Conference Center (TBD)

## HOUSING PROJECTS

13. North Torrey Pines Living and Learning Neighborhood (Fall 2020; 2,000 beds)
14. Theatre District Living and Learning Neighborhood (in Construction; 2,000 beds)
15. Pepper Canyon West (in Construction; 1,300 beds)
16. Ridge Walk North LLN (in Design; 2,400 beds)
17. Pepper Canyon East (TBD; 3,500 beds)
18. South Mesa Housing (TBD; ~4,000 beds)



# Table of LEED Certified Projects

## Certified

- 1 Robert Paine Scripps Institution of Oceanography Seaside Forum
- 2 East Campus Graduate Housing
- 3 Original Student Center Expansion
- 4 Price Center Expansion
- 5 RIMAC Annex
- 6 The Village at Torrey Pines West – North Campus Housing Phase I

## Silver

- 1 Canyon Vista Marketplace
- 2 Computer Science & Engineering Addition & Renovation
- 3 East Campus Office Building
- 4 East Campus Health Science Parking Structure
- 5 Geisel Teaching & Learning Commons
- 6 Goody's Place and Market
- 7 Housing, Dining & Hospitality Services Administration Building
- 8 Muir Biology Building 3rd Floor Lab
- 9 Scripps Institution of Oceanography Research Support Facility
- 10 Torrey Pines Center North Renovations
- 11 Triton Ballpark Stadium and Clubhouse Improvement

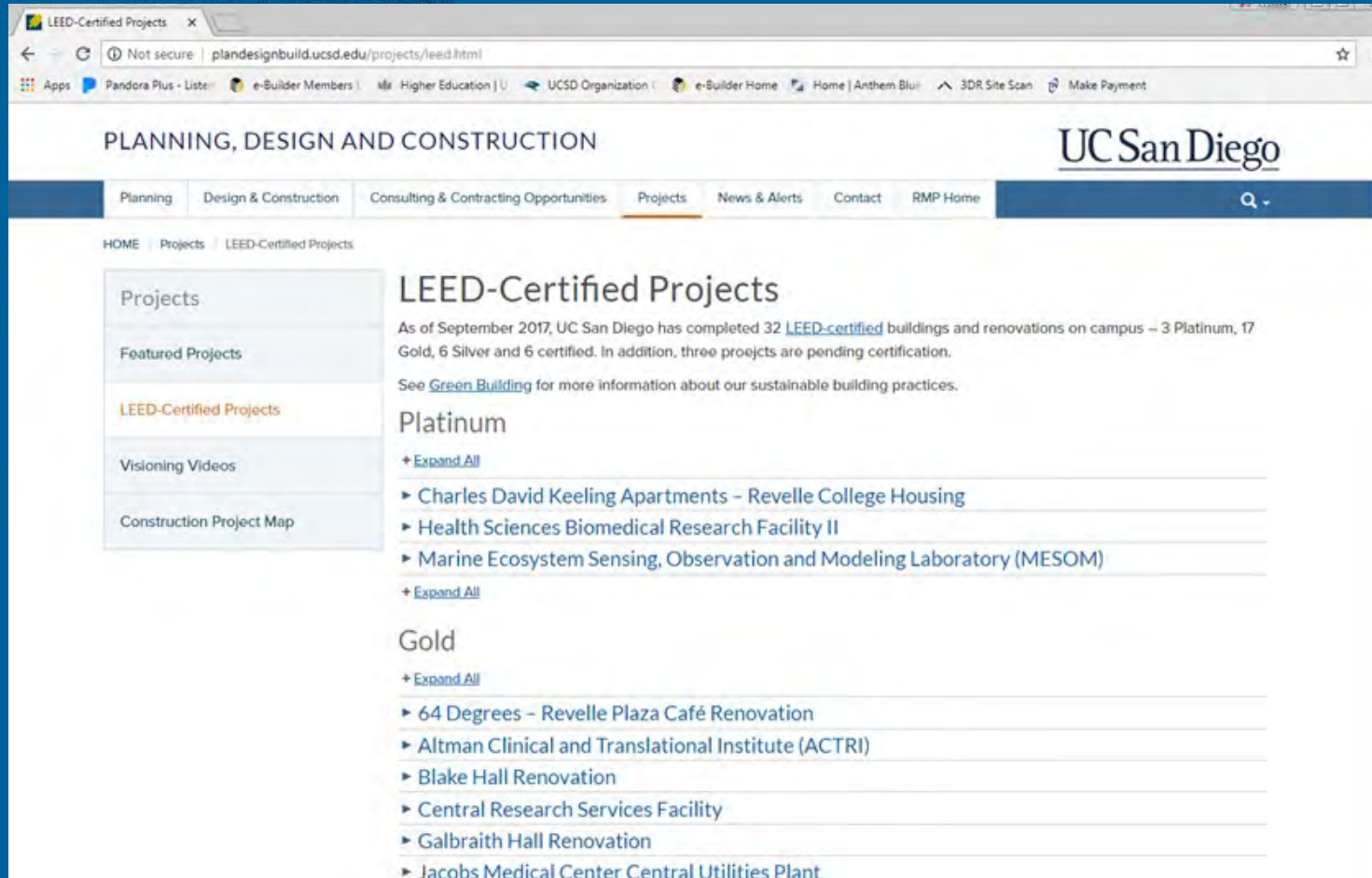
## Gold

- 1 64 Degrees – Revelle Plaza Café Renovation
- 2 Altman Clinical and Translational Institute (ACTRI)
- 3 Blake Hall Renovation
- 4 Central Research Services Facility
- 5 Charles & Beano Scripps Center for Coastal Studies
- 6 Design and Innovation Building
- 7 Galbraith Hall Renovation
- 8 Jacobs Medical Center
- 9 Jacobs Medical Center Central Utilities Plant
- 10 Koman Family Outpatient Pavilion
- 11 Mesa Child Development Center
- 12 Mesa Nueva Housing
- 13 Muir College - Stewart Commons Renovation
- 14 Rita Atkinson Residences - Health Sciences Graduate Housing
- 15 San Diego Supercomputer Center
- 16 Sanford Consortium of Regenerative Medicine
- 17 Spanos Athletic Performance Center
- 18 Structural and Materials Engineering Building
- 19 Student Health Services Renovation
- 20 Sustainability Resource Center
- 21 Tamarack Apartments – Muir College Housing and Dining
- 22 Tata Hall
- 23 Telemedicine & Prime Heq Education Facility
- 24 The Village at Torrey Pines East – North Campus Housing Phase II
- 25 UC San Diego Sulpizio Family Cardiovascular Center
- 26 Wells Fargo Hall - Rady School of Management Phase II

## Platinum

- 1 Charles David Keeling Apartments – Revelle College Housing
- 2 Health Sciences Biomedical Research Facility II
- 3 Marine Ecosystem Sensing, Observation and Modeling Laboratory (MESOM)
- 4 UCSD/SDSU Mission Bay Aquatic Center

# Planning, Design and Construction Website



The screenshot shows a web browser window with the URL [plandesignbuild.ucsd.edu/projects/lead.html](https://plandesignbuild.ucsd.edu/projects/lead.html). The page title is "PLANNING, DESIGN AND CONSTRUCTION" and the UC San Diego logo is in the top right. A navigation menu includes "Planning", "Design & Construction", "Consulting & Contracting Opportunities", "Projects", "News & Alerts", "Contact", and "RMP Home". The "Projects" section is active, showing a breadcrumb trail: HOME > Projects > LEED-Certified Projects. On the left, there is a sidebar with links for "Projects", "Featured Projects", "LEED-Certified Projects", "Visioning Videos", and "Construction Project Map". The main content area is titled "LEED-Certified Projects" and contains the following text: "As of September 2017, UC San Diego has completed 32 LEED-certified buildings and renovations on campus – 3 Platinum, 17 Gold, 6 Silver and 6 certified. In addition, three projects are pending certification. See [Green Building](#) for more information about our sustainable building practices." Below this, there are two sections: "Platinum" and "Gold". Each section has an "Expand All" link and a list of project names.

**LEED-Certified Projects**

As of September 2017, UC San Diego has completed 32 [LEED-certified](#) buildings and renovations on campus – 3 Platinum, 17 Gold, 6 Silver and 6 certified. In addition, three projects are pending certification. See [Green Building](#) for more information about our sustainable building practices.

**Platinum**

- + [Expand All](#)
- ▶ Charles David Keeling Apartments – Revelle College Housing
- ▶ Health Sciences Biomedical Research Facility II
- ▶ Marine Ecosystem Sensing, Observation and Modeling Laboratory (MESOM)

+ [Expand All](#)

**Gold**

- + [Expand All](#)
- ▶ 64 Degrees – Revelle Plaza Café Renovation
- ▶ Altman Clinical and Translational Institute (ACTRI)
- ▶ Blake Hall Renovation
- ▶ Central Research Services Facility
- ▶ Galbraith Hall Renovation
- ▶ Jacobs Medical Center Central Utilities Plant



# Planning, Design and Construction Website

PLANNING, DESIGN AND CONSTRUCTION UC San Diego

Planning ▾ Design & Construction ▾ Consulting & Contracting Opportunities ▾ Projects ▾ News & Alerts ▾ Contact ▾ RMP Home 🔍 ▾


HOME / Design & Construction / LEED Projects / Platinum Projects

- LEED Projects
- Platinum Projects**
- Gold Projects
- Silver Projects
- LEED-Certified and LEED-Equivalent Projects

## LEED Platinum Projects

[+ Expand All](#)

▼ **Charles David Keeling Apartments – Revelle College Housing**



## Sustainable Features

- Passive solar building orientation and shading devices to take advantage of and control solar gain
- Natural ventilation and cross ventilation in each apartment
- High-performance exterior envelope
- Daylighting optimization
- Energy-efficient building systems
- Water conservation with low-flow plumbing fixtures
- High-albedo materials/finishes to reduce heat island effect on roofs
- Rooftop photovoltaics infrastructure
- Recycled and sustainable building materials
- Bioswale landscape for storm water drainage and filtration
- Drought-tolerant landscaping

## Project Details

- **Project Manager:** Charles Kaminski
- **Architect:** Kieran Timberlake
- **Contractor:** Swinerton Builders, Inc.
- **Completed:** 2011

[LEED Scorecard](#) (PDF)

# LEED Rating System –

## Building Design and Construction Categories



Location &  
Transportation



Water Efficiency



Integrated  
Process



Sustainable Sites



Indoor  
Environmental  
Quality



Innovation in  
Design



Energy &  
Atmosphere



Materials &  
Resources



Regional Priority

# LEED Scorecard Example



15	3	6	9	Energy and Atmosphere		LEED version
Y				EA p1	Fundamental Commissioning and Verification	4
Y				EA p2	Minimum Energy Performance	4
Y				EA p3	Building-Level Energy Metering	4
Y				EA p4	Fundamental Refrigerant Management	4
6				EA 1	Enhanced Commissioning	4
8	2	4	4	EA 2	Optimize Energy Performance	4
1				EA 3	Advanced Energy Metering	4
		2		EA 4	Demand Response/ Grid Harminization	4.1
			3	EA 5	Renewable Energy Production	4.1
	1			EA 6	Enhanced Refrigerant Management	4
			2	EA 7	Green Power and Carbon Offsets	4.1

# Green Building Features

# Franklin Antonio Hall – Sustainability Features



## Sustainable Sites



- **Reclaim Nature** – replaced existing parking lot with verdant landscaping, protecting surrounding environmentally sensitive areas
- **Wildlife Mitigation**
- **Native Planting**
- **Sustainable Materials**
- **Promoting Healthy Lifestyle**
- **Programmed Outdoor Spaces**



- 186,000 GSF Collaborative Research Facility
- LEED Platinum Design

# Franklin Antonio Hall – Sustainability Features



## Energy & Atmosphere



- Onsite Renewable Energy



- Solar Shading



- Energy Efficiency



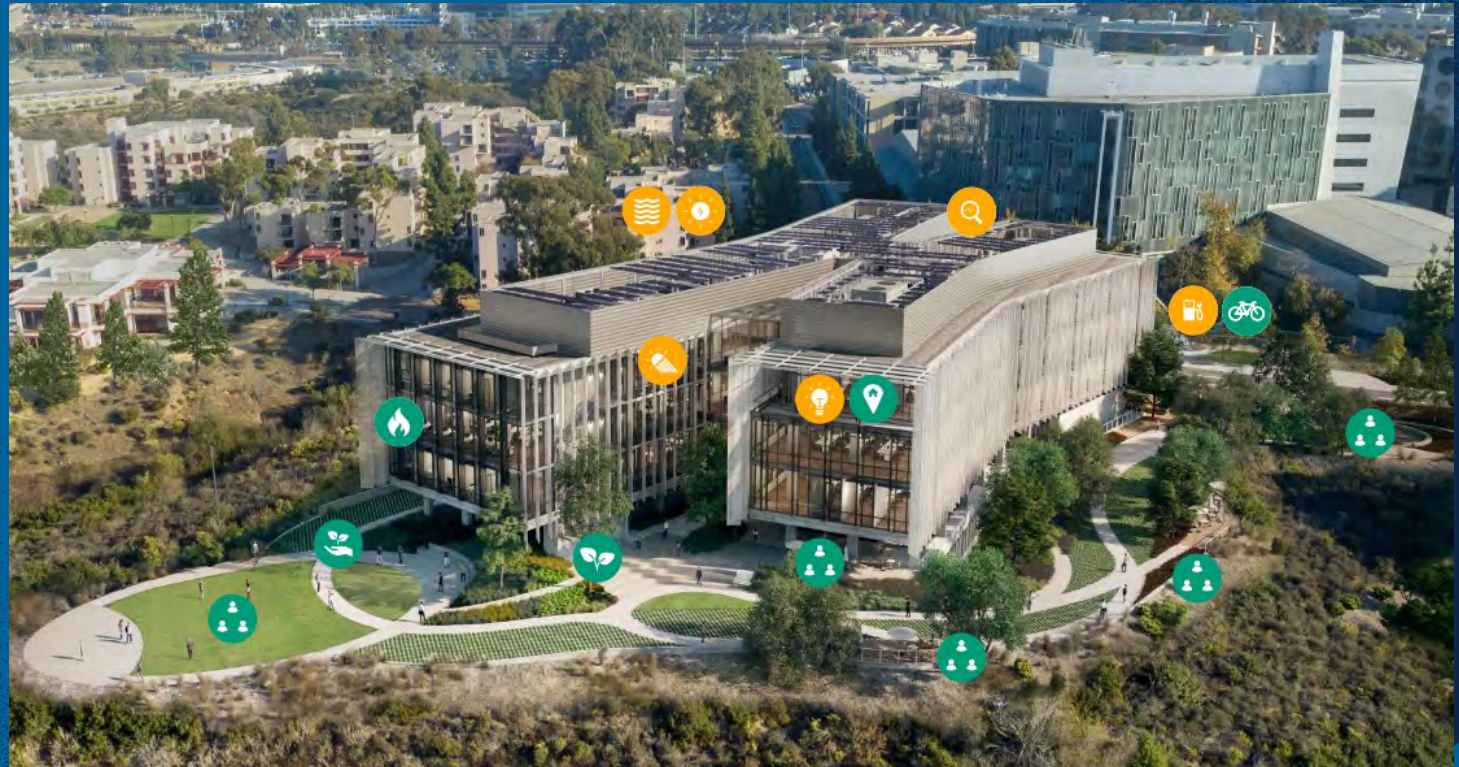
- Electric Vehicle Charging



- Enhanced Monitoring Systems



- Systems Efficiency



- 186,000 GSF Collaborative Research Facility
- LEED Platinum Design



# Franklin Antonio Hall – Sustainability Features



## Water



- **Water Efficiency** – low flush/flow fixtures reduce water consumption by ~40%



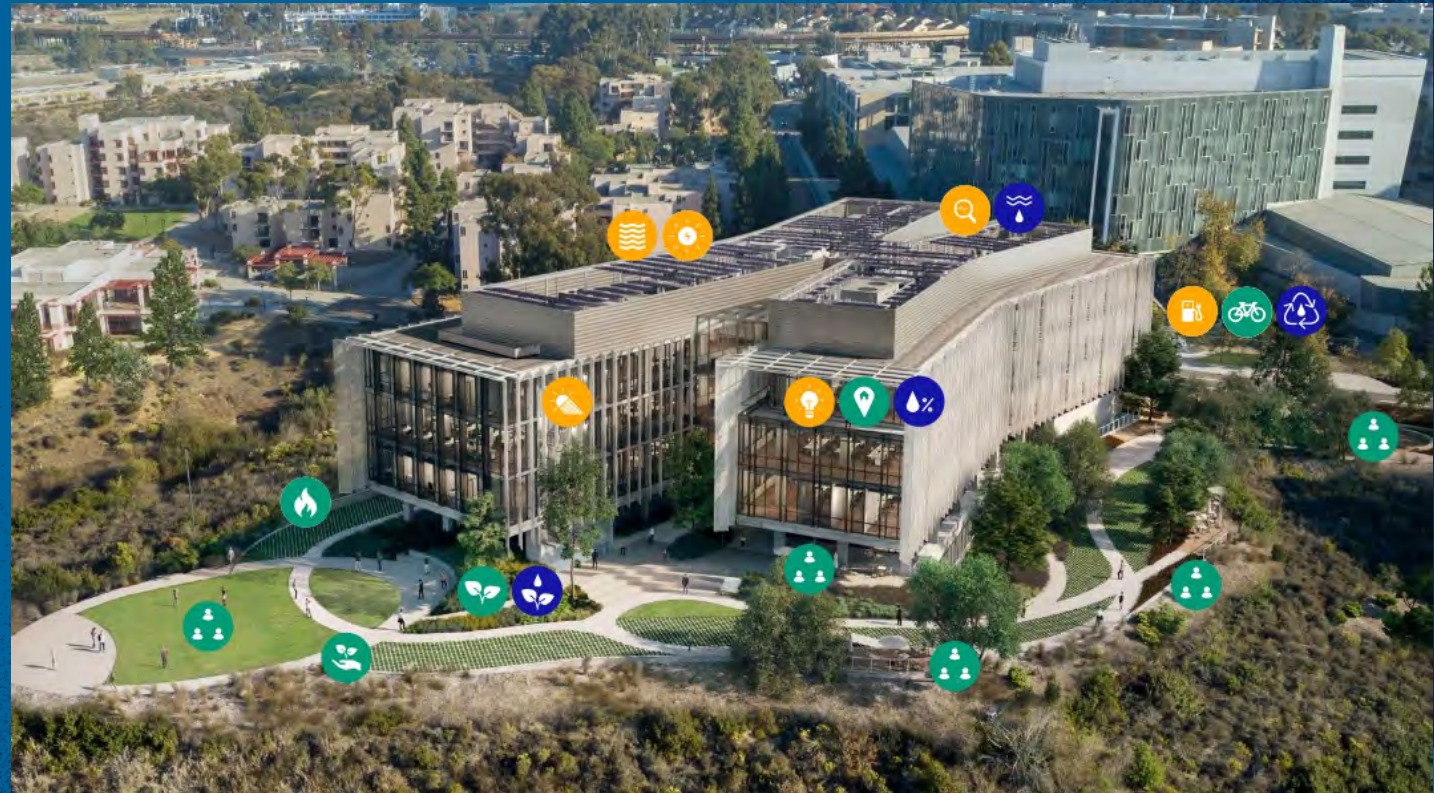
- **Condensate Recovery**



- **Campus Recycled Water loop**



- **Reclaimed Water Irrigation** – reduces potable water for Irrigation by 100%



- 186,000 GSF Collaborative Research Facility
- LEED Platinum Design

# Marine Conservation & Technology Facility – Sustainability Features



- **53,000 GSF Marine Research Facility**
- **Adaptive reuse of 1961 building**
- **One of the largest research aquaria in the U.S.**
- **Pursuing LEED Gold (2009)**
- **Sustainable Features:**
  - Building Reuse
  - Energy Efficiency
  - Water Efficiency
  - Certified Wood

# Marine Conservation & Technology Facility – Building Reuse

- **Building Reuse**
  - Maintain existing floors, walls, and roof of historic 1961 building
- **Floors/Roof**
  - Precast concrete C channels
- **Walls**
  - Existing cast-in-place concrete walls
  - Historic blue mosaic tile
- **Vertical Circulation**
  - Existing concrete stairs and elevator shaft



# Marine Conservation & Technology Facility

## Energy Efficiency

- **Optimize Energy Performance**
  - 33% better energy performance than ASHRAE 90.1 baseline
- **Lighting**
  - LED fixtures, daylighting, and occupancy sensors
- **Natural Ventilation**
  - Operable windows at all exterior rooms
  - No air conditioning at west-facing offices; cooling utilizes natural ventilation and ceiling fans



# Marine Conservation and Technology Facility

## Water Efficiency

- **Water Use Reduction**
  - 43% better than water use baseline
  - Low-flow plumbing fixtures
  - Seawater and aquarium equipment is exempt
- **Water-Efficient Landscaping**
  - >50% better than irrigation baseline
  - Combination of no-irrigation and low-irrigation plantings



# Marine Conservation and Technology Facility

## FSC Certified Wood

- **Certified Wood**
  - 100% of permanently installed wood is FSC certified or FSC mix
- **Exterior Rain Screen**
  - Certified solid garapa wood planks
- **Exterior Shade Canopies**
  - Certified solid garapa wood planks
- **Interior Wood Slat Ceilings**
  - FSC Mix garapa veneer slats
- **Interior Casework**
  - FSC Mix garapa veneer cabinets



# North Torrey Pines Living & Learning Neighborhood



Energy <40 EUI

- EUI = Energy Use Intensity
- Kbtu/SF
- Natural ventilation
- Ocean views
- Passive solar design

## DESIGN FOR ENERGY

### Climate-Sensitive Design

NTPLLN is designed for energy performance and year-round passive survivability. More than one third of the total building area is unconditioned and every student bedroom has operable windows, integrated trickle vents, and negatively pressurized continuous exhaust systems that increase indoor air quality while reducing energy use. The university's first micro-anaerobic digester also generates on-site renewable energy and organic fertilizer from food waste.

**81% reduction** in measured EUI



- 1 Indoor/Outdoor Spaces
- 2 Daylight and Natural Ventilation
- 3 Anaerobic Digester



# North Torrey Pines Living & Learning Neighborhood



Water Efficiency <50%

- 244,000 gallons saved annually

## DESIGN FOR WATER

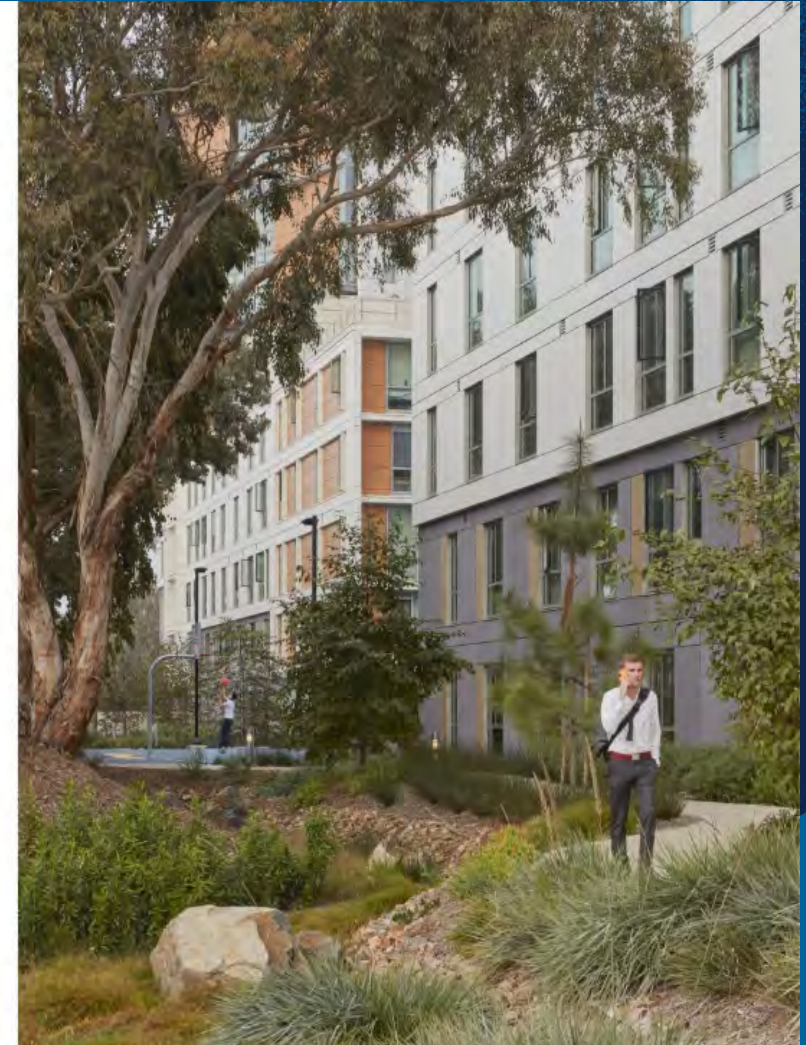
### Weathering Historic Drought

California's current drought is the driest period in recorded history. Drought tolerant vegetation and drip irrigation at NTPLLN reduce potable water and bioswales naturally filter rainwater, leading to high quality runoff on the sensitive coastal site. Water efficiency and conservation strategies also reduce burden on local supplies and systems.

**50% lower water use intensity** than benchmarked trends for residence halls

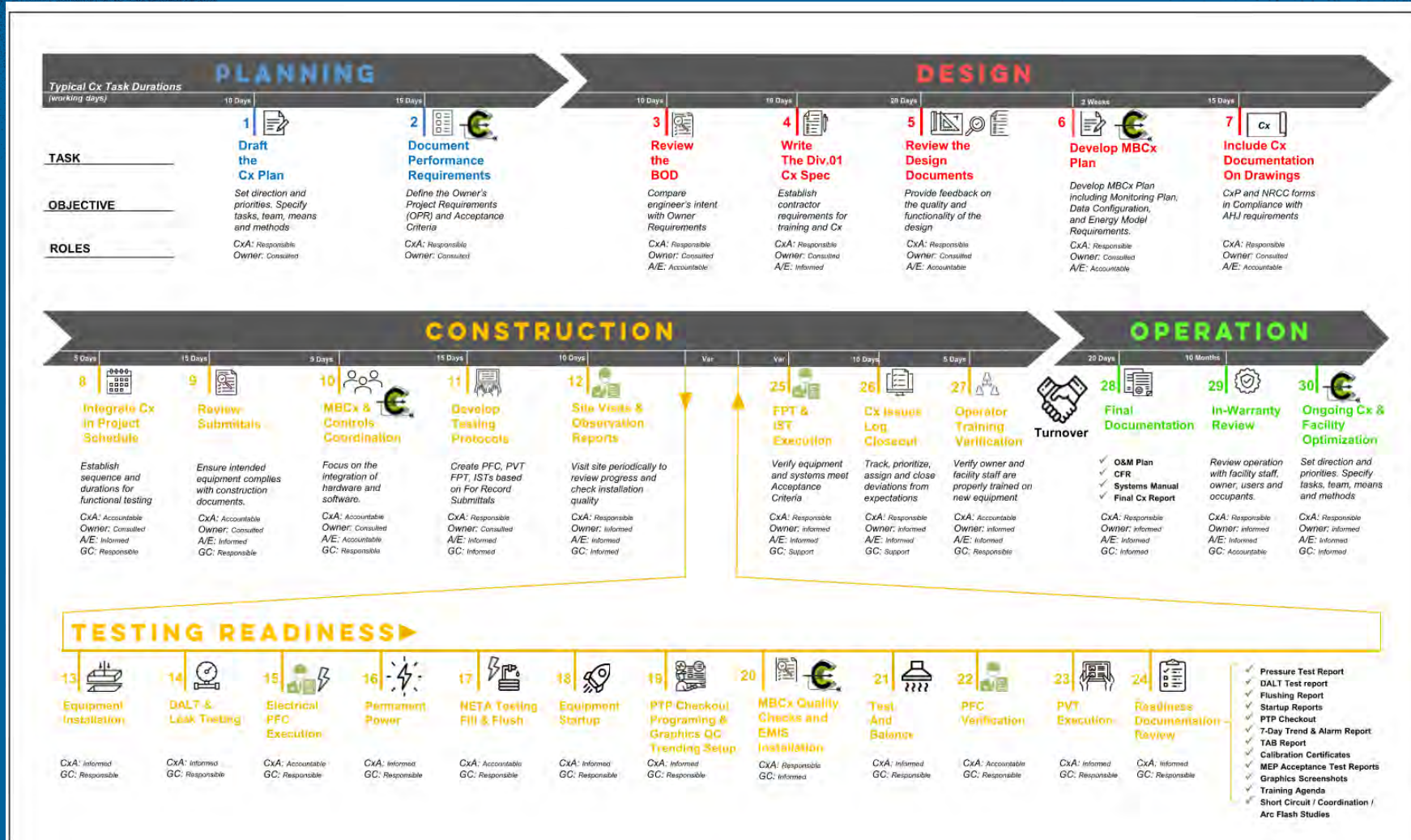


- 1 Diverse regional plants including succulents limit irrigation needs on the ground and on roof gardens
- 2 Bioswales and increased vegetation reduce harmful contaminants in site run-off





# Building Life Cycle Commissioning



# Sustainable Building Operations



**Jason Kayne**  
Director, Facilities Management

# Facilities Management

- Jason Kayne - Director
- Building Services – Mario Sierra, Asst. Director
- Landscape Services and Waste Management – Bryan Hooks, Asst. Director
- Building Operations – Jose Moret, Asst. Director
- Fleet Services – Jonny Mason, Asst. Director
- Project Management – Harley Crace, Asst. Director
- Work Services – Wendy Schiefer, Asst. Director



# Green Cleaning

- CY 2022 Total Consumables Spend (Waxie) \$1,330,733; Sustainable Spend \$825,295; 62% Sustainable
- Purchasing 100% sustainable equipment
- Trash Bin Buddy Program
- Paper towel composting in restrooms, breakrooms and kitchenettes throughout campus
- Utilize paper liners for compostable bins
- Hand air dryers provided as options in new restrooms
- Transitioned to 100% microfiber rags, reducing the use of chemicals and water
- Auto-dilution chemical mixing systems throughout campus to reduce chemical use and improve indoor air quality
- Replaced most mops/buckets with auto scrubbers EZ mops and I-mops



# Sustainable Landscaping & Waste Management

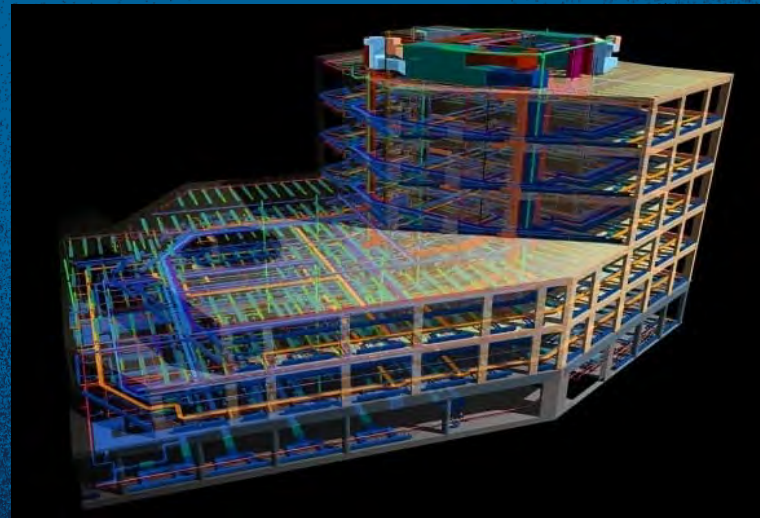
- Zero waste
- Electrification of landscape equipment
- Campus gardens
- Water use reduction



# Maintenance & Operations

Enhancing performance through Smart Building operations:

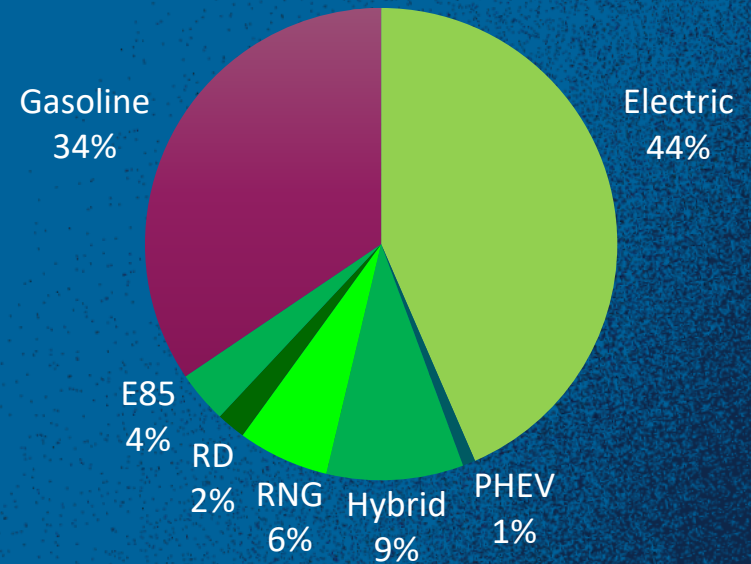
- Building Automation Systems
- Occupancy programming
- Load shedding
- Condensate recovery systems
- Chilled beams
- CO<sub>2</sub> meters
- Anemometers and other specialized equipment
- BIM Modeling



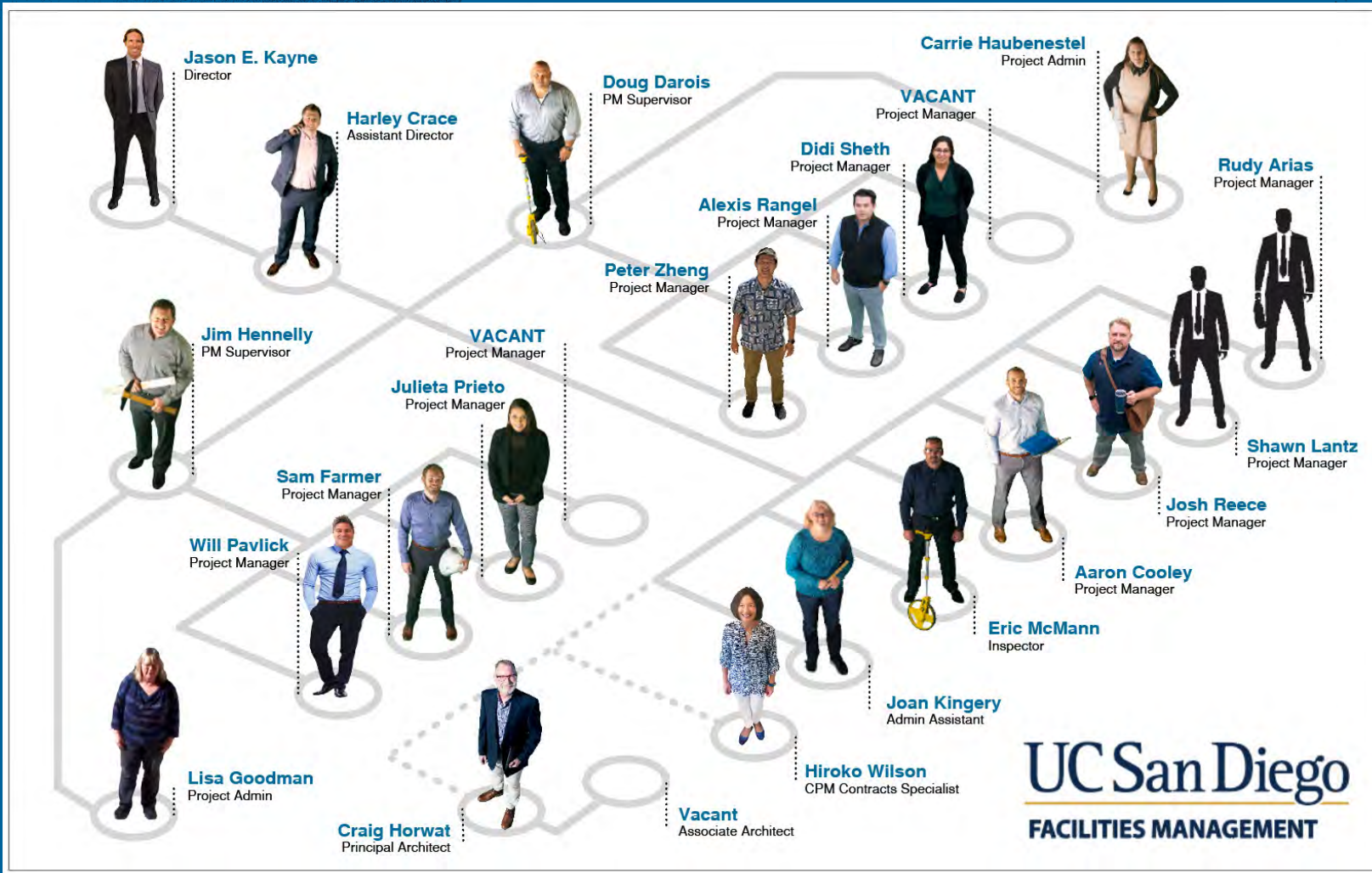
# Greening Our Fleet

- **1,200 UC San Diego Vehicles**
  - 66% UC San Diego's fleet is powered with alternative fuels
- **Acquisition Goals**
  - 100% light-duty sedans and minivans will be ZEV or PHEV
  - At least 50% of all vehicle acquisitions are ZEV, PHEV or dedicated clean fueled vehicles
- **Onsite Renewable Fuels**
  - Renewable diesel
  - Renewable natural gas
  - EV charging

Vehicle Fuel Types



# Sustainability & Project Management



Who We Are and What We Do



# Preservation

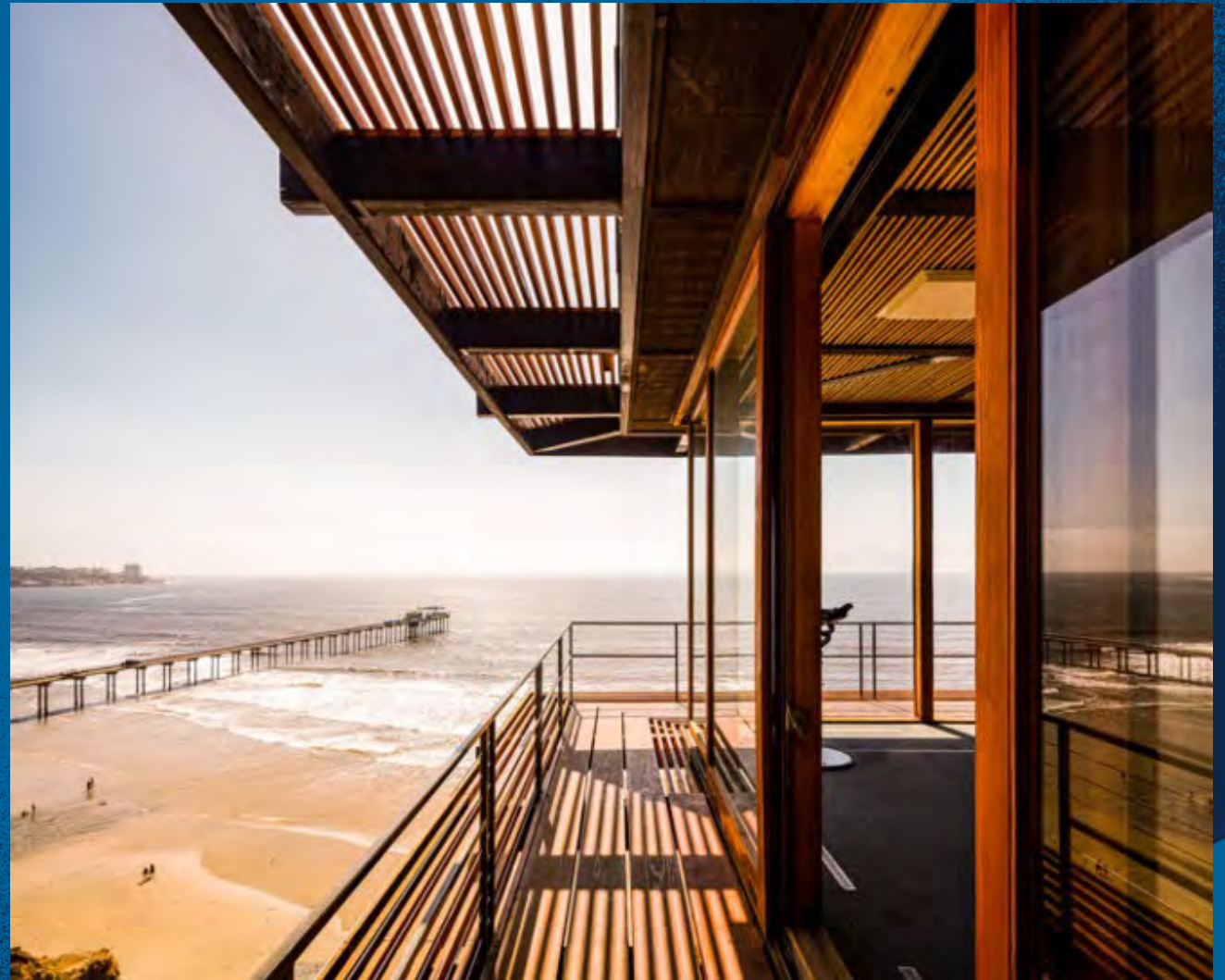
- Deferred Maintenance Program
- HVAC and plumbing system replacements
- Electrical system replacements
- Exterior building envelope restoration
- Elevator modernizations
- Building systems and controls

## IGPP Munk Lab (photo to right)

- \$2M Exterior Renewal
- Local, State and National historic preservation awards

## Hubbs Hall

- \$30M over 15 years HVAC, electrical distribution, plumbing repairs, exterior renewal, roof replacement, paint, flooring, etc.



# Energy Efficiency Projects



- HVAC system replacements – over 50 projects @ \$50M+ since 2010
- HVAC energy reduction – 20 lab buildings @ \$65M+ since 2010
- Lighting retrofits – over 40 projects @ \$5M+ since 2010
- Retro commissioning/building tune ups – over 30 buildings since 2010
- SDSC waterside economizer (photo to left) – \$500K+ reduced cooling and energy consumption per year

# Product Selection and Project Records

- Healthy and sustainable products
- Low/No VOC paints, coatings, adhesives
- Low chemical-use products
- Water reducing plumbing fixtures
- Energy reducing lighting and controls
- High recycled-content materials
- Indoor air quality controls during construction
- Construction waste diversion program



# Guest Faculty Presentation

## Energy Research in the UC San Diego Living Laboratory



**Jan Kleissl**  
Director, Center for Energy Research

# Collaborative Research Overview

Plug load controls

Lighting controls

Electric vehicle charge scheduling

Battery energy storage system scheduling and market participation

Distributed Energy Resources management

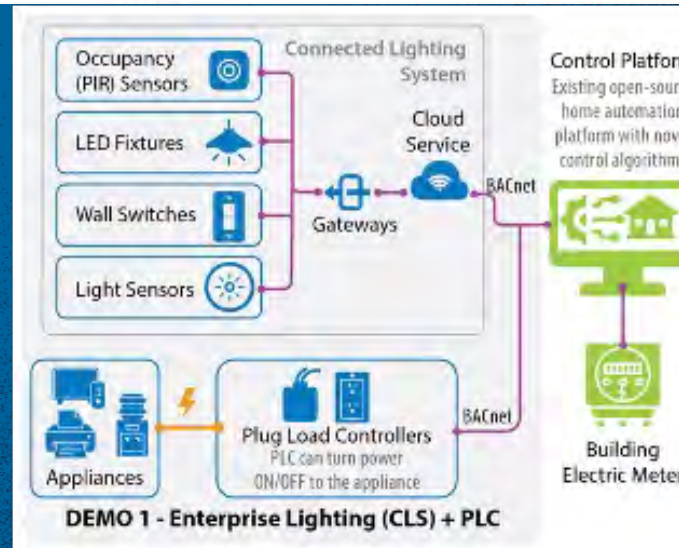
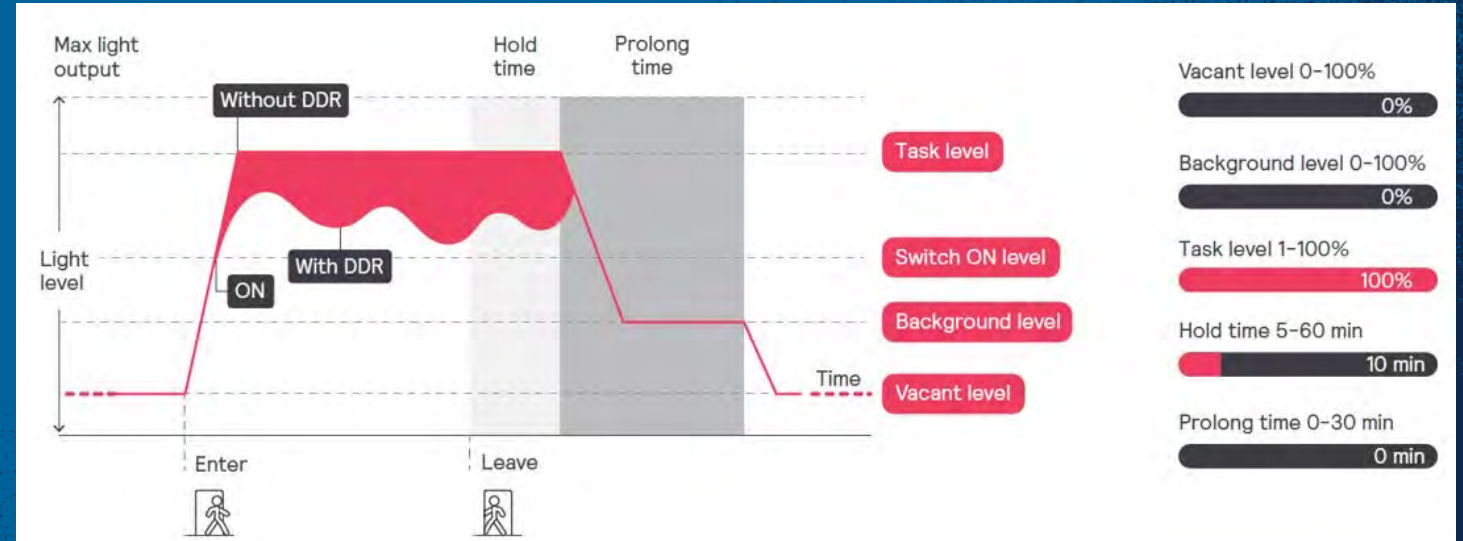


# Lighting Control

Occupancy sensing

Daylight harvesting

Coupling between connected LED lighting system and plug loads

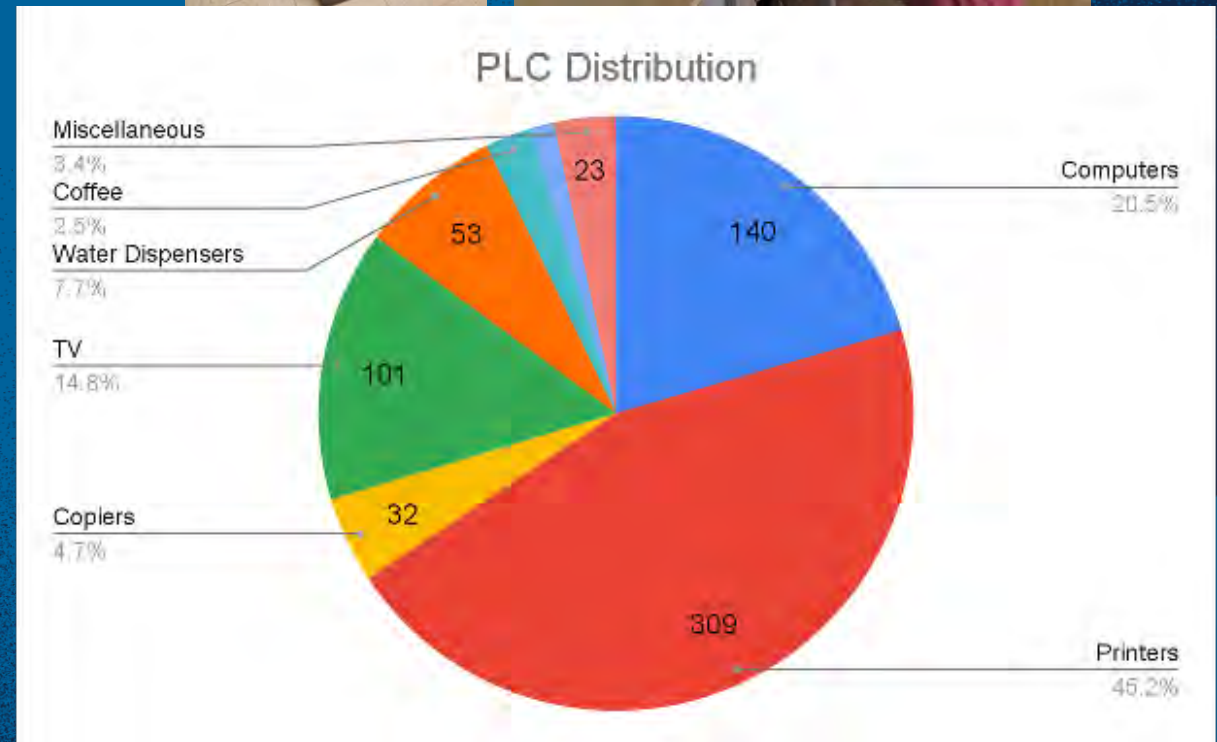
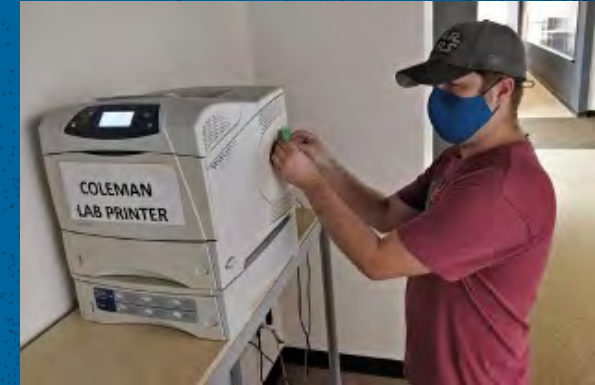


# Plug Load – Reduction in Energy Use

800 Plug Load Controllers

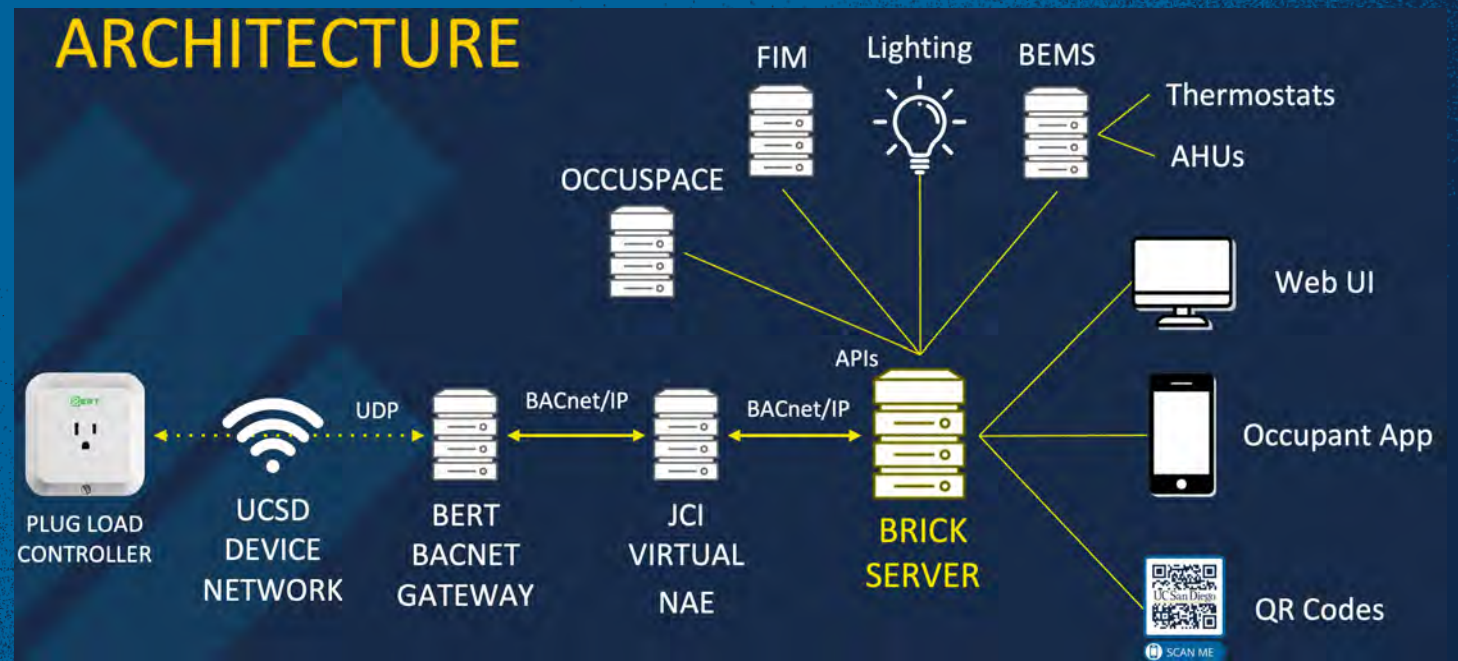
650 Controllable Loads

14 Buildings



# Plug Load – Reduction in Energy Use

- Static Schedules (off from 9 p.m. to 6 a.m. and weekends)
- Location Based (on when occupant on campus)
- Occupancy Sensors (on when in room)
- Usage Schedule (on when we predict user will need power)
- Inferred Occupancy (predict occupancy of other rooms)
- Behavior Changes (demand response)





# Plug Load – Reduction in Energy Use

Building: Robinson Hall

Start: 7/4/2022

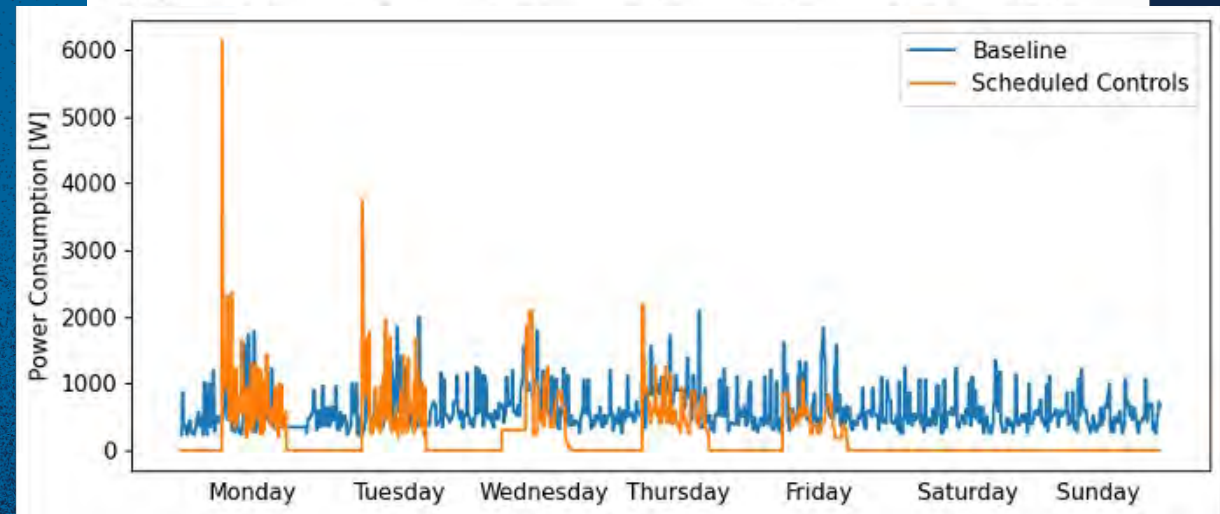
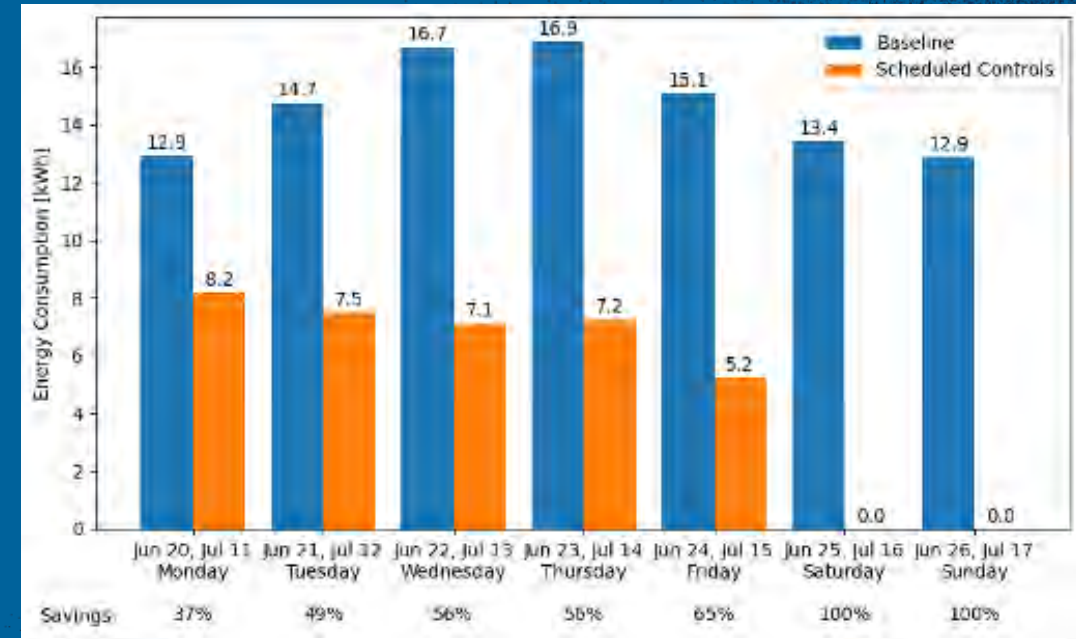
End: 10/3/2022

# of PLCs: 31 (TVs, water dispensers, printers, copiers, coffee)

Schedule:

- ON 7 a.m. – 6 p.m., weekdays.
- OFF 6 p.m. – 7 a.m., weekends

**66% energy savings!**



# Battery Participation in Energy Markets

1.8 MW / 3.6 MWh Battery Energy Storage System (BESS)

Largest BESS on any university campus in the world at time of install

Optimized demand charge reduction with demand response markets

Operational since summer 2020



# Battery Participation in DRAM Market

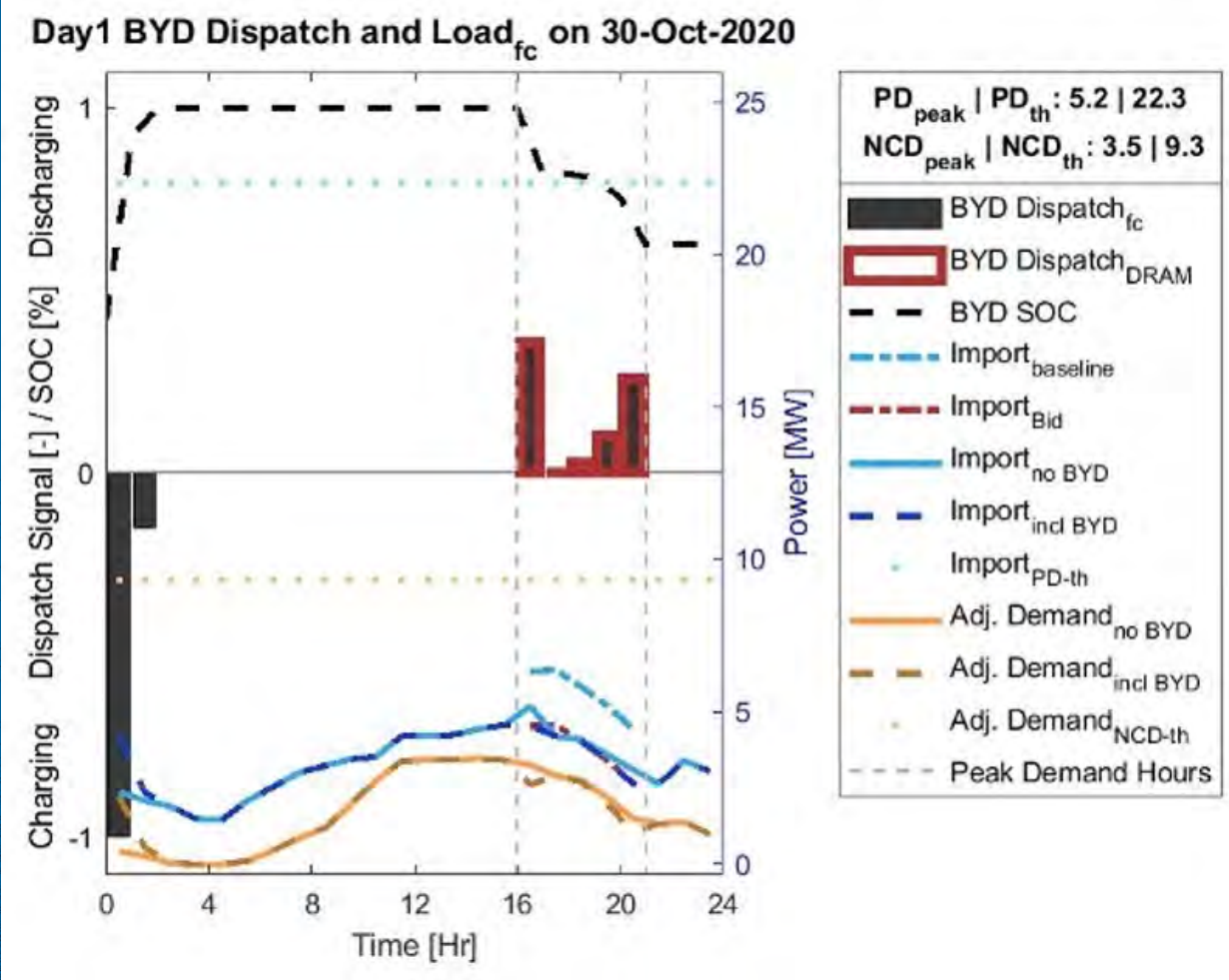
Demand Response Auction Mechanism (DRAM) market participation

Capacity payments and energy payments

Daily option to bid

Monthly demonstration of capacity

	July 2020	August 2020
Nominated Capacity (kW)	1,800	1,800
Demonstrated Capacity (kW)	3,376	4,612
Capacity Price (\$/kW-mo)	11.60	15.95
Capacity Revenue (\$)	39,161	50,000
Energy Revenue (\$)	925	8,226
Total Monthly Revenue (\$)	40,086	58,226



# Flexible Low-Carbon EV Charging

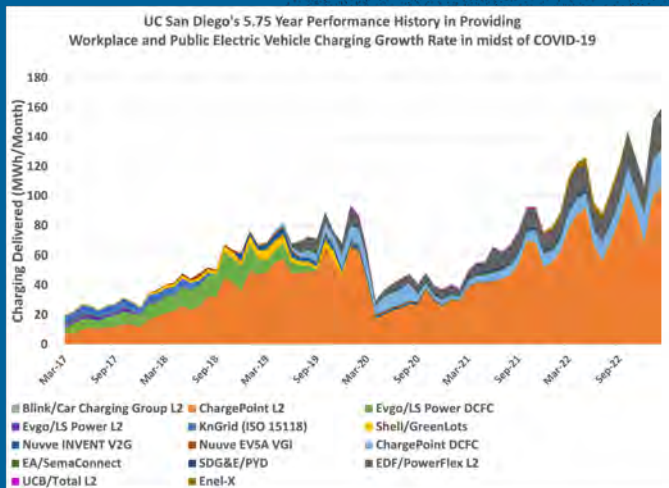
Charging Station Portfolio:

19 DCFC @ 62 – 100 kW

110 Level 2 with Adaptive Load Management (ALM, 12 h dwell time)

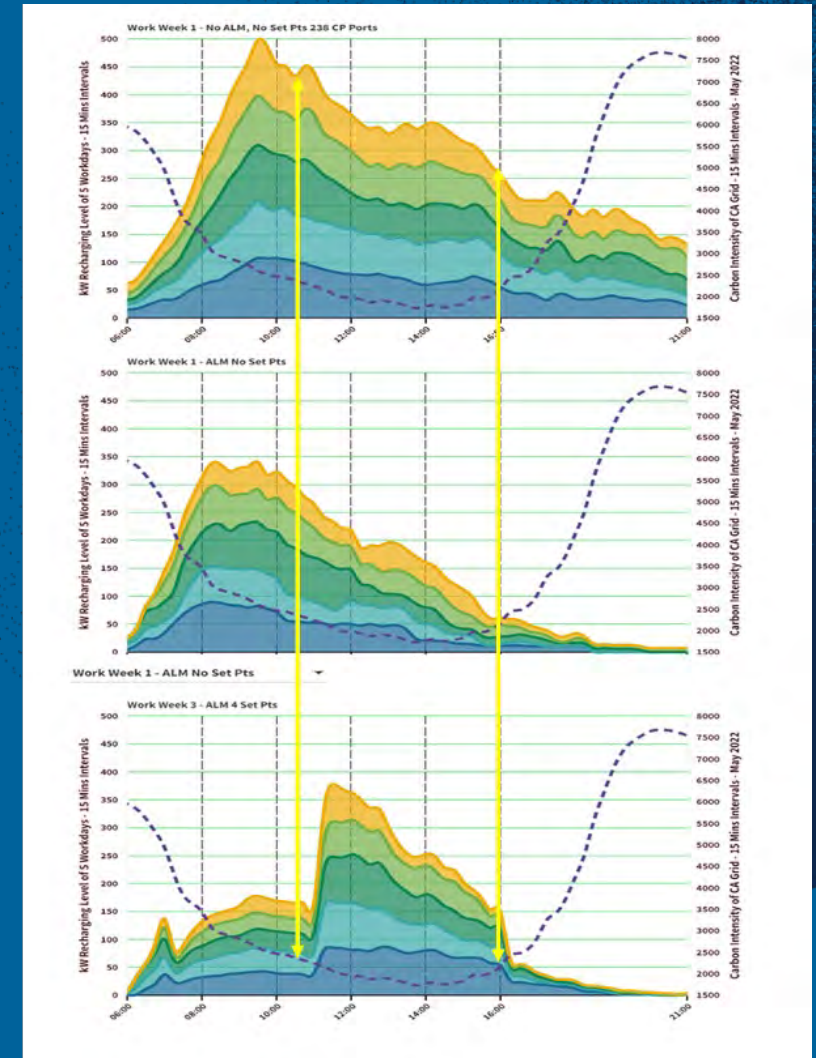
250 Level 2 without load management (4 h dwell time)

2,400 UCSD students, faculty, staff users



Adaptive Load Management Disabled

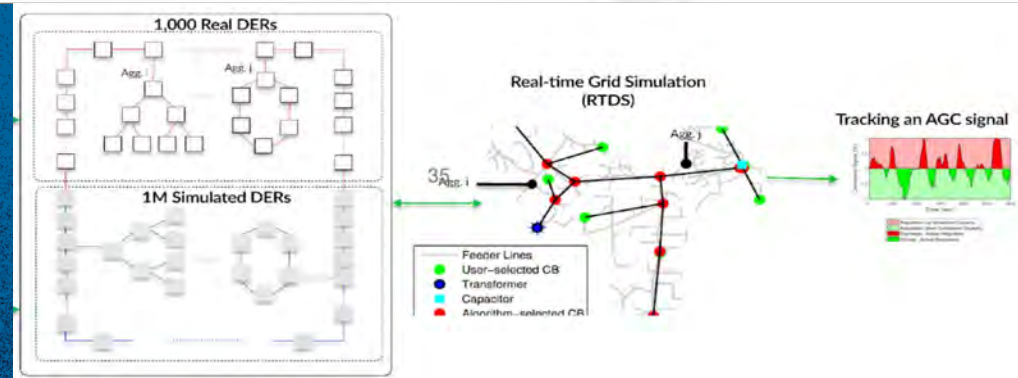
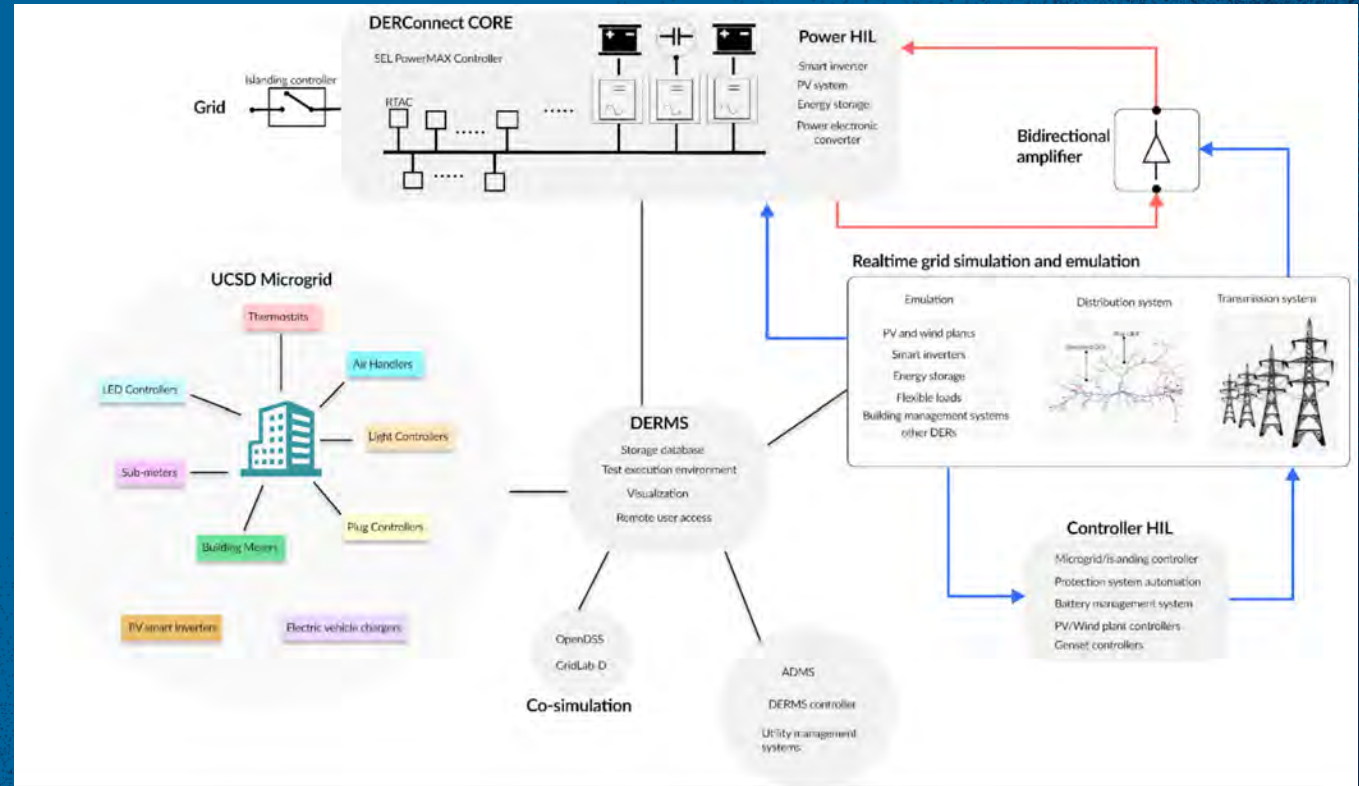
ALM Enabled, Charge during CAISO hours of lowest CO2 intensity



27 L2 with 12 Hour Limit

# Distributed Energy Resource Connect

- \$42M National Science Foundation national testbed for distributed control of flexible loads
- Larger fluctuations in grid net load due to variable renewables
- Most economical and robust solution: Controllable loads
- Millions of DERs
  - Energy storage. Electric Vehicles (EVs). Heating Ventilation and Air Conditioning (HVAC). Lighting.
- Real-time, scalable control.

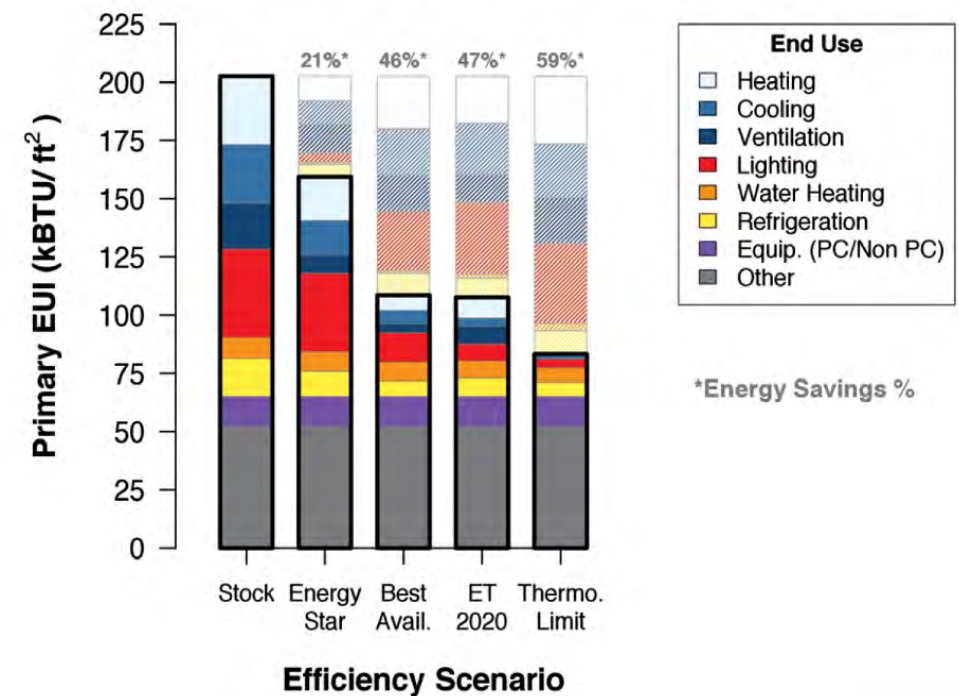


# Teaching MAE 125 Building Energy Efficiency

- Course offered every two years.
- Covers all building energy efficiency aspects:
  - Lighting and Daylighting
  - HVAC
  - Appliances
- Design project using eQuest building energy simulation model
- Guest Speaker: Michelle Perez
- Minimal prerequisite requirements:
- 80 students from across campus (mostly JSOE)

**Figure 5.3** Use of ENERGY STAR® technologies would reduce commercial energy consumption 21%, best available technology 46%, goals of ET 47% and theoretical limits 59%. No savings are assumed for “other” technologies that become the dominant energy use in high savings scenarios. (EUI)

**Commercial Energy (Composite, All Regions)**



# Engagement



# Engagement – Staff and Faculty Partnership – USP

## 169



### **USP 169. Introduction to Green Building (4)**

Introduction to green building including the Leadership in Energy and Environmental Design (LEED) rating system which explores sustainable strategies in the built environment including site, energy, water, materials, waste, and health. Develops a general understanding of concepts and prepares students for the LEED GA exam.

The Class has been offered for Credit since 2019 and was started as a volunteer program with members of the project team from the North Torrey Pines Living and Learning Neighborhood. It is now taught by the current President of the San Diego Green Building Council.

We use the campus as a living lab to engage students with actual projects so they can experience hands on learning and be exposed to the numerous significant projects on campus.



# Next Steps

- **Feedback**
  - We aim to get representation from our diverse campus community.
  - You can express your comments, ideas and questions by completing our survey on the Town Halls webpage.
- **Future Town Halls Covering Various Sustainability Topics**